Cross-Border Public Health in European Border Regions: Between Everyday Life and National Systems

Brigitte van der Zanden



Propositions accompanying this thesis

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1. Europe does not lack surveillance but surveillance that can be shared, compared and acted upon across borders. (this thesis)
2. Cross-border cooperation makes visible what national classifications keep invisible. (this thesis)
3. Citizens cross borders more easily than democracy does. (this thesis)
4. For decision-makers, a border becomes a convenient crisis tool because closing it is easier than coordinating systems across it. (this thesis)
5. Governing global health problems nationally means organising action structurally too late.
6. In public health, innovation is widely welcomed across institutions until institutional interests are truly at stake.
7. Healthcare is celebrated for visible recovery of patients, while prevention must justify the value of harm to populations that never happened.
8. Without an institutional anchor, the knowledge accumulated on cross-border public health in the Dutch-German-Belgian border region as for instance presented in this thesis risks being reduced to archives. (Impact)
9. Doing a PhD is like project management, but without the illusion of efficiency.
10. After completing this PhD, playing a corpse in a forensic detective series is a perfectly logical next step.

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PROLOGUE

> "I am writing the book of my life, not the book of my (art)work. What I mean is that if you follow my work over the years, you can reconstruct my life and what happened in it."(Piet Stockmans)(1)

When I was young, we crossed the border, travelling just a few kilometres from our village in the Netherlands to Germany to buy groceries, fuel or briquettes for the stove. Some things we bought in the Netherlands, others in Germany. In our daily life, the border hardly played a role.

Yet there was a moment when that boundary suddenly felt insurmountable. My sister had severe orthopaedic problems and required treatment in various medical facilities, including hospitals and rehabilitation centres. The specialised care that she needed was not available nearby in the Netherlands. For example, we travelled to Nijmegen and Amsterdam, both major Dutch cities with specialised medical facilities. This meant endless car journeys and logistical challenges for all of us in terms of work and school.

No one ever asked: why do we always drive that way? Why not go to Münster, a German city with a well-equipped teaching hospital, less than an hour from our home? We spoke fluent German, so language was not a barrier. And whenever we travelled to, say, Nijmegen, we even drove via Kleve in Germany. Yet the possibility never crossed our minds, nor those of the doctors and specialists who treated my sister for 15 years.

In my early twenties I completed an internship as a health scientist for health at EUREGIO, a cross-border cooperation network between the Netherlands and Germany, based in Gronau. During that internship I became intrigued by the question 'Why do we enter Germany so effortlessly for groceries, fuel and other necessities, while accessing healthcare across the border felt 'impossible'? If a border is not a barrier in everyday life, why is it one for healthcare?'


?!
PUBLIC HEALTH
EVERYDAY LIFE

Chapter 1

General introduction



PUBLIC HEALTH IN A BORDER REGION

My sisters' experiences, together with my internship at EUREGIO in Gronau, shaped the beginning of my more than 25-year career in healthcare in a border area. At first, I focused mainly on questions concerning the provision of care and cure. Is a specific treatment in a neighbouring country permitted and how are costs and reimbursements arranged? While the system of European and national rules, insurance structures, and agreements between healthcare institutions about cross-border care is complex, there is a certain degree of formal clarity, because rights and procedures for planned cross-border healthcare are set out in the EU legal framework, including Directive 2011/24/EU (2) and Regulation (EC) No 883/2004 (3). In my sister's case, cross-border treatment might have offered a practical solution, yet, because it was still rather uncommon to search for health care in a neighbouring country, neither our family nor by the clinicians involved considered it, despite the formal routes that existed.

Over time, my focus shifted from questions about access to and reimbursement of individual care trajectories in border regions to questions about the health of populations, specific risks and responsibilities for health in border regions. Public health refers to the collectively organised practices through which populations are protected, risks are monitored, and health is promoted. It also includes the capacities and infrastructures that sustain these functions, such as workforce and expertise, legal and organisational mandates, surveillance systems, coordination arrangements, and governance routines (3,4). However, what remains largely implicit in this definition is that public health practice is predominantly guided by national policy frameworks and organised within national boundaries. In light of my own professional experiences, this prompted a broader question: what does public health mean, and how is it shaped, in a border region?

Studies of public health practices in border regions during the COVID-19 pandemic illustrate the relevance of studying public health in border regions. In their study conducted in South Limburg, a Dutch border region bordering Belgium and Germany, Huijten et al. (5) examined whether Dutch residents, living in the Netherlands, went across the border to get a COVID-19 vaccination, most often because vaccination was available there earlier. They found that only a minority did, and that these persons had stronger transnational ties and regular cross-border mobility than people who waited until the Dutch government offered a vaccination. Their study also shows that cross-border vaccination practices can complicate our insight in vaccination uptake because registration and monitoring of vaccination in border regions remain nationally organised. In other words, Dutch persons vaccinated in Germany may not be counted correctly in nationally organised vaccination records. Considering the fact that health care and public health are organised nationally, this example raises the question how the health situation of residents living in in border regions is known. How is health for these residents organised, who is authorised to act

under which mandate, and which information flows are available to make coordination work in practice. In their study of Norway's COVID-19 border closings, Friberg et al. (4) examine how restrictions on cross-border shopping along the Norway-Sweden border affected retail activity and commodity tax revenue. While their study focuses on the economic effects of border closings, it shows concretely that closures interrupted established cross-border shopping routines. When shopping in Sweden became infeasible, purchases shifted back to Norwegian stores, especially in areas close to the border. Renner et al. (5) have analysed media representations during the COVID-19 pandemic in eastern German border regions to Poland. They show how national border regulations reactivated the Schengen border, which was a kind of non-existent in everyday life, as instrument of pandemic control. These changes led to an ambiguous status of borders and insecurities in everyday life of citizens living in these border regions and used to frequent border crossings.

Inspired by these studies and by my own professional experiences, this thesis examines how public health policies and practices are organised across borders in border regions. Because public health is predominantly structured within national systems, I am particularly interested in how forms of cross-border collaboration develop in practice. Before presenting the theoretical framework and methodology, I will first briefly clarify the concepts of border region and cross-border public health. In this thesis, public health in border regions refers not to public health within a single national border area, but to public health organised across adjacent border regions in neighbouring states. More specifically, the study investigates how policies and practices are shaped across state borders, and where and how differences, discontinuities, coordination mechanisms, and collaborative arrangements emerge between adjacent national contexts.

Throughout the thesis, I use both public health in border regions and cross-border public health, depending on context, readability, and argumentative flow. Against this background, the main research question of this thesis is: How are public health policies and practices shaped in adjacent border regions? In the next section of this introductory chapter, I set out the theoretical background. I then explain the methodological approach. Next, I introduce the empirical setting in which I conducted the research. Finally, I provide an outline of the thesis, indicating how the different chapters together address the main research question.

THEORETICAL BACKGROUND

For this study of public health policies and practices in adjacent border regions I was inspired by debates in two theoretical fields, namely border studies and infrastructure scholarship. These theoretical discussions do not play an explicit role in all articles of

this thesis. However, they help to situate the different chapters in a broader perspective and have played an important role in shaping my understanding of the main research question of this thesis.

First, I draw on border studies. In this field, borders are understood not only as formal and relative static political state lines but also as dynamic processes that organise space. Newman and Paasi (6) argue that narratives and symbolic practices produce and stabilise borders and delineate belonging and otherness. Referring, among other things, to work on the Finnish-Russian border, they show how school textbooks, atlases, newspapers, and other cultural materials help reproduce particular understandings of the Finnish and Russian territory, identity, and of who belongs where (6). This means that stories, classifications, and administrative distinctions through which political communities are defined and governed can simultaneously bind and separate. Paasi (7) develops this further by conceptualising boundaries as social processes that are institutionalised and reproduced, so that bordering is not confined to the territorial edge but reappears within organisations and in everyday practices of mobility. Using the Finnish-Russian border as an example, he shows that even when borders remain formally unchanged, their can meaning and function can shift over time (7).

Kolossov and Scott (8) provide an overview of major conceptual developments in border studies, and describe a shift from understanding borders primarily as fixed state lines to approaching them as institutions, processes, and symbols that are continuously produced through bordering. Building on this perspective, borders can be understood not only as territorial markers, but also as ongoing forms of institutional work that shape what becomes practically possible and impossible in organisations and routine procedures. In formally, relatively open European border contexts, residents still experience practical obstacles, unequal access, and administrative effort in everyday cross-border life. Bos and Hogervorst (9), for example, describe a 'glass wall' in Dutch border regions. While they note that cross-border shopping and other forms of mobility do frequently occur, they argue that open borders do not automatically produce fully integrated cross-border markets. They illustrate this with the fact that Dutch service providers located near the German border, such as architects, electricians, and plumbers, are hardly used in nearby North Germany, despite demand just across the border. Thus, notwithstanding open borders access to services across borders may be differentiated in practice: who can use which cross-border services, under what conditions, and with how much administrative effort is not easily predictable (9). In line with the work of Kolossov and Scott (8), Aure (10) studied everyday life in a Russian-Norwegian border setting. Båtsfjord is a coastal community in northern Norway shaped by increasing interaction across the Russian-Norwegian border after 1991. Aure shows that a more open state border after 1991 did not simply produce a borderless social space. Instead, social divisions at both sides of the border reappeared in everyday cross-border interactions, workplaces, leisure spaces, and public areas, making

some places more accessible to some groups than to others. This suggests that borders do not disappear when mobility increases but can re-emerge within everyday practices and relations. Some scholars have studied how European borders are organised and governed. In his article on the frontiers of the European Union, Walters (11) argues that EU borders are shaped and operate in many different ways. He identifies different geostrategies, that is, different ways of organising border space, different ways of distinguishing 'inside' from 'outside', and different ways of governing the risks and problems that borders are expected to address (11). The COVID-19 pandemic provides a recent illustration. The European Council set out common criteria and thresholds, colour-coded risk categories, and possible measures such as testing, quarantine, and passenger locator forms, while also indicating that certain groups with an essential function or need, including cross-border workers, transport workers, and persons travelling for imperative family or medical reasons, should in principle be exempt from quarantine requirements (12). At the same time, the European Court of Auditors found that Member States' actions remained largely uncoordinated and formed a patchwork of different internal border controls and travel restrictions during the pandemic (13). These examples show that, in public health emergencies, borders can reappear not only as territorial controls but also as administrative arrangements that classify the urgency of cross-border mobility, define exceptions, and structure how cross-border movement is checked and governed.

Considering the variety of borders in Europe, some scholars have studied what growing cross-border interaction does, and does not, tell us about European social and cultural integration. Decoville and Durand (14) examine frequent cross-border practices in relation to residents' perceptions of their neighbours. Using survey data on activities such as work, shopping, the use of public services, visits to family or friends, and leisure, they show that frequent border crossing is only weakly related to trust, perceived proximity, or feelings of connectedness with residents living across the border. They do not argue that cross-border interaction is irrelevant for social integration, but that it does not by itself determines how residents in the neighbouring border region are socially experienced (14). In this thesis, this matters because frequent everyday cross-border mobility may coexist with public health practices that remains largely organised through national and territorial structures. This suggests that cross-border interdependence can coexist with persistently territorially organised public tasks and decision making.

Second, to understand how public health is organised in practice in border regions, this study draws on infrastructure studies. In this field, the concept of infrastructure refers not only to buildings or technologies, but also to categories, records, reporting formats, and information systems through which public work is organised (15, 16). Bowker and Star (15) illustrate how information infrastructures work in practice through examples such as the International Classification of Diseases which groups diseases into standard categories so that cases can be counted, recorded and compared and policies can be developed

to address specific trends made visible through this infrastructure (15). They define a classification system as a set of categories into which things are placed so that administrative or knowledge work can be carried out, and they show that such classifications do not merely describe diseases or professional work, but they are actively meant to shape the reality of diseases and professional practices. These classifications determine what can be entered on forms, stored in information systems, and counted in formal records, and what remains outside the record (15). Star (16) further argues that infrastructures are typically embedded in working practices and are taken for granted when they function smoothly, but that they attract attention when they break down, do not fit local routines, or require extra maintenance and support work (16). Together, these studies show that public practices are shaped not only by formal policy decisions, but also by infrastructural categories, records, reporting formats, and ongoing support work through which such systems are maintained.

In this thesis, I use this perspective to examine more concretely how national public health infrastructures relate to cross-border practices of public health. From an infrastructural perspective, differences between countries are not located only in abstract 'systems' or policy documents, but also in concrete definitions of risks, categories of risk groups and cut-off points, software, registration fields, and reporting routines. Together, these shape whether and how public health practices on different sides of the border can be compared, coordinated, and eventually integrated. In this sense, infrastructures may both facilitate and hinder cross-border collaboration. However, even when information infrastructures could in principle function across borders, the question remains whether such systems and routines will actually be used. In their study of a collaborative information system for a geographically dispersed scientific community, Star and Ruhleder (17) show that many users did not get beyond the initial hurdles of access and connection, and did not use many functions of the system (17). In other words, infrastructure is not simply something that works by virtue of its existence, but something that becomes usable only in relation to everyday organisational practices and the extent to which routine work can be aligned with it (17).

Cross-border collaboration can be approached as a form of infrastructural work, that is, as the set of practices that establish and sustain connections between organisations across borders. The practical work involved includes maintaining networks and contacts, making agreements, organising information exchange, fostering cross-cultural understanding, and aligning information and labour between organisations. Williams (18) points to the importance of boundary spanners, meaning practitioners who work across organisational and sectoral boundaries in inter-organisational public policy settings. Drawing on surveys and interviews with, among others, health promotion specialists and partnership managers, he shows that effective coordination of inter-organisational relationships depends on building and sustaining relationships, working across dispersed authority, and

understanding roles, responsibilities, and interdependencies across organisations (18). In this thesis, the relevance of boundary spanning lies in the day-to-day work through which public health organisations across the Netherlands-Germany-Belgium border maintain professional networks, negotiate responsibilities, and align expectations while mandates and accountability remain located within national and subnational jurisdictions. Karasti and colleagues (19) add a temporal dimension to the work of sustaining cross-organisational connections by distinguishing project time from infrastructure time in the collaborative development of information infrastructures. They argue that short-term project cycles are oriented towards delivery, whereas the development of infrastructural connections requires continuity, maintenance, and cumulative alignment over longer periods (19). This distinction helps to explain why cross-border working relations and routines may function for a time, yet become unstable when funding ends, meeting routines lapse, or key individuals disappear.

The theoretical perspectives of border studies and infrastructure studies have informed the way I approach public health policies and practices in border regions. Border studies draw attention to the continuing significance of borders under conditions of cross-border interdependence, while infrastructure studies make it possible to analyse how strong national infrastructures shape cross-border public health policies and practices and how networks, categories, routines, information flows, and coordination work actively constitute them. Not every chapter engages with these perspectives in the same way, and some chapters draw on additional concepts in relation to the specific empirical material. Taken together, however, these perspectives provide both a conceptual lens and a heuristic for examining public health in border regions as simultaneously territorially structured and practically organised. Inspired by these theoretical discussions, this thesis analyses how public health policies and practices are organised in border regions.

METHODOLOGY

To examine how public health policies and practices in border regions are shaped, I adopted a multi-site approach that analyses cross-border public health across a range of analytical sites, including European policy, international scientific literature, professional public health practice, municipal policy, cross-border participatory processes, spatial patterns of public health outcomes, and epidemiological patterns of health and health promotion across state borders. Studying public health as organised across adjacent border regions in neighbouring states requires tracing the documents, routines, forms of coordination and alignment through which cross-border policy and practices are organised. The studies included in this thesis therefore span policy and system contexts, organisational and infrastructural arrangements, and the practical organisation of public health by professionals, municipalities, and citizens. This range of analytical sites is impor-

tant because public health policies and practices in border regions are shaped through the interaction between governance conditions at EU, national, regional, and local levels, organisational infrastructures, and their enactment in practice.

I combine qualitative and quantitative approaches, selecting methods that are appropriate to the specific research question, the practices under study, and the kind empirical data available. Each chapter provides detailed information about the specific method used. I use qualitative methods to examine how cross-border public health policies and practices are organised in practice. I use qualitative document analysis and discourse-oriented analysis to study how European policy defines and structures the space for cross-border public health. A scoping review complements this analysis by examining how scientific literature delineates public health in border regions and which recurrent assumptions and blind spots shape the knowledge base informing policy. To study how public health in border regions is organised, coordinated and aligned in practices, I use semi-structured interviews and group interviews. In addition, I also analyse documentation from cross-border participation initiatives to examine how participatory processes are organised in border regions and how results are brought together across borders.

Alongside these qualitative studies, I conducted quantitative analyses of public health outcomes across state borders in the fields of COVID-19 and youth health. I selected these case-studies primarily because suitable data were available; however, they also contribute meaningfully to the main research question by illuminating how public health is shaped in a border region. The quantitative studies examine whether observed patterns and associations differ across the state border and whether such differences correspond to variations in policy contexts and practices on either side of the border. The studies included in this thesis followed different routes of ethical oversight, reflecting differences in study design, data source, research context, and the institutional procedures applicable at the time of data collection.

The next subsection specifies the research setting of the study.

SETTING

In this thesis, I study how public health is organised across adjacent jurisdictions within a border region. I begin by further clarifying the specific character of this research setting.

The setting refers to a context in which cross-border proximity and everyday interdependence coexist with national administrative responsibilities, legal frameworks, and information infrastructures organised on either side of a border. To delineate the research setting, I draw on the territorial typologies used by the European Union. In its manual,

Eurostat classifies border regions at NUTS 3 level as regions with a land border, or as regions in which more than half of the population lives within 25 km of a land border (20, 21). Eurostat emphasises that the classification is statistical and analytical and that 'border regions' do not constitute a legally defined category under the NUTS Regulation. Eurostat data indicate that, as of 2026, more than one third of the EU population lives in a border region (22). The thesis examines how public health is organised and coordinated across such adjacent border regions.

Throughout the thesis, cross-border refers to cooperation between adjacent administrative units within a shared border zone, in line with the Interreg distinction between cross-border cooperation in neighbouring regions and transnational cooperation across wider, non-adjacent territories (23, 24). This more specific use of the term matches the setting of my research, namely public health across adjacent border regions in neighbouring states. It is important to point to the fact that the use of the concept cross-border in border regions is different form the use of the concept cross-border' in many EU policies. In EU policy and law, the concept 'cross-border' is also used for cooperation across national borders that is not limited to neighbouring regions. For example, in EU frameworks on cross-border healthcare and serious cross-border threats to health do not focus on border regions but on countries (2, 25). The Council of Europe's Outline Convention on Transfrontier Co-operation, for example, codifies this concept of transnational or transfrontier cooperation (26). However, in my thesis, I define the research setting through two established cross-border cooperation regions along the same border.

The concrete research setting consists of two cross-border regions along the Netherlands-Germany-Belgium border, the Meuse-Rhine Euroregion (EMR) (27) and the Rhine-Meuse-North Euroregion (ERMN) (28). Figure 1 situates these two regions along the same border (29, 30). Throughout the thesis, EMR and ERMN refer to the border regions as territorial research settings, whereas Euregio Meuse-Rhine and the Euregio Rhine-Meuse-North refer to the cross-border organisations that support cooperation within those areas. The Euregio Meuse-Rhine (27) covers about 11,000 km^2 and has a population of roughly 3.9 million, while the Euregio Rhine-Meuse-North (28) covers around 3,400 km^2 and has a population of about 1.8 million. Euregio organisations support both regions and provide regular contact structures for cooperation, but the two organisations are constituted differently. Euregio Meuse-Rhine brings together partner regions at provincial or equivalent level, whereas Euregio Rhine-Meuse-North consists primarily of Dutch municipalities and German Kreise, together with a small number of larger cities. Taken together, these differences make it possible to study public health across the same state border in two established cross-border cooperation regions that differ in administrative level, membership composition, and mode of organisation. Euregio Meuse-Rhine is organised as a European Grouping of Territorial Cooperation (31, 32) and is constituted by partner regions at provincial or equivalent level. Euregio Rhine-Meuse-North is organised

as a network body in which membership is primarily held by municipalities on the Dutch side and by German administrative districts, known as Kreise, together with a small number of larger cities on the German side (28). These two organisations make cross-border coordination more feasible in practice, while public health mandates and core infrastructures remain located within national and subnational jurisdictions (32).



Figure 1. Meuse-Rhine Euroregion and Rhine-Meuse-North Euroregion (29, 30)

To introduce the research setting further, I briefly outline how public health responsibilities and core infrastructures are organised in the Netherlands, Belgium, and Germany. These differences are important because cross-border public health is shaped in public health systems that remain nationally and subnationally organised. In the Netherlands, municipalities hold statutory responsibility for municipal public health tasks, with regional delivery through municipal public health services, while national infrastructures standardise key indicators and registration for specific programmes and monitoring (33-35). In Belgium, prevention and health promotion responsibilities are distributed across communities and regions, while federal infrastructures such as Sciensano (36) concentrate monitoring and epidemiological expertise, which creates routine needs to connect implementation and data across institutional levels (36, 37). Germany combines a federal state structure with multiple prevention routes, including statutory health insurance

and local public health authorities, alongside national monitoring and epidemiological interpretation anchored at the Robert Koch Institute (38-40). So, the three countries have rather different nation public health systems, with different organisational configurations, different authority structures, different organisations of outreach and registration. These differences become consequential when the shaping of cross-border public health practices stumbles upon situations where residence, schooling, and administrative registration of residents in a border region do not coincide (41, 42). A clear example is vaccination outreach, where Dutch invitations and registration are aligned primarily with residence, while parts of vaccination delivery in Flanders are organised through schools, so pupils who go to school in the neighbouring country may either be missed or approached twice (34, 41, 42). For a more detailed description of public health organisation in the three countries, the delineation of cross-border public health, and illustrative challenges in the Meuse-Rhine Euroregion, I refer to the WHO Regional Office for Europe report that provides further background for this subsection (29).

OUTLINE OF THE THESIS

The chapters that follow each examine a distinct aspect of the main research question of how public health policies and practices are shaped in border regions. The thesis first considers the broader policy and scientific contexts within which cross-border public health is defined and studied. **Chapter 2** analyses how European policies frame public health in adjacent border regions including the problems, responsibilities, and policy instruments through which cross-border public health is constructed as a European policy concern. **Chapter 3** examines how the international scientific literature addresses public health in border regions public health in border regions through a scoping review focused on cross-border infectious disease control policies and practices. As such, the chapter examines how a specific domain of cross-border public health, namely infectious disease prevention and control, is addressed within the broader international scientific context. The thesis then turns in **Chapter 4** to professional practice and analyses the accounts of public health professionals working in border regions in order to understand how collaborative public health infrastructures develop in the context of well-established nationally organised public health systems and in the absence of a dedicated border-regional governance structure. In doing so, Chapter 4 examines how cross-border public health is shaped at the organisational and professional level and in day-to-day professional practice. Having examined cross-border collaboration itself as a professional and organisational practice in Chapter 4, the following three chapters turn to distinct public health domains in which the relationship between border-regional realities and nationally organised policies and practices can be investigated. **Chapter 5** begins with pandemic control and examines the role of state borders in public health policy and practice during a cross-border pandemic. Through an epidemiological analysis of spatial patterns in individual COVID-19 cases

across four European border regions, the chapter investigates the relationship between cross-border transmission and the use of state borders in nationally organised pandemic control. **Chapter 6** puts municipalities in a border region centre stage. This chapter examines how age-friendly policies in border regions are perceived and enacted at municipal level, and how cross-border exchange and collaboration between these municipalities are shaped. **Chapter 7** focuses on adolescent substance use and health promotion in the three national parts of the Meuse-Rhine Euroregion. Through a comparative epidemiological analysis, it explores adolescent substance use across nationally organised regulatory and prevention contexts and social environments in a border region. Whereas the preceding chapters primarily examine cross-border public health from the perspective of policy, institutions, and professional practice, **Chapter 8** turns to citizen participation and examines how citizens are involved in shaping cross-border public health. This chapter therefore analyses how citizen participation processes in the border region are designed and organised, how residents are given a voice and how they are allowed to co-shape the agendas and outcomes of participatory processes. In the general discussion, **Chapter 9**, I reflect on the insights these chapters provide into the shaping of public health practices in border regions and discuss these findings in relation to relevant theoretical debates. Finally, in the **Impact Chapter**, I address the implications of this study for public health policy and practice.

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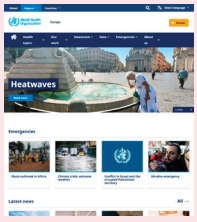
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APPENDIX I – PRACTICAL EXAMPLES CHAPTER 1

This annex presents selected organisations and documents that illustrate the practice context of cross-border public health in European border regions. The examples show how cross-border public health is made visible through regional cooperation structures, networks, communication products and practical tools.

The organisations are included as contextual examples rather than as empirical cases. Links and QR codes are provided to enable access to further information or archived materials.

WHO Regional Office for Europe



The WHO Regional Office for Europe provides an international public health reference point. In the context of cross-border public health, WHO/Europe illustrates how public health can be understood through functions, capacities and governance arrangements that go beyond individual services, projects or institutions.

Online version:
https://www.who.int/europe

European Commission, Public Health



The European Commission provides the main EU-level policy context for health. In the context of cross-border public health, it illustrates the tension between European mobility, EU-level coordination and the fact that health responsibilities largely remain organised within national systems.

Online Version:
https://health.ec.europa.eu/index_en

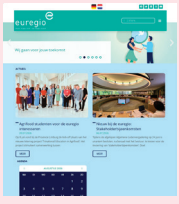
Euregio Meuse-Rhine



The Euregio Meuse-Rhine is an established cross-border co-operation area between Belgium, Germany and the Netherlands. It illustrates how adjacent border regions can develop practical forms of cooperation while public responsibilities, including public health responsibilities, remain embedded in different national and subnational systems.

Online version:
https://euregio-mr.info/en

Euregio Rhine-Meuse-North



The Euregio Rhine-Meuse-North is an established cross-border cooperation area along the Dutch-German border. It illustrates another institutional form of cross-border cooperation, with municipalities, districts and regional actors working across adjacent jurisdictions.

Online version:
https://euregio-rmn.de

euPrevent



euPrevent was a cross-border network for health promotion and public health in the border region between the Netherlands, Belgium and Germany. It illustrates how cross-border public health can be organised in practice through networks, partnerships, shared activities and communication products across several public health themes.

Online version:
https://euprevent.eu

EPECS

EPECS focuses on cross-border healthcare in adjacent border regions from the perspective of citizens and patients. It illustrates how people living in border regions may need to organise care within their geographical living area, including across a national border. EPECS brings attention to citizen and patient voices, access to care, information and continuity of care.

Online version:
https://www.epecs.eu/en



Euregha

Euregha is a European network of regional and local health authorities. It illustrates how subnational authorities engage with European health policy and how regional perspectives can be brought into wider debates on health systems, public health and governance.

Online version:
https://www.euregha.net



AEBR

The Association of European Border Regions represents border and cross-border regions in Europe. It illustrates the broader institutional landscape in which border regions are recognised as specific spaces of cooperation, policy development and governance.

Online version:
https://www.aebr.eu



euPrevent Factsheet 2023

The euPrevent Factsheet 2023 provides a practice-based snapshot of cross-border public health shortly before the discontinuation of euPrevent. It shows how cross-border public health was organised through networks, partnerships, events and communication products across several themes. The factsheet illustrates the broader practice infrastructure behind cross-border public health, without focusing on one specific project or study.

See next page for the full factsheet.

1

EUPREVENT IN 2023

Empowering cross-border networks to confront public health challenges together!

In 2023, amidst post-pandemic recovery, it became increasingly clear that health systems need to be re-evaluated and adapted to transcend national borders in order to better meet people's needs. While citizens' lives effortlessly cross borders, health systems are often confined by national boundaries. This demands a fundamental shift, whereby health systems adapt to people's needs rather than vice versa. The shared challenges of border regions emphasize the collective need for adaptability and collaboration. Strengthening cross-border health networks has become an essential response to persisting challenges that transcend borders.

euPrevent's achievements in 2023
Reinforcing cross-border collaboration remains the focus of euPrevent. In 2023, having recognized that robust networks are essential for effectively combating future (public) health challenges, euPrevent prioritized network strengthening. Significant milestones were achieved in various fields, including mental health, environmental health, infectious disease, citizen participation and addiction issues.

Some highlights in 2023

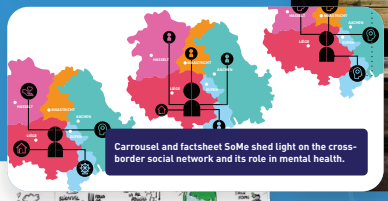
2 new projects started:

YES (Youth Euregional Scan) 2023

SoMe (Social Networks and Mental Health)


PROFILE activity conference attracted 170 participants.


Theatre play Sterrelicht was developed to increase awareness of loneliness.


Carrousel and factsheet SoMe shed light on the cross-border social network and its role in mental health.



EMR (Euregion Meuse Rhine) environmental health conference marks the first Euregional health conference.



Project ACP held its stakeholder kickoff meeting.

www.euprevent.eu | communication@euprevent.eu
Het Overloon 2 | 6411 TE Heerlen, NL

Mental Health

euPREVENT | PROFILE

The Project PROFILE (Prevention of Loneliness of Older People in the Euregio) has developed various tools, e.g., guidelines and training modules for professionals dealing with people suffering from loneliness, and the theatre play "Sterrelicht". This project's products serve as inspiration and a catalyst for exploring the issue further, and have sparked new initiatives for positive change.

euprevent.eu/profile

euPREVENT | SOME

Project SoMe (Social Networks and Mental Health) was an impactful micro-project. The project provided deeper insight into cross-border prevention and care systems for mental health, and underscored the vital role (cross-border) social networks of citizens play in their mental health and well-being.

Environmental health

EMR environmental health conference: euPrevent organised, together with the EGTC EMR, the first health conference in the EMR with environment and health as the theme. This conference shed light on how environmental health differs across borders and how we can cooperate in addressing differences and challenges. One conference initiative was to establish a Linkedin group to follow up discussions on environmental health and climate changes in the EMR.

euprevent.eu/cross-border-collaboration-extends-beyond-conferences

Infectious diseases

Quality seal
Experience in recent years has illustrated the importance of collaborative efforts to control infectious disease across borders. In this regard, the fourth Euregional hospital quality seal was awarded to three hospitals in the EMR: St. Elisabeth Hospital Geilenkirchen (Germany), Jessa Hospital Hasselt (Belgium) and Maastricht UMC+ (the Netherlands). Exchanging expertise and information is clearly essential in order to be able to provide citizens in border areas with reliable, needs-based care.

euprevent.eu/cross-border-infection-protection-sealed

Crossing programme

Project YES (Youth Euregional Scan) 2023
Ongoing euregional youth scan in the EMR provides valuable data on young people aged 13-16 years. This initiative, which fosters collaboration among public health professionals to develop targeted policies, has now been extended to the Euregion Meuse-Rhine North (EMRN), with Interreg VI A Deutschland-Nederland support.

euPREVENT | ACP

Project ACP (Active Citizenship Participation)
This project aims at structural and sustainable citizen participation in cross-border decision-making in the EMR, particularly in matters relating to climate change and health. Tools have been developed, including the place standard tool for climate health, to encourage closer engagement. Stakeholders have convened to start discussions on pertinent issues, marking a crucial step forward in advancing the project's objectives.

euprevent.eu/project-euprevent-acp

Other products

Collaboration with Flanders
At the request by its Flemish partner, euPrevent organised a series of webinars on **positive health**, covering the fundamental principles of positive health, and their application in promoting a healthy living environment. The webinars were well received, whereby our Flemish partners expressed a desire for more in-depth insight and concrete examples at policy level. Our German partners made a similar request, leading to plans for a series of webinars in German.

Network events with partners
euPrevent's partners from various program lines gathered together to reflect on current activities and to strategize cross-border collaboration. Recognizing the importance of a robust cross-border network, they are committed to strengthen their collaborative efforts to more effectively tackle the common public health challenges.




- PREPARED!
- ACUTE!
THREAT
PUBLIC HEALTH

Chapter 2

European policies for public health in border regions: no European mindset as yet

Brigitte A.M. van der Zanden, Christian J.P.A Hoebe & Klasien Horstman.

BMC Public Health. 2024; 24(1), Article 746.
Doi: 10.1186/s12889-024-18175-9

ABSTRACT

Background The sudden emergence of COVID-19 in 2020 demonstrated that Europe was not prepared for a public health crisis like this pandemic. In the European Union, matters of health have remained primarily under the jurisdiction of individual Member States. However, certain events, such as the Kohll-Decker ruling on free mobility of health services and the COVID-19 pandemic, compelled the EU to address health matters in border regions. This study examines how EU policies address public health in border regions. To that end, we have drawn from border studies, a field that provides insight into the fluidity and complexity of borders in everyday life. Besides that we used constructivist policy studies as a lens for the analysis of EU policy documents.

Methods A policy discourse analysis was conducted to explore how European policy addresses the development of a transnational, European public health in border regions. Key European policy documents published between 2002 and 2027 were analysed to understand how policies are constructed and problems are framed. The analysis was guided by research questions and the theoretical approach.

Results The analysis reveals that, while having limited competences in the field of health care, the EU is slowly developing a rationale and a knowledge base to increase its competences in health care. It also shows that in the field of public health, the EU argues for addressing health determinants and promoting healthy lifestyles, though it does not address health promotion in border regions. The EU's authority in public health in border regions revolves primarily around addressing physical, biological and chemical threats rather than social health problems.

Conclusion Though the EU has carefully developed a transnational perspective on health care, the EU has not developed any authority with respect to transnational public health. Though public health and health promotion in border regions have been confronted with specific challenges, neither specific Member States nor the EU have a transnational collaborative perspective that does justice to the characteristics of border regions. When it comes to public health in border regions, there is no European mindset as yet.



INTRODUCTION

The diverse responses to the sudden and unexpected emergence of COVID-19 in 2020 demonstrated that Europe was not prepared for a pandemic. To control the pandemic, many states introduced national measures, such as wearing a facemask, social distancing, limiting group sizes, reducing travel, testing and vaccination strategies. Some countries also decided to close their borders to reduce cross-border mobility: by physically reinstating the formal state borders, countries reduced cross-border mobility in an unsuccessful attempt to keep the virus outside.

These national policies did not take into account that 30% of the EU population lives in so-called border regions (1-3). Since the European Union has embraced the 'free movements of persons' in accordance with the Schengen Agreement of 1985 and the Schengen Convention of 1990 (4) and the EU principle of the free movement of goods and services (5, 6), intense cross-border mobility – for work, leisure, shopping, family visits, care and education – has become a self-evident aspect of daily life in border regions. From that perspective, it is not surprising that border closures were not particularly successful (7), especially because the every-day mobility necessary in border regions required too many exemptions. However, these responses reflect a remarkable national reflex in relation to European public health and, as such, they raise the question as to what extent – and how – European policies for public health take border regions into account.

In this article, we explore this question by analysing how transnational European public health in border regions is addressed in European policy discourses. In the next section, we first introduce how Europe has dealt with the potential European character of public health to date. Next, we sketch the theoretical background of the study and present the methodology. After having presented the results of the policy analysis, we discuss these findings within the context of relevant literature.

Health as a European issue?

While Europe has developed as an open market and has embraced the free movement of persons, goods and services in the EU, the same cannot be said in relation to health. In the last consolidated version of the Treaty on the Functioning of the European Union (6), of which the first version appeared in 2002 (5), the EU formally stated that health care is a matter for Member States. This entails that the Member States agreed that the EU's role with respect to health does not go beyond supporting, coordinating, and complementing national policies (6). However, in 1998 the EU was forced to stretch this policy to a degree.

In 1998, the European Court of Justice ruled that the free movement of goods and services within Europa also applies to health care, the so-called Kohll-Decker Ruling (8, 9).

Interestingly, this ruling was the result of an initiative from citizens. In the early 1990s, Mr Kohll and Mr Decker, both living in Luxembourg, decided to go abroad for, respectively, prescribed glasses and dental care. Both submitted their expenses to their health insurance companies for reimbursement, but both received a rejection. The insurance companies argued that there was no medical emergency or need for them to seek help in a neighbouring country or another EU Member State. Mr Kohll and Mr Decker went all the way to the European Court of Justice (ECJ) to fight this decision. The Member States found this quite problematic and nine of the - at that time - 15 EU Member States voiced their concerns to the ECJ, warning the ECJ about the impact if it were to rule in favour of Mr Kohll and Mr Decker. This had no effect and in 1998 the European Court of Justice supported the arguments of Kohll and Decker and ruled that the free movement of goods and services also applies to health care. This forced the EU to consider how to respond. In 2011, after a long and extensive negotiation period between the EU and the Member States, the EU responded by establishing the patient rights directive. This directive obliges EU Member States to translate into national legislation the right of patients to search for health care in Member States other than their home country. However, though this goal must be met by all Member States, in line with the idea that the role of the EU with respect to health matters should be limited, Member States were not told how they should implement this directive. In 2021 and 2022 two reports were published by the EU which described in detail the challenges of implementing the directive (10, 11).

A more recent example of the EU's interference in health matters was evident during the COVID-19 pandemic, namely the introduction of the digital COVID-19 passport. Since the start of the COVID-19 pandemic, the EU worked with its Member States to strengthen Member States' health systems in order to limit the spread of the virus. To this end, the EU coordinated action at EU level and recommended public health measures to EU Member States, such as the introduction of the EU digital COVID-19 passport which allowed EU citizens to move more easily within the EU. Compared with the Kohll-Decker ruling, the EU COVID-19 policy was not particularly controversial among policymakers and did not meet extensive criticism from EU Member States. The COVID-19 crisis and the impact of pandemic control measures were considered urgent problems that blocked the free movement of goods and persons, and the COVID-19 passport was considered an adequate response as it enabled the resumption of cross-border mobility. Apart from this, as a too, the COVID-19 passport matched existing national public health infrastructures while not competing with them.

These examples demonstrate that in specific situations the EU will go beyond its limited role when it comes to health matters. The new directive legitimises the EU holding countries accountable for ensuring that their citizens can fulfil their rights with respect to the free movement of services and goods in the field of health care, a right that may be of extra importance in border regions. Prevention and health promotion encounter

various obstacles in border regions. For example, the introduction of sugar tax in Norway (not an EU Member) to decrease sugar intake stimulated people to buy their sweets in Sweden (12), and in the Netherlands raising the age limit for buying alcohol from 16 to 18 resulted in young people taking their custom to Belgium and Germany. Both examples illustrate the so-called waterbed effects of policies in border regions. If specific prevention and health promotion policies in one country do not align with those in a neighbouring country, this may decrease the legitimacy and the efficacy of these policies. In numerous publications, the World Health Organisation (WHO) has called for more attention should be paid to the effects of marketing in border regions in relation to alcohol and tobacco. This raises the question as to how public health in border regions is addressed in EU policies.

THEORETICAL BACKGROUND

For our study, we draw from two different fields, namely border studies and constructivist policy studies. While border studies help to reflect on the notion of borders and border regions, constructivist policy studies offer ideas for an in-depth understanding of how policies shape the world (13-16).

In border studies many scholars have argued that borders should be considered as cultural, economic, political and social constructs. Aure (13), for example, explained that to understand life in border regions, formal, national and political borders are far less important than everyday cross-border social-economic relations. Kolossov and Scott (17) argues that, in practice, borders are rather fluid. In the same vein, according to Walters (15), the EU is characterised by 'multiple, fluid spaces of regions, markets and cities connected by networks of communication and transport and traversed by flows of goods, people, information and capital' (15) (p. 676). While a geopolitical perspective on borders as demarcating nation states is dominant in the domains of policy and law, scholars such as Kolossov and Scott (17), Aure (13) and Walters (15, 18) argue that developing adequate policies requires focusing on the fluidity of borders in everyday life. Studies of life in border regions also indicate that living with different governance regimes close at hand provides flexibility and freedom: if parents do not like the national educational system, they can put their children in schools in the neighbouring country, and if some groceries are very expensive in the home country, it is easy to shop across the border.

To analyse EU policies of public health in border regions, we draw from constructivist policy studies. Scholars in this field e.g. Borras and Edler, have stressed that governance - instead of steering - is a process of co-construction by state and diverse non-state actors, and the dynamics of co-construction is affected by a variety of social, cultural, economic and scientific-technical processes (19). More specifically, for our question about trans-

national public health - a scientific professional field - we use the work of Barry (20-22). According to Barry, transnational governance is related to the emergence of transnational knowledge dynamics such as controversies about climate change (21). Although controversies are often seen as obstacles to transnational collaboration and consensus, Barry argues that these controversies stimulate innovations in governance, such as the development of transnational technological standards and metrics. Attempts to develop transnational mechanisms to tackle the problem of climate change were accompanied by disagreements about, for instance, the extent of the climate problem, its urgency, the causes and consequences, and the reliability of measuring instruments, models and data that stimulated new scientific-technological strategies. These controversies are the machinery that shape transnational governance. So, according to Barry, to get insight into a transnational policy landscape, it is important to get insight into transnational knowledge dynamics. Kingdon (23) demonstrated the inevitably selective character of policy processes: some problems, objects or issues receive more attention than others in the prioritisation of problems and in these processes, so-called 'hidden participants' such as scientists, consultants and analysts play a major role. However, their role in putting some problem definitions and solutions forward depends on a 'window of opportunity': a moment where – often by coincidence – a specific problem definition or solution become embraced by many stakeholders and is rapidly developed. This process is influenced by what Kingdom calls 'social entrepreneurs': people who – on behalf of organisations, institutes or stakeholders – spend time and resources on lobbying for the issues and policies they represent. If their work is not successful and topics are not put on the agenda, Kingdon interprets this in terms of the lack of a 'window of opportunity'.

The core of Bacchi's (24-27) critical policy analysis focuses not on policy construction through the agenda-setting dynamics of state and non-state actors, but on the representation of problems. She argues that problems are often presented as natural, objective facts, while they should be analysed as specific representations that are loaded with normative assumptions and have normative consequences. An example, according to Bacchi (26), is policies that aim to increase the number of women in influential positions by educating these women. While this may seem 'logical', a critical policy analysis may, for instance, indicate that such an educational strategy defines lack of education of women as the main problem rather than the power dynamics of old boys' networks. In line with this, women are expected to improve their education, and gendered organisation patterns remain in place. While Kingdon (23) stresses that we need to study how problems acquire status and are prioritised on a government's agenda, Bacchi (24-27) recommends critically analysing how these 'problems' are constructed as 'problems' of a particular kind and to critically reflect on the normative assumptions in policies.

METHODS

To explore the question 'How do European policies address and construct public health in border regions?', we conducted a constructivist policy analysis. Although we consider policy and

governance as processes in which many institutional and cultural actors play a role, we analysed EU policy documents in order to understand the construction of policies and how problems and solutions are framed in the process (28, 29). The analysis of policy documents allows us to map how specific problem definitions have developed. According to Asdal (28), editing and changing the presentation of content is part of transforming reality. For example, she shows how a letter from a veterinarian in Norway describing a problem relating to an aluminium factory and the effects of the factory's emissions have on local livestock, resulted in - through all kinds of modifications - to policy at a national level. The issue that was raised in the letter quickly changed from an exemplary situation to a general situation, from an emotional argument to a factual argument, and from an individual and local issue to a national issue. The final report has become rather detached from the initial context. In other words, texts, and networks of texts play an important role in constructing the world.

Inspired by the work of Asdal (28), we analyse whether and how EU policies on public health consider public health in border regions. For that purpose, we selected key EU policy documents that were digitally available on the website of the European Commission, supplemented by regulations, directives, guidelines, programmes, strategic plans and studies. We carried out the selection in four steps. First, we selected all policy documents issued by the EU and its departments from 2002 until May 2022 by using the key words 'cross-border', '(public) health' and 'Europe'. We started in 2002 because in that year the first integrated Community programme for public health and health promotion was adopted. This step resulted in a list of 16 documents (see Figure 1, points on the timeline are marked orange and blue).

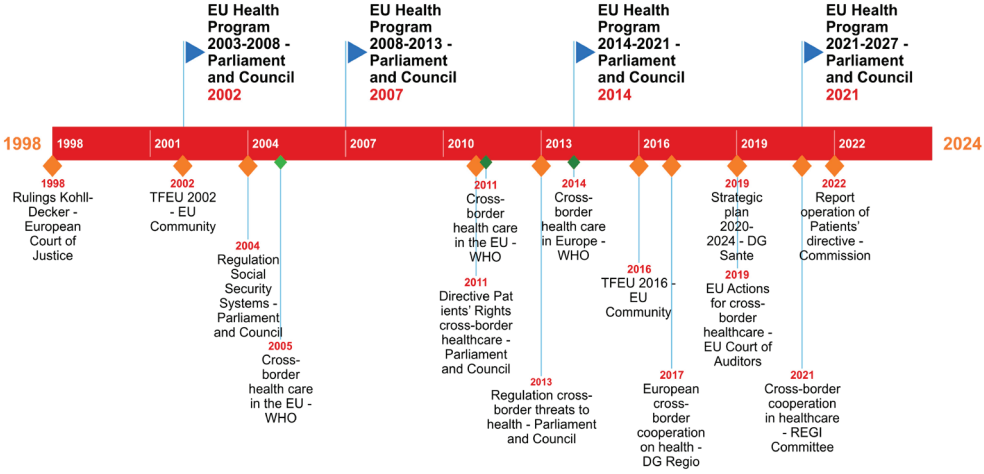


Figure 1. Timeline of EU and WHO policy documents used for analysis (blue triangles: main documents in analysis; orange rhombus: all EU documents selected for this paper and green rhombus: related WHO documents). Full name of documents in Table 1.

Table 1: Legend of Figure 1 ('Name in figure 1'- the name as it is mentioned in figure 1, 'Full name of document and reference' – the full name of the document and its reference number')

Legend to Figure 1	
Blue triangle in figure 1: documents analysed in this article	
Name in Figure 1	**Full name of document and reference**
2002 EU Health Programme 2003-2008 – Parliament and Council	Decision No 1786/2002/EC of the European Parliament and of the Council of 23 September 2002 adopting a programme of Community action in the field of public health (2003-2008) - Commission Statements (30)
2007 EU Health Programme 2008-2013 – Parliament and Council	Decision No 1350/2007/EC of the European Parliament and of the Council of 23 October 2007 adopting a programme of Community action in the field of public health (2008-2013)(31)
2014 EU Health Programme 2014-2021 – Parliament and Council	Regulation (EU) No 282/2014 of the European Parliament and of the Council of 11 March 2014 on the establishment of a third Programme for the Union's action in the field of health (2014-2020) and repealing Decision No 1350/2007/EC (32)
2021 EU Health Programme 2021-2027 – Parliament and Council	Regulation (EU) 2021/522 of the European Parliament and of the Council of 24 March 2021 establishing a Programme for the Union's action in the field of health ('EU4Health Programme') for the period 2021-2027, and repealing Regulation (EU) No 282/2014 (33)

Table 1: Legend of Figure 1 ('Name in figure 1'- the name as it is mentioned in figure 1, 'Full name of document and reference' – the full name of the document and its reference number') (*continued*)

Legend to Figure 1	
Orange rhombus in figure 1: EU related documents	
Name in Figure 1	**Full name of document and reference**
1998 Rulings Kohll-Decker – European Court of Justice	Raymond Kohll versus Union des Caisse de Maladie. (8)
1998 Rulings Kohll-Decker – European Court of Justice	Nicolas Decker versus Caisse de Maladie des Employés Privés. (9)
2002 TEU 2002 – EU Community	Consolidated versions of the Treaty on European Union and of the Treaty establishing the European Community.(5)
2004 Regulation on social Security Systems - Parliament and Council	Regulation (ec) no 883/2004 of the European Parliament and of the Council of 29 April 2004 on the coordination of social security systems (34)
2011 Directive patients' Rights cross-border health care - Parliament and Council	Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border health care (35)
2016 TEU 2016 – EU Community	*Consolidated versions of the Treaty on European Union and of the Treaty on the functioning of the European Union. (6)*
2017 European cross-border cooperation on health - DG Regio	European cross-border cooperation on health: theory and practice (36)
2019 Strategic plan 2020-2024 - DG Sante	Strategic Plan 2020-2024 DG Health and Food Safety (SANTE) (37)
2019 EU Actions for cross-border health care - EU Court of Auditors	EU actions for cross-border healthcare: significant ambitions but improved management required. Special report No 07, 2019 (38)
2021 Cross-border cooperation in health care - REGI Committee	Research for REGI Committee – Cross-border cooperation in health care (39)
2022 Report operation of Patients' directive - Commission	Commission Report on the operation of Directive 2011/24/EU on the application of patients' rights in cross-border health care (40)
Green rhombus in figure 1: WHO-related documents	
Name in Figure 1	**Full name of document and reference**
2005 Cross-border health care in the EU - WHO	Cross-border health care in Europe (41)
2011 Cross-border health care in the EU - WHO	Cross-border health care in the European Union: mapping and analysing practices and policies (42)
2014 Cross-border health care in Europe - WHO	Cross-border health care in Europe (43)

Second, after a first tentative reading of the EU documents, we decided to also include documents of the WHO related to the three key words of 'cross-border', '(public) health' and 'Europe'. As EU policy documents often refer to the WHO and this organisation is presented as an important knowledge institute for public health, we expected the WHO to play an important role in defining cross-border public health in Europe. Therefore, we also selected relevant WHO documents. These WHO documents are marked green on the timeline presented in Figure 1.

Third, we selected the four policy documents that are most relevant to grasp how EU public health policies deal with health issues in border regions in the sense that these have been enshrined in formal EU decisions and regulations by the European Parliament and the Council, as listed below:

1. Decision No 1786/2002/EC of the European Parliament and of the Council of 23 September 2002, adopting a programme of Community action in the field of public health (2003-2008) (30);
2. Decision No 1350/2007/EC of the European Parliament and of the Council of 23 October 2007, establishing a second programme of Community action in the field of health (2008-2013) (31);
3. Regulation (EU) No 282/2014 of the European Parliament and of the Council of 11 March 2014 on the establishment of a third Programme for the Union's action in the field of health (2014 – 2020) and repealing Decision No 1350/2007/EC (32); and
4. Regulation (EU) 2021/522 of the European Parliament and of the Council of 24 March 2021 establishing a Programme for the Union's action in the field of health ('EU4Health Programme') for the period 2021–2027, and repealing Regulation (EU) No 282/2014(33).

Finally, in order to validate our selection process, we presented this sample and selection criteria to three people closely involved in health policy processes in the Brussels arena and working for DG Sante and Euregha, and to get feedback on the quality of the procedure and to check for relevant and possibly missed documents. Based on their feedback, the sample was not changed.

These policy documents reflect existing discourses, initiatives and urgencies in the framework of European public health policy and have shaped EU public health policy. In these four policy documents, references are made to more general health policy documents of the EU (Commission, Parliament and European Court of Justice), as well as to the WHO (in the timeline in Figure 1 marked in orange and green). As these referenced documents provide the context in which public health policy emerged, they are included in the analysis.



The analysis of the documents was guided mostly by the research question and the theoretical approaches and partly inductively. The analysis was done on paper and in Excel by two researchers, namely BZ and KH, and consisted of several steps. We started by the double reading of each policy document by two researchers. Next, with the research question and theoretical background in mind, we identified core themes and questions. First, where and how were the notions health care and public health, prevention, health promotion discussed in the papers? Second, inspired by border studies, we identified such expressions as cross-border and transnational governance/actors/institutions. Third, informed by the work of Barry, we looked at how institutions and strategies of science and technology were put forward. Fourth, inspired by Kingdon, we looked at indications of the dynamics and the rationale of agenda-setting in the policy papers. Finally, making use of Bacchi's work, we looked at the definition of problems and solutions in policy documents.

We re-read each document and selected text fragments associated with the chosen questions and themes. These were broad fragments, as we also included the context in which these themes were addressed. These fragments were then placed in an excel file. Fourth, we familiarised ourselves even more with the fragments and looked for chronological and systematic patterns of links between these themes. We specifically compared expressions linked with health care and public health. This resulted in a specific narrative about the attention for transnational and cross- border issues in public health in EU policy documents.

In the next section, we present the results of the analysis. The answers to the question if and how different health practices – health care, public health, prevention, health promotion - are considered from a transnational perspective, and to what extent border regions are taken into account, form the basis of the three result sections.

RESULTS

In the following sections we present how European policy discourse reflects a European, transnational perspective with respect to health care and public health and how cross-border public health issues are framed in these policy documents.

EU Policies for health care: constructing a transnational knowledge strategy and limited authority

While it is generally acknowledged that the role of the EU in health matters is limited to supporting, coordinating and complementing national policies, it is interesting to note that, nevertheless, the EU is slowly developing a rationale and a knowledge base for increasing its authority in matters of health.

First, European policy documents are increasingly articulating and calling attention to transnational health issues that cannot successfully be dealt with by national states. On several occasions, within the context of discussions about, for example, rare diseases and COVID-19, the European Parliament stresses the limits of national states in achieving health aims. These problems are considered as transnational by nature and as too complex to be controlled by individual nation states. (30) (p. 271/4, no. 22)

In the 2007 EU policy document, the Commission argues again that:

> Since the objectives of this Decision cannot be sufficiently achieved by the Member States due to the transnational nature of the issues involved, and can therefore, by reason of the potential for Community action to be more efficient and effective than national action alone in protecting the health and safety of citizens, be better achieved at Community level. (31) (p. 301/7, no. 37)

The limitations of national policies in dealing with urgent health threats became very clear with the outbreak of the COVID-19 pandemic. Not surprisingly, in the 2021–2027 EU policy plan on health, one of the main themes is COVID-19.

Second, in line with the increasing attention to the transnational character of health matters, the policy analysis reveals that the EU has invested in a European knowledge base with respect to curative health care. While Member States rely on their own national health knowledge infrastructures, the EU has relied, to a large degree, on global policy-knowledge bodies such as the WHO. The 2002 and 2007 policy documents, for example, refer to cooperation with the WHO and the Organisation for Economic Co-operation and Development (OECD):

> Article 11, International cooperation: In the course of implementing the programme, cooperation with third countries and with international organisations competent in the sphere of public health, in particular the World Health Organisation, the Council of Europe and the Organisation for Economic Cooperation and Development, or able to have an impact on public health […] shall be encouraged in accordance with the procedure laid down in Article 9(3). In particular, the health information system and the capacity to respond to health threats should be, where appropriate and possible, coordinated with the activities of the World Health Organisation. (30) (p. 271/8).

> Article 12, International cooperation: In the course of implementing the Programme, relations and cooperation with third countries that are not participating in the Programme and relevant international organisations, in particular the WHO, shall be encouraged. (31) (p. 301/10)



However, since 2007 the EU has increasingly referred to European institutes, such as the European Centre for Disease Prevention and Control (ECDC), which focuses on the control of infectious diseases, and the European Medicines Agency (EMA), which deals with EU admission and the safety of medicines. These institutes articulate notions of transnational collaboration and transnational knowledge and were established either by the European Parliament via a regulation or by a decentralised agency of the European Union. The 2007 EU policy document states:

> For the attainment of the objectives of the Programme, the Commission shall, in close cooperation with the Member States: (b) ensure the necessary cooperation and communication with the European Centre for Disease Prevention and Control and other relevant EU agencies in order to optimise the use of Community funds. (31) (p. 301/8)

The 2021 EU policy document again underlined the importance of the ECDC: "... in synergy with other Union instruments, programmes and funds, without prejudice to Member State competences and in close cooperation with the ECDC." (33) (p. 107/13)

While the importance of ECDC is further supported by … the communication of the Commission of 11 November 2020 entitled 'Building a European Health Union: Reinforcing the EU's resilience for cross-border health threats'. (33) (p.107/3)

Third, the Directive on patients' rights in cross-border health care (35) allows the EU to develop transnational vehicles to stimulate Member States to act in this respect. For that purpose, in 2013 the EU introduced the so-called European reference networks (ERNs), a (virtual) network for knowledge institutes and healthcare providers from all over Europe to "increase access to medical expertise and information for specific conditions beyond national borders" (32) (p. 86/7). The networks that were actually established centre around rare diseases (35) (p. 88/61, article 8), a choice that indicates the EU's careful navigation in this field. While health issues are considered a national issue, EU interference concerning rare diseases is not really controversial, as all Member States have only few cases and an obvious need to share knowledge and resources about these diseases and about the highly specialised treatment. The EU has anticipated an increase in these networks and has been willing to support Member States in participating in these networks:

> … through the increase in the number of European reference networks established in accordance with Directive 2011/24/EU of the European Parliament and of the Council (1) ("European reference networks"), the increase in the number of healthcare providers and centres of expertise joining European reference networks, and the increase in the number of Member States using the tools developed. (32) (p. 86/7)

> The Programme should contribute to the upscaling of networking through ERNs and other transnational networks. (33) (p. 107/7, no. 33)

In the 2021 EU policy document, the importance of ERNs in relation to transnational networks was again frequently mentioned: "… the Programme should contribute to the upscaling of networking through ERNs and other transnational networks." (33) (p. 107/7, no. 33; p. 107/28, no. 9d)

However, in practice, no European reference network has been established other than the one addressing rare diseases. Apparently, in practice, it is not that easy for the EU to go transnational when it comes to curative health.

EU policies for public health: constructing a transnational knowledge strategy while lacking authority

Although the EU had, and has, a limited role and limited authority in issues relating to health care, the EU has developed an agenda to address the health of populations. In 1996, the EU introduced eight so-called Community actions in the field of public health, focusing on 'health promotion, education and training', 'cancer', 'AIDS and certain other communicable diseases', 'drug dependence', 'health monitoring', 'injury prevention', 'rare diseases' and 'pollution-related diseases'. These programmes led to annual work programmes with specific objectives and activities and specific EU funding. Mainly through financial support, the EU encouraged Member States to conduct research and studies, to exchange best practices and knowledge, to promote actions and activities and to encourage greater integration of, for example, health promotion and health education. The programmes were reviewed in 1998, and the Commission concluded that "… a new health strategy and programme was needed in view of the new Treaty provisions, new challenges and experiences so far." (30) (p. 271/2) This led, in 2002, to a more integrated approach to public health: "The general objectives of the programme shall be: […] (c) to promote health and prevent disease through addressing health determinants across all policies and activities." (30) (p. 271/6)

Interestingly, this objective did not change over the following decades. The EU policy documents of 2002, 2007, 2014 and 2021 mention the same aim. The overall aims of public health policy, namely prevention and health promotion, have not changed.

In the first EU document in 2002 (30) about prevention and health promotion, attention was paid to diverse "health determinants" (p. 271/2,3, e.g. no. 6,7, 10), "health promotion" (p. 271/6, e.g. no. 41 /art 2.3.a) "and disease prevention" (p. 271/1, e.g. no. 3). The document explicitly mentions classic lifestyle factors that are assumed to contribute to worse health: "nutrition, physical activity, tobacco, alcohol, drugs and other substances and on

mental health" (30) (p. 271/11, no. 3.1). This perspective is mentioned again in the 2007 and 2014 EU policy documents:

> Address health determinants to promote and improve physical and mental health, creating supportive environments for healthy lifestyles and preventing disease; key factors such as nutrition and physical activity and sexual health, and on addiction-related determinants such as tobacco, alcohol, illegal drugs and pharmaceuticals used improperly. (31) (p. 301/11, no. 2.2.1)

The above quote refers to a specific action mentioned in the programme that shall complement, support and add value to the policies of Member States. In line with this, nutrition, alcohol, passive smoking, unhealthy dietary habits and physical inactivity (32) (p. 86/11, no. 1.1) are described as risk factors for health. In the last EU policy document of 2021, a broad spectrum of health determinants is mentioned again:

> … such as behaviour-related, biological, socio-economic and environmental factors (33) (p. 107/12, article 2.11)

Our analysis of the policy documents shows that that the EU repeatedly mentions the importance of prevention and health promotion and aims to stimulate knowledge exchange and policy developments between member states about these matters. However, it had no authority to develop policies itself when it comes to prevention and health promotion.

EU policies for public health in border regions: a selective transnational knowledge strategy while lacking authority

Thus far, we have sketched how the EU has tried to do justice to the notion that, in many respects, promoting the health of EU citizens requires transnational work, while at the same time being bound by the principle that health matters are a national and not an EU concern. In this context, how do EU policy discourses address public health in border regions?

In the 2007 EU policy document, referring to specific health threats, the EU highlighted the importance of considering health issues from a transnational perspective and of organising European cross-border collaboration:

> The European Parliament and the Council of the European Union, acting in accordance with the procedure laid down in Article 251 of the Treaty (3), Whereas: A number of serious cross-border health threats with a possible worldwide dimension exist and new ones are emerging which require further Community action. The Community should treat serious cross-border health threats as a matter of priority.

> The Programme should place emphasis on strengthening the Community's overall capacities by further developing cooperation between the Member States. (31) (p. 301/3, no. 5)

> Due to the serious nature of cross-border threats to health, the Programme should support coordinated public health measures at Union level to address different aspects of such threats. (33) (p. 107/3, no. 11)

The above policy directives led to the general objective in 2021 of "protecting people in the Union from serious cross-border threats to health and strengthening the responsiveness of health systems and coordination among the Member States in order to cope with serious cross-border threats to health" (33) (p. 107/12).

In these policy documents 'cross-border' is used primarily in the context of a 'threat', but what is considered a threat? The EU policy documents of 2002, 2007 and 2014 mention a variety of biological and chemical threats – such as E. coli, influenza strain H1N1, SARS or toxic chemicals. The first document of 2002 particularly emphasises communicable diseases as a threat:

> … developing an information system for the early warning, detection and surveillance of health threats, both on communicable diseases, including with regard to the danger of cross-border spread of diseases (including resistant pathogens), and on non-communicable diseases. (30) (p. 271/10, no. 12)

In the 2014 document, the notion of cross-border health threats was broadened to include environmental events and hazards due to climate change. The document specifically refers to the EU decision of 2013 on serious cross-border threats to health:

> Apart from communicable diseases, a number of other sources of danger to health, in particular related to other biological or chemical agents or environmental events, which include hazards related to climate change, could by reason of their scale or severity, endanger the health of citizens in the entire Union, lead to the malfunctioning of critical sectors of society and the economy and jeopardise an individual Member State's capacity to react. (32) (p. 293/1)

> In order to minimise the public health consequences of cross-border threats to health as set out in Decision No 1082/2013/EU of the European Parliament and of the Council (1), which could range from mass contamination caused by chemical incidents to pandemics, like those unleashed recently by E. coli, influenza strain H1N1 or SARS (severe acute respiratory syndrome), or health effects resulting from increasing population movements, the Programme should contribute to the

> creation and maintenance of robust mechanisms and tools to detect, assess and manage major cross-border health threats. (32) (p. 86/3, no. 15)
>
> Protect Union citizens from serious cross-border health threats: 2.3 Actions required by, or contributing to, the implementation of Union legislation in the fields of communicable diseases and other health threats, including those caused by biological and chemical incidents, environment and climate change. (32) (p. 86/11)

In the 2021 EU policy document, the notion of a 'cross-border threat' was again raised, and this document explicitly argues for EU efforts to address these disasters:

> … 'border threat to health' means a life-threatening or otherwise serious hazard to health of biological, chemical, environmental or unknown origin which spreads or entails a significant risk of spreading across the national borders of Member States, and which may necessitate coordination at Union level in order to ensure a high level of human health protection (33) (p. 107/12, no. 9)

The risks of cross-border biological, chemical and environmental threats introduce a rationale to argue for EU policy and EU authority, but apparently, this EU policy discourse was not extended to include prevention and health promotion. While one can observe in EU policy documents the development of a perspective on social health problems, social health problems are not been considered from a European, cross-border perspective. In the EU policy documents, alcohol consumption, drugs and tobacco are not constructed as urgent cross-border problems, and these documents do not argue for European, transnational efforts. EU policy documents that were analysed associate 'cross-border' only to 'threats' in the sense of 'a life-threatening or otherwise serious hazard to health' (33) (p. 107/12, no. 9), whereby these threats result in acute health emergencies and disasters.

DISCUSSION

Informed by insights from constructivist policy discourses, we analysed how public health in border regions was addressed and constructed in EU policy. What kind of story is narrated through EU policy discourse? As the EU has no formal authority over health issues, what can be observed is that the EU has carefully navigated the carving out of niches where it may address health issues from an EU perspective. Our analysis shows that EU health policy discourse increasingly acknowledges the importance of transnational perspectives and practices, but that no attention is given to the specific characteristics of border regions in relation to public health.

In the field of border studies, scholars have studied the multiple meanings of borders, beyond borders as geopolitical and historical demarcations. Everyday life in border regions testifies to the fluidity of borders and to the cross-border mobility and engagement of citizens living in border regions. For these citizens, the centre of the nation state is sometimes more distant than that of the neighbouring country. However, it appears to be difficult for EU policies to relate to that reality. The document analysis shows that European policies are transnational by definition (44), but European policies do not necessarily consider border regions in Europa where state-borders are practically non-existent in everyday life (45), even when the term 'cross-border' is used in EU policy discourses. Our analysis furthermore shows that even when EU policies address prevention and health promotion as a European phenomenon, practices in border regions are not taken into account. Whether this is a problem is a normative question: citizens in border regions have the freedom to tinker with diverse national governance regimes, benefitting from these different governance regimes or to experience the drawbacks when national policies, as during COVID-19 prevent them from their normal mobility.

Barry (20-22) has argued that transnational knowledge controversies are an important vehicle in the construction of transnational policies and practices. From this perspective, it is not surprising that the EU has invested in a European knowledge base in the health domain to extend national knowledge infrastructures. The analysis indicates that, though it lacks authority in the domain of health care because it is a national responsibility, the EU regards transnational knowledge infrastructures as a route to stimulate transnational governance. There are many other examples where the EU mediates transitional knowledge infrastructures, but in the policy documents we analysed, the focus is on governance bodies like the ECDC, the EMA and ERNs as constituting knowledge infrastructures.

Resonating with the work of Kingdon (23) and the initiatives of Kohll (8) and Decker (9), the recent outbreak of the COVID-19 pandemic has created 'windows of opportunity' that allowed the EU to place the transnational perspective on health higher on the agenda. Following Bacchi (24-27) in our analysis of policy discourses, we observed that EU policy discourse defines cross-border health issues in a rather selective way, namely as biological, chemical and environmental problems. This problem definition constructs health problems in such a way that they can be solved by already existing infrastructures in public health and disaster control. This problem construction demonstrates the difficulty of creating new directions. Cross border socio-economic health problems that are also related to smoking, alcohol consumption and poverty, are excluded from the European agenda. To date there have been no 'windows of opportunity' to prioritise prevention and health promotion in border regions in EU policies.

Our analysis does not address recent debates about the Europeanisation of health, but it does speak to it. While the concept Europeanisation has several different meanings, most scholars point to the impact of European structures on a national level. Radaelli (46) defines Europeanisation like: 'Processes of (a) construction, (b) diffusion, and (c) institutionalisation of formal and informal rules, procedures, policy paradigms, styles, 'ways of doing things', and shared beliefs and norms which are first defined and consolidated in the making of EU public policy and politics and then incorporated in the logic of domestic discourse, identities, political structures, and public policies.' In the context of this debate, Martinsen (47) has argued that studies of the Europeanisation of health that repeatedly show limited Europeanisation in the field of health care are mostly performed in Western European countries with old, national bureaucracies. Interestingly, public health is not analysed in these studies, while public health problems - disasters - are dealt with transnationally. Moreover, our analysis shows the importance of knowledge and technologies as vehicles of transnational governance, which raises the question of what can be learned about the Europeanisation of health if integration of knowledge and technologies and the making of European standards (e.g. perinatal death) were to be systematically studied. Knowledge infrastructures and standards may be considered 'soft tools' compared to legally binding policies when it comes to Europeanisation, but 'soft tools' may have a massive practical impact. From that perspective, it is also interesting to study specific knowledge infrastructures and collaborations for public health in border regions that developed in the absence of EU policies for that goal.

LIMITATIONS

We are aware that not all local, regional and national policies relating to prevention and health promotion in border regions are reflected in EU policy documents. However, this does not alter the fact that we did include the four most important policy documents in this study. These four policy documents form the basis for the actions that the EU has taken and will take in relation to healthcare in Europe in the continuous period from 2002 to 2027. We presented the selected policy documents to EU experts who confirmed our selection. In doing so, we reduced the limitation as far as possible.

It would be interesting to know more about the background to the emergence of the analysed documents. For example, the analysis of policy documents did not include the national regimes and laws of different member states. This could have an impact on why, to date, the EU has no real authority on cross-border prevention and health promotion. However, since EU policy was developed in coordination with all Member States that belonged to the EU at that time, these four policy documents show that this is the direction the Member States could all agree on at that time.

CONCLUSION

To conclude, our analysis of policy documents reveals that, while the EU respects the authority of the Member States in health matters, it is also committed to developing a European transnational health policy to address the challenges and limitations of national approaches. Our analysis also indicates that the EU has been able to translate this transnational commitment into a policy agenda and a knowledge strategy and into limited authority with respect to health care. Although the EU also developed a European policy agenda and a knowledge strategy for public health, prevention and health promotion, it was not able to construct authority in these matters. When it comes to threats resulting in (potentially) acute health emergencies and disasters on EU level, border regions are considered as an object for EU policy, taking advantage of the European Health Union, but when it comes to the broader field of public health in border regions, a European mindset or European knowledge strategy has not yet been developed. European Union policies for public health, prevention and health promotion are based on the collaboration of Member States and do not take the everyday realities of border regions into account.

ABBREVIATIONS

ECDC	European Centre for Disease Control
ECJ	European Court of Justice
EMA	European Medicines Agency
ERN	European reference network
EU	European Union
OECD	Organisation for Economic Co-operation and Development
WHO	World Health Organisation



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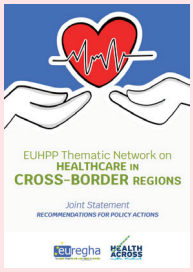
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APPENDIX I – PRACTICAL EXAMPLES CHAPTER 2

This appendix presents selected practice documents that illustrate how cross-border health and public health were addressed in European and regional policy contexts, with particular attention to examples from the Meuse-Rhine and Rhine-Meuse-North border regions.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

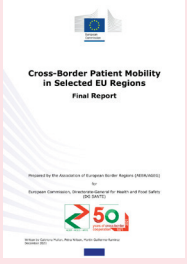
Healthcare in Cross-Border Regions, 2019



This EU Health Policy Platform joint statement calls for policy action on healthcare in cross-border regions. It addresses access to care close to home, bottom-up initiatives, professional qualifications, financing, service coordination, National Contact Points and data. It illustrates how EU-level attention to cross-border regions was mainly framed through healthcare and patient access, while public health remained less explicit.

Online version:
https://health.ec.europa.eu/publications/eu-health-policy-platform-joint-statement-healthcare-cross-border-regions-european-regional-and_en

Cross-Border Patient Mobility in Selected EU Regions, 2022



This DG SANTE report, prepared by the Association of European Border Regions, examines cross-border patient mobility in selected EU regions, including the Meuse-Rhine region. It describes who uses care across borders, which actors are involved, how patients receive information, how reimbursement and insurance arrangements work, and why available data on cross-border patient mobility remain incomplete.

Online version:
https:/ /data.europa.eu/doi/10.2875/603558

EPECS Response to the European Commission Consultation on Health Services, 2007



This EPECS response was submitted to the European Commission consultation on health services. It presents the perspective of cooperating patient organisations in Dutch-German border regions. The response discusses cross-border patient mobility, patient rights, quality, transparency, access to care, complaints, liability, monitoring and patient involvement in European health policy.

Online version:
https://www.epecs.eu/wp-content/uploads/2021/03/Reactie-consultatie-070129.pdf

Cross-Border Cooperation in Health, 2017



This EUREGHA booklet presents cross-border health cooperation examples from several European regions. The examples include specialised medical care, hospital cooperation, emergency care, mental healthcare and mother-and-child healthcare. The Meuse-Rhine example describes public health cooperation across the region, including euPrevent, cross-border health data, preventive health themes and Senior Friendly Communities.

Online version:
https://www.euregha.net/wp-content/uploads/2018/12/2017-cross-border-updated-booklet.pdf

Archived copies of the listed documents are retained by the author and may be requested from the author, where copyright and institutional permissions allow.


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Chapter 3

Policies and practices of infectious disease control in European border regions: a scoping review

Brigitte A.M. van der Zanden, Mitch van Hensbergen, Koen Gorgels, Alena Kamenshchikova, Klasien Horstman & Christian J.P.A. Hoebe.

BMC Infectious Diseases. 2026.
Doi: 10.1186/s12879-026-14287-2

ABSTRACT

Background The COVID-19 pandemic exposed critical vulnerabilities in cross-border cooperation for infectious disease control, particularly in European border regions where fragmented public health systems complicate coordinated response. Despite longstanding collaborations in some regions, preventive strategies and structural alignment remain under-examined in the available evidence. This scoping review explores the available evidence on cross-border infectious disease threats, challenges of addressing those, as well as re recommendations to improve cross-border cooperation.

Methods Following JBI methodology, comprehensive searches were conducted in PubMed, Web of Science, Embase, the Cochrane database of systematic reviews, and grey literature sources. Studies published since 1994 were included. Two independent reviewers conducted study selection and data extraction, resolving discrepancies through discussion. Findings were reported following PRISMA-ScR guidelines.

Results Forty-five studies were included, covering various study designs and cross-border regions. Most studies focused on outbreak investigations and surveillance of respiratory infections, while vector-borne and other emerging infections were scarcely represented. Twelve challenges were identified, including fragmented surveillance, inconsistent data sharing, and differences in national laws and procedures. Eleven public health recommendations were extracted, addressing areas like institutional collaboration, harmonised surveillance systems, and improved data integration.

Conclusions The findings highlight a concentration of research in specific border regions and limited evaluation of cross-border interventions. The underrepresentation of Southern and Eastern European areas indicates gaps in geographical coverage. EU project funding was frequently reported, particularly in the Netherlands-German-Belgium border region, while post-project continuation was rarely evaluated. The finding points to the need for institutional and financial arrangements, and for embedding cross-border collaboration in routine public health governance to strengthen preparedness for future infectious disease threats.



BACKGROUND

Infectious diseases transcend national borders. Specifically, the COVID-19 pandemic demonstrated that infectious diseases do not stop at state borders. Yet, infectious disease prevention and control (IDC) policies and practices remain state based. Such misalignment between the cross-border transmission dynamics and state-based IDC policies and practices poses unique challenges for border regions across Europe, a policy space that extends beyond the EU to include all 46 member states of the Council of Europe (1).

Border regions are territories where two or more states meet, and this connection shapes the specific dynamics of cross-border life, including work, healthcare, leisure and trade as part of the socio-economic fabric of everyday routine (2). These regions are dynamic spaces where social ties and economic activities are shaped by the potential porosity or rigidity of international borders. Specifically, many European border regions, such as those between Germany and the Netherlands, operate under the Schengen regime (3) in which border control is normally limited (4). Although, during COVID-19, such internal borders were shown to regain salience through pandemic-related restrictions. By contrast, the Estonian–Russian border forms part of the EU external border, where systematic checks and border control are required and where border crossing is organised through formal control points.

These cross-border interactions may strengthen community resilience and foster economic vitality as illustrated by Aure's (5) study of cross-border cooperation in Norwegian fishery. At the same time, they may expose vulnerabilities in state-based public health systems. For example, during the COVID-19 pandemic, uncoordinated border closures and divergent national measures in the Nordic region disrupted long-established cross-border cooperation, undermined trust in authorities and created confusion for commuters and patients seeking care across the border (6, 7). Utheim et al. (8) identified similar gaps in coordination and preparedness at European level, where simulation exercises repeatedly pointed to weaknesses in joint risk communication and emergency management. Therefore, border regions are analytically important settings for studying IDC policies and practices, as they expose recurring coordination gaps in preparedness, risk communication and emergency management. This makes it necessary to map the dispersed evidence on cross-border challenges and public health recommendations.

Several studies have explored how infectious diseases spread across borders and what it means for IDC policies and practices. For instance, the 2009 Q fever outbreak in the Dutch–German border area illustrated how delayed cross-border information exchange can hinder timely preventive actions (9), while experiences from European border regions during COVID-19 showed how border control measures created practical coordination challenges for public health actors (10). Against this background, preventive arrange-

ments appear less systematically examined across border settings, than crisis response and ad hoc outbreak management. Prevention includes measures aimed at reducing risks before outbreaks occur, such as vaccination, infection control in community and long-term care settings, and sustained health promotion. In border regions, preventive strategies intersect with specific challenges because infrastructures and responsibilities remain nationally organised, while daily life and mobility are transnational. Recognising prevention as a distinct and under-explored domain provides the basis for the following analysis.

In the aftermath of the COVID-19 pandemic, considerable attention has been paid to cross-border cooperation for cross-border IDC policies and practices, which has been manifested through initiatives such as the European vaccination passport (11) and specific regulations for cross-border pandemic threats, such as the EU framework on serious cross-border threats to health, first adopted in 2013 and reinforced in 2022 (12, 13). Additionally, the EU4Health Programme, running from 2021-2027, focuses on cross-border threats with one of its objectives dedicated to 'protecting people in the Union from serious cross-border threats to health and strengthening the responsiveness of health systems and coordination among the Member States in order to cope with serious cross-border threats to health' (14). Yet, as Van der Zanden et al. (15) argue, despite these developments, a European mindset in public health policymaking still seems to be lacking. While the EU provides strategic direction and funding, health competencies remain predominantly national, and cross-border cooperation largely depends on voluntary initiatives rather than formal EU coordination. This imbalance between EU-level frameworks and nationally anchored decision-making illustrates a persistent structural gap shaping the coherence and sustainability of cross-border public health collaboration (15, 16).

Previous scoping reviews have addressed related but distinct aspects of health and infectious disease preparedness in border settings. These include health outcomes in EU cross-border regions (17), infectious disease surveillance for refugees at borders and in receiving countries (18), health security and emergency preparedness at formal ground border crossings (19), and generic principles of public health emergency preparedness in EU and EEA countries (20). However, none of these reviews provides the same integrated and Europe-specific synthesis of infectious disease prevention and control policies and practices across adjacent European land border regions. Therefore, this study aims to scope the available evidence and map first, the infectious diseases involved, the geographical regions, and study designs that have been the focus of research so far. Second, the identified cross-border challenges, and third, the public health recommendations for improving cross-border cooperation.

METHODS

This scoping review followed a protocol developed in advance and made publicly available via the Open Science Framework (OSF)(21). The scoping review comprised formulation of the research questions, a comprehensive literature search, study selection, data charting and mapping, and reporting of findings. To inform the final search strategy, an initial exploratory search was undertaken to identify relevant terminology and indexing terms. The eligibility criteria were structured using the PCC framework, presented in Additional file 1. Reporting follows the PRISMA-ScR reporting guidelines (22) and the checklist is provided in Additional file 2. In line with JBI guidance for scoping reviews, no formal critical appraisal was undertaken, as the aim was to map the scope and characteristics of the available evidence rather than to assess study quality or effectiveness (23).

In this review, infectious disease prevention and control is abbreviated as IDC and refers to prevention and control oriented public health policies and practices in community and care settings, including surveillance, preparedness and response, and excluding curative care delivery.

Data charting was guided by a structured extraction form developed for this review and refined during the initial stages of data charting by BZ, KH, and AK to support clarity and consistent data capture. Extracted items included study purpose and design, the infectious diseases addressed, the countries and European land border settings involved, and the policies and practices described in relation to infectious disease prevention and control. In addition, we charted reported cross-border challenges and public health recommendations to improve cross-border cooperation. The results are presented in three sections: study characteristics and border settings, identified cross-border challenges, and reported public health recommendations.

Inclusion and exclusion criteria

Eligibility criteria were defined using the PCC framework and are summarised in Additional file 1. We included evidence sources focusing on populations, public health actors, or cross-border health practices in European land border regions in the relation to cross-border infectious disease prevention and control policies and practices in community and care settings. No restrictions were applied regarding age, gender, socioeconomic status, education, or ethnicity. We included peer reviewed studies using quantitative, qualitative, or mixed-methods designs including outbreak investigations and epidemiological studies, as well as relevant grey literature produced by official bodies and international organisations (Additional file 3). Language was restricted to English, German and Dutch as these were the languages spoken by the authors. Eligible evidence sources involved cooperation between at least two adjacent jurisdictions that share a land border within the wider European space of the Council of Europe, understood as 46 member states (1).

Evidence sources focusing on cross-border collaborations between non-neighbouring countries were excluded. Hospital-based studies were excluded to maintain a community perspective, as hospital data often reflect nosocomial infections influenced by clinical factors rather than general population dynamics.

Identifying relevant studies

The search strategy targeted peer reviewed publications and grey literature, including primary studies, review articles, and relevant reports. To inform the final search strategy, an exploratory search was undertaken on 23 May 2024 to identify relevant terminology and indexing terms. The search strategies were subsequently refined and run on 3 June 2024. A search update restricted to 2024 and 2025 was run on 9 January 2026. The update output was processed to avoid re-screening of records already retrieved in 2024 and to prepare a set of new records for screening. Within each database, the 2026 update export was compared with the 2024 export. Records that overlapped with the 2024 export were removed at this stage, because they had already been retrieved and screened in the initial round. The remaining updated records were then merged across databases for further de-duplication. After merging, remaining duplicates were removed, and records with a publication year of 2026 were excluded in line with the review time frame. Four bibliographic databases were searched, PubMed, Web of Science, Embase via Ovid, and the Cochrane Library. The database specific search strategies are provided in Additional file 3. Reference lists of included sources were screened for additional eligible evidence.

Grey literature was identified through targeted web searches conducted in April 2024 using Google Advanced Search and Google Scholar, as well as targeted searches of selected institutional and programme websites. For each source, the first 20 results per search were screened. The search logic and the list of grey literature sources are provided in Additional file 4. Searches were limited to sources published between 1994 and December 2025 in English, German, and Dutch. The search strategy was developed and executed by MH, who is both an information specialist and data specialist, in consultation with BZ.

Data screening and data charting

Search results were exported and managed in EndNote (version 20.6, Clarivate Analytics, PA, USA) for reference management and de-duplication. The EndNote library was imported into Rayyan (version 1.0.0; Rayyan Systems Inc., Cambridge, MA, USA) and merged with the existing Rayyan library from the initial search from 2024. Rayyan was then used to identify and remove any remaining duplicates across the combined dataset, including cross database duplicates and overlaps between the update set and the previously screened records. Title and abstract screening was performed by BZ against the eligibility criteria. In the initial screening phase, the eligibility criteria were discussed within the research team by BZ, KH, and AK and applied iteratively to support consistent interpretation. Records that were uncertain were assessed by CH as a second reviewer.

Where uncertainty remained, BZ and CH discussed the record and reached agreement. Full text reports were retrieved for records considered potentially eligible and were assessed using the same procedure.

Data charting was undertaken using a structured extraction form. The full data charting instrument is provided in Supplementary file 5. Extracted items included study purpose and design; the infectious diseases addressed; the countries and European land border settings involved; the IDC policies and practices described; reported cross-border challenges; and public health recommendations to improve cross-border cooperation.

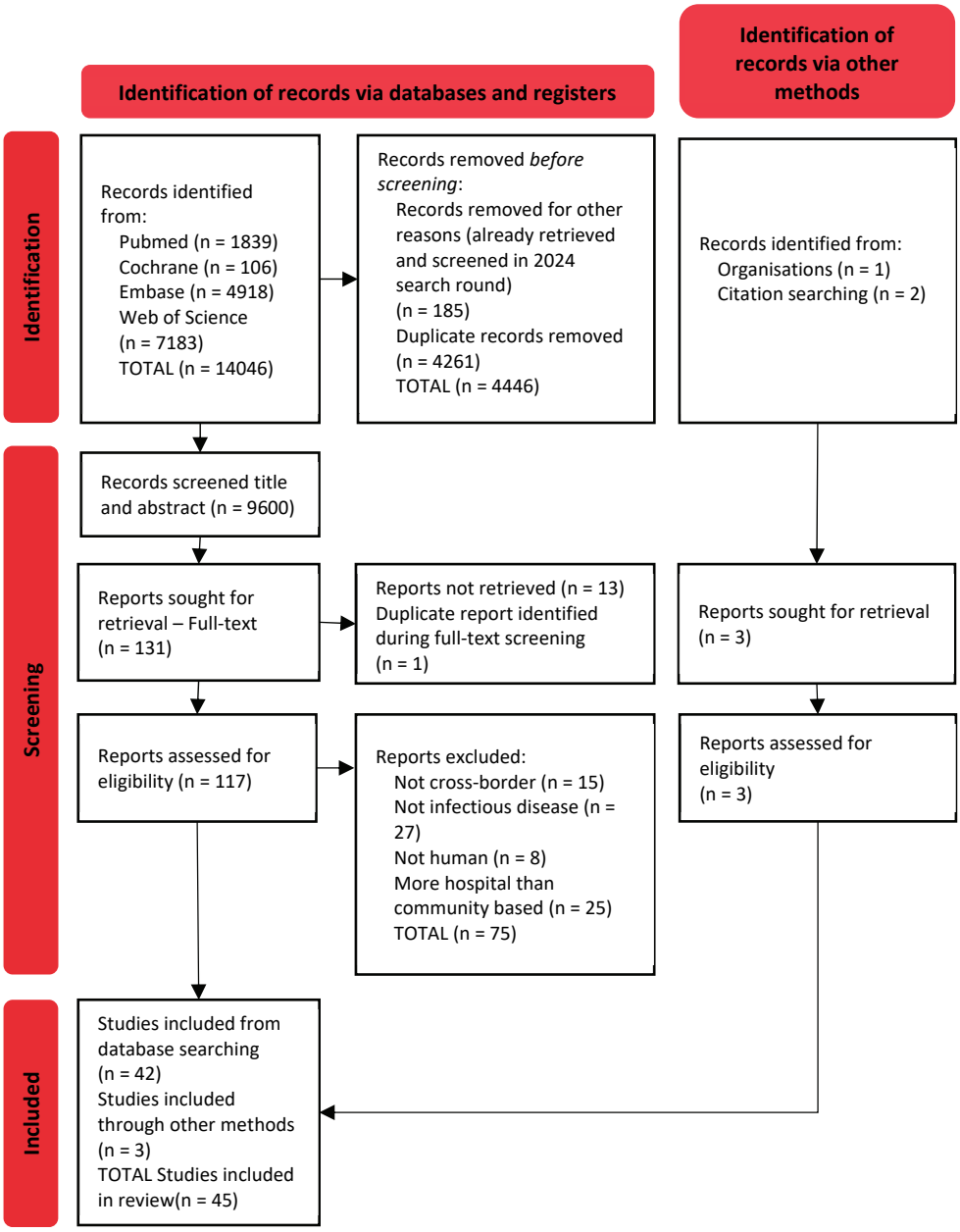
Data synthesis

Data were synthesised using descriptive mapping and narrative synthesis. For each included source, a structured summary was drafted based on the data extraction instrument. Extracted data were subsequently compiled into an Excel database to enable comparison across sources and to support structured reporting. Reported challenges were narratively compared across study focus and design, broader infectious disease groups, and geographical settings. Only statements that directly addressed cross-border infectious disease prevention and control in European land border regions were charted, excluding recommendations that related to other diseases, settings, or study contexts. Findings were synthesised and presented in three sections: study characteristics and border settings, identified cross-border challenges, and reported cross-border public health recommendations.

RESULTS

Selected articles

We initially identified 14,046 records. Before screening, 4,446 records were removed, comprising 4,261 duplicates and 185 records that had already been retrieved and screened during the 2024 screening round, leaving 9,600 records for title and abstract screening (see Figure 1). Eligibility was assessed based on inclusion and exclusion criteria for records screened by title and abstract, as well as for full-text records. Additionally, two studies were included after citation screening and one through grey-literature search. After final assessment, a total of 45 studies fulfilled the inclusion criteria. The result of the search is presented in a PRISMA flow diagram (24) (Figure 1).



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

Figure 1. PRISMA flow diagram of the search study selection process

Characteristics of the reviewed studies

We mapped the characteristics of the included studies (Table 1) and provided a detailed overview of all included studies in Table 2. For full references, see the reference list (2, 9, 10, 25-66). Although the eligibility period extended from 1994 until December 2025, most included studies were published between 2016 and 2025 (n=37, 82%), with the remainder published between 2011 and 2015.

Most studies reported results from outbreak investigations (n=24, 53%) (10, 25, 31-34, 36-41, 43, 45, 50, 53, 55, 57-62, 64) or epidemiological studies (n=18, 40%) (2, 9, 26-30, 42, 44, 46, 49, 51, 52, 54, 56, 63, 65, 66). Cross-sectional designs were most common (n=28, 62%) (2, 9, 27-30, 34-40, 42, 46-48, 50-52, 54-58, 61, 64, 65), followed by outbreak studies (n=7, 16%) (25, 32, 33, 41, 43, 45, 60) and modelling studies (n=4, 9%) (26, 44, 49, 66). No case-control studies, systematic reviews, or meta-analyses were present. Studies addressed both viral (2, 10, 26, 27, 35, 37, 44, 47-51, 54, 59, 60, 62) and bacterial (9, 25, 28-30, 32-34, 36, 39-43, 45, 46, 55-58, 61, 63-66) infections, frequently focusing on SARS-CoV-2 and MRSA, while some studies (n=5, 11%) (31, 38, 52, 53, 62) addressed infectious diseases more broadly. Target populations varied, including the general population, healthcare workers, nursing home residents, people living with HIV, and infected individuals. Sample sizes varied widely, ranging from studies of only three infected individuals (25) to a large-scale analysis with 55,121 participants (30). Several of the smaller studies concerned specific outbreaks. Geographically, Germany (2, 9, 10, 26, 30, 31, 33, 34, 36, 38, 39, 41, 44, 46, 47, 50, 51, 53-64, 66) and the Netherlands (2, 9, 10, 25, 26, 28-31, 34, 36, 38-40, 46, 50, 51, 53-64, 66) featured in 30 studies each (67%), while Belgium featured in 15 studies (33%) (2, 10, 25, 26, 28, 29, 40, 51, 54, 56, 57, 59, 63, 64, 66). Twenty-five studies (56%) included both the Netherlands and Germany (2, 9, 10, 26, 30, 31, 34, 36, 38, 39, 46, 50, 51, 53-64, 66), eleven (24%) included all three countries (2, 10, 26, 51, 54, 56, 57, 59, 63, 64, 66), and eleven studies (24%) (27, 32, 35, 37, 42, 43, 45, 48, 49, 52, 65) concerned other European border regions. No included studies concerned Southern European border regions.

EU funding was the most frequently reported source of funding, with 21 studies (47%) (28-31, 33, 34, 36, 39, 40, 46, 51, 53-59, 61, 63, 65) receiving full or partial EU funding, mainly through Interreg. Nineteen of these focused on the cross-border regions between the Netherlands, Germany, and Belgium (28-31, 34, 36, 39, 40, 46, 51, 53-59, 61, 63). National funding was reported in thirteen studies (29%) (2, 9, 10, 25, 35, 43, 44, 47, 48, 60, 62, 64, 66). Ten received funding from a single country (2, 25, 43, 44, 47, 48, 60, 62, 64, 66) and three received funding from multiple countries without EU funding (9, 10, 35). Eleven studies (24%) (26, 27, 32, 37, 38, 41, 42, 45, 49, 50, 52) reported no external funding. One of these drew on resources from an existing cross-border cooperation mechanism involving Norway, Finland, Sweden, Iceland and Denmark (49), which was not classified as external funding.

Table 1. Overview of the main study characteristics

Characteristic	Subcategory	Number of Studies (n)	Percentage (%)
1. Study Design	Cross-sectional study	28	62%
	Outbreak study	7	16%
	Modelling study	4	9%
	Intervention study	2	4%
	Cohort Study	1	2%
	Qualitative study	3	7%
2. Research Goal	Outbreak investigation	24	53%
	Epidemiological study	18	40%
	Microbiological study	3	7%
3. External Governmental Funding	No external funding	10	22%
	EU funding	10	22%
	EU and national funding	11	24%
	National funding	14	31%
4. Pathogen Studied	SARS-CoV-2 (COVID-19)	13	29%
	HIV	4	9%
	Multi-resistant bacteria	10	22%
	Bacteria – other	10	22%
	Virus – other	3	7%
	General (not pathogen-specific)	5	11%
5. Frequency of country involvement in a CB study*	Germany (DE)	30	67%
	The Netherlands (NL)	30	67%
	Belgium (BE)	15	33%
	Czech Republic (CZ)	4	10%
	Poland (PL)	4	10%
	Romania (RO)	3	8%
	Switzerland (CH)	3	8%
	Austria (AT)	2	4%
	Croatia (HR)	2	4%
	Denmark (DK)	2	4%
	France (FR)	2	4%
	Slovakia (SK)	2	4%
	Sweden (SE)	2	4%
	Bulgaria (BG)	1	2%
	Finland (FI)	1	2%
	Hungary (HU)	1	2%
	Ireland (IE)	1	2%
	Luxembourg (LU)	1	2%



Table 1. Overview of the main study characteristics (*continued*)

Characteristic	Subcategory	Number of Studies (n)	Percentage (%)
	Montenegro (ME)	1	2%
	Norway (NO)	1	2%
	Serbia (RS)	1	2%
	Slovenia (SI)	1	2%
	Ukraine (UA)	1	2%
	United Kingdom (UK)	1	2%

*Note: The total exceeds 45 because this table reflects the number of times countries were involved in the studies. As all studies concern cross-border cooperation between two or more countries, each country's participation is counted separately.

Table 2 summarises the distribution of infectious diseases and study characteristics across the included publications. As shown, the included evidence was concentrated on a limited number of infectious diseases and geographic regions. Respiratory infections, particularly COVID-19, influenza, and tuberculosis, were most frequently studied, followed by antimicrobial-resistant pathogens such as MRSA. A smaller number of studies addressed zoonotic and food-borne infections, including Salmonella and Q fever. Overall, the included evidence was thematically concentrated and geographically focused on Northwestern Europe, particularly in the Netherlands-Germany-Belgium border region.

Table 2. Summary of 45 included studies and their key characteristics

Author	Study design	Countries involved (ISO-code)	Target group	Research goal	Pathogen	Financed with external governmental funds?
Bedri et al. (2025) (62)	Qualitative study	NL, DE	23 Study participants	Outbreak investigation	Uncomplicated urinary tract Infection	Funds from NL
De Boeck et al. (2016) (25)	outbreak study	NL, BE	3 Infected individuals	Outbreak investigation	Chlamydia psittaci	Funds from BE
Brackx et al. (2022) (26)	Modelling study	NL, BE, DE, FR, LU	General population	Epidemiological study	SARS-CoV-2 (COVID-19)	No external funding
Charpentier et al. (2021) (27)	cross-sectional study	FR, CH	157 Infected individuals	Epidemiological study	HIV	No external funding
De Koster et al. (2024) (28)	cross-sectional study	NL, BE	3,375 Study participants	Epidemiological study	colistin-resistant Enterobacterales (ColR-E)	EU Interreg VA funds

Table 2. Summary of 45 included studies and their key characteristics (*continued*)

Author	Study design	Countries involved (ISO-code)	Target group	Research goal	Pathogen	Financed with external governmental funds?
Dequeker et al. (2024) (29)	cross-sectional study	NL, BE	947 Study participants	Epidemiological study	MDRO: ESBL-E, ciproR-E	EU Interreg VA funds and funds from NL and BE
Dieminger et al. (2022) (10)	Qualitative study	NL, DE, BE	27 Study participants	Outbreak investigation	SARS-CoV-2 (COVID-19)	Funds from NL and DE
Dik et al. (2016) (30)	cross-sectional study	NL, DE	55,121 Study participants	Epidemiological study	Antibiotics	EU Interreg IVA and funds from NL and DE
Eikelenboom-Boskamp et al. (2011) (31)	Intervention study	NL, DE	General population	Outbreak investigation	Infectious Disease	EU Interreg IIIA funds
Espenhain et al. (2019) (32)	outbreak study	SE, DK	57 Infected individuals	Outbreak investigation	Yersinia enterocolitica O3	No external funding
Fiebig et al. (2017) (33)	outbreak study	AT, RO, DE	13 Infected individuals	Outbreak investigation	Tuberculosis (TB)	EU FP7 funds and Funds from DE
Friedrich et al. (2009) (34)	cross-sectional study	NL, DE	59 Healthcare services	Outbreak investigation	MRSA	EU Interreg IIIA funds
Hackert et al. (2020) (9)	cross-sectional study	NL, DE	3,460 Study participants	Epidemiological study	Coxiella burnetii (Q-fever)	Funds from DE and NL
Hanssen et al. (2025) (63)	Cohort Study	NL, DE, BE	3,110 Study participants	Epidemiological study	SARS-CoV-2 (COVID-19)	EU Interreg VA funds
Jovanovic et al. (2023) (35)	cross-sectional study	RS, SI, ME, RO, HR	2,415 sequences	Microbiological study	HIV- 1 subtype B	Funds from RS and SI
Jurke et al. (2011) (36)	cross-sectional study	NL, DE	General population	Outbreak investigation	MRSA	EU Interreg IIIA funds
Kamburova (2017) (37)	cross-sectional study	BG, RO	3,464 Infected individuals	Outbreak investigation	Measles	No external funding
Kampman et al. (2020) (38)	cross-sectional study	NL, DE	2,664 Study participants	Outbreak investigation	Sexually Transmitted Infections	No external funding
Keizer et al. (2019) (39)	cross-sectional study	NL, DE	574 Study participants	Outbreak investigation	MDRO: MRSA and VRE	EU Interreg IVA funds

Table 2. Summary of 45 included studies and their key characteristics (*continued*)

Author	Study design	Countries involved (ISO-code)	Target group	Research goal	Pathogen	Financed with external governmental funds?
Kluytmans-van den Bergh et al. (2019) (40)	cross-sectional study	NL, BE	10,200 Study participants	Outbreak investigation	MDRO: ESBL-E, carbaR-GNS, coliR-E, ciproR-E, VRE	EU Interreg VA funds and funds from NL and BE
Knoblauch et al. (2015) (41)	outbreak study	DE, CH	20 Infected individuals	Outbreak investigation	Salmonella enterica ssp. enterica serovar Bovismorbificans	No external funding
Kozinska et al. (2016) (42)	cross-sectional study	PL, CZ, SK	209 Infected individuals	Epidemiological study	Mycobacterium Tuberculosis (TB)	No external funding
Labska et al. (2021) (43)	outbreak study	CZ, SK	325 Infected individuals	Outbreak investigation	Salmonella spp.	Funds from CZ
Maessen et al. (2019) (61)	cross-sectional study	NL, DE	86 study participants	Outbreak investigation	MDRO, Carbapenem-resistant Enterobacteriaceae (CRE)	EU Interreg VA funds and funds from NL and DE
Mertel et al. (2023) (44)	Modelling study	CZ, DE	General population	Epidemiological study	SARS-CoV-2 (COVID-19)	Funds from DE
Nakakawa et al. (2025) (64)	cross-sectional study	NL, DE, BE	24 Study participants	Outbreak investigation	HIV	Funds from NL
O'Brien et al. (2020) (45)	outbreak study	IE, UK	21 Infected individuals	Outbreak investigation	Shigella sonnei	No external funding
Pagen et al. (2024) (2)	cross-sectional study	NL, BE, DE	9,996 Study participants	Epidemiological study	SARS-CoV-2 (COVID-19)	Funds from NL
Paget et al. (2015) (46)	cross-sectional study	NL, DE	974 Study participants	Epidemiological study	MRSA	EU Interreg IVA funds
Serwin et al. (2022) (47)	cross-sectional study	PL, DE	19,994 Sequences	Microbiological study	SARS-CoV-2 (COVID-19)	Funds from PL
Serwin et al. (2023) (48)	cross-sectional study	PL, UA	9.513 Sequences	Microbiological study	HIV	Funds from PL
Shubin et al. (2023) (49)	Modelling study	DK, NO, SE, FI	General population	Epidemiological study	SARS-CoV-2 (COVID-19)	CB funding by Nordic countries (NO, FI, SE, IS, DK)
Sperle et al. (2023) (50)	cross-sectional study	DE, AT, NL, CH	5,757 infected individuals	Outbreak investigation	SARS-CoV-2 (COVID-19)	No external funding

Table 2. Summary of 45 included studies and their key characteristics (*continued*)

Author	Study design	Countries involved (ISO-code)	Target group	Research goal	Pathogen	Financed with external governmental funds?
Stabourlos et al. (2023) (51)	cross-sectional study	NL, BE, DE	6,006 Study participants	Epidemiological study	SARS-CoV-2 (COVID-19)	EU Interreg VA funds
Stefanoff et al. (2014) (52)	cross-sectional study	CZ, PL	General population	Epidemiological study	Tick-borne encephalitis (TBE), Lyme borreliosis (LB)	No external funding
Szinger et al. (2024) (65)	cross-sectional study	HU, HR	5,643 Study participants	Epidemiological study	Measles virus, mumps virus, rubella virus	IPA HU-HR cross-border programme grant and funds from HU
Ter Waarbeek et al. (2011) (53)	Intervention study	NL, DE	2 Healthcare services	Outbreak investigation	Infectious Disease	EU Interreg IIIA funds and national funds from NL and DE
Van Bilsen et al. (2024) (54)	cross-sectional study	NL, BE, DE	3,543 Exposed individuals	Epidemiological study	SARS-CoV-2 (COVID-19)	EU Interreg VA funds
Van der Donk et al. (2012) (55)	cross-sectional study	NL, DE	433 Isolates	Outbreak investigation	Staphylococcus aureus	EU Interreg IVA funds and national funds from NL, DE and BE
Van der Donk et al. (2013) (56)	cross-sectional study	NL, BE, DE	4,042 Study participants	Epidemiological study	MRSA	EU Interreg IVA funds and national funds from NL, DE and BE
Van der Donk et al. (2013) (57)	cross-sectional study	NL, BE, DE	1,651 Study participants	Outbreak investigation	Escherichia coli	EU Interreg IVA funds and national funds from NL, DE and BE
Van der Donk et al. (2013) (58)	cross-sectional study	NL, DE	728 patients	Outbreak investigation	Staphylococcus aureus	EU Interreg IVA funds and national funds from NL, DE and BE
Van der Zanden et al. (2021) (59)	Qualitative study	NL, BE, DE	192 Study participants	Outbreak investigation	SARS-CoV-2 (COVID-19)	EU Interreg VA funds
Van der Zanden et al. (2025) (66)	Modelling study	NL, BE, DE	4,095,607 infected individuals	Epidemiological study	SARS-CoV-2 (COVID-19)	Funds from NL
Van Hensbergen et al. (2021) (60)	Outbreak study	NL, DE	46 Study participants	Outbreak investigation	SARS-CoV-2 (COVID-19)	Funds from NL

Vector-borne and other emerging infections were scarcely represented among the included studies. Only a few studies addressed West Nile virus or tick-borne diseases, while most included studies focused on well-established infections.

Geographically, more than half of the included studies originated from the Netherlands-Germany-Belgium border region. In contrast, southern European border regions were absent, while eastern European border regions were or only rarely represented, limiting the extent to which the findings reflect cross-border infectious disease control across Europe. A smaller cluster of publications concerned Nordic and central European borders and focused mainly on pandemic-related collaboration.

Regarding study focus and design, most publications were descriptive, mapping surveillance systems, outbreak responses, or institutional networks, whereas systematic evaluations or long-term assessments of cross-border governance were rarely reported. Only a few studies applied qualitative or mixed-methods approaches to explore underlying social or organisational processes.

Challenges of cross-border infectious disease control

The reviewed articles described several forms of temporary, project-based cooperation in cross-border infectious disease control. Among the outbreak investigations and response in a variety of ways (10, 25, 31-34, 36-41, 43, 45, 50, 53, 55, 57-62, 64). In some outbreak investigations (25, 32-34, 41, 43, 45, 50, 53, 61) early communication and information exchange supported the identification and coordination of the cross-border response. For example, in the cross-border outbreak described by O'Brien et al. (45), "early communication and the sharing of information within the outbreak control team facilitated the early detection of the international dimension of this outbreak". While these studies reported positive outcomes from project-based efforts, these outcomes primarily referred to operational performance, such as faster bi-national signal detection, coordinated tracing, and actionable joint decisions, rather than long-term impact metrics. However, structural institutionalisation after project completion was rarely assessed. Across the 45 studies, at least eleven were limited to a specific outbreak or project and did not report any post-project institutional follow-up (32, 33, 41, 43, 45, 50-52, 62-64). Where sustainability was discussed, it was generally framed as a recommendation rather than evaluated as an outcome (34, 39, 53). Within the included evidence, the durability of structural or institutionalised cooperation beyond the project period was therefore rarely evaluated. In addition to these findings, the studies identified a range of challenges, which were categorised into twelve thematic clusters described in Table 3, including fragmented surveillance and data integration, legal and procedural discrepancies, communication and language barriers, and limited resources and capacities.

Among the 45 included studies, the most frequently reported challenges were gaps in cross-border data integration (n=12, 27%) (10, 32-34, 38, 39, 42, 45, 46, 49, 63, 66) and fragmented cross-border surveillance and monitoring (n=10, 22%) (9, 28, 32, 35, 41, 42, 47, 48, 52, 60). These studies reported that surveillance and monitoring remained largely nationally organised, which was associated with inconsistent data and delays in outbreak detection. Differences in data formats, testing strategies, and IT infrastructure further hindered the establishment of a reliable and shared epidemiological overview. For example, Espenhain et al. (32) and Stefanoff et al. (52) described uncoordinated and heterogeneous national surveillance systems that impeded timely detection of cross-border outbreaks. In addition, O'Brien et al. (45) and Friedrich (34) reported that the absence of shared databases and incompatible IT systems hindered data integration and joint analysis across borders. Our analysis also identified joint outbreak investigations in which cross-border collaboration and information exchange were reported. Examples included the coordinated response to psittacosis cases between Belgium and the Netherlands (25), tuberculosis tracing across Austria, Romania, and Germany (33), and the COVID-19 investigations in the Meuse-Rhine Euroregion (50). Overall, these studies highlighted persistent problems resulting from national surveillance systems that were insufficiently coordinated across borders, together with inconsistent incidence reporting and fragmented data-sharing practices with inadequate IT infrastructure and divergent testing strategies.

Barriers in cross-border communication were reported in ten studies (22%), including divergent national protocols, inconsistent public messaging, and delayed information exchange

(9, 25, 34, 39, 45, 49, 50, 54, 61, 64). Limited information exchange, lack of access to each other's systems, and differences in communication protocols were reported to delay in decision-making and coordination, particularly in outbreak detection and joint response. For instance, De Boeck et al. (25) described delays in source tracing because two countries and several public health authorities were involved, while Sperle et al. (50) reported delays in information exchange, missing data and a lack of clear and easy-to-use communication channels during cross-border COVID-19 case and contact tracing. Nine studies (20%) mentioned a lack of harmonised guidelines and reporting standards (30, 32, 34, 38, 39, 41, 44, 53, 62). Espenhain et al. (32) reported differences in case definitions and reporting criteria applied across national surveillance systems, and Knoblauch et al. (41) highlighted how differing laboratory standards delayed the recognition of a cross-border Salmonella outbreak.

Other challenges included increasing transmission risks due to cross-border mobility (n=6, 13%) (29, 31, 47-49, 60), for example Shubin et al. (49) found that the effect of inter-country mobility on COVID-19 epidemic growth was most pronounced when sub-

stantial travel occurred from countries with a high prevalence to countries with a lower prevalence. Further issues were the lack of standardised diagnostic methods (n=5, 11%) (9, 33, 41, 42, 52), uncoordinated cross-border responses (n=5, 11%) (32, 33, 45, 60, 61) and divergent border and public health policies (n=5, 11%) (2, 38, 44, 49, 66). The latter were associated with inconsistencies in containment strategies. Less frequently reported issues were limited data mobility (n=5, 11%) (38, 44, 47, 49, 66), divergent prescribing practices (n=5, 11%) (28, 30, 39, 58, 62), limited legal cooperation frameworks (n=3, 7%) (10, 45, 64), and restricted healthcare access in border regions (n=2, 4%) (27, 64). Several broader patterns can be identified across the included studies. Specifically, challenges related to data integration, surveillance, communication, harmonisation, diagnostic procedures, and cross-border response showed considerable thematic overlap. Across the studies, these challenges were reported in situations where nationally organised systems had to operate across borders. The studies described differences in data and reporting structures, laboratory methods, IT systems, communication channels, policies, legal and regulatory arrangements, and administrative responsibilities. In studies of specific outbreaks, these differences became visible as operational problems in timely notification, information exchange, source tracing, case identification, and coordination between the authorities involved (25, 32, 33, 41, 43, 45, 50, 60). Studies comparing surveillance systems, diagnostic or clinical practices, and epidemiological patterns described differences in surveillance performance, case definitions, laboratory and clinical guidelines, prescribing practices, and the availability or comparability of data (9, 28, 30, 39, 42, 44, 46, 52, 62, 66). This distinction was not absolute, as problems with data exchange and system compatibility also affected specific outbreak investigations.

Different emphases were also visible across broader infectious disease groups. For instance, in studies on COVID-19, the reported challenges included cross-border mobility, divergent national measures, limited mobility or comparable epidemiological data, communication, and cross-border case and contact tracing (2, 10, 26, 44, 49, 50, 54, 59, 60, 66). Studies on antimicrobial resistance and antibiotic use described differences in surveillance, prescribing practices, infection-control and diagnostic approaches, and data exchange between national systems (28, 30, 34, 39, 46, 62). In studies of foodborne and zoonotic infections, the reported challenges concerned timely cross-border notification and information exchange, source tracing, outbreak recognition, and the combination of epidemiological and microbiological information (9, 25, 32, 41, 43, 45). These patterns were not exclusive, and several challenges occurred across multiple disease groups. Consistent regional differences could not be established because the evidence was strongly concentrated in border regions involving the Netherlands, Germany, and Belgium, while studies from other European border regions were too few and heterogeneous to support a reliable regional comparison.

Table 3. Overview of twelve reported cross-border challenges, ranked by frequency of mention.

	Main Challenge	Explanation of Challenge	N	Reference
1	Gaps in cross-border data integration	Inconsistent data-sharing practices, inadequate IT infrastructure, and logistical barriers fragment epidemiological monitoring. Varying testing strategies further distort incidence rates, making cross-country comparisons unreliable and hindering a coordinated public health response.	12	(10), (32), (33), (34), (38), (39), (42), (45), (46), (49), (63), (66)
2	Fragmented cross-border surveillance and monitoring	The absence of a coordinated cross-border surveillance system and differences in public health infrastructures lead to inconsistent incidence data and varying disease reporting. These gaps hinder real-time outbreak monitoring, delaying warnings and responses, which allows infections to spread unnoticed.	10	(9), (28), (32), (35), (41), (42), (47), (48), (52), (60)
3	Barriers in cross-border communication	Delays in information exchange between national authorities and limited communication among professionals hinder effective collaboration. Additionally, inconsistencies in public education and awareness campaigns can lead to misunderstandings, further complicating coordinated responses to health threats.	10	(9), (25), (34), (39), (45), (49), (50), (54), (61), (64)
4	Lack of harmonised guidelines and reporting standards	Divergent national guidelines, reporting protocols, and policy frameworks create inconsistencies in response measures. These differences hinder coordination, delay decision-making, and reduce the effectiveness of cross-border outbreak management.	9	(30), (32), (34), (38), (39), (41), (44), (53), (62)
5	Cross-border mobility increases transmission risks	The movement of individuals across borders accelerates the spread of infections and complicates monitoring efforts, making containment strategies more challenging.	6	(29), (31), (47), (48), (49), (60)
6	Lack of standardised diagnostic methods	Differences in diagnostic procedures and testing criteria across countries make it difficult to ensure accurate case identification. These inconsistencies lead to variations in disease classification and complicate clinical decision-making.	5	(9), (33), (41), (42), (52)
7	Lack of coordinated cross-border response and dependence on voluntary cooperation	The reliance on voluntary cooperation between countries weakens response strategies, leading to inconsistent and ineffective actions in managing public health threats across borders.	5	(32), (33), (45), (60), (61)
8	Divergent border and public health policies hinder coordination	Inconsistent border restrictions and differing national health strategies complicate a unified response to cross-border outbreaks. These misalignments weaken collaboration and can lead to negative social and economic consequences.	5	(2), (38), (44), (49), (66)
9	Limited mobility data hinders outbreak tracking	The lack of accurate mobility data and inconsistent travel registration complicate the tracking of transmission chains in cross-border outbreaks. This gap weakens outbreak response efforts and increases the risk of uncontrolled disease spread.	5	(38), (44), (47), (49), (66)

Table 3. Overview of twelve reported cross-border challenges, ranked by frequency of mention. (*continued*)

	Main Challenge	Explanation of Challenge	N	Reference
10	Divergent prescribing practices and antibiotic use	Differences in prescribing habits and antibiotic use lead to inconsistencies in treatment approaches and contribute to antimicrobial resistance. These disparities make it challenging to implement standardised guidelines for effective disease control.	5	(28), (30), (39), (58), (62)
11	Legal barriers to cross-border cooperation	Divergent legal systems and the absence of binding international regulations hinder the establishment of joint cross-border measures, making coordinated responses more difficult.	3	(10), (45), (64)
12	Limited healthcare access across borders delays detection and treatment	Restricted access to healthcare services for cross-border populations hampers timely disease detection and effective treatment, increasing the risk of uncontrolled outbreaks.	2	(27), (64)

Cross-border public health recommendations

In addition to the identified challenges, the reviewed studies also provided concrete recommendations to strengthen cross-border public health collaboration. We identified eleven public health recommendations for cross-border infectious disease control (Table 4). These recommendations span institutional, technical, and policy domains, addressing how surveillance, data exchange, crisis response, and long-term governance can be improved.

The most frequently cited recommendation was strengthening institutional collaboration (n=25, 56%) (2, 9, 10, 26, 30-32, 34, 39-43, 45, 50-54, 59-62, 64, 66) including the formalisation of partnerships, the development of sustainable networks, and improved coordination between public health authorities, scientific institutions, and policymakers across borders. The recommendations concerned not only emergency response, but also prevention, monitoring, and policy development. Recommendations included the development of structural cooperation mechanisms, cross-border public health networks, and joint initiatives integrating both human and veterinary health sectors to improve surveillance, particularly for zoonoses. For example, Based on the EUREGIO MRSA-net experience, Friedrich (34) highlighted the value of cross-border structures and the needs of healthcare workers into account when developing effective cross-border networks that bring together healthcare providers and public health authorities and establish shared infection-control protocols, communication channels, training, and surveillance structures, while Van der Zanden and Maes (59) recommended new coordination mechanisms to ensure that national health policies take account of their effects on border regions.

A second recurring recommendation concerned the establishment of harmonised cross-border surveillance systems. Eleven studies (24%) (9, 28, 33-35, 40, 43, 47, 52, 53, 57), recommended greater standardisation of laboratory methods, screening protocols, and reporting criteria. Several also called for improved access to shared data infrastructure to support timely detection, epidemiological comparison, and coordinated decision-making. For example, Fiebig et al. (33) highlighted the need for systematic and timely integration of genotyping and sequencing data into routine tuberculosis surveillance and raised the possibility of using a secure interactive online platform to support cross-border communication.

In addition, nine studies (20%) (9, 34, 42, 44, 53, 56, 57, 63, 66), highlighted the importance of enhanced data sharing and epidemiological analysis, with recommendations focusing on improved real-time access to data, stronger IT systems, and ensuring timely communication during outbreaks. Improving cross-border crisis response mechanisms was recommended in eight studies (18%) (2, 25, 41, 43-45, 49, 61). These studies addressed outbreak response procedures, coordination mechanisms, and approaches to assessing cross-border preparedness. For example, Maessen et al. (61) recommended simulation studies to assess the coordination needs of cross-border response networks and proposed either joint leadership by regional public health services from both countries or a broader binational steering group to coordinate outbreak response. Labska et al. (43) recommended using the jointly developed trawling questionnaire in future investigations of suspected foodborne outbreaks to support timely cross-border investigation. Other recommendations included harmonising national policies (n=6, 13%) (26, 29, 39, 47, 59, 60), advancing scientific research (n=6, 13%) (45, 53, 56, 61, 65, 66). Strengthening knowledge exchange (34, 45, 51, 58, 62) and training (38, 39, 50, 62, 64) were each mentioned in five studies (11%), while awareness of the social and economic impact was mentioned four times (9%) (54, 59, 60, 66). Improving diagnostic infrastructure (42, 43, 60) and long-term policy alignment (27, 53, 63) were each mentioned in three studies (7%).

Across the studies, the recommendations broadly corresponded to the types of challenges identified. Operational challenges related to communication, notification, and outbreak response were commonly accompanied by recommendations for faster information exchange and clearer coordination mechanisms (2, 25, 34, 41, 43-45, 50, 53, 61), whereas structural challenges related to surveillance, data compatibility, and institutional fragmentation were accompanied by recommendations for harmonised systems, shared infrastructures, and more sustained cross-border collaboration (9, 28, 33-35, 39, 40, 52, 53, 57, 59-62, 66)



Table 4. Overview of eleven reported public health recommendations, ranked by frequency of mention.

	Main Recommendation	Explanation of recommendation	N	Reference
1	Strengthen institutional collaboration for cross-border public health	It is recommended to strengthen cross-border public health collaboration by formalising partnerships, expanding networks, and improving communication and coordination between public health authorities, policymakers, and scientific institutions. Integrating veterinary and public health authorities into joint initiatives will enhance the detection of zoonotic diseases and improve surveillance. Structural cooperation mechanisms, such as cross-border partnerships, should be established to facilitate coordinated public health efforts.	25	(2), (9), (10), (26), (30), (31), (32), (34), (39), (40), (41), (42), (43), (45), (50), (51), (52), (53), (54), (59), (60), (61), (62), (64), (66)
2	Establish a harmonised cross-border surveillance system	A coordinated surveillance system should be developed to monitor antimicrobial resistance and infectious diseases, including MDR-TB and MRSA. Standardised screening protocols, laboratory methods, and food safety procedures must be implemented to ensure accurate comparison of test results and epidemiological data between countries.	11	(9), (28), (33), (34), (35), (40), (43), (47), (52), (53), (57)
3	Enhance cross-border data sharing and epidemiological analysis including advancing technology infrastructure	Data-sharing mechanisms should be expanded to improve the understanding of epidemiological trends and transmission routes. Countries must facilitate real-time access to health data, ensuring timely interventions and coordinated responses to outbreaks. Standardised monitoring programmes and response measures should be implemented to ensure consistency in public health interventions across borders.	9	(9), (34), (42), (44), (53), (56), (57), (63), (66)
4	Enhance cross-border crisis response and emergency measures	Notification and communication systems should be improved to ensure a rapid and coordinated response to cross-border outbreaks. Response measures must be tailored to cross-border hotspots, recognising that outbreaks often spread asymmetrically across national territories. Border restrictions should be carefully assessed before implementation to avoid unintended negative consequences.	8	(2), (25), (41), (43), (44), (45), (49), (61)

Table 4. Overview of eleven reported public health recommendations, ranked by frequency of mention. (*continued*)

	Main Recommendation	Explanation of recommendation	N	Reference
5	Harmonise policies for effective cross-border public health	To improve cross-border public health responses, it is recommended to harmonise travel restrictions, prevention measures, and pandemic strategies between neighbouring countries. Aligning policies helps prevent confusion, inefficiencies, and unintended shifts in cross-border mobility, as seen during COVID-19. Additionally, national policies should be adapted to address the specific health challenges of border regions, ensuring more effective and regionally relevant interventions.	6	(26), (29), (39), (47), (59), (60)
6	Advance scientific research for cross-border public health	Research efforts should focus on improving cross-border collaboration by assessing how existing systems can be adapted to different regions. Studies on the long-term effects of cross-border mobility should be expanded to strengthen the evidence base for future pandemic policies. Spatial epidemiological models must be developed to identify potential transmission areas without relying on direct mobility data, enabling more precise and targeted public health measures.	6	(45), (53), (56), (61), (65), (66)
7	Enhance knowledge-sharing and data exchange	It is recommended to strengthen cross-border knowledge-sharing by improving the exchange of epidemiological data, research, and best practices. Establishing a well-integrated system for data-sharing will accelerate outbreak detection and containment.	5	(34), (45), (51), (58), (62)
8	Strengthen public health training and education	To enhance cross-border cooperation, standardised training programmes should be developed for healthcare professionals in border regions, ensuring effective knowledge exchange despite differences in healthcare structures and practices. In addition, public health education and preventive measures should be promoted to raise awareness and improve compliance among citizens, patients, and target groups.	5	(38), (39), (50), (62), (64)
9	Balance public health measures with socio-economic stability in border regions	Public health measures in border regions should be designed with greater awareness of their social and economic impact, ensuring a balance between health protection and economic stability. Cross-border policy coordination must be strengthened to align regulations and minimise disruptions for local communities. Even in crisis situations, access to healthcare and family visits across borders must be safeguarded to avoid unnecessary restrictions on daily life.	4	(54), (59), (60), (66)

Table 4. Overview of eleven reported public health recommendations, ranked by frequency of mention. (*continued*)

	Main Recommendation	Explanation of recommendation	N	Reference
10	Strengthen diagnostic infrastructure and molecular typing capabilities	Advanced molecular typing methods, such as whole genome sequencing (WGS) and pulsed-field gel electrophoresis (PFGE), should be widely accessible to improve outbreak detection and source identification. Investment in laboratory infrastructure and harmonised diagnostic tools is essential for strengthening disease control and public health preparedness.	3	(42), (43), (60)
11	Promoting long-term policy harmonisation and surveillance strategies	It is recommended to extend cross-border collaboration beyond emergency response by developing long-term policies and aligning surveillance strategies. Establishing joint strategies for disease monitoring, data-sharing, and policy implementation will improve responses to future health threats.	3	(27), (53), (63)

DISCUSSION

This scoping review examined the scope and characteristics of the current evidence base on cross-border infectious disease prevention and control in European border regions, the cross-border challenges reported across studies, and the public health recommendations proposed. We identified three overarching research patterns. First, the included evidence was thematically concentrated on a range of infectious diseases and geographically concentrated in a small number of border regions. Second, structural and systemic barriers were repeatedly reported across national organised systems, particularly in relation to surveillance, data exchange, communication and harmonisation . Third, strengthening the structural basis of cross-border collaboration was widely recommended, particularly through institutional partnerships, and harmonised surveillance.

Thematic and geographical concentration of the included evidence

The thematic distribution of the included evidence did not fully correspond with some current European infectious disease preparedness priorities. This suggests that certain threats remain underrepresented in the cross-border evidence captured by this review. Arboviral diseases provide one example, as recent European public health guidance highlights the growing relevance of Aedes-borne viral diseases for preparedness, surveillance, prevention and control in the EU/EEA (67). The limited representation of vector-borne and other emerging infections in the included evidence is therefore noteworthy, given projections that some of these pathogens may expand geographically or increase in incidence across Europe under changing climatic and ecological conditions (68). European policy has addressed serious cross-border health threats since Decision No 1082/2013/

EU, primarily through coordination of national surveillance, preparedness, early warning, and response (13). Regulation (EU) 2022/2371 subsequently strengthened this framework and made cross-border interregional preparedness and cooperation between neighbouring border regions more explicit (12). The limited representation of emerging infectious disease threats in the included evidence therefore points less to the absence of a policy framework than to a need for research on how these provisions are translated into preparedness, surveillance, and response in specific European border regions.

More than half of the included studies concerned the Netherlands-Germany-Belgium border region. This concentration of publications may partly reflect the region's long-standing history of cross-border cooperation and the research generated through collaborative initiatives (69, 70). As a result, much of the available evidence is derived from a limited number of relatively established border settings. This restricts the extent to which findings on cooperation mechanisms, organisational arrangements, and implementation can be generalised to other European border regions with different institutional, epidemiological, and administrative contexts. The predominance of descriptive studies further limits conclusions about the effectiveness and the long-term durability of the cooperation mechanisms described.

EU funding, particularly through Interreg, was frequently reported among the included studies especially in the Netherlands-Germany-Belgium border region. This demonstrates the prominence of project funding within the evidence captured by this review but does not establish that cross-border infectious disease cooperation is generally dependent on it. As post-project institutional follow-up was rarely evaluated, the review could not determine how often project-based activities continued after funding ended. Research on European cross-border regions and Euregional health projects indicates that project funding can initiate and support cooperation, while continuation beyond the funding period may depend on adequate resources and more enduring organisational and financial arrangements (69, 70). More general research on temporary projects and collaborative infrastructures similarly suggests that accumulated activities and knowledge may be difficult to maintain when short project cycles are not connected to more enduring organisational and network structures (71, 72) . The findings therefore raise questions about how project-based cross-border cooperation becomes institutionally and financially embedded beyond the funding period, rather than demonstrating that cooperation ended when funding ceased.

Evaluative studies of cross-border collaboration and interventions were underrepresented in the included evidence. Most studies were descriptive, while systematic evaluations of implementation and the long-term durability of structural cross-border cooperation were rarely reported. Where positive outcomes were described, these generally concerned operational achievements, such as timely information exchange, outbreak detection, or

coordinated response, rather than comparative or long-term measures of effectiveness. A recent scoping review of health security at ground border crossings likewise emphasised the need for evidence-based research, standardised data collection, and regular on-site assessments to support the evaluation and implementation of border health measures (73). Consequently, the available evidence provides limited insight into which forms of cross-border collaboration are effective, under what conditions, and in which border settings. More systematic evaluation is therefore needed to move from descriptions of cooperation towards evidence that can inform the design and adaptation of cross-border interventions.

Structural and systemic barriers shape cross-border public health challenges

This scoping review showed that recurring challenges in cross-border infectious disease control in Europe were not limited to technical incompatibilities, but were also embedded in governance arrangements, legal competences, and information-sharing practices (16, 74, 75). At the same time, several projects demonstrated that harmonisation across borders was possible in specific technical and organisational areas. For instance, Interreg-funded initiatives enabled laboratories to align diagnostic protocols and surveillance methods, which improved the comparability of results and facilitated joint outbreak detection (39, 40). These examples show that technical and organisational barriers can be reduced when cross-border partners invest in standardisation and shared practices, but that such technical alignment does not necessarily resolve the broader institutional conditions under which national systems collaborate across borders. The included literature largely focused on practical arrangements for cooperation or coordination, while more far-reaching forms of technical, organisational and institutional alignments were discussed less frequently. This may reflect a predominantly pragmatic orientation within the included literature towards making collaboration workable within national structures, rather than towards developing more enduring and closely coordinated institutional arrangements (16). A similar tension is visible in international food safety domain. Savelli et al. (76) describe how limitation in the streamlined exchange of traceability and laboratory information can undermine confidence in risk assessments and complicate coordination between countries.

National differences in reporting criteria, policies, and legal mandates further complicated coordinated decision-making during cross-border outbreaks and contributed to delays and inconsistencies in collaboration. Aristei et al. (16) similarly argue that regulatory conflicts, fragmented governance, and insufficiently harmonised decision-making can limit a timely and coordinated response to health emergencies. Although European frameworks provide mechanisms for coordination, key legal competences and operational responsibilities remain largely nationally organised. This may constrain consistent and timely action across Member States.

These barriers were linked to fragmented responsibilities, divergent interests and concerns about the consequences of sharing, all of which could delay rapid and transparent data sharing (74). Van Roode et al. (74) demonstrate that delays in formal notification and clearance procedures, fragmented mandates, and insufficiently structured communication and coordination can hamper the timely sharing of data needed for outbreak response. Lencucha and Bandara (75) further argue that states' willingness to share information promptly is shaped by economic or political risks they associate with doing so, and by the degree of trust that these risks will be recognised and mitigated. Information exchange is therefore not merely a technical issue, but also a governance challenge involving institutional responsibilities, competing interests, incentives and trust (75).

Taken together, these findings suggest that recurring cross-border challenges cannot be addressed through operational responses to acute crises alone. Technical alignment may reduce specific barriers, but more enduring collaboration also depends on how institutional responsibilities, legal competences, information-sharing arrangements, and trust are organised across borders.

Structurally strengthening cross-border collaboration

The findings point to the need for stronger structural support for cross-border collaboration, not only for emergency response, but also for prevention, monitoring, and policy development. Beyond technical and operational arrangements, stronger structural support for cross-border collaboration requires clearer alignment between governance levels within the EU. As Van der Zanden et al. (15) show that health remains primarily a national competence and that the EU policy has not yet developed a transnational public health perspective that fully reflects the characteristics of border regions. The EU therefore continues to play a mainly supportive role, while national decisions such as border closures, can have substantial consequences for border regions. Establishing routine mechanisms for dialogue between EU, national, and regional authorities before crisis measures are implemented could help prevent conflicting actions and strengthen mutual understanding and support more sustainable cross-border public health. Embedding such multi-level coordination in regular governance structures could reduce dependence on temporary projects and [personal networks, preserve responsibilities and communication channels between crises, and enable earlier consideration of cross-border effects in national decision-making (69-72, 75).

Although the reviewed literature provides valuable practical accounts, institutional anchoring and long-term sustainability were rarely evaluated. Broader literature suggests that enduring collaboration depends not only on informal cooperation, but also on governance arrangements that define membership, responsibilities, funding, quality standards, information exchange, and evaluation. Palm et al. (77), for example, show how European Reference Networks in health care require formal criteria, governance struc-

tures, monitoring, and financial arrangements to connect national systems at European level. Although these networks concern specialised health care rather than infectious disease control, they illustrate how cross-border collaboration can be embedded in more permanent institutional arrangements. Lencucha and Bandara (75) further show that such arrangements also need to address trust and the political and economic risks associated with information sharing. Taken together, these insights suggest that structurally strengthening cross-border infectious disease collaboration requires sustained investment in institutional capacity, coordination, and evaluation.

Overall, the included literature showed a recurring contrast between what was recommended and what was evaluated. Many studies called for stronger institutional collaboration, harmonised surveillance, and more sustained cross-border structures, while the long-term effects and post-project sustainability of such arrangements were rarely examined. This limits the extent to which the available evidence can establish which forms of cross-border collaboration remain effective over time and under which conditions they become institutionally embedded.

Comparison with non-European contexts

While this review focused on European border regions, several of the challenges identified in the included evidence have also been reported in non-European border settings. For instance, the recent Africa CDC strategic framework (78) identifies persistent challenges in cross-border surveillance, including underfunding, weak reporting and information-sharing mechanisms, legal and governance barriers, and limited operational capacity at points of entry. Dzaba et al.'s evaluation (79) of a Kenya-Tanzania cross-border field simulation exercise identified continuing challenges in communication and information exchange, staff turnover, follow-up, and the sustainability of preparedness activities. In the Middle East and North Africa region, Buback et al. (80) reported comparable difficulties in cross-border public health surveillance, particularly in data collection and sharing, governance, and sustainable financing. At the same time, studies from the China–Myanmar border provide examples of positive outcomes associated with coordinated cross-border activities (81, 82). Wang et al. (81) describe how rapid information-sharing and coordinated investigations and response activities followed the detection of an imported vaccine-derived poliovirus case and may have helped prevent further transmission, while Zhang et al. (82) reported how a long-term cross-border programme combining surveillance, standardised reporting, local health service organisation, and stakeholder coordination was associated with substantial improvements in malaria control.

Comparable patterns are also visible in the Americas. Along the U.S.-Mexico border, the CDC's BIDS programme supports binational detection, reporting, notification, and preparedness for infectious diseases (83), while Jimenez and Kozo (84), describe how existing binational partnerships in the San Diego-Tijuana region were mobilised during

COVID-19 to support data exchange, communication, testing, and vaccination. Abdallah et al. (85) further illustrate the challenges that imported malaria poses for control in the Brazil-Venezuela-Guyana triple-border region and emphasise the need for international border surveillance and collaborative malaria control.

Taken together, these examples indicate that several challenges and enabling conditions identified in the European evidence are also reported in other border settings. They also suggest the broader relevance of research on underrepresented diseases and regions, structural barriers in governance and surveillance, and the conditions under which cross-border cooperation can be sustained.

Cross-border policy implications and future research

This scoping review highlights the need for more structured and evidence-informed policymaking in the field of cross-border infectious disease control. Moving beyond reliance on ad hoc coordination during emergencies, policy efforts should focus on developing sustainable legal and institutional frameworks to support harmonised surveillance, data exchange, and response coordination across borders, including preparedness for emerging and re-emerging infectious diseases. Existing EU instruments, such as the common case definitions provided by the EU, the European Health Data Space and the European Grouping of Territorial Cooperation, may help address particular barriers by facilitating health-data exchange or providing a formal structure for territorial cooperation. However, their practical applicability and contribution to cross-border infectious disease control require further examination and they are unlikely to resolve the full range of legal, institutional, and operational differences identified in this review. Future research should move beyond the identifying barriers and focus more on evaluating the impact, implementation, scalability and sustainability of existing policy mechanisms. Future policy and research should also examine how effective project-based arrangements can be embedded in routine governance and financing structures, supported by shared indicators for evaluating implementation, effectiveness, and sustainability over time. Comparative studies across European border regions are needed to examine how different governance models shape cross-border health outcomes, while interdisciplinary research linking public health, legal studies, and implementation science will be essential to bridge the gap between recommendations and real-world preparedness.

Further work should also strengthen the conceptual and methodological foundations of the field. Comparative research can clarify how different models of collaboration, such as cooperation, coordination, harmonisation and integration, are defined, implemented and sustained. In addition, more systematic evaluations, qualitative studies of governance and trust, and explanatory studies on the conditions that shape success or failure are needed.

LIMITATIONS

This scoping review has several methodological limitations. As it maps existing literature without critically assessing study quality, it may include research of varying robustness. Title and abstract screening were primarily conducted by one reviewer, which may have increased the risk of missed records, although uncertainties were discussed with a second reviewer. The inclusion of diverse study designs, ranging from epidemiological analyses to policy reviews, limits direct comparability and the formulation of uniform conclusions. Moreover, the findings cover a 30-year period during which cross-border infectious disease control, surveillance systems and European policy frameworks continued to evolve.

Although searches were conducted in English, German and Dutch, all included records were published in English. Relevant evidence published exclusively in other European languages or primarily disseminated through national, regional or professional outlets may therefore be underrepresented. This may be particularly relevant for border regions in Southern, Central and Eastern Europe, where research may more often be published in national languages or in journals and repositories that are less visible in the databases searched. Differences in terminology and database indexing may also have affected retrieval, as cross-border infectious disease activities may be described using programme-specific, regional or disease-specific terms rather than explicitly as cross-border collaboration. These factors may have contributed to the predominance of studies from border regions involving the Netherlands, Germany and Belgium and limit the extent to which this concentration can be interpreted as reflecting the actual distribution of research activity across Europe.

In addition, this review included peer-reviewed literature and selected grey literature rather than conducting a comprehensive analysis of all regional, national and organisational sources. Relevant initiatives, evaluations, and policy developments documented in project reports, national repositories, or institutional publications may therefore not have been captured. The review also did not systematically analyse European or national legislative and policy documents. The references to legal and policy developments in the Background and Discussion were included to provide context rather than to constitute a legal evaluation. Consequently, relevant developments in the legal and policy framework may not be fully reflected in the evidence base.

Finally, the review was confined to European border regions. Studies from other continents were not systematically included, and the non-European examples discussed were selected to provide contextual comparison rather than to constitute a comprehensive global evidence synthesis.

CONCLUSION

This scoping review identified three recurring patterns in the European evidence on cross-border infectious disease control. First, the included literature was concentrated on a limited set of diseases and border regions, while other diseases and geographical contexts were less well represented. Second, structural and systemic barriers in surveillance, governance and data exchange repeatedly complicated timely and coordinated cross-border responses. Third, project-based initiatives and outbreak investigations demonstrated that practical collaboration and technical alignment can produce positive operational outcomes, but their long-term effects, sustainability and institutional embedding were rarely evaluated.

Taken together, these findings highlight the need to broaden research across diseases and European border regions, address persistent structural barriers, and embed cross-border cooperation in stable legal, institutional, and financial arrangements. This requires stronger alignment between European, national, and regional governance levels and more systematic evaluation of how cross-border arrangements are implemented, sustained, and adapted over time. Although this review focused on Europe, comparable challenges and enabling conditions have also been reported in other border settings, indicating the broader relevance of sustained and institutionally embedded cross-border collaboration for preparedness for future public health threats.



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ADDITIONAL FILE 1: PCC OPERATIONALISATIONS

Population	Populations and actors in European land border regions that are relevant to public infectious disease prevention and control policy and practice. This includes residents and mobile populations as well as public health actors and cross-border health practices described in the included studies, and public health actors such as regional and national public health services, laboratories, and crisis and surveillance structures in border settings. The focus is on community and care settings, with exclusion of studies that primarily concern curative care delivery, including general practice and hospital-based care.
Concept	Cross-border alignment and cooperation in public infectious disease prevention and control policy and practice. This concerns described practices and arrangements related to surveillance and signal detection, notification processes and information exchange, data infrastructures and interoperability, outbreak investigation, contact tracing, crisis response and preparedness, risk communication, and preventive measures. It also includes reported barriers and facilitating factors, and explicit recommendations to improve cross-border cooperation.
Context	European land border regions within the wider European policy space of the Council of Europe, understood as 46 member states. Inclusion is based on cooperation between at least two adjacent jurisdictions that share a land border.

Search period 01/1994 to 12/2025. Language restriction English, German, and Dutch. Databases PubMed, Web of Science, Embase, and the Cochrane Library, supplemented by grey literature.

This scoping review addresses the following questions:

1. Which infectious diseases, geographical regions, and study designs are covered in the evidence on cross-border infectious disease prevention and control policies and practices in European land border regions?
2. Which cross-border challenges are identified in this evidence base in relation to infectious disease prevention and control policies and practices?
3. Which public health recommendations are reported to improve cross-border cooperation in infectious disease prevention and control in European land border regions?



ADDITIONAL FILE 2: PRISMA-SCR CHECKLIST

Section and topic	Item	PRISMA – ScR Checklist item	Reported on Page
ADMINISTRATIVE INFORMATION			
Title:		Policies and Practices of Infectious disease control in European Border regions: a scoping review	1
Identification	1a	Identify the report as a protocol of a systematic review	N/A
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	N/A
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	6
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1-2
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	34-35
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
Support:			
Sources	5a	Indicate sources of financial or other support for the review	34
Sponsor	5b	Provide name for the review funder and/or sponsor	N/A
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	N/A
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	3-6
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	5-6 and 47-48
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	6-7
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	8

Section and topic	Item	PRISMA – ScR Checklist item	Reported on Page
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	52-74
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	8-9
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	8-9
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	9
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	9 and 77-78
Outcomes and prioritisation	13	List and define all outcomes for which data will be sought, including prioritisation of main and additional outcomes, with rationale	9 and 77-78
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	N/A
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	N/A
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	N/A
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	N/A
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	9
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	N/A
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	N/A

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.



ADDITIONAL FILE 3: PEER-REVIEWED LITERATURE SEARCH STRATEGY

PubMed.

Search conducted on May 23rd, 2024 and on January 9th, 2026

Public Health

"Public Health"[Mesh:NoExp] OR "Public Health"[tiab] OR "Community Health"[tiab] OR "health project*" [tiab] OR "Disease Eradication"[Mesh:NoExp] OR "Disease Eradication*" [tiab] OR "Disease Elimination*" [tiab] OR "Disease Outbreaks"[Mesh:NoExp] OR "Outbreak*" [tiab] OR "Disease Hotspot"[Mesh] OR "Disease Hotspot*" [tiab] OR "Disease Hot spot*" [tiab] OR "Transmission Hotspot*" [tiab] OR "Burden Hotspot*" [tiab] OR "Disease Cluster*" [tiab] OR "Space-Time Clustering"[Mesh] OR "Space Time Clustering*" [tiab] OR "Space-Time Clustering*" [tiab] OR "Epidemics"[Mesh:NoExp] OR "Epidemic*" [tiab] OR "Pandemics"[Mesh] OR "Pandemic*" [tiab] OR "Disease Transmission, Infectious"[Mesh] OR "Pathogen Transmission*" [tiab] OR "Disease Transmission*" [tiab] OR "Infection Transmission*" [tiab] OR

"Close-Contact Transmission*" [tiab] OR "Close Contact Transmission*" [tiab] OR "Person-to-Person Transmission*" [tiab] OR "Person to Person Transmission*" [tiab] OR "Autochthonous Transmission*" [tiab] OR "Disease Superspread*" [tiab] OR "Community Transmission*" [tiab] OR "Community Spread*" [tiab] OR "Basic Reproduction Number"[Mesh] OR "Basic Reproduction Number*" [tiab] OR "Basic Reproduction Ratio*" [tiab] OR "Basic Reproductive Ratio*" [tiab] OR "Basic Reproductive Rate*" [tiab] OR "Basic Reproductive Number*" [tiab] OR "Effective Reproduction Number*" [tiab] OR "Effective Reproductive Number*" [tiab] OR "Transmissibility Measure*" [tiab] OR "Disease Vector*" [tiab] OR "Arthropod Vector*" [tiab] OR "Arachnid Vector*" [tiab] OR "Tick vector*" [tiab] OR "Insect Vector*" [tiab] OR "Mosquito Vector*" [tiab] OR "Infectious Disease Incubation Period*" [tiab] OR "Patient-to-Professional Transmission*" [tiab] OR "Patient to Professional Transmission*" [tiab] OR "Professional-Patient Transmission*" [tiab] OR "Healthcare Worker-Patient Transmission*" [tiab] OR "Healthcare Worker Patient Transmission*" [tiab] OR "Infectious Disease Transmission*" [tiab] OR "Mother-to-Child Transmission*" [tiab] OR "Mother to Child Transmission*" [tiab] OR "Endemic Diseases"[Mesh] OR "Endemic Disease*" [tiab] OR "Risk Assessment"[Mesh:NoExp] OR "Risk Assessment*" [tiab] OR "Risks and Benefits" [tiab] OR "Risk Analys*" [tiab] OR "Benefit-Risk Assessment*" [tiab] OR "Risk-Benefit Assessment*" [tiab] OR "Adverse Outcome Pathways"[Mesh] OR "Adverse Outcome Pathway*" [tiab] OR "Healthcare Failure Mode and Effect Analysis"[Mesh] OR "Failure Mode and Effect Analys*" [tiab] OR "HFMEA"[tiab] OR "Risk Adjustment"[Mesh] OR "Risk Adjustment*" [tiab] OR "Case-Mix Adjustment*" [tiab] OR "Case Mix Adjustment*" [tiab] OR "Epidemiologic Measurements"[Mesh:NoExp] OR "Epidemiologic Measurement*" [tiab] OR "Epidemiologic Methods"[Mesh:NoExp] OR "Epidemiological Method*"

[tiab] OR "Epidemiologic Method*" [tiab] OR "Contact Tracing"[Mesh] OR "Contact Tracing" [tiab] OR "Contact Investigation" [tiab] OR "Contact Screening" [tiab] OR "Close Contact Epidemiology" [tiab] OR "Partner Notification*" [tiab] OR "Index Case Epidemiology" [tiab] OR "Index Patient Epidemiology" [tiab] OR "Patient Zero Epidemiology" [tiab] OR "Carrier State"[Mesh] OR "Carrier State*" [tiab] OR "Superspreader*" [tiab] OR "Super-spreader*" [tiab] OR "Super spreader*" [tiab] OR "Presymptomatic*" [tiab] OR "Asymptomatic*" [tiab] OR "Inapparent Carrier*" [tiab] OR "Chain of Infection"[Mesh] OR "Infection Chain*" [tiab] OR "Disease Reservoir*" [tiab] OR "Infection Reservoir*" [tiab] OR "Fomite*" [tiab] OR "Disease Notification"[Mesh] OR "Infectious Disease Reporting*" [tiab] OR "Disease Notification*" [tiab] OR "Exposure Notification*" [tiab] OR "Epidemiological Monitoring"[Mesh] OR

"Epidemiological Monitoring" [tiab] OR "Epidemiologic Monitoring" [tiab] OR "Epidemiologic Surveillance*" [tiab] OR "Wastewater Surveillance*" [tiab] OR "Wastewater-Based Surveillance*" [tiab] OR "Wastewater-Based Epidemiology" [tiab] OR "Wastewater Epidemiology" [tiab] OR "Sewage-Based Epidemiology" [tiab] OR "Sewage Epidemiology" [tiab] OR "Sewage-Based Surveillance*" [tiab] OR "Sewage Surveillance*" [tiab] OR "Molecular Epidemiology"[Mesh:NoExp] OR "Molecular Epidemiolog*" [tiab] OR "Genetic Epidemiolog*" [tiab] OR "Genome-Wide Association Study"[Mesh] OR "Genome-Wide Association" [tiab] OR "Whole Genome Association" [tiab] OR "GWA" [tiab] OR "Genome Wide Association" [tiab] OR "Surveillanc*" [tiab] OR "Biosurveillanc*" [tiab] OR "Sentinel Health Event*" [tiab] OR "Legal Epidemiology"[Mesh] OR "Legal Epidemiology" [tiab] OR "Public Health Practice"[Mesh:NoExp] OR "Communicable Disease Control"[Mesh:NoExp] OR "Communicable Disease Control" [tiab] OR "Parasite Control" [tiab] OR "Flattening the Curve" [tiab] OR "Flatten the Curve" [tiab] OR "Infection Control"[Mesh] OR "Infection Control*" [tiab] OR "Antisepsis" [tiab] OR "Asepsis" [tiab] OR "Blood Safet*" [tiab] OR "Hemovigilance" [tiab] OR "Patient isolation*" [tiab] OR "Negative Pressure Isolation*" [tiab] OR "Home Isolation*" [tiab] OR "Steriliz*" [tiab] OR "Disinfect*" [tiab] OR "Mandatory Testing"[Mesh] OR "Mandatory Screening" [tiab] OR "Mandatory test*" [tiab] OR "Physical Distancing"[Mesh] OR "Physical Distanc*" [tiab] OR "Social Distanc*" [tiab] OR "Immunization"[Mesh] OR "Immunization*" [tiab] OR "Immunological Sensitization*" [tiab] OR "Immunologic Stimulation*" [tiab] OR "Immunostimulation*" [tiab] OR "Immunological Stimulation*" [tiab] OR "Immunologic Sensitization*" [tiab] OR "Variolation*" [tiab] OR "Immunoglobulin Therap*" [tiab] OR "Passive Antibody Transfer*" [tiab] OR "Passive Transfer of Immunit*" [tiab] OR "Serotherap*" [tiab] OR "Immunotherap*" [tiab] OR "Convalescent Plasma Therap*" [tiab] OR "Adoptive Transfer*" [tiab] OR "Convalescent Serum Treatment*" [tiab] OR "Convalescent Sera Treatment*" [tiab] OR "Chimeric Antigen Receptor Therap*" [tiab] OR "CAR T-Cell Therap*" [tiab] OR "Revaccination*" [tiab] OR "Vaccine Therap*" [tiab] OR "Vaccination*" [tiab] OR

"Quarantine"[Mesh] OR "Quarantine*" [tiab] OR "Stay at Home Order*" [tiab] OR "Health Lockdown*" [tiab] OR "Cordon Sanitaire" [tiab] OR "Health Travel Restriction*" [tiab] OR "Self-Quarantine*" [tiab] OR "Mass Screening"[Mesh] OR "Screening*" [tiab] OR "Anonymous Test*" [tiab] OR "Automated Multiphasic Test*" [tiab] OR "Substance Abuse Detection*" [tiab] OR "Substance Abuse Testing*" [tiab] OR "Drug Abuse Testing*" [tiab] OR "Drug Abuse Detection*" [tiab] OR "Street Drug Testing*" [tiab] OR

"Illicit Drug Detection*" [tiab] OR "Illicit Drug Testing*" [tiab] OR "Population Surveillance"[Mesh] OR "Primary Prevention"[Mesh] OR "Primary Prevention*" [tiab] OR "Primordial Prevention*" [tiab] OR "Pre Exposure Prophylaxi*" [tiab] OR "Pre-Exposure Prophylaxi*" [tiab] OR "PrEP" [tiab]

Communicable Diseases

"Communicable Diseases"[Mesh] OR "Communicable Disease*" [tiab] OR "Infectious Disease*" [tiab] OR "Blood-Borne Infection*" [tiab] OR "Blood Borne Disease*" [tiab] OR "Blood Borne Infection*" [tiab] OR "Hepatitis" [tiab] OR "HIV Infection*" [tiab] OR "HTLV-III Infection*" [tiab] OR "HTLV III Infection*" [tiab] OR "HIV Coinfection*" [tiab] OR "Acquired Immunodeficiency Syndrome*" [tiab] OR "Acquired Immune Deficiency Syndrome*" [tiab] OR "Acquired Immuno-Deficiency Syndrome*" [tiab] OR "Acquired Immuno Deficiency Syndrome*" [tiab] OR "Acquired Immuno-Deficiency Syndrome*" [tiab] OR "AIDS" [tiab] OR "Acute Retroviral Syndrome*" [tiab] OR "HIV-1-Associated CNS Vasculiti*" [tiab] OR "HIV 1 Associated CNS Vasculiti*" [tiab] OR "HIV-Associated Nephropath*" [tiab] OR "HIV Associated Nephropath*" [tiab] OR "Human Immunodeficiency Virus-Associated Nephropath*" [tiab] OR "Human Immunodeficiency Virus Associated Nephropath*" [tiab] OR "HIV-Related Nephropath*" [tiab] OR "HIV Related Nephropath*" [tiab] OR "HIV-Related Nephropath*" [tiab] OR "HIV Related Nephropath*" [tiab] OR "HIV-Associated Cognitive Motor Complex*" [tiab] OR "HIV Associated Cognitive Motor Complex*" [tiab] OR "Acquired-Immune Deficiency Syndrome Dementia Complex*" [tiab] OR "HIV Dementia*" [tiab] OR "HIV Encephalopath*" [tiab] OR "Lymphadenopathy Syndrome*" [tiab] OR "ARC" [tiab] OR "HIV-Related Opportunistic Infection*" [tiab] OR "HIV Related Opportunistic Infection*" [tiab] OR "HIV Lipodystroph*" [tiab] OR "HIV Enteropath*" [tiab] OR "HIV Seropositivit*" [tiab] OR "Anti-HIV Positivit*" [tiab] OR "Anti HIV Positivit*" [tiab] OR "HTLV-III Seropositivit*" [tiab] OR "HTLV III Seropositivit*" [tiab] OR "HIV Seroconversion*" [tiab] OR "HTLV-III Seroconversion*" [tiab] OR "HTLV III Seroconversion*" [tiab] OR "HIV Antibody Positiv*" [tiab] OR "HIV Wasting Syndrome*" [tiab] OR "HIV Wasting Disease*" [tiab] OR "Slim Disease*" [tiab] OR "Imported Infection*" [tiab] OR "Sexually Transmitted Disease*" [tiab] OR "Venereal Disease*" [tiab] OR "STD" [tiab] OR "STDs" [tiab] OR "Sexually Transmitted Infection*" [tiab] OR "STIs" [tiab] OR "STI" [tiab] OR "Chancroid*" [tiab] OR "Chlamydia Infection*" [tiab] OR "Lymphogranuloma Venereum*" [tiab] OR "Lymphogranuloma Inguinale*" [tiab] OR "Gonorrhea*" [tiab] OR "Neisseria gonorrhoeae Infection*" [tiab] OR "Granuloma Inguinale*" [tiab] OR "Granuloma Venereum*" [tiab] OR "Donovanos*" [tiab]

OR "Syphilis*" [tiab] OR "Great Pox*" [tiab] OR "Condylomata Acuminat*" [tiab] OR "Venereal Wart*" [tiab] OR "Genital Wart*" [tiab] OR "Buschke-Lowenstein" [tiab] OR "Buschke Lowenstein" [tiab] OR" Buschke-Loewenstein" [tiab] OR "Buschke Loewenstein" [tiab] OR "Giant Condyloma Acuminatum*" [tiab] OR "Herpes Genitalis" [tiab] OR "Genital Herpes" [tiab] OR "Papillomavirus Infection*" [tiab] OR "HPV Infection*" [tiab]

Europe

"Europe"[Mesh:NoExp] OR "Europ*"[tiab] OR "Andorra"[Mesh] OR "Andorra" [tiab] "Andorran" [tiab] OR "Austria"[Mesh] OR "Austria" [tiab] OR "Austrian" [tiab] OR "Belgium"[Mesh] OR "Belgian" [tiab] OR "Belgium" [tiab] OR "Europe, Eastern"[Mesh:NoExp] OR "Albania"[Mesh] OR "Albania" [tiab] OR "Albanian" [tiab] OR "Baltic States"[Mesh] OR "Baltic" [tiab] OR "Baltics" [tiab] OR "Estonia" [tiab] OR "Estonian" [tiab] OR "Latvia" [tiab] OR "Latvian*" [tiab] OR "Lithuania" [tiab] OR "Lithuanian"[tiab] OR "Bosnia and Herzegovina"[Mesh] OR "Bosnia" [tiab] OR "Bosnian" [tiab] OR "Herzegovin" [tiab] OR "Bulgaria"[Mesh] OR "Bulgaria" [tiab] OR "Bulgarian" [tiab] OR "Croatia"[Mesh] OR "Croatia" [tiab] OR "Croatian" [tiab] OR "Czech Republic"[Mesh] OR "Czech*" [tiab] OR "Hungary"[Mesh] OR "Hungary" [tiab] OR "Hungarian" [tiab] OR "Moldova"[Mesh] OR "Moldovan" [tiab] OR "Moldovian" [tiab] OR "Montenegro"[Mesh] OR "Montenegro" [tiab] OR "Poland"[Mesh] OR "Poland" [tiab] OR "Polish" [tiab] OR "Republic of North Macedonia"[Mesh] OR "Macedonia" [tiab] OR "Macedonian" [tiab] OR "Romania"[Mesh] OR "Romania" [tiab] OR "Rumania" [tiab] OR "Roumania" [tiab] OR "Romanian" [tiab] OR "Serbia"[Mesh] OR "Serbia" [tiab] OR "Serbian" [tiab] OR "Slovakia"[Mesh] OR "Slovakia" [tiab] OR "Slovakian" [tiab] OR "Slovenia"[Mesh] OR "Slovenia" [tiab] OR "Slovenian" [tiab] OR "Yugoslavia" [tiab] OR "Ukraine"[Mesh] OR "Ukraine" [tiab] OR "Ukrainian" [tiab] OR "European Alpine Region"[Mesh] OR "Alps" [tiab] OR "Alpine Region" [tiab] OR "France"[Mesh:NoExp] OR "France" [tiab] OR "French" [tiab] OR "Germany"[Mesh:NoExp] OR "Germany" [tiab] OR "German" [tiab] OR "Gibraltar"[Mesh] OR "Gibraltar" [tiab] OR "Greece"[Mesh] OR "Grecian" [tiab] OR "Greek" [tiab] OR "Ireland"[Mesh] OR "Ireland" [tiab] OR "Irish" [tiab] OR "Eire" [tiab] OR "Italy"[Mesh] OR "Italy" [tiab] OR "Italian" [tiab] OR "Liechtenstein"[Mesh] OR "Leichtenstein" [tiab] OR "Liechtenstein" [tiab] OR "Luxembourg"[Mesh] OR "Luxembourg" [tiab] OR "Mediterranean Region"[Mesh] OR "Mediterranean" [tiab] OR "Cyprus" [tiab] OR "Cypriot*" [tiab] OR "Malta" [tiab] OR "Maltese" [tiab] OR "Sicily" [tiab] OR "Sicilian" [tiab] OR "Monaco"[Mesh] "Monaco" [tiab] OR "Netherlands"[Mesh] OR "Netherlands" [tiab] OR "Holland" [tiab] OR "Dutch" [tiab] OR "Portugal"[Mesh] OR "Portuguese" [tiab] OR "Portugal" [tiab] OR "San Marino"[Mesh] OR "San Marino" [tiab] OR "San-Marino" [tiab] OR "Scandinavian and Nordic Countries"[Mesh] OR "Scandinavia" [tiab] OR "Scandinavian" [tiab] OR "Nordic" [tiab] OR "Denmark" [tiab] OR "Danish" [tiab] OR "Finland" [tiab] OR "Finnish" [tiab] OR "Iceland" [tiab] OR "Norway" [tiab] OR "Norwegian" [tiab] OR "Sweden" [tiab] OR "Swedish" [tiab] OR "Spain"[Mesh] OR "Spain" [tiab] OR "Spanish" [tiab] OR "Switzerland"[Mesh] OR "Switzerland" [tiab] OR "Swiss" [tiab] OR "Transcaucasia"[Mesh] OR "Transcaucasia" [tiab] OR "Armenia" [tiab] OR "Armenian" [tiab] OR "Azerbaijan" [tiab] OR "Georgia" [tiab]

OR "Georgian" [tiab] OR "United Kingdom"[Mesh] OR "United Kingdom" [tiab] OR "Great Britain" [tiab] OR "British" [tiab] OR "England" [tiab] OR "English" [tiab] OR "Scotland" [tiab] OR "Scottish" [tiab] OR "Wales" [tiab] OR "Welsh" [tiab] OR "European Union"[Mesh] OR "EEC" [tiab] OR "Euratom*" [tiab] OR "EU" [tiab] OR "Euro" [tiab]

Cross-border

"bordering" [tiab] OR "borders" [tiab] OR "border" [tiab] OR "crossborder*" [tiab] OR "euroregional" [tiab] OR "transnational" [tiab] OR "CBHC" [tiab] OR "Cross-border*" [tiab] OR "cross-countr*" [tiab] OR "cross countr*" [tiab] OR "transboundar*" [tiab] OR "Euregio*" [tiab]

Gesundheitswesen

("Gesundheitswesen"[Journal] OR "Gesundheitswesen"[Title/Abstract])

Cochrane

Search conducted on May 23rd, 2024 and on January 9th, 2026.

Public Health

[mh ^"Public Health"] OR "Public Health":ti,ab,kw OR "Community Health":ti,ab,kw OR ("health" NEXT project*):ti,ab,kw OR [mh ^"Disease Eradication"] OR ("Disease" NEXT Eradication*):ti,ab,kw OR ("Disease" NEXT Elimination*):ti,ab,kw OR [mh ^"Disease Outbreaks"] OR Outbreak*:ti,ab,kw OR [mh "Disease Hotspot"] OR ("Disease" NEXT Hotspot*):ti,ab,kw OR ("Disease Hot" NEXT spot*):ti,ab,kw OR ("Transmission" NEXT Hotspot*):ti,ab,kw OR ("Burden" NEXT Hotspot*):ti,ab,kw OR ("Disease" NEXT Cluster*):ti,ab,kw OR [mh "Space-Time Clustering"] OR ("Space Time" NEXT Clustering*):ti,ab,kw OR ("Space-Time" NEXT Clustering*):ti,ab,kw OR [mh ^Epidemics] OR Epidemic*:ti,ab,kw OR [mh Pandemics] OR Pandemic*:ti,ab,kw OR [mh "Disease Transmission, Infectious"] OR ("Pathogen" NEXT Transmission*):ti,ab,kw OR ("Disease" NEXT Transmission*):ti,ab,kw OR ("Infection" NEXT Transmission*):ti,ab,kw OR

("Close-Contact" NEXT Transmission*):ti,ab,kw OR ("Close Contact" NEXT Transmission*):ti,ab,kw OR ("Person-to-Person" NEXT Transmission*):ti,ab,kw OR ("Person to Person" NEXT Transmission*):ti,ab,kw OR ("Autochthonous" NEXT Transmission*):ti,ab,kw OR ("Disease" NEXT Superspread*):ti,ab,kw OR ("Community" NEXT Transmission*):ti,ab,kw OR ("Community" NEXT Spread*):ti,ab,kw OR [mh "Basic Reproduction Number"] OR ("Basic Reproduction" NEXT Number*):ti,ab,kw OR ("Basic Reproduction" NEXT Ratio*):ti,ab,kw OR ("Basic Reproductive" NEXT Ratio*):ti,ab,kw OR ("Basic Reproductive" NEXT Rate*):ti,ab,kw OR ("Basic Reproductive" NEXT Number*):ti,ab,kw OR ("Effective Reproduction" NEXT Number*):ti,ab,kw OR ("Effective Reproductive" NEXT Number*):ti,ab,kw OR ("Transmissibility" NEXT Measure*):ti,ab,kw OR ("Disease" NEXT Vector*):ti,ab,kw OR ("Arthropod" NEXT Vector*):ti,ab,kw OR ("Arachnid" NEXT

Vector*):ti,ab,kw OR ("Tick" NEXT vector*):ti,ab,kw OR ("Insect" NEXT Vector*):ti,ab,kw OR ("Mosquito" NEXT Vector*):ti,ab,kw OR ("Infectious Disease Incubation" NEXT Period*):ti,ab,kw OR ("Patient-to-Professional" NEXT Transmission*):ti,ab,kw OR ("Patient to Professional" NEXT Transmission*):ti,ab,kw OR ("Professional-Patient" NEXT Transmission*):ti,ab,kw OR ("Healthcare Worker-Patient" NEXT Transmission*):ti,ab,kw OR ("Healthcare Worker Patient" NEXT Transmission*):ti,ab,kw OR ("Infectious Disease" NEXT Transmission*):ti,ab,kw OR ("Mother-to-Child" NEXT Transmission*):ti,ab,kw OR ("Mother to Child" NEXT Transmission*):ti,ab,kw OR [mh "Endemic Diseases"] OR ("Endemic" NEXT Disease*):ti,ab,kw OR [mh ^"Risk Assessment"] OR ("Risk" NEXT Assessment*):ti,ab,kw OR "Risks and Benefits":ti,ab,kw OR ("Risk" NEXT Analys*):ti,ab,kw OR ("Benefit-Risk" NEXT Assessment*):ti,ab,kw OR ("Risk-Benefit" NEXT Assessment*):ti,ab,kw OR [mh "Adverse Outcome Pathways"] OR ("Adverse Outcome" NEXT Pathway*):ti,ab,kw OR [mh "Healthcare Failure Mode and Effect Analysis"] OR ("Failure Mode and Effect" NEXT Analys*):ti,ab,kw OR HFMEA:ti,ab,kw OR [mh "Risk Adjustment"] OR ("Risk" NEXT Adjustment*):ti,ab,kw OR ("Case-Mix" NEXT Adjustment*):ti,ab,kw OR ("Case Mix" NEXT Adjustment*):ti,ab,kw OR [mh ^"Epidemiologic Measurements"] OR ("Epidemiologic" NEXT Measurement*):ti,ab,kw OR [mh ^"Epidemiologic Methods"] OR ("Epidemiological" NEXT Method*):ti,ab,kw OR ("Epidemiologic" NEXT Method*):ti,ab,kw OR [mh "Contact Tracing"] OR "Contact Tracing":ti,ab,kw OR "Contact Investigation":ti,ab,kw OR "Contact Screening":ti,ab,kw OR "Close Contact Epidemiology":ti,ab,kw OR ("Partner" NEXT Notification*):ti,ab,kw OR "Index Case Epidemiology":ti,ab,kw OR "Index Patient Epidemiology":ti,ab,kw OR "Patient Zero Epidemiology":ti,ab,kw OR [mh "Carrier State"] OR ("Carrier" NEXT State*):ti,ab,kw OR Superspreader*:ti,ab,kw OR Super-spreader*:ti,ab,kw OR ("Super" NEXT spreader*):ti,ab,kw OR Presymptomatic*:ti,ab,kw OR Asymptomatic*:ti,ab,kw OR ("Inapparent" NEXT Carrier*):ti,ab,kw OR [mh "Chain of Infection"] OR ("Infection" NEXT Chain*):ti,ab,kw OR ("Disease" NEXT Reservoir*):ti,ab,kw OR ("Infection" NEXT Reservoir*):ti,ab,kw OR Fomite*:ti,ab,kw OR [mh "Disease Notification"] OR ("Infectious Disease" NEXT Reporting*):ti,ab,kw OR ("Disease" NEXT Notification*):ti,ab,kw OR ("Exposure" NEXT Notification*):ti,ab,kw OR [mh "Epidemiological Monitoring"] OR

"Epidemiological Monitoring":ti,ab,kw OR "Epidemiologic Monitoring":ti,ab,kw OR ("Epidemiologic" NEXT Surveillance*):ti,ab,kw OR ("Wastewater" NEXT Surveillance*):ti,ab,kw OR ("Wastewater-Based" NEXT Surveillance*):ti,ab,kw OR "Wastewater-Based Epidemiology":ti,ab,kw OR "Wastewater Epidemiology":ti,ab,kw OR "Sewage-Based Epidemiology":ti,ab,kw OR "Sewage Epidemiology":ti,ab,kw OR ("Sewage-Based" NEXT Surveillance*):ti,ab,kw OR ("Sewage" NEXT Surveillance*):ti,ab,kw OR [mh ^"Molecular Epidemiology"] OR ("Molecular" NEXT Epidemiolog*):ti,ab,kw OR ("Genetic" NEXT Epidemiolog*):ti,ab,kw OR [mh "Genome-Wide Association Study"] OR "Genome-Wide Association":ti,ab,kw OR "Whole Genome Association":ti,ab,kw OR GWA:ti,ab,kw OR "Genome Wide Association":ti,ab,kw OR Surveillanc*:ti,ab,kw OR ("Sentinel Health" NEXT Event*):ti,ab,kw OR [mh "Legal Epidemiology"] OR "Legal Epidemiology":ti,ab,kw OR [mh

^"Public Health Practice"] OR [mh ^"Communicable Disease Control"] OR "Communicable Disease Control":ti,ab,kw OR ("Parasite" NEXT Control*):ti,ab,kw OR "Flattening the Curve":ti,ab,kw OR "Flatten the Curve":ti,ab,kw OR [mh "Infection Control"] OR ("Infection" NEXT Control*):ti,ab,kw OR Antisepsis:ti,ab,kw OR Asepsis:ti,ab,kw OR ("Blood" NEXT Safet*):ti,ab,kw OR Hemovigilance:ti,ab,kw OR ("Patient" NEXT isolation*):ti,ab,kw OR ("Negative Pressure" NEXT Isolation*):ti,ab,kw OR ("Home" NEXT Isolation*):ti,ab,kw OR Steriliz*:ti,ab,kw OR Disinfect*:ti,ab,kw OR [mh "Mandatory Testing"] OR "Mandatory Screening":ti,ab,kw OR ("Mandatory" NEXT test*):ti,ab,kw OR [mh "Physical Distancing"] OR ("Physical" NEXT Distanc*):ti,ab,kw OR ("Social" NEXT Distanc*):ti,ab,kw OR [mh Immunization] OR Immunization*:ti,ab,kw OR ("Immunological" NEXT Sensitization*):ti,ab,kw OR ("Immunologic" NEXT Stimulation*):ti,ab,kw OR Immunostimulation*:ti,ab,kw OR ("Immunological" NEXT Stimulation*):ti,ab,kw OR ("Immunologic" NEXT Sensitization*):ti,ab,kw OR Variolation*:ti,ab,kw OR ("Immunoglobulin" NEXT Therap*):ti,ab,kw OR ("Passive Antibody" NEXT Transfer*):ti,ab,kw OR ("Passive Transfer of" NEXT Immunit*):ti,ab,kw OR Serotherap*:ti,ab,kw OR Immunotherap*:ti,ab,kw OR ("Convalescent Plasma" NEXT Therap*):ti,ab,kw OR ("Adoptive" NEXT Transfer*):ti,ab,kw OR ("Convalescent Serum" NEXT Treatment*):ti,ab,kw OR ("Convalescent Sera" NEXT Treatment*):ti,ab,kw OR ("Chimeric Antigen Receptor" NEXT Therap*):ti,ab,kw OR ("CAR T-Cell" NEXT Therap*):ti,ab,kw OR Revaccination*:ti,ab,kw OR ("Vaccine" NEXT Therap*):ti,ab,kw OR Vaccination*:ti,ab,kw OR

[mh Quarantine] OR Quarantine*:ti,ab,kw OR ("Stay at Home" NEXT Order*):ti,ab,kw OR ("Health" NEXT Lockdown*):ti,ab,kw OR "Cordon Sanitaire":ti,ab,kw OR ("Health Travel" NEXT Restriction*):ti,ab,kw OR Self-Quarantine*:ti,ab,kw OR [mh "Mass Screening"] OR Screening*:ti,ab,kw OR ("Anonymous" NEXT Test*):ti,ab,kw OR ("Automated Multiphasic" NEXT Test*):ti,ab,kw OR ("Substance Abuse" NEXT Detection*):ti,ab,kw OR ("Substance Abuse" NEXT Testing*):ti,ab,kw OR ("Drug Abuse" NEXT Testing*):ti,ab,kw OR ("Drug Abuse" NEXT Detection*):ti,ab,kw OR ("Street Drug" NEXT Testing*):ti,ab,kw OR

("Illicit Drug" NEXT Detection*):ti,ab,kw OR ("Illicit Drug" NEXT Testing*):ti,ab,kw OR [mh "Population Surveillance"] OR Biosurveillanc*:ti,ab,kw OR [mh "Primary Prevention"] OR ("Primary" NEXT Prevention*):ti,ab,kw OR ("Primordial" NEXT Prevention*):ti,ab,kw OR ("Pre Exposure" NEXT Prophylaxi*):ti,ab,kw OR ("Pre-Exposure" NEXT Prophylaxi*):ti,ab,kw OR PrEP:ti,ab,kw

Communicable Diseases

[mh "Communicable Diseases"] OR ("Communicable" NEXT Disease*):ti,ab,kw OR ("Infectious" NEXT Disease*):ti,ab,kw OR ("Blood-Borne" NEXT Infection*):ti,ab,kw OR ("Blood Borne" NEXT Disease*):ti,ab,kw OR ("Blood Borne" NEXT Infection*):ti,ab,kw OR "Hepatitis":ti,ab,kw OR ("HIV" NEXT Infection*):ti,ab,kw OR ("HTLV-III" NEXT Infection*):ti,ab,kw OR ("HTLV III" NEXT Infection*):ti,ab,kw OR ("HIV" NEXT Coinfection*):ti,ab,kw OR ("Acquired Immunodeficiency" NEXT Syndrome*):ti,ab,kw

OR ("Acquired Immune Deficiency" NEXT Syndrome*):ti,ab,kw OR ("Acquired Immuno-Deficiency" NEXT Syndrome*):ti,ab,kw OR ("Acquired Immuno Deficiency" NEXT Syndrome*):ti,ab,kw OR ("Acquired Immuno-Deficiency" NEXT Syndrome*):ti,ab,kw OR AIDS:ti,ab,kw OR ("Acute Retroviral" NEXT Syndrome*):ti,ab,kw OR ("HIV-1-Associated CNS" NEXT Vasculiti*):ti,ab,kw OR ("HIV 1 Associated CNS" NEXT Vasculiti*):ti,ab,kw OR ("HIV-Associated" NEXT Nephropath*):ti,ab,kw OR ("HIV Associated" NEXT Nephropath*):ti,ab,kw OR ("Human Immunodeficiency Virus-Associated" NEXT Nephropath*):ti,ab,kw OR ("Human Immunodeficiency Virus Associated" NEXT Nephropath*):ti,ab,kw OR ("HIV-Related" NEXT Nephropath*):ti,ab,kw OR ("HIV Related" NEXT Nephropath*):ti,ab,kw OR ("HIV-Related" NEXT Nephropath*):ti,ab,kw OR ("HIV Related" NEXT Nephropath*):ti,ab,kw OR ("HIV-Associated Cognitive Motor" NEXT Complex*):ti,ab,kw OR ("HIV Associated Cognitive Motor" NEXT Complex*):ti,ab,kw OR ("Acquired-Immune Deficiency Syndrome Dementia" NEXT Complex*):ti,ab,kw OR ("HIV" NEXT Dementia*):ti,ab,kw OR ("HIV" NEXT Encephalopath*):ti,ab,kw OR ("Lymphadenopathy" NEXT Syndrome*):ti,ab,kw OR ARC:ti,ab,kw OR ("HIV-Related Opportunistic" NEXT Infection*):ti,ab,kw OR ("HIV Related Opportunistic" NEXT Infection*):ti,ab,kw OR ("HIV" NEXT Lipodystroph*):ti,ab,kw OR ("HIV" NEXT Enteropath*):ti,ab,kw OR ("HIV" NEXT Seropositivit*):ti,ab,kw OR ("Anti-HIV" NEXT Positivit*):ti,ab,kw OR ("Anti HIV" NEXT Positivit*):ti,ab,kw OR ("HTLV-III" NEXT Seropositivit*):ti,ab,kw OR ("HTLV III" NEXT Seropositivit*):ti,ab,kw OR ("HIV" NEXT Seroconversion*):ti,ab,kw OR ("HTLV-III" NEXT Seroconversion*):ti,ab,kw OR ("HTLV III" NEXT Seroconversion*):ti,ab,kw OR ("HIV Antibody" NEXT Positiv*):ti,ab,kw OR ("HIV Wasting" NEXT Syndrome*):ti,ab,kw OR ("HIV Wasting" NEXT Disease*):ti,ab,kw OR ("Slim" NEXT Disease*):ti,ab,kw OR ("Imported" NEXT Infection*):ti,ab,kw OR ("Sexually Transmitted" NEXT Disease*):ti,ab,kw OR ("Venereal" NEXT Disease*):ti,ab,kw OR STD:ti,ab,kw OR STDs:ti,ab,kw OR ("Sexually Transmitted" NEXT Infection*):ti,ab,kw OR STIs:ti,ab,kw OR STI:ti,ab,kw OR Chancroid*:ti,ab,kw OR ("Chlamydia" NEXT Infection*):ti,ab,kw OR ("Lymphogranuloma" NEXT Venereum*):ti,ab,kw OR ("Lymphogranuloma" NEXT Inguinale*):ti,ab,kw OR Gonorrhea*:ti,ab,kw OR ("Neisseria gonorrhoeae" NEXT Infection*):ti,ab,kw OR ("Granuloma" NEXT Inguinale*):ti,ab,kw OR ("Granuloma" NEXT Venereum*):ti,ab,kw OR Donovanos*:ti,ab,kw OR Syphilis*:ti,ab,kw OR ("Great" NEXT Pox*):ti,ab,kw OR ("Condylomata" NEXT Acuminat*):ti,ab,kw OR ("Venereal" NEXT Wart*):ti,ab,kw OR ("Genital" NEXT Wart*):ti,ab,kw OR Buschke-Lowenstein:ti,ab,kw OR "Buschke Lowenstein":ti,ab,kw OR " Buschke-Loewenstein":ti,ab,kw OR "Buschke Loewenstein":ti,ab,kw OR ("Giant Condyloma" NEXT Acuminatum*):ti,ab,kw OR "Herpes Genitalis":ti,ab,kw OR "Genital Herpes":ti,ab,kw OR ("Papillomavirus" NEXT Infection*):ti,ab,kw OR ("HPV" NEXT Infection*):ti,ab,kw

Europe

[mh ^Europe] OR Europ*:ti,ab,kw OR [mh Andorra] OR "Andorra "Andorran"":ti,ab,kw OR [mh Austria] OR Austria:ti,ab,kw OR Austrian:ti,ab,kw OR [mh Belgium] OR Belgian:ti,ab,kw OR Belgium:ti,ab,kw OR [mh ^"Europe, Eastern"] OR [mh Albania] OR Albania:ti,ab,kw OR Albanian:ti,ab,kw OR [mh "Baltic States"] OR Baltic:ti,ab,kw OR Baltics:ti,ab,kw OR Estonia:ti,ab,kw OR Estonian:ti,ab,kw OR Latvia:ti,ab,kw OR Latvian*:ti,ab,kw OR Lithuania:ti,ab,kw OR Lithuanian:ti,ab,kw OR [mh "Bosnia and Herzegovina"] OR Bosnia:ti,ab,kw OR Bosnian:ti,ab,kw OR Herzegovin:ti,ab,kw OR [mh Bulgaria] OR Bulgaria:ti,ab,kw OR Bulgarian:ti,ab,kw OR [mh Croatia] OR Croatia:ti,ab,kw OR Croatian:ti,ab,kw OR [mh "Czech Republic"] OR Czech*:ti,ab,kw OR [mh Hungary] OR Hungary:ti,ab,kw OR Hungarian:ti,ab,kw OR [mh Moldova] OR Moldovan:ti,ab,kw OR Moldovian:ti,ab,kw OR [mh Montenegro] OR Montenegro:ti,ab,kw OR [mh Poland] OR Poland:ti,ab,kw OR Polish:ti,ab,kw OR [mh "Republic of North Macedonia"] OR Macedonia:ti,ab,kw OR Macedonian:ti,ab,kw OR [mh Romania] OR Romania:ti,ab,kw OR Rumania:ti,ab,kw OR Roumania:ti,ab,kw OR Romanian:ti,ab,kw OR [mh Serbia] OR Serbia:ti,ab,kw OR Serbian:ti,ab,kw OR [mh Slovakia] OR Slovakia:ti,ab,kw OR Slovakian:ti,ab,kw OR [mh Slovenia] OR Slovenia:ti,ab,kw OR Slovenian:ti,ab,kw OR Yugoslavia:ti,ab,kw OR [mh Ukraine] OR Ukraine:ti,ab,kw OR Ukrainian:ti,ab,kw OR [mh "European Alpine Region"] OR Alps:ti,ab,kw OR "Alpine Region":ti,ab,kw OR [mh ^France] OR France:ti,ab,kw OR French:ti,ab,kw OR [mh ^Germany] OR Germany:ti,ab,kw OR German:ti,ab,kw OR [mh Gibraltar] OR Gibraltar:ti,ab,kw OR [mh Greece] OR Grecian:ti,ab,kw OR Greek:ti,ab,kw OR [mh Ireland] OR Ireland:ti,ab,kw OR Irish:ti,ab,kw OR Eire:ti,ab,kw OR [mh Italy] OR Italy:ti,ab,kw OR Italian:ti,ab,kw OR [mh Liechtenstein] OR Leichtenstein:ti,ab,kw OR Liechtenstein:ti,ab,kw OR [mh Luxembourg] OR Luxembourg:ti,ab,kw OR [mh "Mediterranean Region"] OR Mediterranean:ti,ab,kw OR Cyprus:ti,ab,kw OR Cypriot*:ti,ab,kw OR Malta:ti,ab,kw OR Maltese:ti,ab,kw OR Sicily:ti,ab,kw OR Sicilian:ti,ab,kw OR [mh Monaco] OR [mh Netherlands] OR Netherlands:ti,ab,kw OR Holland:ti,ab,kw OR Dutch:ti,ab,kw OR [mh Portugal] OR Portuguese:ti,ab,kw OR Portugal:ti,ab,kw OR [mh "San Marino"] OR "San Marino":ti,ab,kw OR "San-Marino":ti,ab,kw OR [mh "Scandinavian and Nordic Countries"] OR Scandinavia:ti,ab,kw OR Scandinavian:ti,ab,kw OR Nordic:ti,ab,kw OR Denmark:ti,ab,kw OR Danish:ti,ab,kw OR Finland:ti,ab,kw OR Finnish:ti,ab,kw OR Iceland:ti,ab,kw OR Norway:ti,ab,kw OR Norwegian:ti,ab,kw OR Sweden:ti,ab,kw OR Swedish:ti,ab,kw OR [mh Spain] OR Spain:ti,ab,kw OR Spanish:ti,ab,kw OR [mh Switzerland] OR Switzerland:ti,ab,kw OR Swiss:ti,ab,kw OR [mh Transcaucasia] OR Transcaucasia:ti,ab,kw OR Armenia:ti,ab,kw OR Armenian:ti,ab,kw OR Azerbaijan:ti,ab,kw OR Georgia:ti,ab,kw OR Georgian:ti,ab,kw OR [mh "United Kingdom"] OR "United Kingdom":ti,ab,kw OR "Great Britain":ti,ab,kw OR British:ti,ab,kw OR England:ti,ab,kw OR English:ti,ab,kw OR Scotland:ti,ab,kw OR Scottish:ti,ab,kw OR Wales:ti,ab,kw OR Welsh:ti,ab,kw OR [mh "European Union"] OR EEC:ti,ab,kw OR Euratom*:ti,ab,kw OR EU:ti,ab,kw OR Euro:ti,ab,kw

Cross-border

borders:ti,ab,kw OR border:ti,ab,kw OR bordering:ti,ab,kw OR crossborder*:ti,ab,kw OR euroregional:ti,ab,kw OR transnational:ti,ab,kw OR CBHC:ti,ab,kw OR Cross-border*:ti,ab,kw OR cross-countr*:ti,ab,kw OR ("cross" NEXT countr*):ti,ab,kw OR transboundar*:ti,ab,kw OR Euregio*:ti,ab,kw

Gesunsheitswesen

(Gesundheitswesen:so OR Gesundheitswesen:ti,ab,kw)

Embase

Search conducted on May 23rd, 2024 and January 9th, 2026.

Public Health

(Public Health OR Community Health OR health project* OR Disease Eradication* OR Disease Elimination* OR Outbreak* OR Disease Hotspot* OR Disease Hot spot* OR Transmission Hotspot* OR Burden Hotspot* OR Disease Cluster* OR Space Time Clustering* OR Space-Time Clustering* OR Epidemic* OR Pandemic* OR Pathogen Transmission* OR Disease Transmission* OR Infection Transmission* OR

Close-Contact Transmission* OR Close Contact Transmission* OR Person-to-Person Transmission* OR Person to Person Transmission* OR Autochthonous Transmission* OR Disease Superspread* OR Community Transmission* OR Community Spread* OR Basic Reproduction Number* OR Basic Reproduction Ratio* OR Basic Reproductive Ratio* OR Basic Reproductive Rate* OR Basic Reproductive Number* OR Effective Reproduction Number* OR Effective Reproductive Number* OR Transmissibility Measure* OR Disease Vector* OR Arthropod Vector* OR Arachnid Vector* OR Tick vector* OR Insect Vector* OR Mosquito Vector* OR Infectious Disease Incubation Period* OR Patient-to-Professional Transmission* OR Patient to Professional Transmission* OR Professional-Patient Transmission* OR Healthcare Worker-Patient Transmission* OR Healthcare Worker Patient Transmission* OR Infectious Disease Transmission* OR Mother-to-Child Transmission* OR Mother to Child Transmission* OR Endemic Disease* OR Risk Assessment* OR "Risks and Benefits" OR Risk Analys* OR Benefit-Risk Assessment* OR Risk-Benefit Assessment* OR Adverse Outcome Pathway* OR "Failure Mode and Effect Analys*" OR HFMEA OR Risk Adjustment* OR Case-Mix Adjustment* OR Case Mix Adjustment* OR Epidemiologic Measurement* OR Epidemiological Method* OR Epidemiologic Method* OR Contact Tracing OR Contact Investigation OR Contact Screening OR Close Contact Epidemiology OR Partner Notification* OR Index Case Epidemiology OR Index Patient Epidemiology OR Patient Zero Epidemiology OR Carrier State* OR Superspreader* OR Super-spreader* OR Super spreader* OR Presymptomatic* OR Asymptomatic* OR Inapparent Carrier* OR Infection Chain* OR Disease Reservoir* OR Infection Reservoir* OR Fomite* OR Infectious Disease Reporting* OR Disease Notification* OR Exposure Notification* OR

Epidemiological Monitoring OR Epidemiologic Monitoring OR Epidemiologic Surveillance* OR Wastewater Surveillance* OR Wastewater-Based Surveillance* OR Wastewater-Based Epidemiology OR Wastewater Epidemiology OR Sewage-Based Epidemiology OR Sewage Epidemiology OR Sewage-Based Surveillance* OR Sewage Surveillance* OR Molecular Epidemiolog* OR Genetic Epidemiolog* OR Genome-Wide Association OR Whole Genome Association OR GWA OR Genome Wide Association OR Surveillanc* OR Biosurveillanc* OR Sentinel Health Event* OR Legal Epidemiology OR Communicable Disease Control OR Parasite Control* OR Flattening the Curve OR Flatten the Curve OR Infection Control* OR Antisepsis OR Asepsis OR Blood Safet* OR Hemovigilance OR Patient isolation* OR Negative Pressure Isolation* OR Home Isolation* OR Steriliz* OR Disinfect* OR Mandatory Screening OR Mandatory test* OR Physical Distanc* OR Social Distanc* OR Immunization* OR Immunological Sensitization* OR Immunologic Stimulation* OR Immunostimulation* OR Immunological Stimulation* OR Immunologic Sensitization* OR Variolation* OR Immunoglobulin Therap* OR Passive Antibody Transfer* OR Passive Transfer of Immunit* OR Serotherap* OR Immunotherap* OR Convalescent Plasma Therap* OR Adoptive Transfer* OR Convalescent Serum Treatment* OR Convalescent Sera Treatment* OR Chimeric Antigen Receptor Therap* OR CAR T-Cell Therap* OR Revaccination* OR Vaccine Therap* OR Vaccination*

OR Quarantine* OR Stay at Home Order* OR Health Lockdown* OR Cordon Sanitaire OR Health Travel Restriction* OR Self-Quarantine* OR Screening* OR Anonymous Test* OR Automated Multiphasic Test* OR Substance Abuse Detection* OR Substance Abuse Testing* OR Drug Abuse Testing* OR Drug Abuse Detection* OR Street Drug Testing* OR

Illicit Drug Detection* OR Illicit Drug Testing* OR Primary Prevention* OR Primordial Prevention* OR Pre Exposure Prophylaxi* OR Pre-Exposure Prophylaxi* OR PrEP).ti,ab,kf.

OR

Public Health/ OR Disease Eradication/ OR epidemic/ OR Disease Hotspot/ OR spatiotemporal analysis / OR Pandemic/ OR exp Disease Transmission/ OR Basic Reproduction Number/ OR Endemic Disease/ OR exp Risk Assessment/ OR exp Adverse Outcome Pathway/ OR "Healthcare Failure Mode and Effect Analysis/" OR "population and population related phenomena/" OR epidemiology/ OR contact examination/ OR exp disease carrier/ OR Infection/ OR Disease Notification/ OR exp Epidemiological Monitoring/ OR Molecular Epidemiology/ OR Genome-Wide Association Study/ OR Legal Epidemiology/ OR Public Health service/ OR Communicable Disease Control/ OR exp Infection Control/ OR Mandatory Testing/ OR social distancing/ OR exp Immunization/ OR

exp Quarantine/ OR exp Mass Screening/ OR Population Surveillance/ OR Primary Prevention/

Communicable Diseases

(Communicable Disease* OR Infectious Disease* OR Blood-Borne Infection* OR Blood Borne Disease* OR Blood Borne Infection* OR Hepatitis OR HIV Infection* OR HTLV-III Infection* OR HTLV III Infection* OR HIV Coinfection* OR Acquired Immunodeficiency Syndrome* OR Acquired Immune Deficiency Syndrome* OR Acquired Immuno-Deficiency Syndrome* OR Acquired Immuno Deficiency Syndrome* OR Acquired Immuno-Deficiency Syndrome* OR AIDS OR Acute Retroviral Syndrome* OR HIV-1-Associated CNS Vasculiti* OR HIV 1 Associated CNS Vasculiti* OR HIV-Associated Nephropath* OR HIV Associated Nephropath* OR Human Immunodeficiency Virus-Associated Nephropath* OR Human Immunodeficiency Virus Associated Nephropath* OR HIV-Related Nephropath* OR HIV Related Nephropath* OR HIV-Related Nephropath* OR HIV Related Nephropath* OR HIV-Associated Cognitive Motor Complex* OR HIV Associated Cognitive Motor Complex* OR Acquired-Immune Deficiency Syndrome Dementia Complex* OR HIV Dementia* OR HIV Encephalopath* OR Lymphadenopathy Syndrome* OR ARC OR HIV-Related Opportunistic Infection* OR HIV Related Opportunistic Infection* OR HIV Lipodystroph* OR HIV Enteropath* OR HIV Seropositivit* OR Anti-HIV Positivit* OR Anti HIV Positivit* OR HTLV-III Seropositivit* OR HTLV III Seropositivit* OR HIV Seroconversion* OR HTLV-III Seroconversion* OR HTLV III Seroconversion* OR HIV Antibody Positiv* OR HIV Wasting Syndrome* OR HIV Wasting Disease* OR Slim Disease* OR Imported Infection* OR Sexually Transmitted Disease* OR Venereal Disease* OR STD OR STDs OR Sexually Transmitted Infection* OR STIs OR STI OR Chancroid* OR Chlamydia Infection* OR Lymphogranuloma Venereum* OR Lymphogranuloma Inguinale* OR Gonorrhea* OR Neisseria gonorrhoeae Infection* OR Granuloma Inguinale* OR Granuloma Venereum* OR Donovanos* OR Syphilis* OR Great Pox* OR Condylomata Acuminat* OR Venereal Wart* OR Genital Wart* OR Buschke-Lowenstein OR Buschke Lowenstein OR Buschke-Loewenstein OR Buschke Loewenstein OR Giant Condyloma Acuminatum* OR Herpes Genitalis OR Genital Herpes OR Papillomavirus Infection* OR HPV Infection*).ti,ab,kf. OR exp Communicable Disease/

Europe

(Europ* OR Andorra OR Andorran OR Austria OR Austrian OR Belgian OR Belgium OR Albania OR Albanian OR Baltic OR Baltics OR Estonia OR Estonian OR Latvia OR Latvian* OR Lithuania OR Lithuanian OR Bosnia OR Bosnian OR Herzegovin OR Bulgaria OR Bulgarian OR Croatia OR Croatian OR Czech* OR Hungary OR Hungarian OR Moldovan OR Moldovian OR Montenegro OR Poland OR Polish OR Macedonia OR Macedonian OR Romania OR Rumania OR Roumania OR Romanian OR Serbia OR Serbian OR Slovakia OR Slovakian OR Slovenia OR Slovenian OR Yugoslavia OR Ukraine OR Ukrainian OR Alps OR Alpine Region OR France OR French OR Germany OR German OR Gibraltar OR Grecian OR Greek OR Ireland OR Irish OR Eire OR Italy OR Italian OR Leichtenstein OR Liechtenstein OR Luxembourg OR Mediterranean OR Cyprus OR Cypriot* OR Malta OR Maltese OR Sicily OR Sicilian OR Netherlands OR Holland OR Dutch OR Portuguese OR Portugal OR San Marino OR San-Marino OR Scandinavia OR Scandinavian OR Nordic OR Denmark OR Danish OR

Finland OR Finnish OR Iceland OR Norway OR Norwegian OR Sweden OR Swedish OR Spain OR Spanish OR Switzerland OR Swiss OR Transcaucasia OR Armenia OR Armenian OR Azerbaijan OR Georgia OR Georgian OR United Kingdom OR Great Britain OR British OR England OR English OR Scotland OR Scottish OR Wales OR Welsh OR EEC OR Euratom* OR EU OR Euro).ti,ab,kf.

OR

Europe/ OR Andorra/ OR Austria/ OR exp Belgium/ OR "Eastern Europe"/ OR Albania/ OR exp "Baltic States"/ OR exp "Bosnia and Herzegovina"/ OR Bulgaria/ OR Croatia/ OR "Czech Republic"/ OR Hungary/ OR Moldova/ OR exp "Montenegro (republic)"/ OR Poland/ OR "Republic of North Macedonia"/ OR Romania/ OR exp Serbia/ OR Slovakia/ OR Slovenia/ OR exp Ukraine/ OR Alps/ OR France/ OR Germany/ OR Gibraltar/ OR Greece/ OR Ireland/ OR Italy/ OR Liechtenstein/ OR Luxembourg/ OR "Southern Europe"/ OR Monaco/ OR Netherlands/ OR Portugal/ OR "San Marino"/ OR Scandinavia/ OR denmark/ OR finland/ OR norway/ OR sweden/ OR Spain/ OR Switzerland/ OR armenia/ OR azerbaijan/ OR "georgia (republic)"/ OR exp "United Kingdom"/ OR "European Union"/

Cross-border
(bordering OR borders OR border OR crossborder* OR euroregional OR transnational OR CBHC OR Cross-border* OR cross-countr* OR cross countr* OR transboundar* OR Euregio*).ti,ab,kf.

Gesundheitswesen
(Gesundheitswesen.jn. OR Gesundheitswesen.ti,ab,kf.)

Web of Science
Search conducted on June 3rd, 2024 and January 9th, 2026.

TS=("Public Health" OR "Community Health" OR "health project*" OR "Disease Eradication*" OR "Disease Elimination*" OR Outbreak* OR "Disease Hotspot*" OR "Disease Hot spot*" OR "Transmission Hotspot*" OR "Burden Hotspot*" OR "Disease Cluster*" OR "Space Time Clustering*" OR "Space-Time Clustering*" OR Epidemic* OR Pandemic* OR "Pathogen Transmission*" OR "Disease Transmission*" OR "Infection Transmission*" OR

"Close-Contact Transmission*" OR "Close Contact Transmission*" OR "Person-to-Person Transmission*" OR "Person to Person Transmission*" OR "Autochthonous Transmission*" OR "Disease Superspread*" OR "Community Transmission*" OR "Community Spread*" OR "Basic Reproduction Number*" OR "Basic Reproduction Ratio*" OR "Basic Reproductive Ratio*" OR "Basic Reproductive Rate*" OR "Basic Reproductive Number*" OR "Effective Reproduction Number*" OR "Effective Reproductive Number*" OR "Transmissibility Meas-

ure*" OR "Disease Vector*" OR "Arthropod Vector*" OR "Arachnid Vector*" OR "Tick vector*" OR "Insect Vector*" OR "Mosquito Vector*" OR "Infectious Disease Incubation Period*" OR "Patient-to-Professional Transmission*" OR "Patient to Professional Transmission*" OR "Professional-Patient Transmission*" OR "Healthcare Worker-Patient Transmission*" OR "Healthcare Worker Patient Transmission*" OR "Infectious Disease Transmission*" OR "Mother-to-Child Transmission*" OR "Mother to Child Transmission*" OR "Endemic Disease*" OR "Risk Assessment*" OR "Risks and Benefits" OR "Risk Analys*" OR "Benefit-Risk Assessment*" OR "Risk-Benefit Assessment*" OR "Adverse Outcome Pathway*" OR "Failure Mode and Effect Analys*" OR HFMEA OR "Risk Adjustment*" OR "Case-Mix Adjustment*" OR "Case Mix Adjustment*" OR "Epidemiologic Measurement*" OR "Epidemiological Method*" OR "Epidemiologic Method* Contact Tracing" OR "Contact Investigation" OR "Contact Screening" OR "Close Contact Epidemiology" OR "Partner Notification*" OR "Index Case Epidemiology" OR "Index Patient Epidemiology" OR "Patient Zero Epidemiology" OR "Carrier State*" OR Superspreader* OR Super-spreader* OR "Super spreader*" OR Presymptomatic* OR Asymptomatic* OR "Inapparent Carrier*" OR "Infection Chain*" OR "Disease Reservoir*" OR "Infection Reservoir*" OR Fomite* OR "Infectious Disease Reporting*" OR "Disease Notification*" OR "Exposure Notification*" OR "Epidemiological Monitoring" OR "Epidemiologic Monitoring" OR "Epidemiologic Surveillance*" OR "Wastewater Surveillance*" OR "Wastewater-Based Surveillance*" OR "Wastewater-Based Epidemiology" OR "Wastewater Epidemiology" OR "Sewage-Based Epidemiology" OR "Sewage Epidemiology" OR "Sewage-Based Surveillance*" OR "Sewage Surveillance*" OR "Molecular Epidemiolog*" OR "Genetic Epidemiolog*" OR "Genome-Wide Association" OR "Whole Genome Association" OR GWA OR "Genome Wide Association" OR Surveillanc* OR Biosurveillanc* OR "Sentinel Health Event*" OR "Legal Epidemiology" OR "Communicable Disease Control" OR "Parasite Control*" OR "Flattening the Curve" OR "Flatten the Curve" OR "Infection Control*" OR Antisepsis OR Asepsis OR "Blood Safet*" OR Hemovigilance OR "Patient isolation*" OR "Negative Pressure Isolation*" OR "Home Isolation*" OR Steriliz* OR "Disinfect* Mandatory Screening" OR "Mandatory test*" OR "Physical Distanc*" OR "Social Distanc*" OR Immunization* OR "Immunological Sensitization*" OR "Immunologic Stimulation*" OR Immunostimulation* OR "Immunological Stimulation*" OR "Immunologic Sensitization*" OR Variolation* OR "Immunoglobulin Therap*" OR "Passive Antibody Transfer*" OR "Passive Transfer of Immunit*" OR Serotherap* OR Immunotherap* OR "Convalescent Plasma Therap*" OR "Adoptive Transfer*" OR "Convalescent Serum Treatment*" OR "Convalescent Sera Treatment*" OR "Chimeric Antigen Receptor Therap*" OR "CAR T-Cell Therap*" OR Revaccination* OR "Vaccine Therap*" OR Vaccination*

OR Quarantine* OR "Stay at Home Order*" OR "Health Lockdown*" OR "Cordon Sanitaire" OR "Health Travel Restriction*" OR Self-Quarantine* OR Screening* OR "Anonymous Test*" OR "Automated Multiphasic Test*" OR "Substance Abuse Detection*" OR "Substance Abuse Testing*" OR "Drug Abuse Testing*" OR "Drug Abuse Detection*" OR "Street Drug Testing*" OR

"Illicit Drug Detection*" OR "Illicit Drug Testing*" OR "Primary Prevention*" OR "Primordial Prevention*" OR "Pre Exposure Prophylaxi*" OR "Pre-Exposure Prophylaxi*" OR "PrEP")

TS=("Communicable Disease*" OR "Infectious Disease*" OR "Blood-Borne Infection*" OR "Blood Borne Disease*" OR "Blood Borne Infection*" OR Hepatitis OR "HIV Infection*" OR "HTLV-III Infection*" OR "HTLV III Infection*" OR "HIV Coinfection*" OR "Acquired Immunodeficiency Syndrome*" OR "Acquired Immune Deficiency Syndrome*" OR "Acquired Immuno-Deficiency Syndrome*" OR "Acquired Immuno Deficiency Syndrome*" OR "Acquired Immuno-Deficiency Syndrome*" OR AIDS OR "Acute Retroviral Syndrome*" OR "HIV-1-Associated CNS Vasculiti*" OR "HIV 1 Associated CNS Vasculiti*" OR "HIV-Associated Nephropath*" OR "HIV Associated Nephropath*" OR "Human Immunodeficiency Virus-Associated Nephropath*" OR "Human Immunodeficiency Virus Associated Nephropath*" OR "HIV-Related Nephropath*" OR "HIV Related Nephropath*" OR "HIV-Related Nephropath*" OR "HIV Related Nephropath*" OR "HIV-Associated Cognitive Motor Complex*" OR "HIV Associated Cognitive Motor Complex*" OR "Acquired-Immune Deficiency Syndrome Dementia Complex*" OR "HIV Dementia*" OR "HIV Encephalopath*" OR "Lymphadenopathy Syndrome*" OR ARC OR "HIV-Related Opportunistic Infection*" OR "HIV Related Opportunistic Infection*" OR "HIV Lipodystroph*" OR "HIV Enteropath*" OR "HIV Seropositivit*" OR "Anti-HIV Positivit*" OR "Anti HIV Positivit*" OR "HTLV-III Seropositivit*" OR "HTLV III Seropositivit*" OR "HIV Seroconversion*" OR "HTLV-III Seroconversion*" OR "HTLV III Seroconversion*" OR "HIV Antibody Positiv*" OR "HIV Wasting Syndrome*" OR "HIV Wasting Disease*" OR "Slim Disease*" OR "Imported Infection*" OR "Sexually Transmitted Disease*" OR "Venereal Disease*" OR STD OR STDs OR "Sexually Transmitted Infection*" OR STIs OR STI OR Chancroid* OR "Chlamydia Infection*" OR "Lymphogranuloma Venereum*" OR "Lymphogranuloma Inguinale*" OR Gonorrhea* OR "Neisseria gonorrhoeae Infection*" OR "Granuloma Inguinale*" OR "Granuloma Venereum*" OR Donovanos* OR Syphilis* OR "Great Pox*" OR "Condylomata Acuminat*" OR "Venereal Wart*" OR "Genital Wart*" OR Buschke-Lowenstein OR "Buschke Lowenstein" OR Buschke-Loewenstein OR "Buschke Loewenstein" OR "Giant Condyloma Acuminatum*" OR "Herpes Genitalis" OR "Genital Herpes" OR "Papillomavirus Infection*" OR "HPV Infection*")

TS=(Europe OR Europ* OR Andorra OR Austria OR Austrian OR Belgium OR Belgian OR Albania OR Albanian OR Baltic OR Baltics OR Estonia OR Estonian OR Latvia OR Latvian* OR Lithuania OR Lithuanian OR Bosnia OR Bosnian OR Herzegovin OR Bulgaria OR Bulgarian OR Croatia OR Croatian OR Czech* OR Hungary OR Hungarian OR Moldova OR Moldovan OR Moldovian OR Montenegro OR Poland OR Polish OR Macedonia OR Macedonian OR Romania OR Rumania OR Roumania OR Romanian OR Serbia OR Serbian OR Slovakia OR Slovakian OR Slovenia OR Slovenian OR Yugoslavia OR Ukraine OR Ukrainian OR Alps OR "Alpine Region" OR France OR French OR Germany OR German OR Gibraltar OR Greece OR Grecian OR Greek OR Ireland OR Irish OR Eire OR Italy OR Italian OR Liechtenstein OR Leichtenstein OR Luxembourg OR Mediterranean OR Cyprus OR Cypriot* OR Malta

OR Maltese OR Sicily OR Sicilian OR Monaco OR Netherlands OR Holland OR Dutch OR Portugal OR Portuguese OR "San Marino" OR San-Marino OR Scandinavia OR Scandinavian OR Nordic OR Denmark OR Danish OR Finland OR Finnish OR Iceland OR Norway OR Norwegian OR Sweden OR Swedish OR Spain OR Spanish OR Switzerland OR Swiss OR Transcaucasia OR Armenia OR Armenian OR Azerbaijan OR Georgia OR Georgian OR "United Kingdom" OR "Great Britain" OR British OR England OR English OR Scotland OR Scottish OR Wales OR Welsh OR EEC OR Euratom* OR EU OR Euro)

TS=(border OR borders OR bordering OR crossborder* OR euroregional OR transnational OR CBHC OR Cross-border* OR cross-countr* OR "cross countr*" OR transboundar* OR Euregio*)

ALL=(Gesundheitswesen)



ADDITIONAL FILE 4: GREY LITERATURE , TARGETED WEB SEARCHES

Targeted web searches were conducted using Google Advanced Search, Google Scholar and the websites of selected institutional and programme sources. For each source, the first 20 results per search were screened for relevance to ensure a consistent and feasible approach across sources.

Search logic

- Border terms used in combination with public health terms
- Border terms: border, cross-border, crossborder, cross border, cross country, cross-country
- Public health terms: infectious disease, infection prevention, communicable disease, public health, health promotion

Google Advanced Search, targeted websites

Queries combined border terms and public health terms, restricting results to one domain at a time using the site operator.

Example query for Google Scholar and Google

(infectious disease OR infection prevent* OR communicable disease OR public health OR health promotion) AND (border OR cross-border OR crossborder OR cross border OR cross country OR cross-country)

Organisation	URL
World Health Organization Europe	https://www.who.int/europe/about-us/our-work/core-priorities
European Center of Disease Prevention and Control	https://www.ecdc.europa.eu/en/publications-data
EUR-Lex	https://eur-lex.europa.eu/homepage.html
Publication Office of the European Union	https://op.europa.eu/en/web/general-publications/publications.
Association of European Border Regions (AEBR)	https://www.aebr.eu/library/
European Regional and Local Health Authorities (Euregha)	https://www.euregha.net/publications/
European Public Health (EUPHA)	https://eupha.org/publications
RIVM	https://www.rivm.nl
Robert Koch Institute	https://www.rki.de/EN/Home/home_node.html
Sciensano	https://www.sciensano.be/nl

ADDITIONAL FILE 5: DATA EXTRACTION INSTRUMENT

Scoping Review Details	
Scoping Review Title	Infectious disease prevention and control in European border regions: a scoping review protocol
Review objective/s	This scoping review aims to investigate the organisation and functioning of the European cross-border public health landscape concerning infectious disease prevention and control.
Review question/s	How is the European cross-border public health landscape organised, and how does it function with regard to infectious disease prevention and control?
Evidence source Details and Characteristics	
Citation details	e.g. author/s, date, title, journal
Countries	Factual representation of the countries included in the study as objects of study: the countries that are involved in the study.
Context	What is the context of the study? How do they interpret their work? Viewed from the theory. How do they operationalise CB? What about the context of prevention and health promotion? How is this described in the study?
Participants	Does the study have a focus on a particular target group? And if so which one? (e.g. patients, cross-border workers, general public)
Details/Results extracted from source of evidence (in relation to the concept of the scoping review)	
Type of study	What kind of study is it? E.g. Qualitative, Quantitative, Policy discourse? Why did they decide to use this methodology? What is the reason they think this provides the information to be able to say something about the CB context? How do they methodically handle CB in relation to infectious diseases? How do they do it with CB? What do I see?
Purpose of study	What is their problem definition? What is the study about?
Neighbouring countries	What is the reason that this study is done in these countries? What about were the studies took place? What is the reason it was studied in that region? Was there a problem? Were there funds? Is there an CB infrastructure? Is this cross-border region different than other regions? Does the study say something about this? Why did they do this study beside the problem definition; background.
Type of intervention	Was an intervention used to conduct this study? If so what kind of intervention was used? For example, was this a new prevention programme, or a communication campaign, or just a new policy protocol, public health policy, government regulation?
Key components	What are the key components in the study? E.g. type of infection, setting (NH, GP, Community e.g),
Results	What are the main findings and how do they relate to CB?
Limitations	What limitations of the study do they describe?
Conclusions	What are the main conclusions of the study?

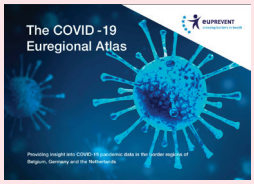


APPENDIX I: PRACTICAL EXAMPLES CHAPTER 3

This appendix presents selected practice documents that illustrate how themes addressed in Chapter 3, the scoping review on cross-border infectious disease control, were reflected in recent public health work in the Meuse-Rhine and Rhine-Meuse-North border regions.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

The COVID-19 Euregional Health Atlas, 2021



This multilingual atlas visualises COVID-19 pandemic data for border regions between Belgium, Germany and the Netherlands. It covers the Meuse-Rhine Euroregion, Rhine-Meuse-North Euroregion, Rhine-Waal Euroregion and EUREGIO, and illustrates practical challenges in cross-border surveillance, including differences in definitions, testing policies, geographical levels and data comparability.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2021: *The COVID-19 Euregional Atlas*

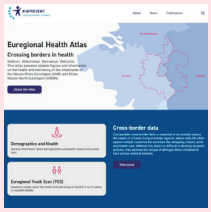
Applying the GDPR and National Legislation in Cross-Border Public Health Cooperation, 2021



This b-solutions report examines legal and administrative obstacles encountered in the euPrevent COVID-19 study in the Meuse-Rhine Euregion. It describes challenges related to ethical approval, informed consent, exchange of address data, national GDPR implementation and data processing in cross-border public health research.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2021: *Applying the GDPR and national legislation in cross-border public health cooperation.*

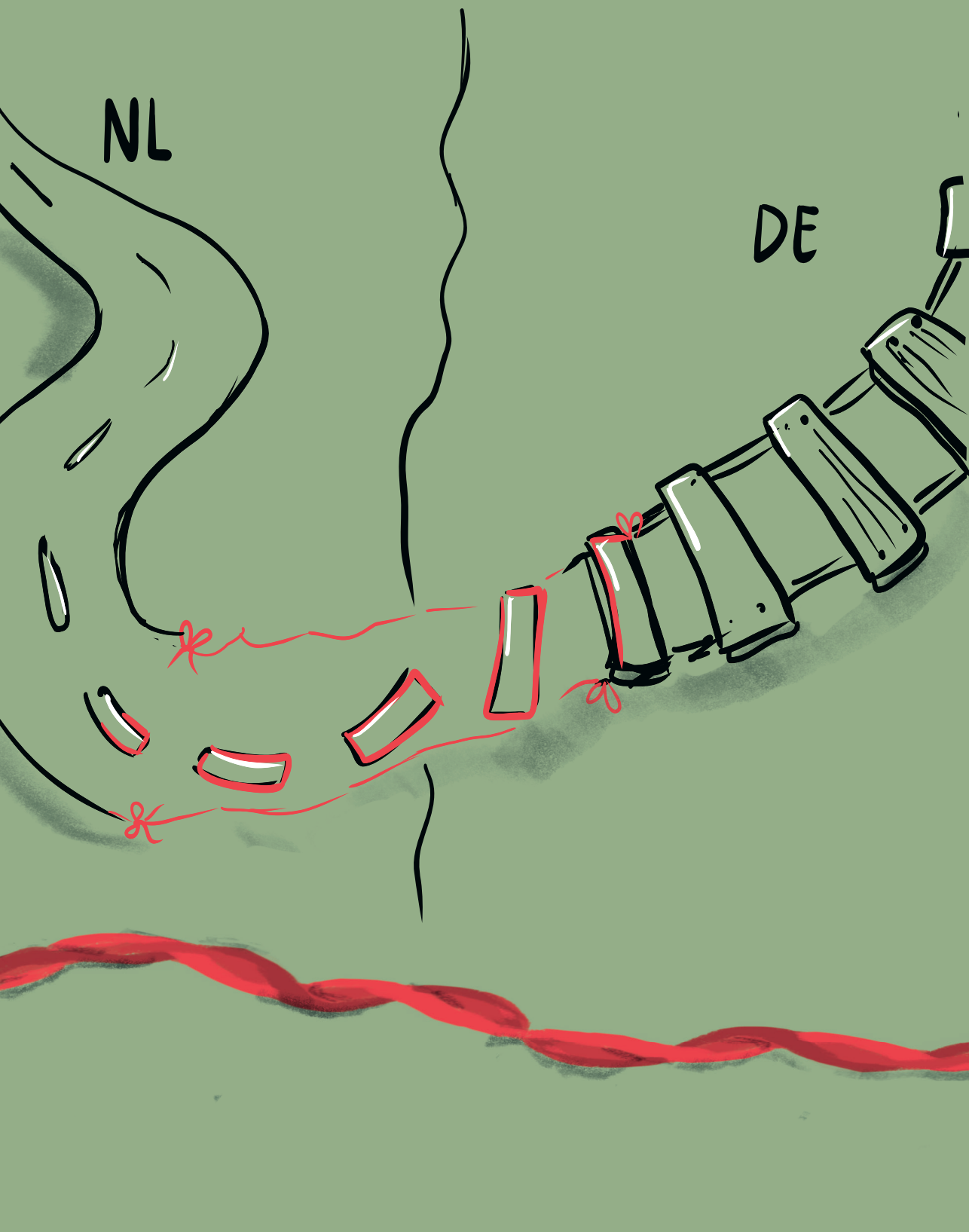
Euregional Health Atlas



This online atlas presents cross-border figures and information on the health and well-being of inhabitants of the Meuse-Rhine Euroregion and Rhine-Meuse-North Euroregion. It includes demographic and general health data, results from the Euregional Youth Scan, COVID-19 data and data on loneliness among older people. The atlas illustrates how different types of regional public health data can be brought together and made accessible for cross-border comparison, interpretation and surveillance.

Online version:
https://euregionalhealthatlas.eu

Archived copies of the listed documents are retained by the author and may be requested from the author, where copyright and institutional permissions allow.


NL
DE

Chapter 4

Infrastructural work for cross-border collaboration in public health: experiences from the Meuse-Rhine Euroregions

Brigitte A.M. van der Zanden, Marja Veenstra, Christian J.P.A. Hoebe & Klasien Horstman.

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Doi: 10.1080/08865655.2026.2714799

ABSTRACT

Cross-border collaboration for public health in European border regions is frequently organised through time-limited projects rather than stable institutions. Using insights from border studies and infrastructure studies, this qualitative study examines how public health professionals in the Meuse–Rhine border regions (Netherlands, Belgium, Germany) experience and sustain such collaborations. The analysis of nineteen interviews showed that borders function as institutional interfaces where divergent legal regimes, administrative procedures, and accountability expectations shape cooperation. To sustain continuity across these interfaces, professionals engage in various forms of light infrastructural work. The analysis conceptualises cross-border public health cooperation as an everyday infrastructural accomplishment of borderland governance while national frameworks remain primary.



INTRODUCTION

While it is a common idea to think about the world as consisting of countries separated by clear borders, a large part of the world consists of border regions. The EU considers at about a third of the EU as a border region (1-3) and around 30% of Europe's population lives in these regions (4). Since the late 1980s, the European Union has recognised that border regions, where people cross borders on a regular basis for work, leisure, shopping, education, health care, visiting friends and family and other reasons, face specific challenges such as labour market limitations due to national differences in labour laws and diploma recognition, language barriers, infrastructural and public transport problems due to different railway systems or poorly coordinated road construction. To address these challenges and to promote cross-border cooperation, the EU developed a specific financial infrastructure for European Territorial Cooperation, also known as the Interreg programme, in the early 1990s (5). Other EU programmes, including Horizon Europe and EU4Health, may also support cooperation between actors from different countries in areas such as health research, innovation, health system resilience and preparedness for cross-border health threats. In context to these broader programmes, Interreg A is more directly linked to cooperation between adjacent border regions. Border regions could apply for funding that would allow them to develop concrete collaborations in specific domains (6). The EU then had to approve these plans, effectively setting the agenda for cross-border projects in a top-down manner.

At the start of Interreg programmes in 1991, in line with the Treaty on European Union (TEU), which stipulated that healthcare formally is considered national policy domain and not an EU policy area (7), Interreg did not include funding for collaborative cross-border initiatives in the field of healthcare. However, the 2000-2006 Interreg programme did provide funding for cross-border collaboration with respect to health issues (8). This policy change can be understood in the context of the 1998 rulings of the European Court of Justice in the Kohll (9) and Decker (10) cases, which extended the principle of free movement of goods and services to healthcare and drew EU attention to the specific challenges of cross-border healthcare in border regions. In this context, cross-border health collaboration also became eligible within Interreg funding programmes (11).

Intrigued by the great interest in cross-border healthcare collaborations in the context of Interreg initiatives, the EU supported a broader inventory of cross-border healthcare initiatives in the European border regions (12-14). This inventory included 122 cross-border health related projects covering fields such as curative-, palliative-, rehabilitative-, and emergency care, disaster management, telemedicine, prevention and health promotion. The study showed the importance of the EU policy as 90% of the analysed projects received EU funding, mainly through Interreg.

Taken together, previous studies show that cross-border cooperation in Europe is shaped by voluntary regional networks, EU territorial cooperation programmes and efforts to reduce legal and administrative border obstacles (6, 15). In health, earlier work has mapped cross-border activities in cross-border regions, Euregios, and identified a wide range of health-related projects, while also pointing to gaps in information, publication and evaluation (12-14). Less is known, however, about how public health professionals sustain such cooperation in everyday practice when formal responsibilities, data systems and accountability structures remain nationally organised. This article addresses that gap by analysing cross-border public health collaboration as ongoing infrastructural work across national systems.

The relevance of this question became particularly visible during COVID-19 pandemic in 2020-2021, when cross-border collaboration was challenged by nationally organised public health measures. Some governments used border closing as an instrument of national pandemic control, which showed the difficulty of cross-border healthcare collaboration especially in a time when it was needed most. National pandemic measures were not internationally aligned, requiring residents of highly mobile border regions to navigate divergent national regulations across everyday domains such as work, healthcare, education, shopping, and leisure. Different national regulations for mask wearing, contact tracing and isolation, combined with cross-border mobility, contributed to the complexity of the lives of both citizens and healthcare professionals in border regions (16-18). Sometimes, it was simply impossible to follow the measures: for instance, while quarantine was mandatory in Germany and lasted 10 days, in the Netherlands it was only a strong recommendation for a maximum of 5 days. This put cross-border workers in a difficult position, such as a German citizen working for a Dutch company whose employer followed Dutch guidelines and required him to return to work after 5 days while his government instructed him to stay at home for 10 days. So, the employee had to choose between keeping his job and complying with German law. This kind of conflicts not only led to personal uncertainty but also to legal ambiguity and disputes between employers and employees in the border regions.

Against the background of these discussions, in this article we will explore how public health professionals working in the Meuse-Rhine border region in Europe have experienced and reflected on the development collaborative cross-border infrastructures for public health. In the next section, we first will introduce the theoretical background that inspired our study. Next, we will explain the methodology. After having presented the results, we will discuss these in the context of relevant scholarly discussions.



THEORETICAL APPROACH

To study how public health professionals working in border regions have experienced and reflect on the development of cross-border cooperation in public health, this article combines insights on border studies and infrastructures studies. Border studies provide the contextual understanding of borders as socially, institutionally and practically produced, whereas infrastructural work is the principal analytical lens through which the empirical material is interpreted.

Cross-border health concerns are not unique to Europe. Comparable forms of cooperation between adjacent border regions have been described, for example, in the San Diego-Tijuana transborder region during COVID-19 (19) and in outbreak preparedness at the Kenya-Tanzania border (20). In this article, however, cross-border public health cooperation is used in a narrower territorial sense, referring to collaboration between public health actors in adjacent border regions across different national systems, within a relatively institutionalised European context.

In border studies, many scholars have argued that borders should not be considered only as political-legal entities but also as cultural, economic and social constructs. Scholars have shown that everyday cross-border social-economic relations are as important for understanding life in border regions as formal national policies (21), and that borders are continuously re-made through political, cultural and everyday interactions (22). This perspective draws attention to the fluidity of borders in everyday life, where borders function not only as dividing lines but also as zones of connection, negotiation and mobility (23, 24). For this study, border studies therefore help to conceptualise the setting in which nationally organised public health practice have to attune to everyday cross-border life in border regions.

The principal analytical lens of this article is infrastructural work. According to Knorr-Cetina (25), infrastructures are complex systems that include both material-technical components such as buildings, protocols, laws and software, as well as human, symbolic and cultural infrastructural work (26). Infrastructures help to connect and mediate between different groups, allowing them to collaborate across boundaries even when they hold different perspectives or operate under different systems. In the field of health care, the making of Peristat, a European statistical data infrastructure on perinatal death, is an example. Even though countries may have different definitions and different cultural and ethical practices regarding perinatal death, professionals can collaborate, exchange and learn through this infrastructure (27). Such shared infrastructural objects enable coordination without requiring full consensus among the actors involved (28). Bowker and Star (29) underlined that infrastructural work is always moral negotiation work: over decades the International Classification of Diseases (ICD) reflected what was considered taboo in a

certain time (e.g. suicide or venereal diseases) and what was considered an accepted disease or cause of death. Scholars such as Schot (30), Bowker and Star (29), Banks, Lombard (31) and Aicardi and Mahfoud (26) argue that while formal infrastructures are legitimised by formal rules and public regulations, informal infrastructures develop in non-formalised domains of live and sometimes explicitly under the radar of formal institutions to enable the operation of these infrastructures. An infrastructural work perspective is particularly useful for this study because it makes visible the practical, relational and often informal work through which professionals keep cooperation workable across different national systems, although it gives less direct attention to formal authority relations and macro-level institutional design than approaches such as multi-level governance or network governance.

Together, perspectives from borders studies and infrastructure studies conceptualise cross-border public health collaboration as both a situated border practice and a governance challenge, in which cooperation has to be organised and maintained across different national systems.

Against this background, we aim to explore how professionals in public health have experienced and reflect on cross-border collaborations in a border region.

METHOD

We performed a qualitative study in the border region of the Netherlands, Belgium and Germany: the Meuse-Rhine Euroregion and the Rhine-Meuse-North Euroregion. In this article these terms are used as geographical designations for the border regions under study, rather than as references to the formal organisations known as Euregio Meuse-Rhine and Euregio Rhine-Meuse-North (figure 1). These regions were chosen as since 2001 long-lasting cross-border collaborations have been developed there due to EU Interreg funding in the period 2001 onwards. In 2010 euPrevent was established, as a non-profit organisation dedicated to improving the quality of life of citizens in the border region between The Netherlands, Germany and Belgium. Through a cross-border network of public health authorities, hospitals, universities, and patient organisations from three countries, euPrevent focuses on health promotion and disease prevention. euPrevent addresses themes such as mental health, addiction prevention, infectious diseases, elderly care, and healthy lifestyles, while fostering knowledge exchange and policy coordination among the participating regions.



Figure 1. Location of the Meuse-Rhine Euroregion and the Rhine-Meuse-North Euroregion. Source: adapted from WHO Regional Office for Europe (2025) and euPrevent (2024).

The network of euPrevent facilitated the organisation of the interviews. The lead-researcher had been director of euPrevent from the start in 2010 until end-2024 and had a good overview of professionals involved in cross-border networks. This network was used to invite people to participate in the study. We performed semi-structured interviews with German, Dutch, Belgian professionals involved in cross-border public health initiatives in the Meuse-Rhine and Rhine-Meuse-North Euroregions between 2010 and 2023.

The participants were selected by purposeful sampling: we selected participants who had experience with cross-border collaborations either as professional staff or as manager since 2010. While professional staff had experience in daily cross-border collaborative work, managers had to mediate between the cross-border work and national policies. Participants were invited by email by the lead author. We aimed for equal participation of the three countries, the Netherlands, Germany and Belgium, so we invited seven German, six Dutch and seven Belgian professionals from the two Meuse-Rhine Euroregions and involved in different types of cross-border collaborations (mental health, infectious disease (COVID), environmental health and youth health). As one person form Germany did

not respond, we conducted 19 interviews with professionals working in the Meuse-Rhine border regions.

The interviews were conducted online in 2023. To reflect the linguistic diversity of the region, interviews were conducted in German, Dutch and English by the lead author who is a native or fluent speaker of the respective languages. The original transcripts were analysed in their original language: This multilingual competence reduced the need for translation and ensured that nuances of meaning were preserved throughout the analysis. The interviews were conducted using a semi-structured topic guide that was tested during the first three interviews and refined accordingly which resulted in topic guide presented in Table 1. The guide was used as a flexible structure rather than as a fixed questionnaire, allowing participants to elaborate on their own experiences while ensuring that themes relevant to the study aim were covered. Follow-up questions were used to explore issues raised by participants in more detail and to ask for concrete examples.

Table 1. Topic guide

Topic guide
Function, role, and everyday professional work of participant
Organisation's and/or personal role in cross-border public health
Experiences with, and perspectives on CBPH
Perspectives on what is going well or not in CBPH and your explanation for them.
Experiences with formal and informal cross-border cooperation in public health
Experience with policies around cross-border cooperation.
Perspective on the significance of knowledge infrastructures and public health data in cross-border cooperation
Recommendations for future cross-border public health collaboration

The interviews lasted from 45 minutes to one hour and were recorded. They were transcribed verbatim by an external agency. Post-interview peer debriefings allowed for iterative preliminary analysis and assessment of data saturation. The interviews were analysed by BZ and MV using thematic analysis. The analysis was primarily guided by the infrastructural work perspective. An initial coding framework included promoting and hindering factors in cross-border public health, classifications, formal and informal rules and standards, and data and knowledge structures. Text fragments could receive more than one code. Codes and emerging interpretations were discussed between the authors and grouped into broader themes, resulting in the three analytical patterns presented in the results section. All quotes in the following paragraphs were transcribed into English by the authors where necessary. Quotations were anonymised by using a letter-number combination (e.g. D1, N2, B3), with the letters denoting Germany, the Netherlands, Belgium respectively. The choice of letters follows the international country codes (DE, NL, BE), from which the first letter was taken for brevity and clarity. Because participants were

drawn from a relatively small cross-border professional network, no individual-level list of background organisations or positions is provided, as such information could make participants identifiable despite anonymisation. All participants gave written informed consent. The study was approved by the research ethics committee of the Faculty of Health, Medicine and Life Sciences at Maastricht University (the approval number is FHML-REC/2023/064).

RESULTS

In this section we will first go into the question of how interviewees consider the importance of cross-border collaboration in public health. Next, we will sketch how they reflect on the difficulties they have experienced developing these collaborations. Finally, we will explore which kind of work was done to strengthen the fragile character of cross-border collaboration.

The importance of cross-border collaboration

Given their longstanding engagement with cross-border activities, it is not surprising that all interviewees express a strong appreciation for such collaboration. They stress that cross-border cooperation expanded their professional and institutional horizons, provided opportunities for mutual learning and helped them reflect on their own health system. This reflexivity is a distinctive feature of cross-border work.

> Differences in legislation and in regulations and structures: I didn't see that as a problem. It was also often a source of inspiration. That's an invitation to ask additional critical questions. (B3) …. It is not easy to start cooperation between municipalities left (BE) and right (NL) of the Meuse, but I think that those cultural differences are not a barrier, but an absolute added value, because you can look at things differently. (B5)

Professionals are constantly confronted with alternative institutional logics that make their routines visible and debatable.

> What I recognised as an important advantage was that we first got to know each other and then, step by step, said: let's first explain to each other how the health systems work and where we see, okay, here we have to do something, and here we could do something together. (N4)

Several interviewees emphasised that working across borders differs fundamentally from national collaboration. It exposes professionals to different legal, organisational, and cultural logics, forcing them to think beyond their own administrative frameworks.

In national structures, alignment is often secured by hierarchy or shared legal norms. In cross-border collaborations, alignment must be constructed through dialogue, comparison and trust. As one German professional explained, "We first think about how we could do it or what we would like to do, and only later about how we can *sell* it legally." (D4)

These accounts underline how cross-border collaboration broadens professional perspectives and encourages a mindset that is less likely to emerge in national settings. Legal and organisational contrasts and cultural difference were also framed as a resource for learning and re-framing practice.

While professionals value these opportunities for learning and innovation, they also emphasise that such collaboration does not develop automatically. They underline the importance to define a problem as a shared problem and addressing it as a shared interest. The other way around, the construction of a shared problem helps to stimulate cross-border collaboration. This dynamic is operative in a national context, but in the context of a border region as well: awareness of the cross-border character of problems and of shared benefits of cross-border collaboration is required for initiating collaborative processes.

It is interesting that the interviewees explain that some types of emergencies have been defined as a shared public problem, such as large fires or chemical disasters, and that cross-border collaboration in these matters has become both self-evident and formally organised. What once depended on ad hoc coordination has, through repeated joint exercises and institutional agreements, developed into stabile routines supported by legal and organisational frameworks.

> We take our emergency service and the fire brigade as examples, for them, it has been normal for years to know exactly who the contact person is on the other side of the border and in which areas joint procedures have already been established. This can currently be seen with the fire in the Hohen Venn: you don't first have to call people privately, because everything is already structured. (D4)

> We had a cross-border incident before Corona, legionella in a paper factory in Düren, which entered the Rur through wastewater. We then had contact with the colleagues responsible for Roermond and agreed that they would also take measurements. I remember speaking with Dutch colleagues who took samples at a large fruit farm just across the border, which used water from the Rur, to check whether there was any risk. (D6)

These examples show that infrastructural maturity emerges not only from legal harmonisation but from habitualised cooperation, professionals knowing their counterparts



across the border, their email addresses and mobile numbers, within a shared operational structure.

The analysis also shows why cross-border collaboration is considered necessary in the first place. First, it is referred to the external effects of disasters and crises. Several interviews point to the fact that environmental crises and epidemics do not stop at a border, and that cross-border collaboration is required to deal with the collective external effects of these problems. The impact of dust of the mining industry and the pollution of the Elbe for instance required that bordering countries were informed so that measures could be taken. "A good example for me was last summer, when the Elbe suddenly turned so green in Germany. That had its origin in Poland and then, of course, it came over into Germany." (D4) Other interviewees pointed to the effects of climate change and in particular floodings in the Meuse-Rhine region: "Think of climate, the consequences of climate change, the adaptation to climate change. Nobody can deal with these problems by themselves." (D2)

COVID-19 was often mentioned as a global health crisis that transcended national borders and that urgently demonstrated the importance of cross-border collaboration. While that succeeded in some respects (development of vaccines), in other respects (preventive measures) countries did not define it as a shared collective problem and did not develop cross-border collaboration. In fact, countries relied on different national control measures and sometimes countries decided unilaterally to close borders. Border closures of borders and different national pandemic control measures created major problems for citizens as well as professionals who had to cross the border on a daily basis.

> There were sometimes very different legal regulations between Germany and the Netherlands or Belgium. There were very different regulations regarding quarantine or not, quarantine obligation or masks or not, which posed great challenges for people. And then, of course, it was also very challenging for us in cooperation when it was handled so very differently. (D2)

> Informal caregivers who could, could not, cross the border. … And making that letter was not the work … but precisely the lobbying around it … to ensure that they could actually cross the border? That is where I really experienced the added value of the cooperation. (N1)

> … I find it really strange that such a little line on a map suddenly determines that completely different rules apply there, completely different contexts. (N1)

Interviewees on the one hand point to the importance of pandemics like COVID-19 or environmental health crises as a signal that cross-border collaboration is urgent. "The

moment we are confronted with a crisis, there will be action." (N2) At the same time they underline that it should not be dependent on crisis. Starting collaboration during a crisis will be difficult when there is not any basis.

> The COVID-19 crisis was an example of that. Then it makes no sense to try to establish cooperation from a clean sheet. That would take a great deal of effort and energy, which under these circumstances was not really advisable. So, you need to have a structure that exists prior to taking joint initiatives. Otherwise, you start with a blank page. .... I think it is not correct to say that urgent projects are the lifeblood of such euregional cooperation. I think that there should be a permanent basis... There are anyway in normal situations problems that can be improved or at least addressed and studied. That is not only in a crisis situation. (B2)

As several respondents argue, crisis situations may highlight the need for cooperation, but sustainable collaboration requires more than emergency-driven initiatives. Crises may demonstrate the need for collaborations, they do not make collaborations sustainable per se.

A second reason to argue for cross-border collaboration is not related to the external effects of disasters in one specific country but to the reality of everyday life in a border region. People routinely cross the border for work, care, education or shopping. "It is quite natural to cooperate with each other, to go shopping in the neighbouring country..." (D4) Crises such as COVID-19 made this normality suddenly visible, and when borders closed, citizens and professionals realised how deeply cross-border mobility is woven into their daily routines.

It is interesting that some interviewees also mention cross-border initiatives that did not work out, initiatives that failed to develop and problems that eventually became not defined as a shared cross-border problem. For instance, one interviewee recalled an initiative to improve the indoor climate of houses in the border region that was not successful. Another interviewee described how attempts to build structures for infection control also stalled:

> Before the pandemic, I also tried to set up structures for infection control, for example the Antibiotic Stewardship. Now that I am no longer active, they are not moving either. … Something gets initiated and at some point you get tired. (D1)

Not surprisingly, most interviewees are positive about the fruitfulness of cross-border collaboration for the development of professional expertise. While public health is rather nationally organised, looking across the border broadens the perspective and deepens the understanding of public health. They also stress the need for cross-border coopera-

tion, as most public health problems are no national problems but are a concern for the whole border region: in border regions countries share problems, and these problems require communication and cooperation.

Challenges for collaboration in a border region

While all interviewees agree about the importance of cross-border collaboration, they also point to many challenges to develop such collaborations. A first challenge concerns the cultural, moral, and procedural diversity that comes to the fore in cross-border collaboration. What is routine in one national context may be considered sensitive or even inappropriate in another. Especially in youth health these differences come to the fore. "For example, sexuality, which was taboo in a neighbouring country ... Very simple things, or things that were clear to us, suddenly became a problem because of different cultures ... That was sometimes very obstructive." (D3) Another interviewee added that even discussing certain health topics could be constrained by national norms and expectations:

> The German police officers were not allowed to speak honestly about cannabis, because they had something like censorship or a gag. They always had to say, no, we are against it ... They had a real taboo ... that they were not allowed to talk openly about the topic with their Dutch and Belgian colleagues. (D3).

This indicates that cross-border work demands explicit alignment of norms and language whereas national work usually relies on shared expectations.

Differences with respect to ethical approval and legal procedures for research and data access were problematic as they create different speeds and sequences of work across borders. As one professional noted: "In the Netherlands it is ... very easy to access those data. In Belgium it is quite a job ... You need to get permission from almost everyone to obtain the data, which makes things very complicated." (B2) Another interviewee describes that these national procedural differences required new, shared protocols across countries:

> As a researcher you wish to work as standardised as possible. That's the easiest thing to do. The fact that you were faced with different situations complicates the collaboration in the sense that procedures and protocols must be written which apply everywhere. … In the Netherlands, in the EMR study an opt-in or an opt-out was imposed. Well, we are now going to apply that here as well. (B2)

While national public health practices are developed within a shared set of rules and procedures, cross-border partners must agree on a minimum common basis that each organisation can execute in practice. While procedural diversity sometimes slowed down

collaboration, it also forced professionals to confront different legal expectations and to coordinate more explicitly across national systems.

A second challenge identified by the interviewees relates to the temporary, project-based nature of cross-border cooperation. Many interviewees observed that once a project ends, cooperation tends to lose momentum. One noted: "I don't have any contact with those people anymore. And they don't know how to find me either. So, you can really see that such a project is very much needed as a kind of engine." (N1) In national infrastructures, public health work has a stable mandate, and continuity is institutionally guaranteed, made independent of personal relationships. In cross-border contexts, public health collaboration is projectified and continuity must be actively made and remade all the time. Projects act as temporary drivers that mobilise people and resources while networks risk falling dormant in between. In this context, some interviewees stress the need for a coordinating structure to keep networks in border regions alive: "… Without structure, you have to invent yourself every time, so to speak." (B2)

Interviewees described how cross-border cooperation often unfolds in bursts of collective energy during project cycles, followed by quieter periods where existing networks must be actively maintained. To develop cross-border collaboration further, a coordination body is required that can bridge the gaps between projects.

> But there is often a lack of a catalyst to get that going. I think that is the merit of euPrevent in the Meuse-Rhine Euroregions. EuPrevent was the catalyst. But the next step, besides that catalyst setting a process in motion, is that you then must have an actor, who takes ownership of the story.' (B5)

In line with the projectification of cross-border work, interviewees made clear that organisational incentives to develop cross-border collaboration were often lacking: "In my organisation, my involvement in euregional cooperation is not valued ... So, for me it really must have added value, otherwise I'll simply be called back." (N1). Compared to national collaborations, cross-border work progress often depends on personal commitment rather than on formal mandates and institutionalised roles and routines. "It is essential that people also have euregional cooperation in public health in their portfolios. And you see that that's still a bottleneck in the different countries." (N6) When collaboration depends on personal networks rather than formalised roles, discontinuity, high turnover and absence can quickly disrupt established networks.

> A disadvantage is that people in such an organisation can of course change, which means that sometimes you have to start again for a moment: this is what we agreed, this is what I expect from you, and this is what you can expect from me.' (N1)



> Z will at some point leave, and we have now … trained another colleague … so that this connection is not lost. (D6)

Even short absences expose how much cross-border collaboration depends on specific people rather than on institutional roles. "That person also goes on holiday once in a while and is not there." (D6). Cross-border collaboration requires dedicated maintenance work.

> We know the network, we know whom to contact, who can contribute something, so that goes very quickly. … But at euregional level, if I think back to the time of the Indoor Environment project, I think we've been working for years to first get the need clear, to find out what the biggest problem is. (B6)

The projectification of European or national funding bodies also implies that sometimes organisations spring on the bandwagon only "to tap funds for one's own specific interest." (D3) or because of "a political decision" (B5) which according to some interviewees results in "a lack … of intrinsic motivation to all pull together." (B5)

> A third challenge for cross-border collaboration arises from the clash between different national accountability cultures, national reputations and imaginations and the practices of professionals working across borders.

From a national political perspective, acknowledging limitations in health systems or reliance on neighbouring countries can be seen as sensitive or a reputational risk. German interviewees described how the presence of national politicians may complicate openness about the relevance of cross-border collaboration: "For me, close cooperation also requires admitting weaknesses … A malicious politician would ask why we didn't plan better ... one is reluctant to make weaknesses transparent." (D4) another interviewee remarks: "As soon as political decision-makers come into the room, it becomes all the more difficult." (D1) This dynamic is not limited to Germany. As a Dutch interviewee explained:

> We work with political agendas that last four years, and then it becomes uncertain which direction the next administration will take. It is very short-term policy, short-term visions. The euregional and European level is political too: who is visible, how this reflects on a party, whether someone might be re-elected. All of that plays a major role.' (N1)

While cross-border work requires a practical cross-regional focus, national accountability cultures often prioritise national perspectives and political interests, making it difficult to acknowledge the specific importance of cross-border collaboration in border regions.

> And is the policy choice actually aimed at facilitating this kind of cross-border cooperation? … The facilitating roles of cross-border cooperation are filled from the political agenda to my sense, and not from a health promotion or prevention agenda… to show politicians who have to justify why they allocated those budgets. (B5)

Especially in diplomacy, national reputations play an important role.

> When the people from the capital cities meet ... it is much more difficult, because there are many more interests ... colliding with each other ... One was very often diplomatic ... One wanted to present a good image of oneself and of one's own country. (B7).

Professionals working in cross-border collaborations in public health face different challenges, such as cultural and moral differences, the consequences of projectified work, and the interplay between national political accountability cultures and every day collaborative cross-border work. These challenges make cross-border work an innovative practice and an exciting learning experience, but they also make it fragile.

Infrastructural work to sustain cross-border collaboration

Whereas national public health systems are typically stabilised through predefined mandates, organisational routines and relatively stable funding streams, the fragility of cross-border cooperation requires continuous professional maintenance work.

A first form of infrastructural work is coordination and facilitation work, to repair or compensate discontinuity created by project-based cooperation and the absence of a permanent coordinating architecture. This work was primarily done by euPrevent, a small nonprofit organisation (personal 3-4 FTE) that e.g. brought potential partners together, lobbied for political support and funding, coordinated the development of grant proposals and did the project management. Professionals sustain continuity between project cycles by relying on the minimal coordinating capacity of euPrevent that helps to identify and connect organisations with similar needs across national borders, so that cooperation does not have to be rebuilt from scratch. As one interviewee put it:

> Ideally, of course, we would be the main initiators ourselves, or, for example, municipalities would ask us: should we now collaborate more with municipalities across the border? But we do see very clearly that the driver, the one who pulls the cart in our region, is euPrevent. I also think we really need that, because we are primarily focused on the local and regional level, that is also our mandate, and that there is then someone, or an organisation, that simply keeps the euregional 'lesson' in view for us. (N2)



Especially when collaborations start, mobilising a network to develop a loosely shared idea into a concrete proposal or activity, the role of euPrevent is important to identify relevant partners, to write proposals, to organise meetings etcetera. "Someone has an idea … you ask: "can we build something around this, and if so, who do we need?" … organisations like euPrevent … look which organisations we can involve, and then the project is drafted further." (B3)

A second form of infrastructural work is relationship-building and maintenance work by engaged individuals, in the absence of formalised roles and routines that would otherwise carry collaboration forward. Cross-border cooperation is often sustained by a small number of people who keep contacts alive across countries and remain accessible between project cycles. "In the Meuse-Rhine Euroregion, hardly anyone would be talking about cross-border cooperation in this form if it hadn't been for that one person and their … motivation." (D1) Informal ties help prevent cooperation from becoming dormant between projects. As one respondent noted, continuity is sustained through personal relations within and around the network: "… but also, what people can contribute to a story. In a network, both formal and informal, there are also personal relationships, and those are very important." (B3). This is visible in everyday responsiveness, even without regular scheduled meetings:

> The informal structures are always based on the individual who holds the relationship … Formally it may not be organised so that you meet weekly or monthly or however often, but when you get in touch there is a very quick response. … Despite the lack of a solid formal structure, people switch very quickly and are actually very effective.' (N3)

In a similar vein, one interviewee described how repeated interaction can create a personal commitment that sustains cooperation over time: "Of course, the more you get to know your network, that regional network, and build a personal relationship with it, the more you get to a point where you don't dare say no anymore." (B6) While euPrevent is important to coordinate cross-border collaborative initiatives, informal relational work is crucial to keep cross-border ties active over time.

A third form of infrastructural work combines translation and legitimation work. Translation concerns how interviewees make collaboration workable across borders while simultaneously legitimising it within their own national organisational context. Interviewees describe how they sustain cross-border collaboration in response to recurring obstacles. As one Belgian interviewee put it, the prospect of "a lot of work" does not lead to postponement but to acting: "They first see the work and say: No, we can't do that. And I'm more like this: I see the work and I say: We'll do it anyway." (B1) Such forward movement, however, also depends on legitimation work within national organisations: securing

sufficient internal backing to initiate cross-border collaboration under conditions of uncertainty. One interviewee described how a cross-border health atlas was authorised internally before full comparability could be guaranteed:

> We coordinated that internally. ... And we also indicated that we would start with a growth model because we knew very well that, being able to compare good indicators with each other, was still a bit of an issue, but you must start somewhere. And in that first phase it was said: 'fine, just do something'. (N3)

This account points to a sequencing dynamic in which organisational authorisation and initial action precede, rather than follow, the formation of a broader cross-border collective of project partners.

This sequencing entails translation of interests across organisations and the activation of relational and communicative infrastructure through concrete workarounds. One interviewee described partner-finding as a chain of referrals within a cross-border network:

> You want something euregional… Who is in your network who could play a role in that? Through Z we ended up with P again. In that way you also expand your network. I think that was a network with K. Because K again put us on the track of B. Then you become more and more connected. (N5)

Another interviewee linked this to the practical availability of a network beyond the project: "I collaborated very pleasantly with organisation H because we had each other's telephone number and e-mail address, so that contacts arose much faster that went beyond only the project." (N4) In this context workability is sometimes achieved through informal exchange that stretches the formal boundaries of one's own organisational practice:

> One does not stick to perhaps prescribed conventions. I actually have the requirement here that there is an official secrecy obligation. That means, for example, that I am not simply allowed to give documents that are available to me to someone else. One does it anyway. And that strengthens a relationship with each other, very practically.' (D4)

Together, these examples suggest that translation and legitimation are intertwined: exchanging material can strengthen collaboration, while simultaneously requiring ongoing assessments about what remains defensible within national organisational settings.

Sustaining cross-border collaboration in public health depends on continuous formal but mainly informal infrastructural work. The interviews suggest that, helped by the work of euPrevent, professionals keep cooperation going in between formal projects, main-

taining relationships through a small number of key individuals, and by translating and legitimating collaboration across national systems.

DISCUSSION

This study examined how professionals in the Meuse-Rhine border regions shape cross-border cooperation in public health. Our findings show that, in this setting, borders and divergent legal regimes, administrative procedures and professional routines shape cooperation. In the absence of a shared institutional border regional governance, cooperation in the cases examined depends on every day infrastructural work. In this discussion, we discuss the results of the analysis in relation to scholarship on infrastructure, border studies and governance.

First, the Meuse-Rhine cases show cross-border cooperation emerging primarily through light, relational infrastructural work, rather than through established institutional routines. Infrastructure studies conceptualise infrastructures as socio-technical arrangements sustained through ongoing maintenance and alignment rather than through fixed institutional structures (29). Our analysis shows that, in the context of a border region, such infrastructures rely almost entirely on relational and improvised coordination because an institutional base for collaboration is lacking. Compared with the national public health systems in which the professionals usually work, the cross-border collaborations examined here lacked shared legislation, aligned definitions and relatively stable funding mechanisms. As a result, cooperation depends strongly on project funding, temporary coalitions and ad hoc routines. This pattern corresponds with Bowker and Star (29) notion of infrastructural work as the alignment of categories, procedures and values to make cooperation possible. Professionals working in cross-border public health continuously harmonise basic arrangements, such as shared case definitions, data-sharing protocols, and points-of-contact, alongside joint collaborative activities. At the same time, the analysis shows that this alignment work enables professionals to develop practices that arise less readily in national contexts, where fixed structures can constrain innovation. This demonstrates that infrastructural work in the border region is not merely supportive but constitutive of cross-border cooperation.

The absence of shared structures leads professionals to focus on relational infrastructures as described by Knorr-Cetina (25). These infrastructures consist of networks of contact, mutual trust and continuous informal exchange of knowledge and practices. Unlike in national contexts, where institutional standards predetermine much of the alignment process, in border regions almost everything must be actively arranged. A key insight from Bowker and Star (29) is that material components of information infrastructures, such as shared databases, classification systems and registries, provide stability by acting

as a common base. In the examined border regions, such material infrastructures were largely absent, requiring professionals to construct temporary and improvised data linkages across national systems and thereby increasing reliance on relational forms of coordination. These material infrastructures also articulate and shape normative ideals. The study by Pillay (27) on perinatal statistics illustrates that national definitions of health outcomes such as perinatal mortality, often rest on deeply rooted ethical and clinical traditions that differ across countries. Similar processes were observed in the border regions examined, where divergent national logics had to be harmonised to create workable forms of collaboration, for example in aligning definitions of target groups in prevention programmes (e.g. 'adolescents' in substance-use prevention or 'older adults' at risk of depression/loneliness) or procedures for data collection.

Informal infrastructures may develop because formal infrastructures are lacking, but they may have functional advantages. Grabher (32) shows that informal networks possess a high degree of flexibility because they are less constrained by bureaucratic structures. This corresponds to the experiences of professionals in this study, who stressed that the absence of national, uniform rules and bureaucratic procedures allows for pragmatic solutions. Polese (33) likewise demonstrates that informal infrastructures can function sustainably when they rely on trust and reciprocity. The results show that such relational infrastructures form an integral part of collaborative practices in public health in the border region.

In the cases examined, cross-border cooperation, even when functioning well, depended on a small number of professionals who maintained inter-organisational relationships and performed informal coordination work. Although national public health infrastructures also exhibit elements of project-based logic, this vulnerability is amplified in a border region because the absence of a shared institutional mechanism does not ensure continuity when personnel or financial conditions change. As cross-border collaboration is not institutionally anchored anywhere, discontinuity may arise within organisations but also between national systems. Light and flexible coordination mechanisms are necessary to support the sustainability of cross-border cooperation. These dynamics suggest that cross-border collaboration itself functions as a form of infrastructure: one that enables coordination across national systems yet remains fragile because it lacks an institutional base.

Second, bordering and borderwork play a central role in shaping cooperation in a border region. Border studies conceptualise borders not as static territorial lines but as dynamic interfaces where administrative, legal and professional systems meet and require continuous interpretation (22). In line with this, Aure (21) has shown that everyday work in border regions is characterised by the ongoing negotiation of divergent national logics. Our study illustrates this dynamic: professionals describe how every step of cooperation, from



data exchange to case definitions and communication practices, requires the alignment and translation of differing national frameworks. As a result, professionals engage both in formal cross-border translation work, such as harmonising definitions and procedures in public health, and in symbolic work through which concepts and imaginations are created that are recognisable in multiple national contexts.

Karasti, Baker (34) emphasises the long-term and collaborative nature of infrastructural development, showing that connecting heterogeneous systems requires sustained attention to infrastructure over time rather than one-off technical fixes. The analysis shows that professionals experience this translation work not only as a necessity but also as an opportunity to reconsider their own routines and values and to incorporate knowledge from other systems. Bowker and Star (29) argues that classification and infrastructural practices are always value-laden. This becomes evident in situations where national taboos, legal constraints or communication regimes shape cross-border cooperation, requiring professionals to do not only technical but also normative work. Pratt (35) conceptualises contact zones as spaces of encounter in which actors with different backgrounds and interpretive frameworks must negotiate meaning. Such encounters do not merely hinder cooperation but prompt forms of reflexive learning, as professionals reassess assumptions and experiment with alternative approaches. This perspective aligns with our findings in which cross-border cooperation repeatedly confronts professionals with divergent assumptions that must be interpreted and reconciled, leading not only to alignment but also to new shared concepts and insights that would not emerge automatically within individual national systems. Cross-border cooperation thus functions as an experimental space in which existing assumptions are questioned and professionals gain access to broader professional perspectives.

A third pattern concerns the question of how cross-border cooperation is sustained over time in the absence of shared authority. Scholars in governance studies emphasise that durable cooperation typically depends on institutional anchoring, shared mandates and stable coordination mechanisms (36, 37). This study shows that such anchoring is largely absent in the border regions examined here. Formal projects make temporary collaborative processes possible, yet these projects take place between parallel national systems that each retain their own accountability logics. As Perkmann (15) notes, cross-border cooperation in Europe often relies on voluntary networks between subnational actors rather than on stronger shared authority. Such reliance increases the coordination work required to make projects function, as partners must align expectations, administrative routines and organisational legitimacy across different national systems. In national programmes, part of this work is usually absorbed by pre-existing routines, shared mandates and established lines of accountability. In the cross-border projects examined here, comparable conditions had to be repeatedly produced through project work and interpersonal engagement, helping to explain why project-based cooperation in the Meuse-

Rhine border regions can be more intensive and complex than comparable cooperation within a single national system.

At the same time, joint project work may lead to interprofessional enrichment because professionals are confronted with alternative institutional logics that are less visible within a single national system. Such repeated cross-border interactions correspond to what Pyrko, Dörfler (38), building on Wenger's original formulation of communities of practice, describe as processes in which expertise and meaning are formed through sustained, situated interaction. Shared thematic concerns, such as infectious diseases or youth health can also function as boundary objects in the sense of Star and Griesemer (28), offering a common frame of reference that enables cooperation despite divergent national systems. Between project periods, cooperation therefore relies strongly on actors who maintain trust, reciprocity and personal commitment across organisational boundaries. These roles resemble what the governance literature describes as boundary spanners, actors who translate between systems and hold together cross-organisational collaboration (39). Cooperation therefore acquires a pronounced relational character in which trust and personal engagement are the primary connecting factors between parallel national systems. This hybrid mode of cooperation is both resilient and vulnerable: resilient because it enables flexibility, reciprocity and learning, but vulnerable because no single system carries joint coordination.

Taken together, the three patterns show that public health infrastructures in border regions are shaped by a combination of relational, institutional and interpretive-normative processes that differ fundamentally from national contexts. Whereas national infrastructures often rely on shared legislation, aligned data logics and organisational frameworks that provide a degree of stability, cross-border infrastructures emerge through ongoing maintenance work, translation processes and relational ties between parallel systems. In this sense, cross-border collaboration can be understood as an emergent and inherently fragile infrastructure, constructed through the accumulated practices that allow professionals to work across systems without a shared institutional framework. This study shows that the Meuse-Rhine border regions function as dynamic assemblages constructed by professionals across different national governance settings, offering additional insight into how public health develops outside the territorial logics of the nation-state. This makes visible that border regions are not only contexts with limited institutional anchoring but also places where new forms of joint knowledge production and innovative practice can emerge.

Several findings resonate with broader literature regarding cross-border collaboration. Project-based cooperation, reliance on personal contacts, institutional asymmetries and difficulties in moving from temporary projects to structural governance have also been described in cross-border collaboration in fields like transport, commuting and tourism

(40-42). In public health, however, these dynamics are shaped by nationally organised responsibilities, collective health risks, health data, ethical procedures, crisis preparedness and public accountability. The study therefore shows both the analytical transferability of these cross-border collaboration dynamics and their sector-specific expression in cross-border public health practice. These findings also have practical implications for cross-border public health collaboration. Such collaboration should not be steered only through temporary projects. It also requires light but stable coordination mechanisms that preserve relationships, knowledge and working routines between funding periods; explicit alignment of data, definitions and accountability requirements; and recognition of the relational work performed by professionals who connect organisations across national systems.

STRENGTHS AND LIMITATIONS

Against this background, the study's contribution and limitations should be interpreted in relation to its empirical scope. A strength of the study is its empirically grounded access to cross-border public health practice in two Euroregions with a long-standing tradition of cooperation, which provides a valuable opportunity to examine how cross-border infrastructures evolve and consolidate over time. Including participants across organisational roles further enabled analysis of both day-to-day cooperation and accountability dynamics. At the same time, the focus on the Meuse-Rhine and Rhine-Meuse-North Euroregions may limit transferability to border regions where institutional collaboration is less developed. The qualitative design based on 19 in-depth interviews enabled thematic saturation and diverse perspectives, but future work could examine whether these patterns hold across a wider set of border settings. Finally, the first authors previous role as director of euPrevent should be considered reflexively. As euPrevent functioned primarily as a coordinating and connecting organisation rather than as a direct service-providing stakeholder, this position facilitated access, trust and openness among interviewees and contributed to rich empirical material. Reflexive analysis and peer debriefing within the author team were used to critically examine how this insider familiarity may have shaped data collection and interpretation.

CONCLUSION

This study shows that cross-border cooperation in public health does not arise from formal policy structures but from the relational, organisational and substantive work that professionals themselves develop and sustain. In their everyday collaboration across borders, they build light, partly informal infrastructures that make coordination possible despite divergent legal and administrative systems. These infrastructures rely on trust,

repeated interaction and shared themes, yet remain vulnerable due to project-based funding and dependence on individual actors.

Strengthening cross-border cooperation therefore requires not primarily new administrative arrangements but support for the relational and organisational conditions that allow these infrastructures to endure. Border regions, such as the Meuse-Rhine regions may thus serve as laboratories for emerging forms of transboundary public health cooperation. In doing so, this study also shows that cross-border cooperation not only bridges the border but actively contributes to the continual shaping of the border itself.

ETHICAL APPROVAL

The study was approved by the Research Ethics Committee of the Faculty of Health, Medicine and Life Sciences, Maastricht University (FHML-REC/2023/064).



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APPENDIX I: PRACTICAL EXAMPLES CHAPTER 4

This appendix presents selected practice documents that illustrate how themes identified in Chapter 4 on the infrastructural work of building and sustaining cross-border public health collaboration were reflected in recent public health work in the Meuse-Rhine and Rhine-Meuse-North Euroregions.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

Social Networks, Mental Well-being and Cross-Border Care:
Factsheet for EMR Professionals, 2023



This SoMe factsheet for professionals presents results from the cross-border project on mental health and social networks in the Meuse-Rhine Euroregion. It describes cross-border social networks, experiences with mental healthcare abroad and practical barriers for professionals, including administrative procedures, insurance, referrals, transport, communication and the need for knowledge exchange between EMR countries.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2023: *Factsheet SoMe for Professionals*

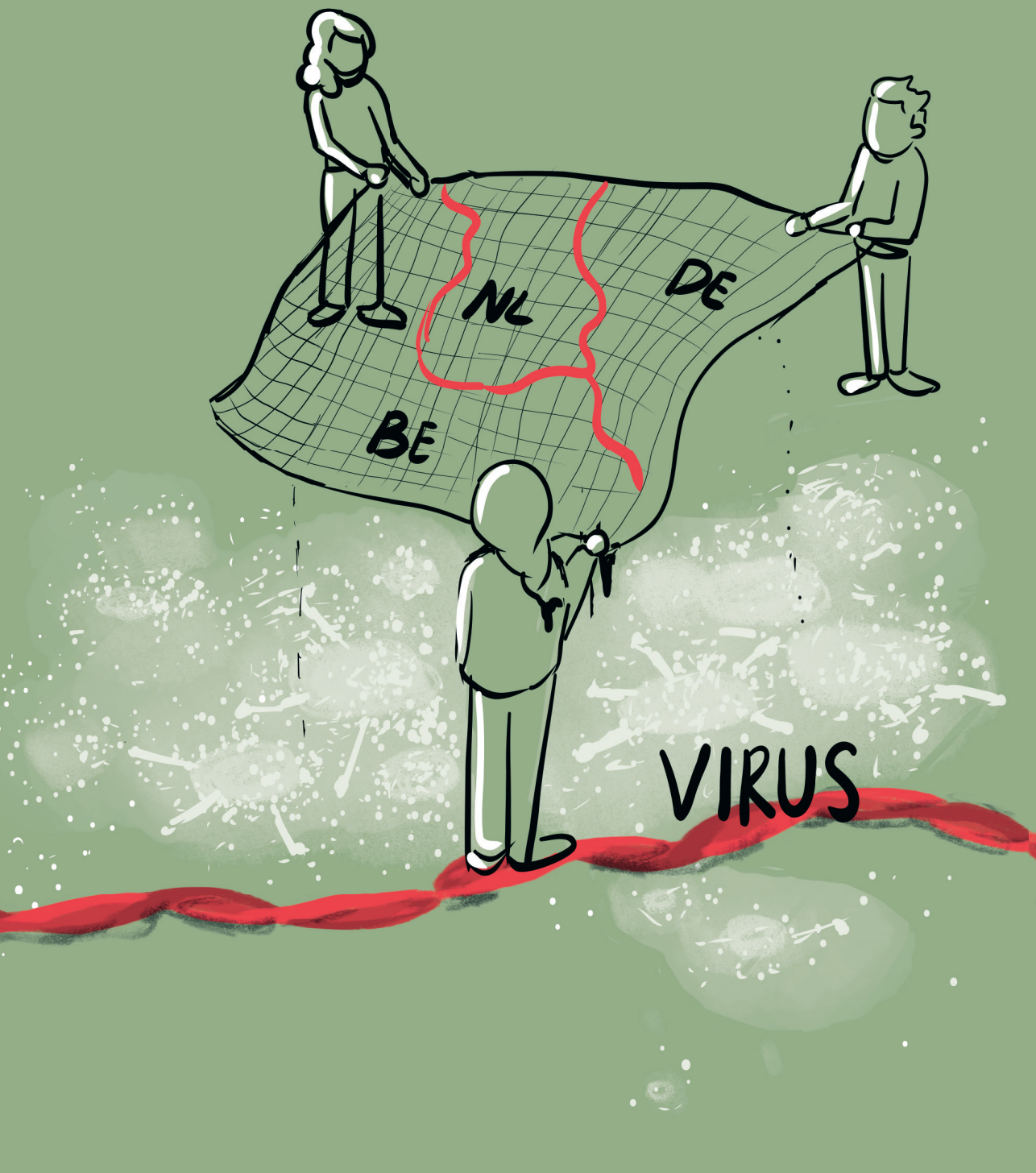
Implementation Plan for Cross-border Cooperation in Limburg, 2017



This Dutch implementation plan was prepared for the Province of Limburg by euPrevent. It explores how cross-border and European cooperation could support Limburg's Social Agenda, especially positive health and participation. The plan identifies the need for cross-border network strengthening and proposes a "Euregional knowledge broker" to initiate dialogue, connect stakeholders and support cooperation with neighbouring regions.

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2017: *Uitvoeringsplan Verkenning.*

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NL
DE
BE
VIRUS

Chapter 5

Four million COVID-19 cases in four European cross-border regions reveal minimal cross-border transmission effect on domestic burden: space-time cluster analysis

Brigitte A.M. van der Zanden, Boris Kauhl, Volker Hackert & Christian J.P.A. Hoebe.

BMC Infectious Diseases. 2025; 25(1), Article 1528.
Doi: 10.1186/s12879-025-11959-3

ABSTRACT

Introduction Restrictions of cross-border mobility were used during the COVID-19 pandemic to slow down transmission between countries. Such restrictions came with significant societal costs, and their effect on in-country burdens of COVID-19 has been questioned. Our study aims to assess whether cross-border transmission contributed significantly to in-country burdens of COVID-19 in four large Euroregions shared by the Netherlands, Germany and Belgium.

Method Geographical information systems (GIS) and Besag-York-Mollie (BYM) models were used to visualise the spatial distribution of COVID-19 cases from January 2020 through October 2022. Space-time cluster analysis with SaTScan was used to identify significant clusters of COVID-19 cases and determine whether they included cross-border areas. Over 4 million cases drawn from the national infectious disease registries were analysed for this study.

Results Incidence of COVID-19 increased and decreased independently within each country, except for one simultaneous peak in January 2022 due to the Omicron variant. Eight significant space-time clusters were identified, four of which were cross-border clusters. All eight clusters occurred during periods of high in-country transmission.

Discussion Our findings showed that cross-border transmission did not contribute in significant ways to in-country burdens of COVID-19 burden in the regions studied. The identified clusters corresponded to in-country waves of infection. Our results challenge the assumption that border closures were crucial in controlling the pandemic and highlight the need for coordinated public health responses that balance the effect of interventions with societal costs.



INTRODUCTION

About 35% of Europe's citizens live inside an area defined by the European Union (EU) as having a land border. Within the EU, about one-third of its regions are considered border regions by the EU (1, 2). Arguments for establishing the EU were rooted in economic advantages, social and cultural integration, political stability resulting in freedom of movement across borders for people, goods, and services under the framework of the Schengen agreement.

However, living in a border region may also pose extra challenges and health-related issues arising from a confluence of epidemiological, socioeconomic, infrastructural and cultural factors. This became even more clear during the COVID-19 pandemic years 2020 and 2021, when European countries implemented a variety of measures to limit border-crossing, motivated by the idea of controlling the spread of the virus. Countries installed restrictive measures like border closures, travel restrictions, quarantine requirements and health screenings. The border closure measures had a major impact on the socio-economic and cultural mobility of citizens, limiting their ability to commute, visit and take care of friends or family, or cross borders to see their family doctor (3-5).

Border restrictions, despite their obvious trade-offs, may have been seen as a legitimate way to mitigate the transmission of SARS-CoV-2, as studies showed that travelling between (EU) countries played a role in the spread of SARS-CoV-2 across Europe (6, 7). The primary argument was to contain the virus by reducing cross-border movement, thereby limiting the potential for imported cases, preventing new outbreaks and especially preventing the importation of SARS-CoV-2 variants and thus protecting the public health systems from becoming overwhelmed. Restrictions on cross-border mobility were often seen as a 'natural' extension of interventions on a national level. Evidence shows, for example, that Dutch holiday-goers who had been to Austria or Italy during the early weeks of the COVID-19 pandemic became infected with SARS-CoV-2 at their holiday destinations and introduced the virus into their home country upon returning home (7), although the relative contribution to the total burden of transmission remains unclear as does effectiveness of border closures in mitigating this unspecified risk. A Dutch cross-border study based on SARS-CoV-2 serology and questionnaire outcomes from almost 10,000 citizens showed no evidence for 'cross-border mobility' as a significant or substantial exposure factor for SARS-CoV2 transmission (8).

A study on the societal impact of cross-border restrictions in the border region of the Meuse-Rhine Euroregion (Netherlands, Germany, Belgium) and the effect of cross-border restrictions during the COVID-19 pandemic confirmed that citizens perceived these cross-border interventions as impactful and disruptive to their everyday wellbeing and presented citizens with financial consequences and logistical challenges, sometimes

affecting access to health care and education (9). While policy and legislation often focus on geopolitical borders, the authors of the said studies argue that effective policy must take into account the fluid nature of borders in citizens' daily lives.

The relevance of these issues is underlined by the stance the EU takes in their Regulation on serious cross-border threats, which states that uncoordinated public health crisis management measures taken by individual EU member states may affect other member states. Coordination at EU level should ensure that member state measures are proportionate and limited to public health risks resulting from serious cross-border threats. This should not conflict with EU obligations and rights, such as the free movement of persons, goods and services (10). The EU itself has no mandate to decide on border closures or travel restrictions, as such decisions rest with national governments. Since such decisions often directly affect border regions, regional and cross-border perspectives warrant consideration in the design of national measures.

To deliver evidence in support of these EU objectives, we explored the scale and scope (as well as associated patterns) of the cross-border transmission of SARS-CoV-2 between the Netherlands, Germany and Belgium in excess of the probability level of domestic and/or accidental transmission. Our research question therefore was whether there is evidence of a significant and substantial role of cross-border transmission of SARS-CoV-2 in relation to the burden of COVID-19 within a country, in order to inform future policy-makers regarding the consideration and justification of border measures.

METHODOLOGY

Data

To answer our research question, we analysed and visualised spatial distribution patterns of COVID-19 cases using a Geographic Information System (GIS) described in more detail below. The geographic area covered by our analyses are the four cross-border regions, the so-called Euroregions, between the Netherlands, Germany, and Belgium. These are the Meuse-Rhine Euroregion, the Rhine-Meuse North Euroregion, the Rhine-Waal Euroregion and the EUREGIO Euroregion (Münster (DE) – Twente (NL)Region). The border regions of these four Euroregions are home to approximately 10.1 million residents, 3.3 million of whom live in the Netherlands, 4.8 million in Germany and 2 million in Belgium. These four regions were chosen as they share common borders in close proximity to each other and were geographically distant from the borders with other countries like France or Luxembourg. Mobility across those more distant borders was likely limited, particularly during major phases of the pandemic. Numbers of COVID-19-positive cases were based on publicly available data of notifications to the national infectious disease registers in the time period between 2nd January 2020 and 2nd October 2022 (RIVM in the Netherlands, Robert

Koch Institute in Germany and Sciensano in Belgium). During the over two-and-a-half year study period – which was from 1st of March 2020 (start of the pandemic) until 2nd October, 2022, in total 4,095,607 COVID-19 cases were included. Of this total number of cases, 1,548,412 were from the Netherlands, 1,780,009 from Germany and 767,186 from Belgium. Data was available at the level of municipalities in Belgium and the Netherlands, and at the level of counties in Germany.

Animated map

To visually display the dynamics of COVID-19, we calculated the 7-day incidence for the study period between 1st March 2020 and 2nd October 2022. To adjust for the uneven distribution of populations between the relatively small Dutch and Belgian municipalities versus the larger German counties, we used the Besag-York-Mollie (BYM) model (11). The BYM model, which adjusts for structured and unstructured effects, weights the incidence of one area to the average incidence of the neighbouring areas (structured effects) and also shrinks the incidence towards the global mean (unstructured effects)(12).This approach has been used extensively, e.g., for small-area disease-mapping of test-positivity for COVID-19 in New York (13), COVID-19 hospitalisations in north-eastern Germany (14), as well as for a wide range of other diseases such as cancer (15) and cardiovascular mortality (16).

Specifically, the BYM model used for our analysis is a Poisson model, consisting of the number of positive COVID-19 cases per municipality or county and the number of expected cases within the last 7 days. Neighbouring areas were defined as areas sharing a common edge or border (12). In total, 946 models were calculated in the R-INLA package (17). The incidence rates were displayed in in the ggplot2 package (18) in RStudio (Version: 2023.12.1+402). The animated GIF map was then created using the gganimate package (19)

Static map

In addition to the animated map, we created a static map for six different time periods covering the period from March 2020 to September 2022, to visually display the overall temporal dynamics of the pandemic. The methodology was the same as for the animated map with the difference that we calculated the incidence for the respective time periods and not the 7-day incidence. The calculation was performed again using the R-INLA package (17). The incidence rates were displayed in in the ggplot2 package (18) in RStudio (Version: 2023.12.1+402).

Space-time cluster analysis

The space-time scan statistic was used to detect high-risk areas where COVID-19 cases clustered in space and time, indicating if and when cross-border spread of SARS-CoV-2 was likely to occur (20, 21). We used a retrospective space-time Poisson model, consisting of the number of COVID-19 cases per day and area, the number of inhabitants per area and the centroid coordinates for each municipality or county (22). We evaluated different possible cluster sizes. We found that the standard setting, i.e., of including up to 50% of the population at risk and up to 50% of the time period in a cluster, delivered results of no practical use since it detected only one giant cluster. Given the geography of our study area and the relatively small geographical size of the Dutch and Belgian municipalities compared to the larger German counties, we found that restricting the maximum cluster radius to 30 km with no temporal restrictions delivered reasonable results. Alternative SaTScan settings were also tested, such as a scanning window of 20km radius and a maximum temporal window of 7, 14 and 31 days. However, this tended to deliver many very small clusters of only a handful of municipalities with very few cases inside, which are of very little practical use. We therefore chose to use a 30km radius to align with the buffer zone proposed by the European Commission and applied by Euregional programmes to define border areas in EU cross-border cooperation (e.g. Interreg A) (23), and opted not to apply any temporal restriction. As there is, unlike in regression analysis, no metric available such as Aikaikes Information Criterion (AIC) to evaluate the best possible set of combinations for the data, we chose to use a setting, which can be justified by the EUs cross border policy to align our analysis with this policy. For the calculation of the space-time clusters, we used the SaTScan software (Version 10.1.3). The results of the cluster analysis were imported into RStudio and were visualised with the ggplot2 package.

Temporal analysis of COVID-19 incidence

To visualise how the 7-day incidence increased over time in the three countries of the border region, we created a line graph for the areas of the Netherlands, Belgium, and Germany and the EU-average. The country-specific 7-day incidence was calculated for each day. The 7-day incidence for the EU average was downloaded from Our World in Data.

The resulting line graph was created using the ggplot2 package in R. Additionally, we added a cylinder to display the time where space-time clusters occurred. During the COVID-19 pandemic, border control policies in the EU remained under the authority of the individual member states, as the EU has no legal mandate to impose uniform border closures. This led to differences in national responses: Belgium formally implemented full border closures for non-essential travels during two periods (March-June 2020 and January-April 2021), though exemptions were allowed for essential reasons. Germany introduced temporary border checks and entry restrictions, including testing requirements, without officially closing its borders. The Netherlands maintained open borders while is-

suing strong travel advisories. These national measures provide additional context when interpreting the cross-border dynamics presented in figure 4.

RESULTS

Animated map of COVID-19

The animated map - which is included as figure 1 - shows that an increasing incidence in autumn of 2020 was first observed in the southern part of the Belgian side and with some delay in the Dutch region. In the winter period of 2020/2021 until spring of 2021, a higher incidence was observed scattered across the Belgian and Dutch sides, whereas incidence in Germany remained relatively low. During the summer period of 2021, incidence across the study area remained very low. In the autumn of 2021, incidence increased again on the Belgian and Dutch sides but remained low in Germany. Towards the end of January 2022, incidence increased to an all-time high across the entire study area. While incidence decreased relatively sharply on the Belgian and Dutch sides towards April 2022, with some municipalities in the Belgian and Dutch sides still displaying very local and short-lived increases, incidence generally remained higher on the German side, with a clear difference between the border of Germany and that of the Netherlands. The animated map clearly shows that incidence tended to increase and decrease independently in each country, except in January 2022, when incidence increased in all parts of the study area.

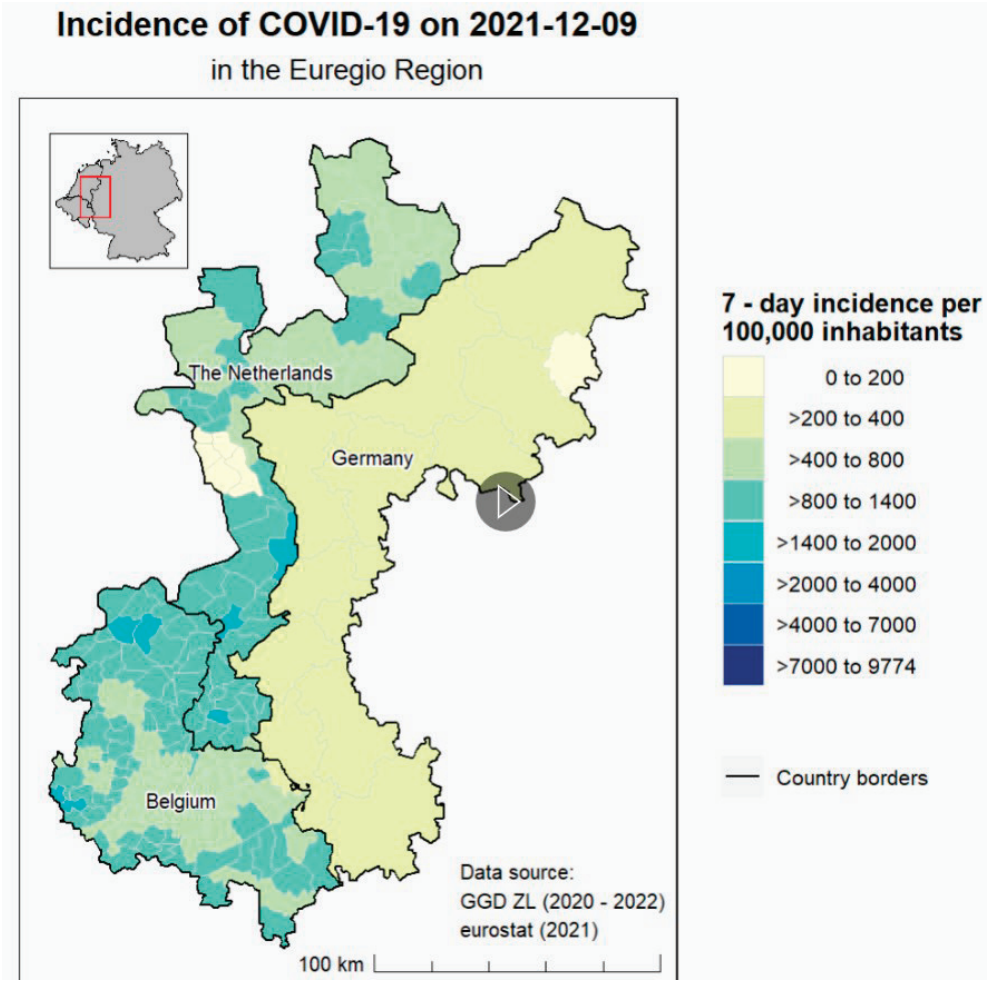


Figure 1. Screenshot of Animation COVID-19 incidence within the four Euroregions study area of Netherlands, Germany, and Belgium. Time period 01-03-2020 until 30-09-2022

Animation: Daily COVID-19 numbers in the border region (NL-DE-BE), available at https://brigittevanderzanden.eu/en/publications.html

Static map

The static map for the six different time periods (fig. 2) shows that the starting period of March – June 2020 was generally characterised by low incidences of reported cases. In the period of July – December 2020, a higher incidence could be observed in the southern part of Belgium while incidence remained low in Germany. Between January – June 2021, incidence in Germany remained low, but was slightly higher in the Netherlands and Belgium. A sharp contrast could be observed between July – December 2021, with higher and relatively similar incidences in the Netherlands and Belgium and lower incidence in Germany. Between January – June 2022, incidences increased across all of the study area, with the highest incidences being observed in the Netherlands and parts of Germany,

while Belgium showed comparably lower incidence. In the last period, July – September 2022, incidences decreased again across the entire study area, although it should be noted that incidence was higher in Germany compared to the Netherlands and Belgium.

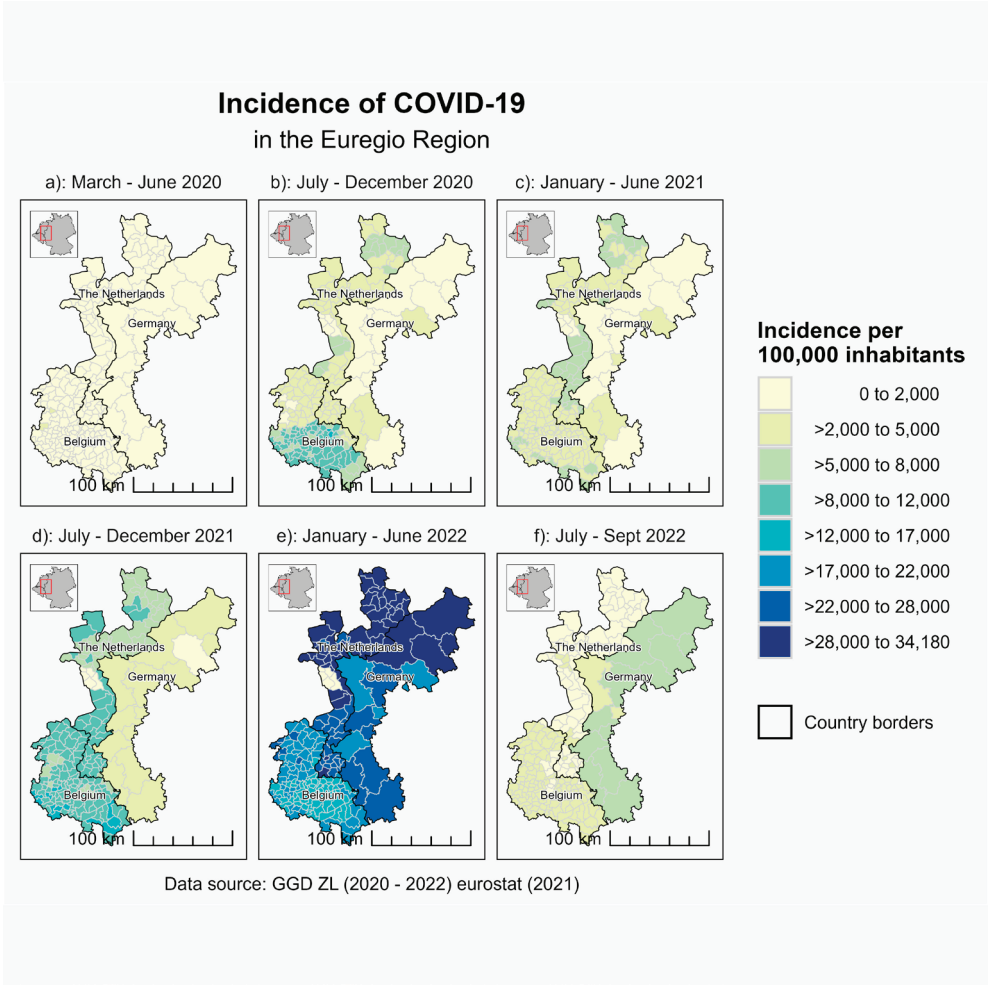


Figure 2. COVID-19 incidence for six different time periods within the four Euroregions study area of Netherlands, Germany, and Belgium. Time period 01-03-2020 until 30-09-2022

Space-time clusters of COVID-19

In total, we identified 8 statistically significant ($p<0.05$) space-time clusters (Figure 3). All clusters lasted on average three to four months. Only one cluster started in November 2021 (only within the country of Belgium and not cross-border), while the remaining seven clusters all started in January 2022 when transmission within all four Euroregions was very high because of the 'Omicron variant' of Sars-CoV-2 virus. No clusters were detected for the longer time period of over one-and-a-half years between January 2020 and

October 2021. Four of the clusters included a cross-border area; two between Germany and the Netherlands, one including parts of Germany, the Netherlands and Belgium, and one including areas in Germany and one municipality in Belgium. Four clusters did not include cross-border areas.

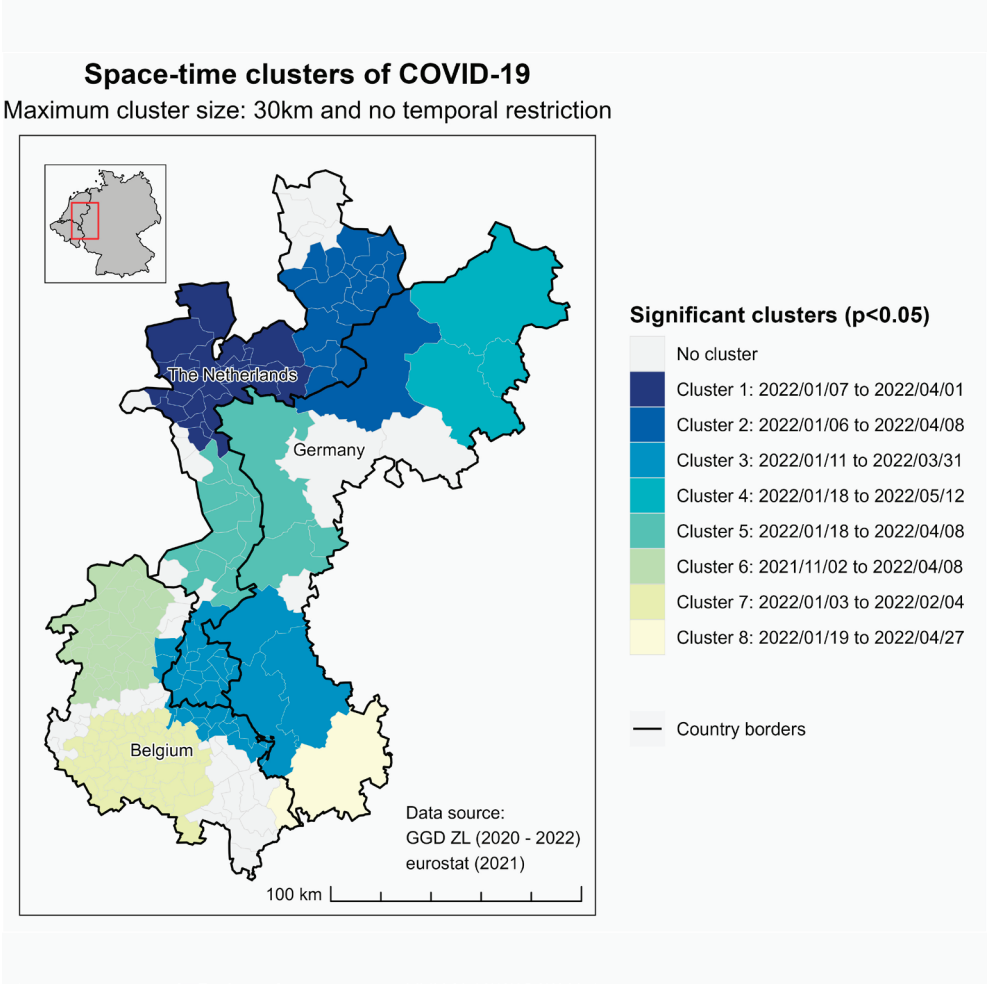


Figure 3. Space-time clusters of COVID-19 within the four Euroregions study area of Netherlands, Germany, and Belgium. Clusters are sorted according to their log-likelihood ratio.

Temporal analysis of COVID-19 incidence

All three countries displayed a similar temporal pattern of occurrence of COVID-19 cases, with regular incidences before the end of 2022, followed by a steep increase towards the end of 2021. The surge in COVID-19 cases and high prevalence in many EU countries at the end of 2021 and the first half of 2022 can be attributed to the arrival of the Omicron variant. The surge in COVID-19 cases and high prevalence in many EU countries at the end

of 2021 and the first half of 2022 can be attributed to the arrival of the Omicron variant. Only Belgium saw a spike in the autumn of 2021, which was independent of the other countries (figure 4). Germany also saw a smaller wave of rising incidences in the second quarter of 2022 which was more pronounced than that in Belgium and the Netherlands.

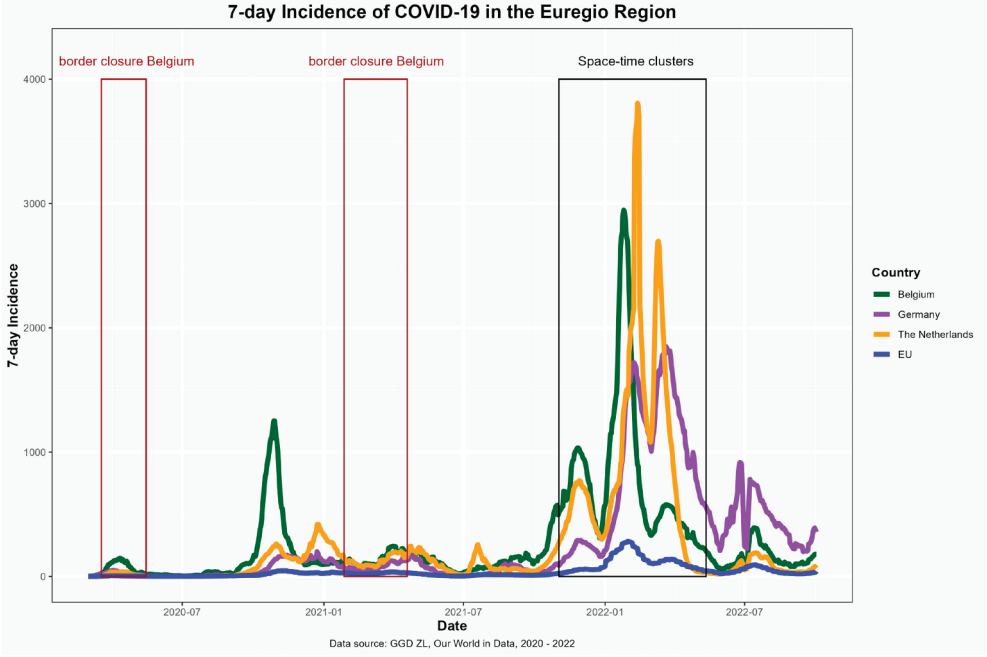


Figure 4. Temporal distribution of COVID-19 for the three countries within the four Euroregions study area and the EU. The black cylinder shows the occurrence of all significant space-time clusters. The dark red cylinder shows the closing of the Belgian border.

DISCUSSION

In this paper, we used space-time analysis to identify clusters in over 4 million COVID-19 cases in four Euroregions of the Netherlands, Germany, and Belgium during a study period of more than two-and-a-half years. Specifically, we explored whether the spatial patterns we found were suggestive of a significant contribution of cross-border transmission of SARS-CoV-2 to in-country burdens of COVID-19.

Our analysis detected a total of eight spatial clusters, all of which occurred in the same time period, with in-country incidences within clusters largely following the same temporal pattern, while no clusters were seen over roughly the first period – lasting more than one and half years – of the COVID-19 pandemic. Clusters within countries and across borders occurred during the peak of the pandemic in late 2021 and the first half of 2022 as was the case in many other countries. The absence of space-time clusters before

November 2021—a period that coincided with stricter border measures, particularly in Belgium—may indicate a potential mitigating effect of such policies. However, as our study was not designed to establish causality, this observation should be interpreted with caution. Other factors, including overall case levels, national lockdowns, testing regimes, and reduced mobility, may also have contributed to the delayed emergence of clusters. Notably, no clusters were observed in areas both with and without border measures.

This surge can be attributed to the arrival of the Omicron variant of SARS-Cov2. Omicron's high transmissibility, led to a rapid spread within populations globally (24). The surge in cases can also be attributed to waning immunity from previous infections or vaccinations (25), as well as challenges in implementing effective public health measures (26). In addition, factors such as increased travel, relaxed restrictions, and pandemic fatigue further contributed to the widespread transmission of the virus during this period (27-29).

To satisfy the hypothesis that cross-border transmission contributed in significant ways, we would have expected space-time clusters to shift in time and space, with a clear direction from one in-country sub-area to another within a given cluster. However, given that incidence only spiked simultaneously in different national sub-areas once in the same period, that is, at a time when Omicron surged, our analysis provides no evidence for significant and substantial contribution of cross-border transmission to in-country burden of COVID-19 burdens within each country. Rather, it is in line with the assumption that by that time SARS-CoV-2 had become ubiquitous. This is highlighted by the animated map, which is void of incidence gradients shifting across borders, suggesting that, in the time periods before the end of 2021, higher incidences tended to occur relatively independently of border areas and incidences seemed more driven by in-country interventions and virus dynamics rather than by cross-border transmission. Even in the winter period stretching from 2021 into 2022, no differential involvement of national subareas could be observed within clusters. Although we did not include phylogenetic analyses to trace viral transmission routes, as comparable cross-border genomic sequencing data were not available during the study period, the emergence of viral genotypes followed distinct waves that were largely consistent across the study area and Europe, with temporal delays generally limited to one or two weeks. The observed spatiotemporal patterns do not indicate a major role of cross-border transmission in shaping the national COVID-19 burden, may suggest that border closures were of limited effectiveness in this cross-border context. This is consistent with a study using qualitative data and geographical visualisations of day-to-day infection rates data (5).

Our study has several limitations. First, data gathering took place at different geographical levels (municipality versus district level). Spatial resolution was higher for the Netherlands and for Belgium, where data were available at a municipality level, whereas German data were only available at a county level. However, while spatial resolution is lower for Ger-

man counties, which usually comprise several municipalities, the impact on our findings was likely limited, given the high number of cases in the analysis. Second, subtle national differences in official case definitions, testing regimes, or testing compliance may have contributed to some degree of bias potentially compromising the full comparability of notification data between countries. Third, both a GIS study (30) and a longitudinal study (9) showed that cross-border mobility decreased significantly during some periods of the COVID-19 pandemic. Nevertheless, some degree of cross-border mobility always persisted, such that our results remain valid. Fourth, the circular scanning window of the space-time scan statistic may, by definition, introduce bias, since independent outbreaks in opposite (national) sub-areas may be subsumed under the same geographical cluster. Clusters enclosing different national sub-areas therefore do not necessarily reflect cross-border spread. For example, we cannot rule out the possibility that transnational cluster 3 represents two different national outbreaks, one in the (far) eastern German part of the cluster and one in the (far) western part in Belgium. As both outbreaks are subsumed under the same space-time cluster, they may have been mistakenly interpreted as a common cross-border event, even though this may not be the case.

Fifth, data was only available in an aggregated form, and not on an individual level. To be able to clearly trace and identify transmission routes between cases and their contacts, it would be necessary to have detailed personal information, including residential addresses of cases and their contacts.

Sixth, we only had access to small-area data for our study region, but not for the entire countries of the Netherlands, Belgium and Germany. Therefore, we could not analyse to what extent the spatial and temporal dynamics observed in our study region were representative of countries as a whole. This limitation may affect the detection of clusters, as SaTScan is sensitive to the number of observations included in the analysis. Consequently, we could not verify whether we would detect the same clusters if we had included data for the entire countries. Finaly, epidemic dynamics outside the study regions may have influenced the observed spatial patterns to some extent, although a significant external influence is considered unlikely given the broadly synchronous epidemic waves across the three countries.

Despite these limitations, our large study provides valuable new scientific insights. Its size, including more than 4 million notified cases, suggested that our findings are robust and valid. Absence of evidence for a significant contribution of cross-border transmission to in-country transmission in our study area lends support to voices questioning the effectiveness of border closures in mitigating domestic transmission. This is particularly important, given the sizeable proportion of the EU population who live in these areas, and the huge impact borders have in terms of economy, employment, social mobility, and the mental wellbeing of the countries' citizens. Available GIS research on the trans-

mission of pathogens, including COVID-19, has been limited to a national or subnational level, turning a proverbial blind eye to cross-border areas. Our study is the first of its kind to attempt to fill this scientific gap by assessing cross-border transmission.

Insights from our study align well with the EU Serious cross-border threats Regulation. In response to the COVID-19 pandemic, the EU aims to enhance its legal framework for epidemiological surveillance and response to cross-border health threats. This includes broadening reporting requirements, analysing health system indicators, and improving cooperation between Member States and EU agencies such as the European Centre for Disease Prevention and Control (ECDC), the European Medicines Agency (EMA), and also international organisations, in particular the World Health Organization (WHO), while considering the burden on national authorities. *(10)*

To guide future policy and decision-making, it may be of value to recognise that there was in this study no evidence of substantial cross-border transmission within EU Euroregions. Consequently, our study lends support to a cautious approach regarding the implementation of border closures or movement restrictions, given the considerable social and economic impact carried by these measures. Further research is needed to more accurately assess these measures in terms of their proposed mitigating effects and potential side effects, and to determine whether their implementation can be justified as an effective and proportionate public health measure. However, this requires the availability of comparable, high-resolution data across borders, including genomic surveillance, individual travel histories, mobility patterns, and comparative policy analysis. The lack of harmonised data between countries remains a major barrier to understand the true impact of border-related measures. Coordinated cross-border and regional data infrastructures will be essential to enable more robust evaluations in future pandemics.

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APPENDIX I: PRACTICAL EXAMPLES CHAPTER 5

This appendix presents selected practice documents that illustrate how themes identified in Chapter 5 on COVID-19 surveillance, spatial-temporal infection patterns and cross-border public health interpretation were reflected in recent public health work in the Meuse-Rhine and Rhine-Meuse-North Euroregions.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

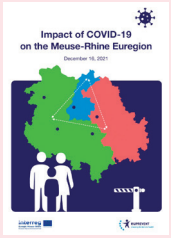
GRENSimpact: Impact of Cross-Border COVID-19 Transmission in Border Regions, 2023



This factsheet summarises the GRENSimpact study on COVID-19 transmission in border regions of the Netherlands, Germany and Belgium. It presents a spatial and temporal analysis of more than four million COVID-19 cases in four Euroregions between January 2020 and October 2022. The factsheet highlights that only eight significant clusters were identified that these mainly occurred during periods of high transmission, and that cross-border transmission was unlikely to have made a substantial contribution to COVID-19 outbreaks within the countries studied.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2024: *GRENSimpact*.

Impact of COVID-19 on the Meuse-Rhine Euregion, 2021



This euPrevent factsheet presents results from a cross-border COVID-19 study in the Meuse-Rhine Euregion. Using two rounds of questionnaires and finger-prick blood sampling, it reports on public health measures, mobility between EMR countries, vaccination and antibodies among participants from the Netherlands, Belgium and Germany.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2021: *Impact of COVID-19 on the Meuse-Rhine Euregion*

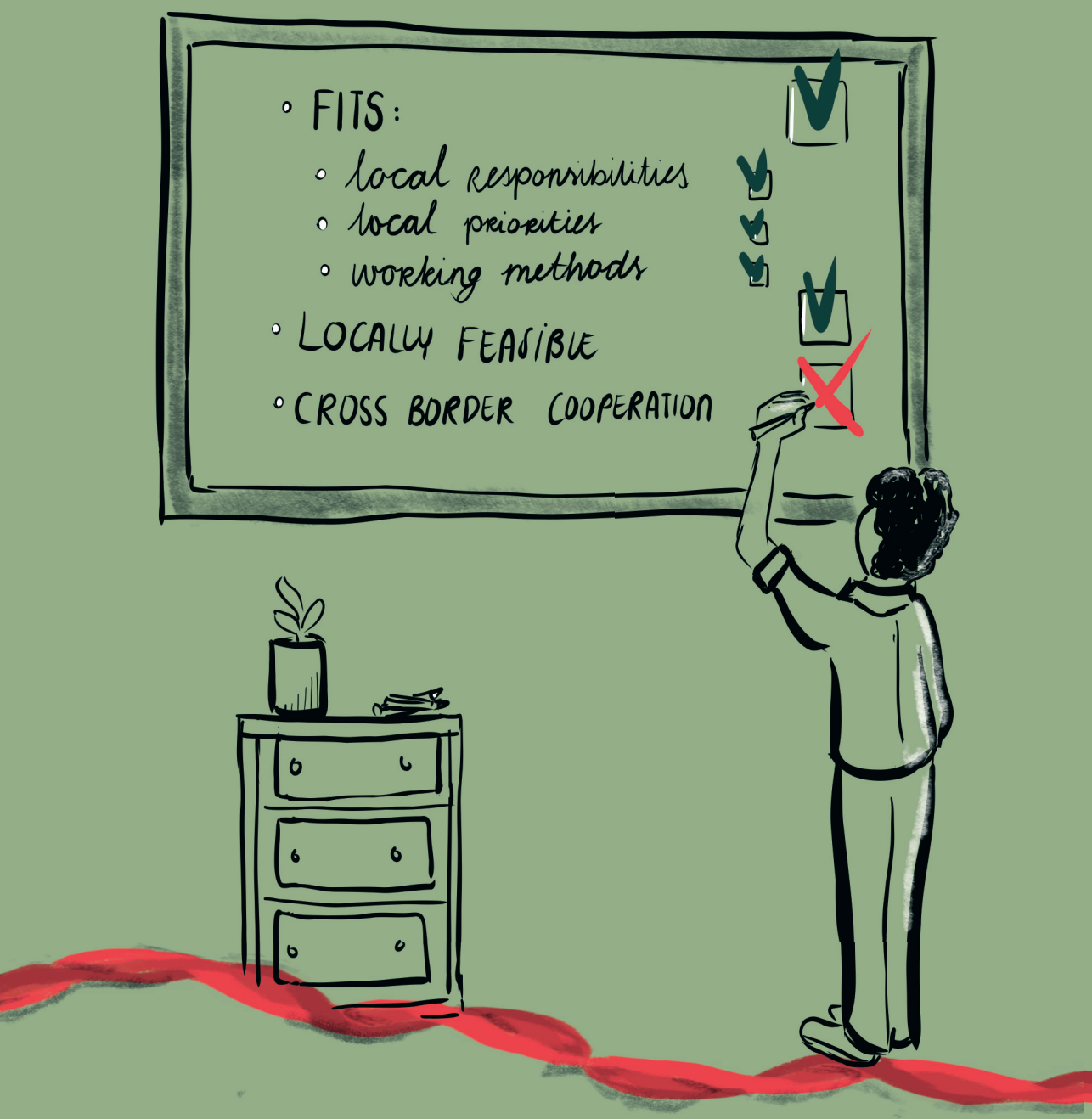
The Development of COVID-19 in the Border Area of the Netherlands, North Rhine-Westphalia and Belgium, 2021



This report presents findings from the COVID in the Border Region project, commissioned by the Province of Limburg, also on behalf of Gelderland and Overijssel, the Dutch Ministry of the Interior and Kingdom Relations, and the State Chancellery of North Rhine-Westphalia. It examines COVID-19 distribution, national measures, cross-border transmission and the effects of border closures in the border area of the Netherlands, North Rhine-Westphalia and Belgium.

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2021: *The development of COVID-19 in the border area of the Netherlands, North Rhine-Westphalia and Belgium.*

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FITS:
local responsibilities
local priorities
working methods
LOCALLY FEASIBLE
CROSS BORDER COOPERATION

Chapter 6

Bridging borders, aging better? Exploring cross-border policy exchange by municipalities on age-friendly initiatives in the Meuse-Rhine Euroregion

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* Contributed equally and therefore share first authorship.

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ABSTRACT

While cross-border collaboration in age-friendly initiatives has been promoted, little is known about how municipalities perceive its practical value. This study explores how 33 municipalities in the Meuse-Rhine Euroregion perceived cross-border policy exchange within the Senior Friendly Communities project, using semi-structured group interviews. Municipalities acknowledged benefits but cross-border exchange was rarely a primary objective. Its relevance and feasibility depended on whether practices from adjacent countries could be aligned with municipalities' own responsibilities, priorities, and ways of working. Institutional fragmentation, including differences in legal systems, responsibilities, and practical conditions, limited more durable forms of exchange. Cross-border policy exchange thus depends on supportive governance conditions.



INTRODUCTION

Europe's border regions, home to 30% of the European population, are experiencing a demographic shift towards aging populations, challenging regional policymakers (1, 2). These areas are shaped by cross-border interdependencies, while policy responsibilities and administrative systems remain organised largely within national frameworks. Border regions often grapple with economic disparities, language differences, and regulatory fragmentation, yet they may provide opportunities for cross-border collaboration, shared learning, and more integrated regional development. However, such opportunities do not arise from geographical proximity alone; they depend on institutional conditions, governance arrangements, and the capacity of local actors to turn cross-border contacts into workable forms of policy exchange (3, 4).

In the Meuse-Rhine Euroregion (EMR), which spans parts of Belgium, the Netherlands, and Germany, the older adults aged 65 and over accounted in 2023 for 25% of the population on the Dutch side, 20.5% in the Belgian part, and 21.4% in the German part. In 2014, these figures were lower at 20.5%, 17.7%, and 20.4% respectively (5). This demographic shift increases demand for age-friendly policies and healthcare services (6-8). Municipalities, play a central role in this process because they are responsible for social care, welfare policies, and creating environments in which older people can live independently and with a good quality of life (9, 10).

Cross-border collaboration may help address these challenges when municipalities draw on practices from neighbouring countries. It can improve policy development and service delivery through shared knowledge and resources (11, 12). Within the EU, initiatives like Interreg promote cross-border collaboration by supporting administrative, economic, and social exchange across national borders (13). Yet little is known about how municipalities perceive the relevance and practical feasibility of these cross-border opportunities in their own policy context.

Previous studies have identified practical and institutional barriers to cross-border collaboration, including differences in legal and administrative systems, financing arrangements, language, and the absence of stable cross-border networks (14-17). Previous research has mainly examined cross-border collaboration in terms of institutional conditions and governance rather than from the perspective of municipalities themselves (16, 18). Empirical studies on how municipalities perceive the relevance and feasibility of cross-border policy exchange remain limited.

This article examines how municipalities in the EMR perceive the relevance and feasibility of cross-border policy exchange for the development of age-friendly initiatives, and which barriers and facilitators shape these assessments. By focusing on the municipal

level, the article contributes to the literature on cross-border collaboration and policy transfer by showing how cross-border exchange is shaped through local responsibilities, priorities, and institutional contexts. In doing so, the article helps explain why cross-border collaboration in ageing policy often remains difficult to sustain in practice.

THEORETICAL BACKGROUND

Policy transfer provides a useful analytical lens for examining how municipalities perceive cross-border policy exchange. Dolowitz and Marsh (11) define policy transfer as a process in which knowledge about policies, administrative arrangements, institutions or ideas in one political setting is used in the development of policies or institutions in another. Their framework draws attention not only to what is transferred, but also to why actors look elsewhere for examples, who is involved, and which factors constrain or enable transfer. This is relevant here because it helps explain why cross-border policy exchange is not a matter of straightforward copying, but of selective adaptation under specific political and institutional conditions (11).

In border regions, such processes take place under conditions of cross-border collaboration. Sousa (16) conceptualises cross-border collaboration as a form of joint action between states or subnational territorial authorities pursuing common goals without transferring sovereignty to a supranational level. He further shows that cross-border collaboration varies in intensity, ranging from awareness-raising and mutual aid, to more functional forms of collaboration requiring stronger institutional alignment, political commitment and resource investment (16). Recent work by Thurm et al. (19) on policy transfer and policy learning in border regions further sharpens this perspective by distinguishing between policy learning within cross-border regions and horizontal policy transfer within such regions, and by emphasising that these processes depend on actor networks, willingness to learn, political-institutional compatibility, and the competences needed to implement policy ideas locally.

Taken together, these perspectives position cross-border policy exchange, used here as an umbrella term, as the analytical focus of this article: a selective and context-bound process within broader collaboration, in which municipalities may learn from, perceive and potentially adapt ideas and practices from across the border in relation to their own responsibilities, institutional setting, networks, and practical room for action (11, 16, 19).

CASE DESCRIPTION: SENIOR FRIENDLY COMMUNITIES

The Senior Friendly Communities project (SFC, 2016-2019) forms the empirical setting for this study. Funded by Interreg, a European programme supporting cross-border collaboration in the Meuse-Rhine Euroregion, it involved municipalities in Belgium, Germany, and the Netherlands (20). SFC aimed to support municipalities in the development of age-friendly policies, with particular attention to older people with dementia, people with late-life depression and informal caregivers of people with age-related conditions. The project brought together municipalities from the three national parts of the EMR within a shared cross-border framework for local age-friendly policy development.

SFC was organised in three successive phases: 1) a baseline assessment of municipal age-friendliness; 2) selection and implementation of age-friendly initiatives; and 3) a post-assessment reflecting on policy development and cross-border policy exchange. A detailed overview of the SFC initiatives, their country of development, target groups, and corresponding WHO pillars, has been published elsewhere (21). The initiatives originated from the participating regions and were compiled by the SFC project team. Municipalities selected initiatives, with support from their regional coordinators and with the baseline assessment reports available to inform their choices. The selected initiatives provided the practical context through which municipalities reflected on the value and feasibility of cross-border exchange; they were not themselves the object of evaluation in this article. The project explicitly required municipalities to select and implement at least one initiative that had originally been developed in a neighbouring country. In this way, cross-border policy exchange was built into the project design rather than treated as something that would emerge automatically from geographical proximity.

SFC was structured around WHO's Active Ageing guidelines (22), and combined a shared project structure with room for local adaptation. In total, 33 municipalities participated in SFC's baseline phase. Their characteristics are summarised in Table 1. SFC offers a relevant case for this study because it did not merely involve municipalities in a border region, but explicitly organised opportunities for cross-border policy exchange and reflection.

Table 1. Characteristics of participating municipalities in the Senior Friendly Communities project

Municipality	Country	Language	Population Size (2017)	Population 65+ (2017)	Urban/Rural based on population (Eurostat - degree of urbanisation - DEGURBA)	Baseline and Post Assessment Completed
Amel	Belgium	Dutch	5,520	18.4%	Rural	Yes/Yes
As	Belgium	Dutch	8,210	17.9%	Rural	Yes/Yes

Table 1. Characteristics of participating municipalities in the Senior Friendly Communities project (*continued*)

Municipality	Country	Language	Population Size (2017)	Population 65+ (2017)	Urban/Rural based on population (Eurostat - degree of urbanisation - DEGURBA)	Baseline and Post Assessment Completed
Hamont-Achel	Belgium	Dutch	14,427	21.5%	Intermediate	Yes/Yes
Hasselt	Belgium	Dutch	77,124	21.4%	Urban	Yes/Yes
Kelmis	Belgium	German	11,017	19.5%	Intermediate	Yes/Yes
Liège	Belgium	French	197,885	22.8%	Urban	Yes/Yes
Plombières	Belgium	French	10,332	17.7%	Intermediate	Yes/Yes
Tessenderlo	Belgium	Dutch	18,517	19.5%	Intermediate	Yes/Yes
Thimister-Clermont	Belgium	French	5,744	14.5%	Rural	Yes/Yes
Verviers	Belgium	French	55,414	18.0%	Urban	Yes/Yes
Aldenhoven	Germany	German	13,932	17.7%	Intermediate	Yes/No
Dahlem	Germany	German	4,277	23.4%	Rural	Yes/Yes
Erkelenz	Germany	German	43,692	21.2%	Intermediate	Yes/Yes
Euskirchen	Germany	German	56,769	19.8%	Urban	Yes/Yes
Herzogenrath	Germany	German	47,977	21.3%	Intermediate	Yes/Yes
Hückelhoven	Germany	German	39,531	19.2%	Intermediate	Yes/Yes
Jülich	Germany	German	32,601	21.2%	Intermediate	Yes/Yes
Stolberg	Germany	German	56,739	21.5%	Urban	Yes/Yes
Wassenberg	Germany	German	17,898	20.2%	Intermediate	Yes/No
Wegberg	Germany	German	27,827	22.3%	Intermediate	Yes/No
Beek	Netherlands	Dutch	15,951	24.2%	Intermediate	Yes/Yes
Beekdaelen	Netherlands	Dutch	36,124	24.8%	Intermediate	Yes/Yes
Beesel	Netherlands	Dutch	13,405	21.6%	Intermediate	Yes/Yes
Eijsden-Margraten	Netherlands	Dutch	25,297	23.6%	Intermediate	Yes/Yes
Kerkrade	Netherlands	Dutch	45,937	24.1%	Intermediate	Yes/Yes
Maastricht	Netherlands	Dutch	122,753	20.4%	Urban	Yes/Yes
Mook	Netherlands	Dutch	7,775	25.4%	Rural	Yes/Yes
Roermond	Netherlands	Dutch	57,390	19.9%	Urban	Yes/Yes
Sittard-Geleen	Netherlands	Dutch	93,319	22.4%	Urban	Yes/Yes
Valkenburg	Netherlands	Dutch	16,440	27.7%	Intermediate	Yes/Yes
Venlo	Netherlands	Dutch	101,059	20.6%	Urban	Yes/Yes
Venray	Netherlands	Dutch	43,565	19.6%	Intermediate	Yes/Yes
Weert	Netherlands	Dutch	49,574	22.1%	Intermediate	Yes/Yes

The table summarises municipality-level characteristics only. Participant roles are not reported at the individual level because municipalities selected participants locally and no standardised role-level dataset was retained.

METHODS

Research Design

This qualitative study explores how municipalities perceived the relevance and feasibility of cross-border policy exchange for age-friendly policy development within the SFC project, based on perceptions shared during baseline and post-assessment group interviews. In this article we refer to these sessions as group interviews rather than focus groups. Although participants could respond to and elaborate on topics, the interviewer worked primarily through the same predetermined question list in each municipality and used follow-up questions mainly for clarification, and to keep the discussion focused.

Group interviews were conducted with municipal policymakers and local stakeholders at two key moments: once during the baseline phase between May and July 2017, and once during the post-assessment phase between April and December 2019. In total this resulted in 33 baseline interviews and 30 post-assessment interviews, with one interview per municipality at each point in time. In project documentation, these interviews were referred to as 'baseline assessment' and 'post-assessment' but in this article they are treated as structured reflection moments. The aim was not to measure intervention outcomes, but to capture how municipalities understood and perceived cross-border policy exchange at two moments during the project.

Selection of municipalities and participants

For the baseline assessment, one group interview was conducted in each municipality, usually involving two to five participants. Participants were selected locally by the municipalities themselves. Prior to the group interview, municipalities were asked to invite participants who were actively involved in their local age-friendly agenda and had sufficient knowledge of the topic and the policy context. Participants consisted mainly of municipal policy staff and, in some cases, local civil society representatives or external advisors (23). In total, 33 baseline interviews (phase 1) were conducted. During phase 2, three German municipalities withdrew for external reasons, e.g., staffing constraints and shifting priorities, leaving 30 municipalities to complete the post-assessment. One group interview was again conducted per municipality (phase 3). The assessments were designed to generate a municipality-level account rather than separate individual respondent accounts. During the group interview, participants were invited to complement one another's responses and to formulate a joint response on behalf of their municipality. For this reason, the primary unit of analysis was the municipality: 33 municipalities participat-

ed at baseline and 30 at post-assessment. Because individual-level characteristics were not systematically recorded, participants can only be described in broad terms as mainly municipal policy staff and, in some cases, civil society representatives or external advisors (23). Their professional roles, seniority, work experience in ageing policy, continuity across both assessment moments and direct involvement in specific SFC initiatives were not systematically documented.

Data collection

The topic list of the semi-structured local group interviews was based on the Assessment of Healthy Aging in Community Policies (AHACom) questionnaire, described in more detail by Schichel et al. (23). AHACom was developed from two existing tools: the 'Cross-Border Capacity Assessment in Dementia Care' (24) and the 'Dementieproofmeter 2015' (25). Whereas these earlier instruments focused mainly on dementia and regional or national context, AHACom was adapted for the present study to also address late-life depression, informal care, and the cross-border context of the Meuse-Rhine Euroregion. The questionnaire was translated into Dutch, French and German, while the order and content of the questions remained the same across language versions.

The group interviews addressed expectations and experiences with cross-border collaboration, including familiarity with relevant organisations, perceived challenges, anticipated benefits and interaction with knowledge institutions. An overview of guiding questions used during the baseline and post-assessments is presented in Supplementary Table 1. At baseline, the group interviews focused on initial expectations and perceptions, while the focus at post-assessment was for participants to reflect on their experiences and discuss whether their perspectives had shifted as a result of their participation in SFC. Responses were entered directly into a custom-built online data entry form developed for SFC on the basis of the AHACom questions. One researcher led the interviews and entered the responses during the session, which ensured that all questions were covered in a consistent way across municipalities. A second researcher documented field notes and made audio recordings solely to verify unclear entries or recover information in the event of a digital error in the online entry form. The recordings were not used for full transcription and were deleted after verification. The group interviews were held in the official language of each respective region: Dutch, French, or German. Most group interviews lasted between two and three hours, including short breaks. The open-ended questions encouraged in-depth reflection and dialogue among participants, rather than collecting standardised responses. This approach made it possible to explore how participants understood the value, feasibility, and practical conditions of cross-border policy exchange in relation to local age-friendly policy development in line with established approaches to semi-structured interviewing in social research (26). Throughout the findings, references to 'municipalities' (e.g., 'Dutch municipalities noted...') reflect the views expressed by participants during group interviews.

Data analysis

The online entry form allowed all responses to be downloaded in a format that facilitated comparison of answers to the same questions across municipalities. The qualitative data were analysed using a combination of deductive and inductive thematic analysis (27). Main categories, including expectations, experiences, facilitators, and barriers, were derived deductively from the interview guide and relevant literature. Subthemes emerged inductively from recurring patterns in responses. This approach follows established methods for descriptive qualitative research (28, 29). Themes were compared across the baseline (phase 1) and post-assessment (phase 3) interviews to identify continuities and changes in how municipalities perceived cross-border policy exchange over time. The first author (MS) grouped responses into key themes and noted how frequently particular topics were raised. Although coding remained interpretative, tracking frequencies improved analytic transparency and provided a structured overview of recurring issues. To strengthen descriptive validity, the coding process was refined through repeated discussions within the research team (23).

Research team and reflexivity

The research team included members with backgrounds in public health, health promotion, ageing, and cross-border collaboration. Several authors were familiar with the SFC project and the Meuse-Rhine Euroregion through research, project involvement, or professional practice. This familiarity supported contextual understanding but may also have shaped the interpretation of the data. To support reflexivity, emerging findings and interpretations were discussed within the research team and checked against the interview data and across national contexts.

Ethical considerations

Participants provided oral consent, as participation in interviews was considered integral to SFC's core aim of supporting municipalities. All presented data in this paper were anonymised and de-identified, and no personal or health-related data were collected. As such, the study did not fall under the Dutch Medical Research Involving Human Subjects Act (WMO) and was exempt from formal ethical approval. Audio recordings were used solely to verify unclear entries and were not transcribed. Because responses were entered directly into a structured online data entry system during the interviews, the recordings functioned only as a temporary check on the completeness and accuracy of the dataset. Entries were reviewed after each interview and, where needed, clarified with field notes and the recordings. Audio files were deleted once the dataset had been validated.

RESULTS

The findings show that municipalities generally viewed cross-border policy exchange as potentially valuable, but rarely as a clear practical priority. Across baseline and post-assessment interviews, perceived relevance remained conditional on local responsibilities, institutional fit, and the availability of time, capacity, and organisational support.

Baseline perspectives on cross-border collaboration

A first theme concerned the priority given to local ageing challenges over cross-border learning. For most municipalities, the main motivation to join SFC was addressing local aging challenges, particularly dementia, rather than cross-border learning. Implementing initiatives and learning from examples from neighbouring countries were seen as helpful, but of secondary importance. Only a few municipalities spontaneously referred to learning from neighbouring countries or to building cross-border networks as part of their motivation. At baseline, reflections on cross-border collaboration were therefore based more on expectations than on prior experience.

Municipalities were generally well-connected to local or national networks, but this familiarity rarely extended across borders. Nevertheless, many municipalities expected potential benefits from collaboration, such as learning from best practices or sharing resources, though these expectations were often abstract. As one Belgian municipality noted:

> Advantage of collaboration in the Euroregion? That collaboration is not there at the moment, but I do see examples of what could be beneficial. For example, living room concept/daycare in NL, how can Belgium learn from that, very practical.

A second theme concerned practical and institutional barriers to cross-border collaboration. Municipalities described unfamiliarity with colleagues across the border, legislation and governance differences, language issues, and lack of time and capacity. One Belgian respondent explained:

> Language: French is not a problem, but German is a challenge. English is also not always easy, especially for older staff. […] Different legislation: In the Netherlands, municipalities have much more responsibility. […] Cross-border work is not part of our main duties.

A German municipality added: 'The structures in neighbouring countries are not well known [to us], making it difficult to identify contact persons. There is too little knowledge of how social systems function elsewhere.' Other municipalities questioned transferability altogether. One Dutch municipality noted that 'a different context makes what happens there seem irrelevant or hard to apply here.' A German municipality similarly observed

that 'I don't easily think about looking for contacts across the border; out of habit I look at what other German municipalities are doing.'

Dutch municipalities often said that local concerns took precedence: 'If you're busy, you focus on your own region rather than the Euroregion.' Other Dutch municipalities noted the absence of clear starting points: 'I don't really know who to approach […] someone has to initiate it, like the Province.' These reflections reveal a recurring pattern. Municipalities recognised the potential value of cross-border exchange, but considered it constrained by practical, institutional, and relational barriers. For some, these challenges were already reason enough to deem such collaboration unrealistic.

Smaller municipalities in Belgium pointed to capacity issues: 'We are a small municipality […] time and finances are a problem. We are a border municipality, but the border still feels like a barrier.' Francophone municipalities noted the absence of shared structures: 'No platform that brings together the information. We don't know what's going on in other EMR municipalities.' Expectations for future collaboration were cautious. Many municipalities considered it unrealistic without additional support. As one municipality put it, 'At the moment I don't see that as realistic. We don't have the time for it.' Others hoped SFC would help build a network that could continue after the project. German municipalities sometimes stated this more directly, for example by describing cross-border collaboration as 'initially only project-based, not sustainable' because 'the structures are too different.' A Dutch municipality similarly noted, 'We are open to it, but [have] no concrete plans yet.'

A third theme concerned the need for coordination and intermediary support. Several municipalities emphasised the need for a coordinating actor, platform or intermediary organisation to facilitate information exchange. Some suggested umbrella organisations such as euPrevent, which focuses on cross-border public health in the EMR. '[euPrevent] works thematically, is already a source of knowledge, brings the right people together. It is an easy access point, easier than building your own network.' Others pointed to the absence of intermediaries: 'In the region, we know the contacts and the lines are short. In the Euroregion, there are no lines at all, […] VNG [Dutch association of municipalities] doesn't facilitate this either.' Similarly, a German municipality stated that collaboration could only work 'once we have knowledge of the organisational structures.'

These accounts suggest that municipalities viewed cross-border collaboration as something that required external facilitation through platforms, umbrella organisations, or networks at higher administrative levels. Few envisioned a proactive role for their own municipality, and cross-border work was often treated as lying outside their core responsibilities. As one German municipality summarised, 'In leisure time we cross borders a lot, but in work the border is still an obstacle.' At baseline, municipalities thus combined

openness to cross-border exchange with a pragmatic reluctance to treat it as an immediate policy priority.

Post-implementation reflections on cross-border learning

In the post-assessment interviews, municipalities reflected on cross-border learning more concretely, but these reflections remained largely cautious and conditional. Cross-border learning was rarely mentioned spontaneously. Only two out of thirteen Dutch participating municipalities referred to it, and both did so with reservations. One described difficulty implementing an activity from across the border and ultimately preferred a Dutch alternative. The other noted that while cross-border learning was theoretically appealing, governance differences hindered practical application. For example, one Dutch municipality discussed a Belgian phone-buddy initiative that had been introduced through SFC as an example from another part of the EMR. This example illustrates how municipal professionals reflected on whether an activity encountered through cross-border exchange could be aligned with their own legal, organisational and volunteer structures. In this case, participants noted that 'we tried very hard to make it work, but it didn't fit […] we encountered too much resistance', referring to privacy legislation, volunteer availability, and cultural differences. Another Dutch municipality distinguished between learning and collaboration: 'I wouldn't call it collaboration, but we can learn from each other.' These responses show that municipalities valued the exchange of ideas, but that this rarely resulted in joint policy action.

Belgian municipalities likewise seldom mentioned cross-border learning unprompted. Those that did emphasised preconditions for cross-border collaboration. One cited the time investment required for cross-border meetings, while another cited the effort needed to adapt initiatives to the local context. Here, 'local context' referred not to language, since materials were available in all EMR languages, but to differences in institutional and governance systems. Others noted a lack of transparency: 'We do not really know who [which municipality] is doing what [which activity, or what challenges they encounter] within the project.' Overall, Belgian municipalities suggested that cross-border learning depended on structural and organisational alignment. As one Belgian municipality summarised, 'We remain focused on our own and neighbouring municipalities. Participating in SFC has not really given [cross-border exchange] a boost.'

German municipalities more frequently reflected on cross-border learning. Some described how their perceptions had changed over time. One noted: 'There are benefits when you can exchange, […] but realistically, in practical day-to-day work, there are not so many benefits. But in theory, it is important and good.' This reflected how initial interest was tempered by constraints, such as time and staffing. Half of the German municipalities commented that the cross-border focus of SFC served as an added motivation for participation. The emphasis was not only on implementing age-friendly initiatives,

but also on gaining political visibility. One German municipality explained: 'This project had a different status politically, in a positive way, than if we had tackled the SFC themes ourselves, because it was cross-border and considered part of something bigger.' For some participants, the cross-border character of SFC raised the project's political profile and, in some cases, helped generate additional local support. However, several municipalities found the practical benefits unclear, citing limited interaction and institutional differences. These responses suggest that cross-border collaboration was valued either as symbolic support or as a potentially useful, but difficult-to-realise opportunity.

Across countries, municipalities emphasised different aspects of cross-border collaboration, but their reflections also showed a common pattern of limited practical traction. Dutch municipalities more often described cross-border learning as difficult to apply in practice, Belgian municipalities more often stressed the need for organisational alignment and greater transparency, whereas German municipalities more often referred to the political importance or visibility of participation. At the same time, municipalities in all three countries mentioned similar barriers, including time constraints, limited knowledge of neighbouring systems, and differences in language, governance, and regulation.

Persistent hesitance in cross-border learning attitudes

The findings suggest that municipalities' positions changed little over time. What started as curiosity or cautious interest seldom developed into concrete engagement. Instead, most municipalities largely reaffirmed their earlier doubts. As one Dutch municipality put it at baseline, 'There are many differences between the countries, in health care and culture, and it already takes a lot of energy to collaborate within the region, let alone beyond it.' Cross-border collaboration was thus perceived as burdensome from the outset, and this view changed little during SFC.

Barriers were not only acknowledged but also used to justify limited engagement. While the idea of cross-border learning was often valued in theory, municipalities cited lack of time, administrative differences, or incompatibility of systems as reasons for limited engagement. These arguments gained weight over time. Several municipalities stressed that practices from neighbouring countries could not simply be transferred, as local contexts required adaptation. Hesitance was thus not a rejection, but a pragmatic response to institutional complexity and the resources required to translate cross-border lessons into local action.

Even after the post-assessment, many municipalities felt they lacked a clear understanding of their counterparts across the border. Knowledge of each other's responsibilities and working methods remained limited, and policy logics were perceived or assumed as fundamentally different. As one German municipality stated: 'The institutional structures are different.' This indicates that beyond time and capacity, deeper structural divergences

shaped perceptions of feasibility. In this context, cross-border learning remained largely an abstract possibility rather than a concrete and actionable practice.

DISCUSSION

This study examined how municipalities in the Meuse-Rhine Euroregion perceive the relevance and feasibility of cross-border policy exchange for the development of age-friendly initiatives, and which barriers and facilitators influence those assessments. The findings point particularly to policy learning about the conditions for cross-border collaboration, while also showing how municipalities assessed whether ideas and practices from across the border could be adapted to their own policy context. Whether such exchange was considered relevant and feasible depended on how municipalities related examples from across the border to their own responsibilities, policy priorities, and fragmented institutional contexts. From this perspective, cross-border collaboration emerged less as a straightforward consequence of geographical proximity than as a process shaped by local interpretation, institutional fragmentation, and the practical conditions for alignment across borders.

Cross-border exchange as selective lesson-drawing

For most municipalities, cross-border exchange did not stand at the centre of SFC. What mattered more was whether it could contribute to strengthening their own local response to population ageing. In that sense, SFC functioned primarily as a way of supporting local policy development with ideas and support from outside, rather than as a means of building a shared cross-border policy space. Rose's (30) concept of lesson-drawing helps clarify this pattern. He defines lesson-drawing as the search for lessons from programmes that already exist elsewhere, with a view to whether and to what extent they can be transferred to another context (30). In SFC, lesson-drawing across the border therefore became meaningful mainly where it could contribute to local policy, rather than where cross-border exchange as such was prioritised. At the same time, Rose (30) shows that such search processes are inherently uncertain, because what works elsewhere is not automatically desirable or practically workable in another setting, and because actors tend to search first in contexts they perceive as near and recognisable. In the case of SFC, this meant that learning from across the border was never simply a matter of identifying an attractive example, but of judging whether it could also be made meaningful within the municipalities' own policy context. From the perspective of Dolowitz and Marsh (11), the issue in cross-border settings is therefore not only what an example offers, but also where the example comes from and under what conditions it can be transferred. Examples from the Netherlands, Belgium, or Germany acquired practical significance only where municipalities regarded them as sufficiently relevant and workable for local policy, given their origin in another administrative context. This points to a wider implication for cross-bor-

der collaboration, namely that proximity alone does not generate exchange, because exchange depends on whether examples can be aligned with local priorities, resources, and organisational conditions across the border (16). Thurm et al.'s (19) framework on policy transfer and policy learning in border regions further specifies this implication, showing that learning and transfer also depend on cross-border contacts among relevant policy actors, willingness to learn, institutional compatibility, and implementation competences. In SFC, examples therefore became relevant only where municipalities considered them compatible with their own policy priorities and organisational conditions. Rather than pointing to direct transfer, this suggests that the potential value of cross-border policy exchange lies primarily in supporting policy learning, including through examples from neighboring countries as sources of inspiration and comparison, which municipalities may then translate into context-specific approaches that fit local legislation, staffing, organizational structures, and policy responsibilities.

Institutional fragmentation and the limits of practical alignment

Structural and institutional fragmentation constrained the possibilities for meaningful cross-border policy exchange within SFC. The issue was not simply that municipalities operated in different national and administrative contexts, but that cross-border examples had to be made workable within different responsibilities, legal frameworks, organisational structures and working practices. This closely aligns with Sousa's (16) observation that cross-border collaboration does not follow automatically from geographic proximity, but depends on the extent to which projects, resources, organisational structures, and political commitment can be aligned across the border. Read in light of Star and Ruhleder (31), the central difficulty in SFC was not difference as such, but the absence of the conditions under which cross-border policy exchange could be aligned in practice with the institutional contexts in which age-friendly policy was organised in the Netherlands, Belgium, and Germany. As Star (32) argues, infrastructures become particularly visible at moments of friction, when what usually remains in the background no longer works as a matter of course. This was illustrated by the Belgian phone-buddy example, where an initiative encountered through SFC as an example from the Belgian part of the EMR could not readily be aligned with a Dutch municipal context because of privacy legislation, volunteer availability, and cultural differences. Karasti et al. (33) further help to explain why a project such as SFC could create space for initial exchange and reflection, yet less readily lead to durable collaboration. They emphasise that infrastructures do not emerge within the short time horizon of projects alone, but depend on longer processes of alignment, maintenance, and ongoing development (33). From that perspective, the limited cross-border exchange within SFC reflects not primarily a lack of willingness, but municipalities' practical assessment of what was feasible under these institutional and organisational conditions. It also clarifies why the relevance and feasibility of cross-border collaboration remained closely tied to the national and local contexts in which municipalities were expected to act.

Governance conditions for workable cross-border exchange

Cross-border policy exchange becomes more likely when it is supported by more durable forms of coordination and organisational support that help bridge differences in policy systems, responsibilities, and ways of working. In SFC, municipalities did not assess cross-border collaboration from a shared cross-border frame, but primarily through their own institutional context, including their responsibilities and policy priorities. From a policy transfer perspective, this matters because lessons are not simply adopted from one context to another, but assessed in relation to their perceived compatibility and practical feasibility (11). Georgiou and Arenas (34) help clarify why such assessments may differ across contexts by showing that collaboration is also shaped by different institutional logics, or distinct normative and organisational reference points regarding what is appropriate, feasible, and desirable. In a cross-border setting, this becomes even more important because municipalities assessed exchange primarily in relation to nationally and locally organised responsibilities and ways of working, rather than in relation to a shared cross-border policy framework. This closely aligns with Sousa's (16) observation that cross-border collaboration does not follow automatically from geographic proximity, but depends on the extent to which organisational structures, resources, and political commitment can be aligned across the border. In SFC, limited knowledge of each other's policy systems and responsibilities, together with the absence of time, structures, and resources to maintain contact independently, further reduced the practical feasibility of exchange. The findings also align with the argument that cross-border collaboration requires not only an objective need, but also engaged institutions, external support, and a governance arrangement that fits the goals and systems involved (18). Familiarity with each other's structures and institutions, political support, and intermediary support structures likewise appear to matter for fostering collaboration (15). In SFC, some of these enabling conditions were present, including a shared project structure and intermediary support, but they were not sufficient to compensate for limited time, resources, institutional anchoring, and the absence of sustained structures for exchange beyond the project context. In practical terms, this points to the value of intermediary support not as a formal platform in itself, but as a practical mechanism for maintaining contacts, contextual knowledge, and continuity beyond individual projects. Such support may help municipalities navigate legal, organisational, and policy differences, but cannot resolve the underlying institutional fragmentation on its own. From this perspective, more durable cross-border exchange depends on governance conditions that structurally support coordination, mutual understanding, political and organisational anchoring, and intermediary capacity across institutional contexts.

Taken together, these findings suggest that cross-border policy exchange in age-friendly policy is unlikely to become durable through proximity or political ambition alone. Its development depends both on whether municipalities regard such exchange as relevant to their own local policy goals and on whether organisational conditions are in place to



support coordination, translation, and continuity across institutional contexts. The main challenge, therefore, lies not simply in encouraging cross-border collaboration, but in creating the conditions under which it can become relevant, feasible, and sustainable in practice. This matters not only for age-friendly policy in the EMR, but more broadly for cross-border policy initiatives that rely on local actors to translate ideas across fragmented institutional settings.

Limitations and strengths

While the study offers valuable insights, several methodological limitations apply. Participation was voluntary, likely attracting more proactive municipalities. Socially desirable responses may have influenced the data, particularly given the limited degree of actual cross-border implementation. To reduce this risk, participants were encouraged to speak freely, ensured anonymity, and reminded that the aim was learning rather than benchmarking. However, due to the theme of the project, it is possible that interview participants were more knowledgeable regarding social or aging policies than cross-border policies. In addition, group dynamics may have affected what was shared during interviews. Because the individual-level characteristics were not systematically recorded, the study did not allow for comparison by participant role, seniority, work experience in ageing policy, or direct involvement in specific SFC initiatives. Differences in emphasis may therefore have reflected variation in participants' professional positions as well as differences between municipalities or countries. The study also relied solely on self-reported perceptions, without triangulation with policy or implementation data. At the same time, the study has several strengths. It provides rare empirical insight into perceptions of cross-border collaboration at the municipal level across three countries. The structured group interviews, based on validated instruments, ensured consistency, while the inclusion of multiple participants per municipality supported internal reflection and generated layered perspectives. These features enhance the relevance of the findings for both research and practice in European border regions.

CONCLUSION

This article examined how municipalities in the EMR perceived the relevance and feasibility of cross-border policy exchange for the development of age-friendly initiatives, and which barriers and facilitators shape these assessments. The findings suggest that such exchange was approached less as a goal in itself than as a selective resource for local policy development. Although this study focused on age-friendly initiatives in one cross-border region, the findings may offer transferable insights for other policy domains and cross-border regions where local actors are expected to translate ideas across different institutional, legal and organisational contexts. Its relevance and feasibility depended on whether examples from across the border could be aligned with municipalities' own

responsibilities, priorities, and ways of working. This indicates that cross-border policy exchange in ageing policy should not be understood as a straightforward route to transferring initiatives across borders, but as a conditional process shaped by how municipalities perceived practical value, institutional fit, and the governance conditions needed for coordination, translation, and continuity. For policymakers, this implies that investment in cross-border exchange is most justified when it supports sustained policy learning, translation, and local adaptation, rather than when it assumes that initiatives can be directly transferred from one institutional context to another. In age-friendly policy, such exchange should complement, rather than replace, participatory approaches that start from the needs and interests of older adults in their own local contexts. By bringing the municipal perspective into debates on cross-border governance and policy transfer, this study helps explain why such collaboration often remains difficult to sustain in practice.

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APPENDIX I: PRACTICAL EXAMPLES CHAPTER 6

This appendix presents selected practice documents that illustrate how themes identified in Chapter 6 on senior-friendly communities, local public health practice and cross-border learning were translated into practical tools and guidance in the Meuse-Rhine Euroregion.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

Guideline for Resilient Communities, 2019



This guideline is a practical tool for municipalities, community professionals and local public health actors who want to promote resilience and prevent depression. It provides a step-based approach for policy and action development, including a "resilient community test", stakeholder workgroup formation, vision and strategy development, activity planning, implementation and evaluation. The guideline emphasises data-informed local policy, user participation, health in all policies, positive health, intersectoral cooperation and sustainability.

Download via publication list: – euPrevent Publications
https://www.brigittevanderzanden.eu/en/publications.html
2019: *How to become a resilient community and prevent depression.*

Building and Sustaining a Senior-Friendly Community Movement, 2019

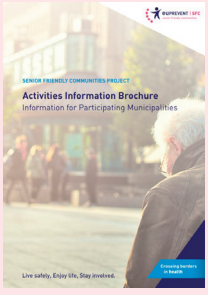


This edited project book presents the euPrevent Senior Friendly Communities project in the Meuse-Rhine Euroregion. It describes how nine partners worked with 32 municipalities in Belgium, Germany and the Netherlands to support senior-friendly communities, with a focus on dementia, late-life depression and informal caregivers. The book explains the WHO Active Ageing framework, the four project stages, the second municipal assessment, the activity buffet, cross-border learning, implementation experiences and lessons learned for building and sustaining a senior-friendly community movement. It also includes the Guideline for Resilient Communities and an appendix on dementia-friendly municipalities.

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https://www.brigittevanderzanden.eu/en/publications.html
2019: *How to become a resilient community and prevent depression.*

ISBN: 978-94-6380-710-4

Senior Friendly Communities Activities Information Brochure, 2017



This brochure was developed for municipalities participating in the Senior Friendly Communities project in the Meuse-Rhine Euroregion. It explains the project's basis in the WHO Active Ageing framework and presents an "activities buffet" from which municipalities could choose locally appropriate interventions. The activities focus on dementia and old-age depression and include advice, awareness-raising, local groups of older people, cross-border learning, dementia communication training, school education, caregiver support tools, positive health, telephone outreach, theatre and well-being on prescription.

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2017: *Activities information Brochure*

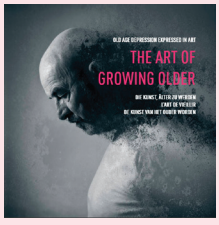
The Development of COVID-19 in the Border Area of the Netherlands, North Rhine-Westphalia and Belgium, 2021



This report presents findings from the COVID in the Border Region project, commissioned by the Province of Limburg, also on behalf of Gelderland and Overijssel, the Dutch Ministry of the Interior and Kingdom Relations, and the State Chancellery of North Rhine-Westphalia. It examines COVID-19 distribution, national measures, cross-border transmission and the effects of border closures in the border area of the Netherlands, North Rhine-Westphalia and Belgium.

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https://www.brigittevanderzanden.eu/en/publications.html
2021: *The development of COVID-19 in the border area of the Netherlands, North Rhine-Westphalia and Belgium.*

The Art of Growing Older, 2019



This multilingual Senior Friendly Community publication addresses old-age depression through art and creative expression. Developed as part of the euPrevent Senior Friendly Communities project, it presents age-related depression in four languages and uses artistic contributions to make the topic more visible and discussable. The book is intended for municipalities, care organisations, schools, informal caregivers and other stakeholders, and aims to support awareness, intergenerational contact and the breaking of taboos around old-age depression.

Online version:
https://euprevent.eu/wp-content/themes/euprevent/page-flip/the-art-of-growing-older/#page=1

ISBN-13: 9-78908200159-4

Senior Friendly Communities in the Meuse-Rhine Euroregion: WHO Good Practice Brief, 2018



This WHO good practice brief presents the Senior Friendly Communities project as an example of local, intersectoral action to support active and healthy ageing in the Meuse-Rhine Euroregion. It describes how municipalities were supported to assess local capacity, choose activities, implement interventions and plan for sustainability. The brief highlights strategic planning, contextualised local action, cross-border collaboration, people-centred approaches, and the role of municipalities in improving the well-being of people with dementia and old-age depression and their informal caregivers.

Download via publication list – reports and international publications:
https://www.brigittevanderzanden.eu/en/publications.html
2018: *Senior friendly communities in the Meuse-Rhine Euroregion: improving the lives of people with dementia and old-age depression.*

See next page for the full factsheet.



World Health Organization
REGIONAL OFFICE FOR Europe

GOOD PRACTICE BRIEF

6

SENIOR FRIENDLY COMMUNITIES IN THE MEUSE-RHINE EUROREGION: Improving the lives of people with dementia and old-age depression

Brigitte van der Zanden[1], Marja Veenstra[2], Sara Reekmans[3], Mignon Schichel[4], Frans Verhey[5], Karl-Heinz Feldhoff[6]

Summary

The Meuse-Rhine Euroregion[7] has embarked on strengthening the role of local municipal authorities to support active and healthy ageing in senior friendly communities paying special attention to dementia and old-age depression. The Senior Friendly Communities Project has included training of local policy-makers in strategy development, local public health interventions, intersectoral action and cross-border collaboration, new roles for community personnel, people-centred approaches to care and well-being, and implementing information technology solutions. The Project can be tailored to the needs of communities and has inspired local authorities to provide more interventions for dementia and old-age depression.

Improving the well-being of people with dementia and old-age depression

As elsewhere in the WHO European Region, the Meuse-Rhine Euroregion grapples with an aging population and increasing prevalence of dementia and old-age depression. The prevalence of dementia and depression is nearly 2% and 25% respectively in a population of about four million people in the Meuse-Rhine Euroregion *(1)*. While these conditions are typically first identified through the health system, improving the lives of older people with dementia and depression requires integrated approaches combining health, social and other municipal services contextualized to the specific needs of communities *(2)*. A wide range of interventions

Key Messages

- Local-level multidisciplinary intersectoral action is needed to support healthy ageing, particularly for those with dementia and old-age depression.
- Local authorities and communities have a key role to play in developing and implementing evidence-based interventions to improve the well-being of people with dementia and old-age depression, and their informal caregivers.
- Strategic planning is an important instrument of successful intersectoral action at local level.
- Contextualized action is essential, taking into account the needs, existing knowledge and strengths of municipalities and communities.
- Planning for sustainability is necessary to safeguard the long-term commitments of municipalities.

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[7] The Meuse-Rhine Euroregion is a cross-border area of Belgium, Germany and the Netherlands.

and services are available to maintain function in people with dementia and/or depression for as long as possible, regaining lost function when there is the potential to do so, and adapting to lost function that cannot be regained *(3)*. This brief provides a good example of how the uptake of such interventions can be implemented in an adaptable manner.

Senior Friendly Communities Project

The Senior Friendly Communities Project started in 2016 and builds on the WHO Active Ageing Framework (2002) *(4)*. The three pillars of this Framework (participation, health and security) provide the conceptual basis for this Project. The euPrevent | EMR Foundation, the implementing agency, supports cross-border cooperation between professionals and organizations engaged in maintaining, promoting and improving public health for residents in the Euregion Meuse-Rhine. The support package for municipalities comprises four consecutive steps.

Step 1. Assess capacity. An online (baseline) capacity assessment (available in Dutch, English, French and German) is carried out in each participating municipality, complemented by in-depth interviews conducted by regional coordinators. From the results of the assessment, municipalities gain insight into their performance in supporting people with dementia and/or old-age depression, and family caregivers which serves as a starting point for further action. The assessment enables contextualizing support.

Step 2. Choose activities. Municipalities receive a fixed budget they can use to select a number of activities, reflecting local preferences and needs. Every municipality appoints a local coordinator who oversees the planning and manages activities. This local coordinator is in turn supported by regional Project coordinators. Key activities municipalities can choose from include the following, with examples presented in Table 1:

- multiple **strategy workshops** for local policy-makers on how to develop a strategic plan focusing on local public health campaigns, intersectoral action and cross-border collaboration that contribute to the well-being of people with dementia and old-age depression;
- **training of well-being coaches** who closely work together with primary care physicians;
- **outreach** activities offered by trained volunteers to socially isolated older people;
- **educational sessions** on ageing, positive health, communicating with people with dementia and on empowering family caregivers;
- creation of **local social networks** of older people;
- **education in primary schools** on dementia and depression;
- **cultural activities** that include the themes of dementia and depression; and
- **online support tools** for informal caregivers.

Step 3. Implement activities. The Project provides support and guidance to municipalities to implement the activities chosen.

Step 4. Ensure sustainability. After the initial implementation process, a second assessment is performed in all municipalities who are advised on how to make the activities sustainable and to develop a five-year sustainability plan.

Table 1. Example activities developed by municipalities in Belgium, Germany and the Netherlands

As, Belgium (8 000 inhabitants)
Municipalities are supported to develop **neighbourhood groups and networks of older people** to improve their social inclusion. Local residents can identify and present topics – such as civil society action, lifelong learning and sports – to their community to initiate these groups and networks.
Municipalities are supported to implement an **online platform to support caregivers of people** with dementia. Developed with the aim to improve collaboration between professional and informal caregivers, this password-secured website allows for the exchange of information and personal messages, and serves as an important care planning tool.
Kerkrade, the Netherlands (46 000 inhabitants)
Family physicians identify patients who are in need of social support, and prescribe services provided by so-called **well-being coaches**. These coaches are volunteers who are trained to **support people at risk of old-age depression**. Interventions include developing a well-being plan, providing social support and helping the patient find supporting networks. The well-being coach reports back to the family physician on progress made by the patient.
A social worker coordinates a team of **volunteers** who are trained to **provide telephone support to socially isolated people**. A social worker identifies people at risk of isolation who are contacted every three days or every week to follow-up on their needs, and to prevent social isolation.
Euskirchen, Germany (56 000 inhabitants)
Different target groups (community personnel, police officers, public transport personnel, fire fighters, shop owners, etc.) are trained on how to **communicate with people who have early dementia**. Three-hour theoretical courses are complemented by role-playing and audio-visual aids.
Children age 12 receive two **educational sessions in schools on dementia and depression**. They visit a nursing home, and participate in activities with residents with the aim to better understand these illnesses and to help develop intergenerational relationships and to promote an inclusive society.

Impact

The Project assisted local coordinators of 32 municipalities in implementing interventions for people with dementia (80 activities) and depression (90 activities). Participating municipalities reported that they expanded their service offerings for people with dementia (Fig. 1) and old-age depression (Fig. 2) since the start of the Project.

Fig. 1. Number of municipalities involved in activities related to dementia before and after the Senior Friendly Communities Project, according to the three pillars of the WHO Active Aging Framework

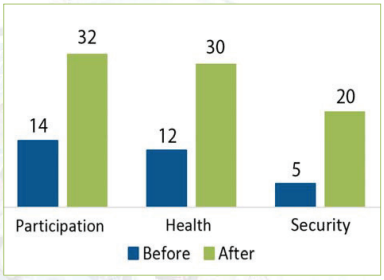
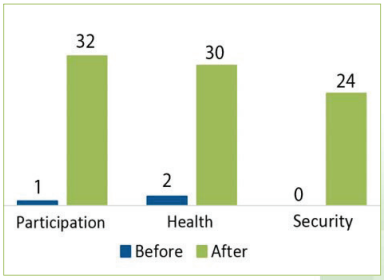


Fig. 2. Number of municipalities involved in activities related to old-age depression before and after the Senior Friendly Communities Project, according to the three pillars of the WHO Active Aging Framework



Lessons learned

- **Local-level multidisciplinary intersectoral action is needed to support healthy ageing**, particularly for those with dementia and old-age depression. While most of these conditions are identified in primary care, maintaining, restoring and replacing declining cognitive functions requires a partnership between various health, social and other municipal services.
- **Local authorities and communities have a key role to play** in developing and implementing evidence-based interventions to improve the well-being of people with dementia and old-age depression, and their informal caregivers.
- **Strategic planning is an important instrument of successful intersectoral action at local level.** Senior friendly communities can only be developed if each municipality has a clear and individualized strategy, taking into account local history, context and partners.
- **Contextualized action is essential**, taking into account the needs, existing knowledge and strengths of municipalities and communities.
- **Planning for sustainability is necessary** to safeguard the long-term commitments of municipalities in addressing the challenges related to dementia and old-age depression.

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PEERS
FREE TIME
PARENTS
CROSS
?
BORDER

Chapter 7

Associations between individual and environmental factors and adolescent substance use in the border regions of the Netherlands, Belgium, and Germany

Brigitte A.M. van der Zanden, Stephanie Wagner & Christian J.P.A. Hoebe.

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ABSTRACT

Introduction Adolescent use of alcohol, tobacco, and cannabis remains a significant public health concern across Europe. In border regions, young people may be exposed to differing laws, social norms, and environmental influences, creating a context in which individual and environmental associations may operate differently. This study investigates how individual and environmental factors relate to substance use among adolescents in the border regions of the Netherlands, Belgium, and Germany.

Method The study included 20,461 adolescents (aged 13–17) from the cross-border regions of the Netherlands, Belgium, and Germany. In 2023, they completed a standardised, anonymous online questionnaire during school hours. The questionnaire assessed substance use (alcohol, tobacco, cannabis), psychosocial characteristics, and physical, social, and economic environmental factors and was analysed using descriptive statistics and logistic regression.

Results Higher odds of binge drinking, smoking and vaping, and cannabis use were observed for older age, peer influence, and frequent late-night outings, while lower odds were observed for parental monitoring, clear household rules, and structured leisure. While the strength of these associations varied across countries, the underlying factors were largely consistent.

Conclusion Behavioural differences between countries may reflect variations in national policies and cultural contexts, as well as the broader social dynamics that characterise life in cross-border regions. The social and cultural environments in which adolescents grow up appear to be more decisive. Effective prevention in border regions should therefore prioritise context-specific, cross-border collaboration, focusing on strengthening social structures around parents, schools, and leisure time.



INTRODUCTION

Unhealthy lifestyle behaviours among adolescents continue to pose significant challenges across many European member states, particularly in relation to substance use, including alcohol, cannabis, and tobacco. Findings from the World Health Organization's Health Behaviour in School-aged Children (HBSC) survey indicate that 57% of 15-year-olds across Europe, Central Asia, and North America have experimented with alcohol, and 40% consumed it within the past 30 days (1, 2). Although the HBSC has shown alcohol use among adolescents has declined in the recent years (1, 2), early initiation remains concerning due to its potential consequences for brain development, risk of addiction, and risky behaviours.

Similar risks are associated with early cannabis and tobacco use. Early cannabis use has been linked to cognitive impairments, structural brain changes and lower academic achievement (3). Adolescent tobacco use is strongly associated with nicotine dependence (4), long-term respiratory and cardiovascular problems (5), and is associated with an increased likelihood of progressing to poly-substance use (6), although this relationship is debated and not consistently supported across studies (7, 8). When initiated at a young age, these substances, like alcohol, can have compounding negative effects, highlighting the importance of early prevention efforts.

According to the same HBSC survey, 6% of 15-year-olds reported using cannabis in the past 30 days, indicating recent rather than frequent use. While traditional cigarette smoking is decreasing, the use of e-cigarettes is on the rise: 32% of 15-year-olds have tried them, and 20% reported recent use (1, 2).

Research consistently demonstrates that adolescent substance use is a complex issue involving a combination of health, developmental, and societal risks. Substance use can significantly harm both physical and mental health by disrupting normal brain development, increasing the risk of future addiction, and contributing to various behavioural problems. Addressing these risks requires developing effective strategies, activities, and interventions that foster a healthy living environment, with a focus on key areas including individual and environmental factors, such as demographics, family situation, peer groups, school structure, and leisure activities. Such an approach is reflected in prevention frameworks used in the three countries, including Dutch initiatives inspired by the Icelandic Prevention Model (IPM) (9, 10), Communities That Care (CTC) in Germany (11, 12), and Belgian school- and environment-based prevention frameworks inspired by the European Drug Prevention Quality Standards (EDPQS) (13) and the COMIQS.BE consensus project (14).

Border regions within the European Union represent complex socio-spatial environments where daily life often transcends national boundaries. Mobility for schooling, leisure, and work creates shared socio-economic spaces shaped by both border permeability and the degree of administrative coordination between neighbouring states (15-17). Scholars in border studies describe these areas as dynamic contact zones influenced by both integration and division, where the meaning of 'borderlessness' remains uneven and context-dependent (15-17). While the EU promotes cross-border cooperation in health and social policy, competencies for prevention and health promotion remain primarily national or even regional (18). Recent analyses also suggest that a genuinely European mindset in public health policymaking is still lacking (18). This tension between European integration and nationally anchored systems makes border areas particularly relevant for studying how individual and environmental determinants of adolescent substance use operate within differing legal, cultural, and institutional contexts.

Within this broader European context, national regulations on adolescent substance use differ across the three countries. For alcohol, the minimum age is 18 years in the Netherlands, whereas in Germany and Belgium beer and wine may legally be purchased from age 16 (spirits from 18). In Germany, supervised consumption of beer or wine is permitted from age 14 when accompanied by a custodial parent. For tobacco and e-cigarettes, sales to minors (<18 years) are prohibited in all three countries. Regarding cannabis, possession and purchase are prohibited for minors across all countries. The Dutch tolerance policy ('coffeeshops') applies only to adults (≥18), and Germany's partial adult-use legalisation took effect only in 2024. These differences shape the legal environment encountered by adolescents in border regions and provide context for interpreting cross-national patterns.

Together, these three approaches converge on the principle that resilience is strengthened by positive factors like supportive social networks and stable family environments, while risks are heightened by negative influences like poverty, and weak parental monitoring. This convergence provides the rationale for the inclusion of both individual and environmental variables in the present study, which is also supported by extensive evidence reviews on risk and protective factors for adolescent substance use (19, 20).

Despite the existence of these three frameworks, research remains limited in certain contexts, particularly in border regions. These border regions may present social and structural conditions that are relevant to substance use but have not yet been thoroughly studied. Border regions are characterised by economic, social, cultural, and political dynamics related to their proximity to national boundaries. At the same time, border regions often face specific challenges, like economic disparities, language differences, and regulatory variations, but they also benefit from cross-border cooperation opportunities that can drive regional development and integration. This research gap is especially



urgent given that about one-third of European citizens reside in border regions (21-23), including about 28% of adolescents aged 10 to 19 (21). Citizens, including adolescents, cross borders for shopping, education, work, or leisure (24-26), subjecting them to varying laws and cultural influences related to alcohol and tobacco, which may shape their choices and behaviours. Moreover, in cross-border regions, differences in taxation and pricing of alcohol and tobacco can influence their accessibility, making these substances more or less available to adolescents and potentially impacting consumption patterns. While many policy strategies emphasise creating safe, healthy, and supportive environments for adolescents, the geographical context of border regions remains understudied (15-17). This study therefore focuses on adolescents living in the border regions of the Netherlands, Belgium and Germany, and presents a large-scale comparison of substance use and social determinants in these border areas.

These considerations highlight the need to examine how individual and environmental factors are associated with adolescent risk behaviour in cross-border settings. Differences in regulations and cultural norms across neighbouring countries may influence adolescent substance use. A deeper understanding of these influences is essential for developing effective, evidence-based interventions and policies tailored to the characteristics to border regions. Therefore, there is a need to examine how individual and environmental factors associate with substance use vary across border regions and how these patterns relate to alcohol consumption, tobacco smoking and vaping, and cannabis use. By analysing patterns of binge drinking, smoking or vaping, and cannabis use in border regions of the Netherlands, Germany, and Belgium, this study leverages the cross-border setting to explore both similarities and differences in adolescent behaviour. The insights gained will inform the development of targeted prevention strategies and policies to mitigate health risks associated with substance use among adolescents in border regions (10, 19, 20, 27-31).

METHOD

Study design and study population

The Youth Euregional Scan (YES) was a cross-sectional survey study among 13-17-year-olds in school-setting in border regions of the Netherlands, Germany, and Belgium. These border regions are part of the so-called Meuse-Rhine and Rhine-Meuse North Euroregions, encompassing several municipalities that vary in size and character, ranging from rural communities to urban centres, that are geographically close but administratively belong to different countries. In September 2023, data collection was conducted in secondary schools within these regions using a standardised online questionnaire. Collected information included data on substance use, along with individual and environmental determinants influencing these behaviours, such as age, gender, parental supervision,

and social support. Recruitment procedures for schools, by convenient sampling, differed by country. In the Netherlands, participation was coordinated by the regional public health services (GGD) as part of their statutory youth health survey, which is conducted every four years and has high school-level participation. In Germany, most schools were approached for the first time through local public health authorities, while a few schools had participated in earlier cross-border youth surveys, the survey is not structurally embedded in the tasks of health authorities. In Belgium, schools were approached through the national public health authority, which applied a sampling procedure for schools, but participation was voluntary and took place in a context where schools are frequently invited to other surveys. All secondary schools in the border regions were invited to participate, ensuring equal opportunity for inclusion, resulting in a convenient sample. Because all eligible secondary schools within the border regions were invited to participate through the respective regional public health authorities, formal participation rates at the school level were not calculated. The analyses were conducted at the individual level, based on all adolescents who completed the full questionnaire. Participation was voluntary, the final sample size depended on the number of schools and students that responded. While not all schools participated, the study included 100 schools located in the border region, representing various educational school levels. Only second- and fourth-grade students at secondary school, focusing on the 14- and 16-year-olds, were invited to participate. Because entire classes were included, the actual age range of participants was 13–17 years. Analyses were therefore restricted to adolescents in this age range. Participation was voluntary and both students and their parents could decline participation or withdraw at any time. The questionnaire was administered online via a secure digital platform during regular school hours under classroom supervision. Data collection took place in a standardised manner, with students completing the survey individually using school computers or tablets under the guidance of a teacher or school staff member. This controlled setting ensured comparable conditions across schools and minimised potential response bias. The survey was conducted anonymously, as no personal identifying information, such as names, dates of birth, or addresses, was collected. Residential address data and information on individual cross-border mobility were not collected due to privacy and feasibility reasons. As a result, analyses are based on school location within border regions rather than on participants' distance to the border or frequency of cross-border movements. Only participants with no missing data on either dependent or independent variables were included in analyses.

Questionnaires were included in the analyses only if they were fully completed. Respondents who left one or more survey items unanswered were excluded prior to analysis, regardless of which variable was missing. Therefore, the analytic sample consisted exclusively of complete cases, and no item-level missing data were present in the dataset. This approach ensured that the descriptive statistics and regression analyses were based on identical respondent groups across all variables.



Measurements

Outcome variables included alcohol, smoking and vaping, and drug use. Alcohol-related outcomes included self-reported alcohol consumption: been drunk or tipsy in the past four weeks (never, 1 time, 2 times, 3 times, 4-10 times, ≥11 times), and binge drinking (≥5 drinks on one occasion) in the past four weeks (never, 1 time, 2 times, 3-4 times, 5-6 times, 7-8 times, ≥9 times; dichotomises into yes/no). Access to alcohol was assessed through whether participants who ever drank alcohol purchased it themselves (yes/no), or received alcohol from others (yes/no), more specifically from parents/guardians, other adults, or peers/acquaintances (yes/no). Perceived parental attitudes towards alcohol use were also measured (approve, think child should drink less alcohol, advise against, forbid, say nothing about, do not know).

Smoking and vaping now (daily, at least weekly, current) were assessed and analysed both separately and combined (yes/no). Cannabis use was assessed for both lifetime (yes/no) and past 4-week prevalence (yes/no). Use of other substances (e.g., ecstasy, cocaine, magic mushrooms, nitrous oxide) was assessed similarly, both lifetime (yes/no) and within the past four weeks (yes/no).

The independent variables included questions on key variables of substance use, based on evidence identified by previous studies on substance use and were related to individual factors and environmental factors. The selection of independent variables was guided by established prevention frameworks (IPM, CTC, EDPQS/COMIQS) and by evidence reviews identifying key risk and protective factors for adolescent substance use (19, 20, 32). Accordingly, the questionnaire included both individual-level determinants (e.g. demographics, psychological well-being, school experiences) and environmental-level determinants (e.g. parental monitoring, peer behaviour, leisure activities). The available items in the survey largely reflected these domains, allowing us to examine both individual and contextual influences in a cross-border setting.

Individual factors included demographic variables such as gender (female vs. male; other excluded for analysis) and school grade (2nd vs. 4th). Psychosocial factors encompassed psychological well-being (total score on the 5-item Mental Health Inventory, MHI-5), feeling stressed by one or more of the following factors: school or homework, home situation, own problems, what others think of them, everything they have to do (often/very often=yes, never/almost never, sometimes=no), and regularly/often perceived performance pressure from themselves or others, including pressure from parents, teachers, friends, and coaches (yes/no). Other variables included the possibility to turn to someone when having a problem or feeling troubled (yes/no), bullied at school in the last 3 months (yes/no), perceiving school as pointless (agree/strongly agree=yes, completely disagree, disagree, neither agree nor disagree=no), and school experience ((really) like, okay, not like/terrible).

Environmental factors covered both the physical and social environment, as well as the economic environment. Physical environment variables included being out of the home after 22:00 for three or more days in the past week (yes/no), and engagement in extracurricular activities in a club or organisation as music or arts, organised sports (sport club or gym), and a different kind of organisation, as well as physical activity without a club ((almost) never, less than 1 day per week, 1 day per week, 2 or 3 days per week, 4 to 6 days per week, every day). Social environmental variables included peer alcohol use (most/(almost) all friends=yes, none/some=no), as well as parents/guardians usually know whereabouts, clear rules from parents, and time parents and child spent together (completely agree/agree=yes, completely disagree, disagree, neither agree nor disagree=no). Economic environment was assessed through perceived difficulty managing finances at home (some/significant difficulty=yes, no difficulty/no difficulty but need to be cautious=no).

Source and comparability

The questionnaire was administered in a standardised manner across all regions, ensuring consistency in the items, response options, and timing of data collection for all participants, making it irrespective of regional differences in culture or regulatory frameworks. The use of a uniform digital platform further enabled reliable comparisons across geographical and socio-economic subgroups within this cross-border context. Anonymous data collection via unique access codes helped mitigate social desirability and interviewer bias, while the inclusion of diverse school types and both urban and rural regions improved representativeness. Additionally, careful translation and cultural adaptation was performed by the research team to minimise interpretation bias. Overall, these safeguards contribute to the validity of the findings in this cross-border study.

Statistical method

Descriptive analyses were performed to examine the characteristics of the study population. To assess the differences between participants from the Netherlands, Germany and Belgium, we performed chi-square tests with Bonferroni adjusted post hoc tests. For each substance use outcome separately, an empty multilevel logistic regression model was estimated with adolescents nested within regions and country as fixed effect. Descriptive Intraclass Correlation Coefficients (ICC) were estimated as an indication of clustering.



We conducted multi-variable logistic regression analyses to examine the association of the individual and environmental factors with substance use, stratified for country, calculating odds ratios (OR) with 95% confidence intervals. A priori, collinearity between independent variables was checked using Pearson correlation coefficients. All correlations were below 0.60 suggesting that multicollinearity was not a major concern (see Supplementary Table S1). In addition, variance inflation factors (VIF) were examined, with all values ranging between 1.07 and 1.90, confirming the absence of problematic multicollinearity. Detailed VIF results are provided in Supplementary Table S2. All analyses were conducted using IBM SPSS software version 27.0 (IBM Corp. Armonk, NY, USA). A p-value <0.05 was considered statistically significant.

RESULTS

A total of 25,632 adolescents participated in the study, of whom 20,461 completed the full questionnaire. The remaining 5,171 incomplete questionnaires were excluded from analysis. A non-response analysis comparing included and excluded respondents on available demographic characteristics suggests that selective non-response was limited. Figure 1 provides a visual overview of the participant flow, including initial participation, exclusion due to incomplete data, and the final analytic sample stratified by country, gender, and grade level.

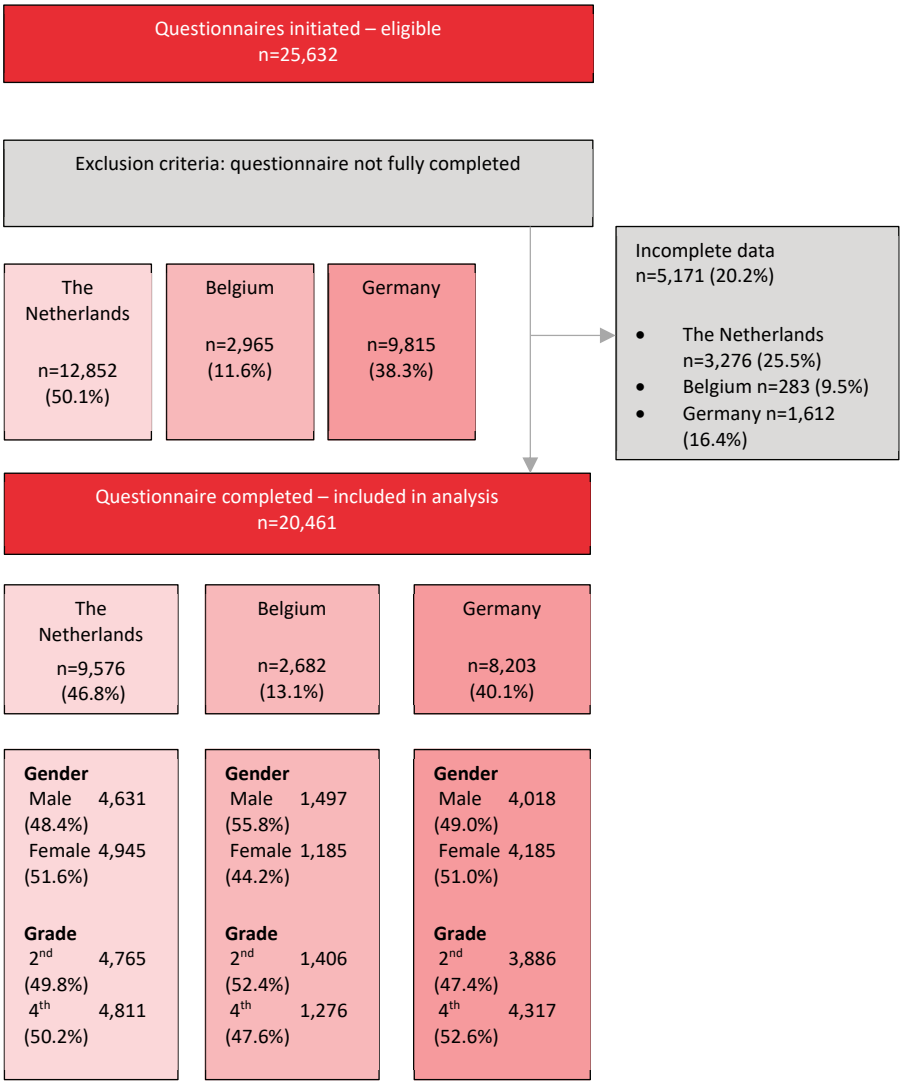


Figure 1. Flowchart of questionnaire participation and inclusion across the Netherlands, Belgium, and Germany, including reasons for exclusion and final analytic sample by gender and grade level.

The included sample was broadly balanced by gender in the Dutch (48.4% male) and German (49.0% male) border regions, while in the Belgian border region boys were slightly overrepresented (56%). Grade distributions were comparable across countries, with approximately equal proportions of adolescents in the 2nd (13-14 years) and 4th (15-16 years) grades (Figure 1). To assess the extent of clustering at the regional level, empty multilevel logistic regression models were estimated for each outcome, with children nested within regions and country included as fixed effect. The intraclass correlation coefficients (ICCs), were low across outcomes (alcohol use = 0.03, smoking and vaping = 0.06, and cannabis use = 0.02), indicating limited clustering at the regional level. Given that the regional

units were broad and internally heterogeneous, and that the main explanatory variables were measured at the individual and immediate social or environmental level, standard logistic regression models were used for the main analyses.

In the following sections, results are presented by substance (alcohol, smoking/vaping, and cannabis), combining descriptive and regression findings for each outcome. Tables 1A-C summarise the descriptive characteristics of substance use by country, whereas Tables 2 and 3 present the statistically significant factors associated with higher and lower odds of substance use derived from the multivariable regression analyses. A summary of individual and environmental characteristics that provides broader context for interpreting these observed behavioural patterns is presented at the end (Table 1D). Full regression outputs, including all odds ratios (OR) and 95% confidence intervals (CIs), are provided (Appendix I).

Overall, substance use prevalence differed between countries (Tables 1A-D). Binge drinking and smoking were most common among Belgian adolescents, while cannabis use was more frequent among Dutch adolescents. In the multivariable analyses, models were stratified by country to explore country-specific associations between individual and environmental factors and substance use outcomes. Differences in odds ratios between countries are therefore not interpreted as statistically different as the focus is on the direction and consistency of associations within each country (Appendix I). To establish whether associations between individual/environmental factors and outcomes (alcohol, smoking/vaping, cannabis use) varied between the counties, interactions terms were tested (Supplementary table S3). All models were adjusted for gender and grade, which function as demographic background variables.

Individual and environmental factors

Table 1A summarises the individual and environmental characteristics of adolescents across the three countries. These factors include demographic and psychosocial variables (e.g. gender, stress, school experience) as well as contextual indicators such as parental monitoring and leisure activities. Several of these characteristics differed between countries. German adolescents reported higher stress levels and lower parental control, whereas Dutch adolescents were most active in organised sports. These background differences provide important context for interpreting the cross-national variations in substance use described above.

Table 1A. Overview of individual and environmental factors in the three countries

	ANSWER	NETHERLANDS			BELGIUM			GERMANY		
		n=	%	Group diff.	n=	%	Group diff.	n=	%	Group diff.
Gender in two categories***	Boy	4,631	48.4%	a	1,497	55.8%	b	4,018	49.0%	a
	Girl	4,945	51.6%	a	1,185	44.2%	b	4,185	51.0%	a
Class***	2nd grade	4,765	49.8%	a	1,406	52.4%	b	3,886	47.4%	c
	4th grade	4,811	50.2%	a	1,276	47.6%	b	4,317	52.6%	c
Feels (very) often stressed by one or more of the following factors: school or homework, home situation, own problems, what others think of them, everything they have to do***	Yes	4,900	51.2%	a	1,514	56.5%	b	5,217	63.6%	c
Can turn to someone when having a problem or feeling troubled***	Yes	9,124	95.3%	a	2,457	91.6%	b	7,299	89.0%	c
Experiences performance pressure regularly/often (from themselves or others) ***	Yes	3,505	36.6%	a	957	35.7%	a	3,376	41.2%	b
Experiences performance pressure regularly/often, including pressure from parent(s)/guardian(s) ***	Yes	1,337	14.0%	a	406	15.1%	a	1,418	17.3%	b
Experiences performance pressure regularly/often, including pressure from teachers/school***	Yes	1,096	11.4%	a	324	12.1%	a	1,282	15.6%	b
Experiences performance pressure regularly/often, including pressure from friends***	Yes	759	7.9%	a	229	8.5%	a	883	10.8%	b
Experiences performance pressure regularly/often, including pressure from coach or trainer in sports***	Yes	403	4.2%	a	147	5.5%	b	447	5.4%	b
Bullied at school in the last 3 months***	Yes	1,331	13.9%	a	390	14.5%	a	2,202	26.8%	b
Finds going to school pointless***	Yes	2,038	21.3%	a	483	18.0%	b	1,224	14.9%	c
School experience in 3 categories***	(Really) like	3,259	34.0%	a	1,134	42.3%	b	3,547	43.2%	b
	Okay	4,466	46.6%	a	1,076	40.1%	b	2,987	36.4%	c
	Not like/ terrible	1,851	19.3%	a	472	17.6%	b	1,669	20.3%	a

Table 1A. Overview of individual and environmental factors in the three countries (*continued*)

	ANSWER	NETHERLANDS			BELGIUM			GERMANY		
		n=	%	Group diff.	n=	%	Group diff.	n=	%	Group diff.
On how many days of the week do you engage in music, singing, acting, drawing/painting, or photography outside school hours with a club or association?	(Almost) never	5,890	61.5%		1,567	58.4%		4,726	57.6%	
	Less than 1 day per week	684	7.1%		172	6.4%		520	6.3%	
	1 day per week	910	9.5%		246	9.2%		1,091	13.3%	
	2 or 3 days per week	1,084	11.3%		389	14.5%		1,158	14.1%	
	4 to 6 days per week	431	4.5%		130	4.8%		386	4.7%	

Legend. Values are absolute numbers (n) and percentages (%), calculated on complete cases per country (Netherlands n = 9,576; Belgium n = 2,682; Germany n = 8,203). Only affirmative ("Yes") responses are shown for dichotomous items; the remaining percentages represent "No" responses. For multi-category items, all relevant answer categories are presented. Asterisks (*, **, ***) indicate statistically significant overall between-country differences based on chi^2 tests (*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$). Superscripts a, b, c within a row denote significant pairwise differences between countries according to Bonferroni-adjusted post-hoc comparisons ($\alpha = 0.05$); identical letters indicate no significant difference.

With respect to individual factors, adolescents in Germany more frequently reported experiencing (very) high levels of stress (63.6%) compared to those in Belgium (56.5%) and the Netherlands (51.2%)(Table 1A). Conversely, Dutch adolescents were more likely to report having someone to turn to when feeling troubled (95.3%) than their peers in Belgium (91.6%) and Germany (89.0%). Beyond these individual factors, adolescents' behaviour is also shaped by environmental factors such as leisure activities and parental monitoring, which show distinct patterns across the border regions (Table 1A). Adolescents in the Dutch border region were more frequently out after 22:00 (17.5%) compared to their peers in the German (15.9%) and Belgian (12.8%) border regions. Parental rule-setting also varied as German parents in the border region were the least likely to set clear rules for their children (62.8%), while Dutch parents enforced rules most often (83.7%), with Belgian parents in between (77.9%). Parental knowledge of adolescents' whereabouts was generally high across all regions (Netherlands 89.5%, Belgium 92.1%, and Germany (91.4%).

Taken together, these findings highlight some contextual contrasts in family and leisure environments that may relate to the broader social conditions in which adolescent substance-use behaviours develop, although these aspects were not directly examined in this study.

Alcohol use

Binge drinking (≥5 alcoholic drinks on a single occasion in the past four weeks) was comparable across the three border regions (NL 21.7%, BE 22.9%, DE 20.7%) The proportion of adolescents who reported being drunk or tipsy during this period was lower, but showed a similar pattern (NL 17.7%, BE 18.2%, DE 17.1%).

Differences were observed in how adolescents obtain alcohol. Dutch adolescents were less likely to report purchasing alcohol themselves (17.2%) than their peers in Belgium (32.1%) and German (27.1%), whereas receiving alcohol from their parents or other adults was reported more often in the Dutch border region (from parents: NL 49.3% vs BE 42.1% and DE 46.3%; from other adults: NL 26.8% vs BE 18.8% and DE 18.7%) (Table 1B). Reported parental approval of drinking was higher in the German border region (49.2%) than in the Dutch (38.4%) and Belgian (37.8%) regions, while Dutch adolescents most frequently reported having friends who drink alcohol (NL 67.7%, BE 64.1%, DE 60.4%). Together, these descriptive patterns suggest that social availability (parents/other adults) may be relatively more salient in the Dutch context, whereas commercial availability (self-purchase) features more in Belgium and Germany. A detailed pairwise comparisons are provided in Table 1B.

Table 1B. Overview of alcohol use in the three countries

	ANSWER	NETHERLANDS			BELGIUM			GERMANY		
		n=	%	Group diff.	n=	%	Group diff.	n=	%	Group diff.
In the last 4 weeks, has drunk alcohol	Yes	3,149	32.9%	a	943	35.2%	a	2,793	34.1%	a
In the last 4 weeks, been drunk or tipsy	Yes	1,691	17.7%	a	485	18.2%	a	1,398	17.1%	a
In the last 4 weeks, 5 or more drinks on 1 occasion (binge drinking)	Yes	2,076	21.7%	a,b	614	22.9%	b	1,695	20.7%	a
I receive alcohol from other adults (full glass or more)***	Yes	926	26.8%	a	186	18.8%	b	560	18.7%	b
I receive alcohol from my parents/guardians (full glass or more)***	Yes	1,701	49.3%	a	417	42.1%	b	1,382	46.3%	b
I receive alcohol from a friend or acquaintance (full glass or more)***	Yes	1,671	48.4%	a	395	39.9%	b	1,478	49.5%	a
I let others buy alcohol (a friend, acquaintance, or stranger) (full glass or more)	Yes	1,043	30.2%	a	286	28.9%	a	945	31.6%	a
I buy alcohol MYSELF (full glass or more)***	Yes	593	17.2%	a	318	32.1%	b	809	27.1%	c
Opinion parents alcohol use (full glass or more)***	They approve	1,369	38.4%	a	386	37.8%	a	1,516	49.2%	b
	They think I should drink less alcohol	260	7.3%	a	69	6.8%	a	243	7.9%	a
	They advise against it	901	25.3%	a	230	22.5%	a	545	17.7%	b
	They forbid it	126	3.5%	a	33	3.2%	a	131	4.3%	a
	They say nothing about it	573	16.1%	a	200	19.6%	b	256	8.3%	c
	They do not know	338	9.5%	a	103	10.1%	a,b	389	12.6%	b
Some to (almost) all friends drink alcohol***	Yes	6,486	67.7%	a	1,719	64.1%	b	4,954	60.4%	c

Legend. Values are absolute numbers (n) and percentages (%), calculated on complete cases per country (Netherlands n = 9,576; Belgium n = 2,682; Germany n = 8,203). Only affirmative ("Yes") responses are shown for dichotomous items; the remaining percentages represent "No" responses. For multi-category items, all relevant answer categories are presented. Asterisks (*, **, ***) indicate statistically significant overall between-country differences based on chi^2 tests (*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$). Superscripts a, b, c within a row denote significant pairwise differences between countries according to Bonferroni-adjusted post-hoc comparisons ($\alpha = 0.05$); identical letters indicate no significant difference.

The results show a consistent association between peer context and binge drinking across countries, as adolescents whose friends drink alcohol had substantially higher odds of engaging in binge drinking (NL: OR 9.56, BE: OR 11.23, DE: OR 9.11). Being out of the house for three or more nights per week after 22:00 was also associated with higher odds in each country (NL: OR 2.95, BE: OR 3.43, DE: OR 2.62). Although, interaction analyses indicated that the strength of certain associations, particularly those related to stress, psychological well-being, and late-night outings, varied between countries, the direction of effects remained the same, suggesting that these mechanisms operate similarly across border regions.

Several factors showed protective associations with binge drinking across settings (Table 3). Parental knowledge of adolescents' whereabouts revealed lower odds in all border regions (NL: OR 0.57, BE: OR 0.58, DE: OR 0.76), as were clear parental rules (NL: OR 0.83, BE: OR 0.75, DE: OR 0.72). Participation in structured leisure activities, such as independent sports or cultural activities (e.g., music, photography), were also associated with lower odds, though the strength of this association varied by activity and country.

Smoking and vaping

Adolescents in the German border region reported smoking both daily (6.2%) and weekly (9.4%) more often than their peers in the Dutch (2.7% and 4.7% respectively) and Belgian (3.7% and 5.5% respectively) border regions (Table 1C).

For vaping, Dutch (6.4%) and German (6.6%) adolescents reported similar daily use, whereas Belgian adolescents vaped less frequently (4.4%). A comparable pattern was observed for weekly vaping, with higher prevalence in both the Dutch (10.5%) and German (11.3%) border regions compared to the Belgian border region (7.8%). When considering smoking and vaping together, German adolescents were somewhat more likely to engage in both behaviours simultaneously (8.6%) than their Dutch (7.3%) and Belgian (6.3%) peers (Table 1C).

Table 1C. Overview of smoking and vaping in the three countries

	ANSWER	NETHERLANDS			BELGIUM			GERMANY		
		n=	%	Group diff.	n=	%	Group diff.	n=	%	Group diff.
Currently smokes daily***	Yes	260	2.7%	a	98	3.7%	b	509	6.2%	c
Currently smokes ≥ weekly***	Yes	450	4.7%	a	147	5.5%	a	775	9.4%	b
Currently smokes every day/every week/less than once a week***	Yes	718	7.5%	a	236	8.8%	a	1,135	13.8%	b
Currently vapes daily***	Yes	610	6.4%	a	117	4.4%	b	544	6.6%	a
Currently vapes ≥ weekly***	Yes	1,004	10.5%	a	210	7.8%	b	927	11.3%	a
Currently smokes or vapes daily***	Yes	696	7.3%	a	170	6.3%	a	707	8.6%	b
Currently smokes or vapes ≥ weekly***	Yes	1,108	11.6%	a	264	9.8%	b	1,070	13.0%	c

Legend. Values are absolute numbers (n) and percentages (%), calculated on complete cases per country (Netherlands n = 9,576; Belgium n = 2,682; Germany n = 8,203). Only affirmative ("Yes") responses are shown for dichotomous items; the remaining percentages represent "No" responses. For multi-category items, all relevant answer categories are presented. Asterisks (*, **, ***) indicate statistically significant overall between-country differences based on chi^2 tests (*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$). Superscripts a, b, c within a row denote significant pairwise differences between countries according to Bonferroni-adjusted post-hoc comparisons ($\alpha = 0.05$); identical letters indicate no significant difference.

Regression results (see Tables 2-3 and Appendix I) revealed a broadly similar pattern to binge drinking (Appendix I), with peer influence appearing as the strongest predictor of smoking and vaping in all three countries. Adolescents whose friends drink alcohol have higher odds of smoking or vaping (NL: OR 4.39, BE: OR 7.55, DE: OR 3.90). Late-night socialisation also increased the likelihood of smoking and vaping, with those staying out after 22:00 on three or more evenings per week showing higher odds across all regions (NL: OR 3.05, BE: OR 4.45, DE: OR 3.15).

Beyond these environmental factors, individual factors were also related to smoking and vaping. Adolescents who viewed school as pointless reported higher odds of smoking or vaping (NL: OR 1.77, BE: OR 1.50, DE: OR 1.30). In contrast, parental supervision showed a protective association as adolescents whose parents usually or always knew their whereabouts were less likely to smoke or vape (NL: OR 0.48, BE: OR 0.41, DE: OR 0.48). Participation in organised sports and, to a lesser extent, cultural activities, was likewise associated with reduced odds, although the strength of these associations varied somewhat between countries. Interaction analyses confirmed that these differences reflected variation in magnitude rather than direction.

Cannabis use

Lifetime prevalence of cannabis use was similar in the Dutch (9.1%) and German (9.3%) border regions, but somewhat lower in the Belgian border region (7.0%) (Table 1D). A comparable pattern was observed for recent cannabis use in the past four weeks, with the Dutch (4.6%) and German (4.9%) adolescents reported similar levels, whereas prevalence was slightly lower among Belgian adolescents (3.7%) (Table 1D).

Table 1D. Overview of cannabis use in the three countries

	ANSWER	NETHERLANDS			BELGIUM			GERMANY		
		n=	%	Group diff.	n=	%	Group diff.	n=	%	Group diff.
Ever used cannabis***	Yes	872	9.1%	a	188	7.0%	b	760	9.3%	a
Used cannabis in the last 4 weeks	Yes	441	4.6%	a,b	98	3.7%	b	405	4.9%	a
Ever used XTC, cocaine, magic mushrooms, laughing gas, etc. ***	Yes	247	2.7%	a	92	3.5%	a,b	367	4.5%	b
Used XTC, cocaine, magic mushrooms, laughing gas, etc. in the last 4 weeks***	Yes	69	0.7%	a	0	0.0%	b	136	1.7%	c

Legend. Values are absolute numbers (n) and percentages (%), calculated on complete cases per country (Netherlands n = 9,576; Belgium n = 2,682; Germany n = 8,203). Only affirmative ("Yes") responses are shown for dichotomous items; the remaining percentages represent "No" responses. For multi-category items, all relevant answer categories are presented. Asterisks (*, **, ***) indicate statistically significant overall between-country differences based on chi^2 tests (*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$). Superscripts a, b, c within a row denote significant pairwise differences between countries according to Bonferroni-adjusted post-hoc comparisons ($\alpha = 0.05$); identical letters indicate no significant difference.

These descriptive findings show that cannabis use is relatively comparable between Dutch and German adolescents, while somewhat less common among Belgian youth. Although cannabis use was less prevalent than alcohol use and smoking or vaping, the regression analyses identified a consistent pattern of social and environmental associations across the three countries.

Regression results (Tables 2-3 and Appendix I) indicated that peer context was associated with cannabis use. Adolescents whose friends drink alcohol had higher odds of cannabis use across all three countries (NL: OR 4.55, BE: OR 6.45, DE: OR 5.31). Late-night socialising was also associated with elevated odds with those staying out three or more nights per week showing (OR between 3.29-3.63 in the three regions). Viewing school as pointless was related to higher odds of cannabis use in the Dutch (OR 1.35) and German (OR 1.45) border regions.

Parental knowledge of adolescents' whereabouts was consistently associated with lower odds of cannabis use in all border regions (NL: OR 0.48, BE: OR 0.54, DE: OR 0.42). Participation in structured sports was likewise associated with reduced odds of cannabis use in each of the three countries (Tables 2-3). While interaction analyses showed that the protective effect of parental monitoring differed somewhat in strength between countries, the overall direction of the association was consistent.



Table 2. Associations of individual and environmental factors with adolescent substance use – factors associated with higher odds.

FACTORS ASSOCIATED WITH HIGHER ODDS OF SUBSTANCE USE				
Substance Use	**Nr.**	**Netherlands (odds)**	**Belgium (odds)**	**Germany (odds)**
Binge drinking	1.	Most to (almost) all friends drink alcohol **(9.56)*** **	Most to (almost) all friends drink alcohol **(11.23)*** **	Most to (almost) all friends drink alcohol **(9.11)*** **
	2.	Child is not at home for 3 days or more after 22:00 **(2.95)*** **	Child is not at home for 3 days or more after 22:00 **(3.43)*** **	Being in 4th grade **(3.04)*** **
	3.	Being in 4th grade **(2.62)*** **	Being in 4th grade **(2.26)*** **	Child is not at home for 3 days or more after 22:00 **(2.62)*** **
	4.	Finds going to school pointless **(1.46)*** **	Participate in sports at a club or gym: 2-3 days per week **(1.82)** **	Can turn to someone when having a problem or feeling troubled **(1.42)** *
	5.	Participate in sports at a club or gym: 2-3 days per week **(1.36)** **	Can turn to someone when having a problem or feeling troubled **(1.59)** *	Participate in sports at a club or gym: 1 day per week **(1.38)** * 2-3 days per week **(1.39)** ** 4-6 days per week **(1.37)** *
Smoking/ vaping	1.	Most to (almost) all friends drink alcohol **(4.39)*** **	Most to (almost) all friends drink alcohol **(7.55)*** **	Most to (almost) all friends drink alcohol **(3.90)*** **
	2.	Child is not at home for 3 days or more after 22:00 **(3.05)*** **	Child is not at home for 3 days or more after 22:00 **(4.45)*** **	Child is not at home for 3 days or more after 22:00 **(3.15)*** **
	3.	Finds going to school pointless **(1.77)*** **	Experience some or significant difficulty managing finances at home **(1.98)** *	Experiences performance pressure from parent(s)/ guardian(s) **(1.54)** **
	4.	Feels (very) often stressed by one or more of the following factors: school or homework, home situation, own problems, what others think of them, everything they have to do **(1.43)*** **	Finds going to school pointless **(1.50)** *	Experience some or significant difficulty managing finances at home **(1.42)** **
	5.	Being in 4th grade **(1.41)*** **	-	Finds going to school pointless **(1.30)** *

Table 2. Associations of individual and environmental factors with adolescent substance use – factors associated with higher odds. (*continued*)

FACTORS ASSOCIATED WITH HIGHER ODDS OF SUBSTANCE USE				
Cannabis Use	1.	Most to (almost) all friends drink alcohol **(4.55)*****	Most to (almost) all friends drink alcohol **(6.45)*****	Most to (almost) all friends drink alcohol **(5.31)*****
	2	Child is not at home for 3 days or more after 22:00 **(3.63)*****	Child is not at home for 3 days or more after 22:00 **(3.29)*****	Child is not at home for 3 days or more after 22:00 **(3.20)*****
	3	Being in 4th grade **(2.45)*****	Being in 4th grade **(1.89)***	Finds going to school pointless **(1.45)****
	4	Feels (very) often stressed by one or more of the following factors: school or homework, home situation, own problems, what others think of them, everything they have to do **(1.41)***	-	-
	5	Finds going to school pointless **(1.35)***	-	-

Legend. Odds ratios (OR) with 95% confidence intervals (CI) were obtained from multivariable logistic regression analyses stratified by country. The table presents all statistically significant factors associated with higher odds of adolescent substance use. Complete regression outputs are provided in Appendix 1. *p < 0.05, **p < 0.01, ***p < 0.001.

Table 3. Associations of individual and environmental factors with adolescent substance use – factors associated with lower odds.

FACTORS ASSOCIATED WITH LOWER ODDS OF SUBSTANCE USE				
Substance Use	**Nr.**	**Netherlands (odds)**	**Belgium (odds)**	**Germany (odds)**
Binge drinking	1.	Parents/guardians usually/always know where he/she is when not at home **(0.57)*****	Parents/guardians usually/always know where he/she is when not at home **(0.58)****	Parents/guardians have clear rules about what the child can and cannot do **(0.72)*****
	2.	Sport or move in free time without a club or gym: 4-6 days per week **(0.64)**** Every day **(0.71)****	Being a girl **(0.67)****	Parents/guardians usually/always know where he/she is when not at home **(0.76)***
	3.	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: 2-3 days per week **(0.76)***	Parents/guardians have clear rules about what the child can and cannot do **(0.75)***	Experiences performance pressure regularly/often (from themselves or others) **(0.76)****

Table 3. Associations of individual and environmental factors with adolescent substance use – factors associated with lower odds. (*continued*)

FACTORS ASSOCIATED WITH LOWER ODDS OF SUBSTANCE USE				
Binge drinking	4.	Experiences performance pressure regularly/often (from themselves or others) **(0.80)****	Parents/guardians spend a lot of time with the child **(0.75)***	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: 1 day per week **(0.77)***
	5.	Parents/guardians have clear rules about what the child can and cannot do **(0.84)***	Total MHI5 score **(0.99)****	Parents/guardians spend a lot of time with the child **(0.85)***
Smoking/ vaping	1.	Parents/guardians usually/ always know where he/she is when not at home **(0.48)*****	Participate in sports at a club or gym: 4-6 days per week **(0.41)*** Every day **(0.34)****	Parents/guardians usually/ always know where he/she is when not at home **(0.48)*****
	2.	Participate in sports at a club or gym: 2-3 days per week **(0.74)**** 4-6 days per week **(0.52)*** Every day **(0.44)*****	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: 2-3 days per week **(0.41)****	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: Less than 1 day per week **(0.71)*** 1 day per week **(0.49)*** 2-3 days per week **(0.73)****
	3.	Sport or move in free time without a club or gym: 1 day per week **(0.72)**** 2-3 days per week **(0.70)*** 4-6 days per week **(0.58)*****	Parents/guardians usually/always know where he/she is when not at home **(0.41)*****	Participate in sports at a club or gym: 2-3 days per week **(0.78)*** 4-6 days per week **(0.57)*** Every day **(0.64)***
	4.	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: 1 day per week **(0.72)*** 2-3 days per week **(0.76)***	Sport or move in free time without a club or gym: 4-6 days per week **(0.44)***	Sport or move in free time without a club or gym: Less than 1 day per week **(0.61)*** 1 day per week **(0.64)*** 2-3 days per week **(0.71)**** 4-6 days per week **(0.61)*** Every day **(0.68)***
	5.	Experiences performance pressure regularly/often (from themselves or others) **(0.75)****	Total MHI5 score **(0.97)*****	Experiences performance pressure regularly/often (from themselves or others) **(0.65)*****
Cannabis use	1	Parents/guardians usually/ always know where he/she is when not at home **(0.48)*****	Participate in sports at a club or gym: 4-6 days per week **(0.35)****	Parents/guardians usually/ always know where he/she is when not at home **(0.42)*****

Table 3. Associations of individual and environmental factors with adolescent substance use – factors associated with lower odds. (*continued*)

FACTORS ASSOCIATED WITH LOWER ODDS OF SUBSTANCE USE				
Cannabis use	2.	Can turn to someone when having a problem or feeling troubled **(0.60)****	Being a girl **(0.47)****	Engaging in music, singing, acting, drawing/painting, or photography outside school hours with a club or association: 1 day per week **(0.51)***
	3.	Participate in sports at a club or gym: 2-3 days per week **(0.62)***** 4-6 days per week **(0.56)***** Every day **(0.48)*****	Parents/guardians usually/always know where he/she is when not at home **(0.54)***	Participate in sports at a club or gym: 1 day per week **(0.62)*** 2-3 days per week **(0.69)*** 4-6 days per week **(0.54)****
	4.	Sport or move in free time without a club or gym: 1 day per week **(0.69)*** 2-3 days per week **(0.63)**** 4-6 days per week **(0.59)**** Every day **(0.66)***	Total MHI5 score **(0.98)***	Sport or move in free time without a club or gym: 4-6 days per week **(0.61)***
	5.	Parents/guardians spend a lot of time with the child **(0.66)*****	-	Being a girl **(0.66)***

Legend. Odds ratios (OR) with 95% confidence intervals (CI) were obtained from multivariable logistic regression analyses stratified by country. The table presents all statistically significant factors associated with lower odds of adolescent substance use. Complete regression outputs are provided in Appendix 1. *p < 0.05, **p < 0.01, ***p < 0.001.

DISCUSSION

This study explored how individual and environmental factors are associated with substance use among adolescents in the border regions of the Netherlands, Belgium and Germany. These findings lead to three key messages. First, social environmental factors, particularly peer influence and frequently being out of the house, emerged as the strongest associations with substance use in all countries. Second, factors such as parental monitoring and participation in structured leisure activities were consistently associated with lower substance use, although levels of exposure to these factors differ between regions. Third, behavioural differences between countries could only partially be explained by national policy differences, suggesting that broader cultural and social contexts, which extend across national borders, play an important role in shaping adolescent behaviour in these border-region setting where daily life is not confined to national boundaries. This is supported by interaction analyses showing that, although the strength of some associations differed, the underlying relationships were consistent across countries.

Binge drinking in border regions

In the border regions, binge drinking rates are a concern in all three countries. Although the legal drinking age differs slightly between the Netherlands (18 years), Belgium (16 years for non-strong alcohol), and Germany (14 years under parental supervision and 16 years for beer and wine), these differences appear to have limited impact on adolescent drinking behaviour. This aligns with earlier studies showing that alcohol policy influences consumption but is not the sole determining factor (33). Compared with recent national figures from the Dutch Youth Health Monitor (34), which reported a binge drinking prevalence of 18.2 % among adolescents aged 13–16 years, the proportion observed in the present study is slightly higher. This suggests that alcohol use may be relatively more common among adolescents living in the Dutch border region. For Belgium and Germany, direct national comparisons are not available for this age group, but the overall findings point to broadly similar behavioural patterns across the three neighbouring regions (1, 2).

Findings from this study show that environmental factors, such as social influences, were associated with higher odds of alcohol use. For example, adolescents are significantly more likely to binge drink if their friends drink alcohol, with an increased likelihood of more than nine times in the Netherlands and Germany, and more than eleven times in Belgium. Other studies also emphasise the importance of peer influence (35). In addition, being outside the home after 22:00 at least three times per week was associated with higher odds of binge drinking in all border regions.

Parental practices appear to occupy a dual position in relation to binge drinking with parental approval reflecting a less restrictive home context and parental monitoring reflecting a more protective one. The descriptive analysis showed that Dutch adolescents relatively often obtain alcohol from their parents (49.3%) or from other adults (26.8%), which may indicate a less restrictive social context for adolescent alcohol access. Previous research in the Netherlands has shown that parents often provide alcohol at home based on the belief that supervised drinking is safer than unsupervised consumption (36). UK research similarly indicates that many parents adopt this strategy because they perceive it as a way to reduce risk, although evidence shows it actually increases alcohol use (37). However, this parental provision of alcohol appears, paradoxically, to increase rather than reduce alcohol use (36). Parental supervision, on the other hand, has been associated with lower levels of later adolescent alcohol use (38), and clear parental rules have also been associated with lower alcohol use (36). In border regions, parents may also navigate overlapping normative and regulatory environments, such as differing legal age limits or cultural attitudes towards adolescent alcohol use. These divergent frameworks may complicate parental decision-making about supervision, rule-setting and alcohol provision, as parents confront norms and regulations that do not align neatly across the neighbouring countries. Although the present study could not directly assess cross-context parental

dilemmas, border studies emphasise that border regions function as multi-layered social spaces where institutional and cultural expectations intersect, potentially shaping parenting practices in subtle ways (17, 30, 36).

Participation in organised leisure activities also plays a complex role among environmental factors. Although sports are generally healthy, they may promote binge drinking, possibly due to social settings where alcohol consumption is seen as a means of social bonding (39).

Taken together, these findings illustrate how adolescents' drinking behaviours are embedded in interconnected social and cultural contexts. Peer norms, parental practices, and leisure structures reinforce or buffer one another, creating locally shared expectations around drinking. The belief among some parents that controlled drinking at home prevents risk, the social acceptance of alcohol in sports clubs, and the normative pressure from peers are all part of a wider cultural framework in which drinking is often seen as a socially acceptable aspect of growing up (35-39). This interplay of socialisation contexts, family, peers, schools, and leisure, helps to explain why adolescent drinking behaviours remain similar across countries despite different legal restrictions.

In border regions, this interaction may be even more complex, as adolescents and their families are exposed to overlapping cultural norms from neighbouring countries. While prevention policies are organised nationally, everyday practices are shaped by these shared social environments. This study shows that around 17% of Dutch adolescents who have ever drunk alcohol purchase alcohol themselves, despite the ban on sales to minors. Although this study did not investigate where adolescents buy alcohol, existing literature indicates that differences in commercial availability, for example through varying legal age limits in neighbouring countries, may influence adolescent alcohol use (33).

These findings emphasise that binge drinking among adolescents in border regions is not primarily determined by national policy, but rather by environmental factors such as their immediate social environment, peer influence and the level of parental involvement. In border regions, these environmental influences may be shaped by overlapping social norms from neighbouring countries, which could dilute or reinforce national policy efforts.

Smoking and vaping in border regions

Adolescents in the German border region smoke significantly more often than their peers in the Dutch and Belgian border regions. At the same time, the percentages of daily and weekly vaping are highest in the Netherlands and Germany. These differences occur even though legislation regarding the purchase and use of tobacco and e-cigarettes is virtually identical in the three countries. Moreover, the analysis shows that the main factors asso-

ciated with smoking and vaping, such as peer influence and parental supervision factors, are consistent across all three countries (Table 3). Compared with recent national figures from the Dutch Youth Health Monitor (34), which reported a daily smoking or vaping prevalence of 7.0% and a weekly prevalence of 11.3% among adolescents aged 13-16 years, the proportions observed in the present study are broadly comparable. This indicates that tobacco and e-cigarette use among adolescents in the Dutch border region is largely in line with national patterns. For Belgium and Germany, directly comparable national data for this age group are not available, but overall findings suggest similar behavioural tendencies across the three neighbouring regions (1, 2).

The fact that similar individual and environmental factors can lead to different outcomes suggests that wider social and cultural contexts influence how these mechanisms operate. Research show that social norms and the perceived acceptability of smoking within peer groups strongly influence adolescent behaviour (40, 41). Longitudinal and network-based studies further highlight the role of peer selection and socialisation processes in reinforcing these patterns (42, 43). When smoking or vaping is seen as 'normal', adolescents are more likely to start smoking themselves.

Beyond peer norms, local prevention contexts may also explain the observed differences. As emphasised in prevention frameworks such as the Icelandic Prevention Model (IPM), Communities That Care (CTC), and the European Drug Prevention Quality Standards (EDPQS), environmental factors including parental involvement and structured leisure activities are key to reducing adolescent substance use (9-14). While the IPM has gained international attention, experts from the European Society for Prevention Research (EUSPR) have cautioned that its evidence base outside Iceland remains debated and that transferability to other countries is uncertain (44). Legislation alone therefore appears insufficient. It is the daily local context that is most influential. This is supported by findings linking organised leisure activities, especially cultural or individual ones, to lower substance use (45). Salmon (6) further shows that psychosocial vulnerability and the absence of protective conditions like parental supervision or social support are linked to increased e-cigarettes and substances use.

Taken together, these findings demonstrate that the mechanisms underlying smoking and vaping are largely universal, peer norms, parental monitoring, and leisure engagement act as key determinants across all countries, but their strength and manifestation depend on the surrounding social and cultural environment. In border regions, these contextual influences may be amplified, as adolescents may be exposed to multiple normative frameworks that could shape attitudes towards tobacco and e-cigarette use even under comparable legal conditions. This illustrates how policy homogeneity does not guarantee behavioural uniformity in regions where everyday interactions routinely cross national borders.

Cannabis use in border regions

Although adolescent cannabis use is higher in the Dutch and German border regions than in the Belgian region, the underlying patterns of associations with both higher and lower cannabis use are broadly similar across the three countries. Compared with national figures from the Dutch Youth Health Monitor (34), which reported that 9.1% of adolescents aged 13-16 years had ever used cannabis and 5.0% had used it in the past four weeks, the prevalence found in the present study is very similar. This suggests that cannabis use among adolescents in the Dutch border region does not substantially differ from the national average. For Belgium and Germany, directly comparable national data for this age group are lacking, but European monitoring data indicate broadly similar levels of experimentation among adolescents (1, 2)

These results indicate that while the prevalence patterns are comparable, the way factors associated with both higher and lower odds manifest may differ across social and cultural contexts. As Wu (46) highlights, perceptions of normative behaviour around cannabis use vary widely between countries and subgroups and strongly influence actual use. In a border region where adolescents may be exposed to multiple normative frameworks, such contextual differences in cultural acceptance and normalisation may play an important role.

The results show that peer influence, a key environmental factor associated with higher odds, is strongly linked to cannabis use. This aligns with previous research identifying peer norms and social bonding as key factors in adolescent substance use (40) (47). Hanafin (48) adds that peer smoking is closely tied to the e-cigarette, highlighting the central role of peer behaviour in shaping substance use patterns. This mechanism likely operates similarly across borders, although the perceived normalisation of cannabis may vary between countries, influencing the strength of these associations.

Among individual factors associated with higher odds for cannabis use, negative school experiences, such as perceiving school as meaningless, are linked to cannabis use in several border regions. This aligns with Henry (49), who identify school disengagement as a pathway to substance use. When school feels unstructured or lacks meaning, adolescents may seek affirmation or fulfilment elsewhere, including through substance use.

Within the environmental context, parental monitoring and structured leisure activities, such as sports, were associated with lower odds of cannabis use, which supports the relevance of environmental conditions associated emphasised across prevention frameworks such as IPM, CTC, and EDPQS-based approaches. Lac (50) show that effective parental supervision, knowing where adolescents are and with whom, significantly reduces the likelihood of cannabis use. This monitoring provides both external control and supports the internalisation of social norms. Steinberg (51) similarly highlight its protective role,

even when peers use substances. Other scholars (52, 53) link regular sports participation to lower cannabis use, as sport provides structure, social bonding and alternatives to risk behaviour, illustrating the role of the environmental context in adolescent cannabis use. However, recent longitudinal evidence suggests this relationship may be more complex, with some studies showing no consistent protective effect (54). In border regions, where adolescents encounter multiple social settings and cultural influences, the local context in which these activities take place may be particularly important.

Taken together, these findings show that the determinants of cannabis use are largely universal, peer influence, school engagement, parental monitoring, and leisure structure operate similarly across countries, but the magnitude and expression of these associations depend on the wider social and cultural environment. This suggests that national legislation alone cannot explain cross-country differences. Rather, it is the everyday social context in which adolescents grow up that shapes how factors associated with higher and lower odds of cannabis use operate. In border regions, this social context may be influenced by cultural dynamics that extend beyond a single national setting, reflecting the fluid and relational nature of borders. This interpretation corresponds with perspectives from border studies, which describe borders not merely as fixed administrative lines but as dynamic social institutions that shape everyday interactions and local cultural environments (17). Together, these findings suggest that adolescent substance use in these border regions should be interpreted in relation to socio-cultural cultural contexts that do not necessarily align neatly with national policy boundaries.

STRENGTHS AND LIMITATIONS

This study offers insights into adolescent substance use in the Dutch, Belgian, and German border regions, with several points that deserve attention. First, we used a convenience sample at school level, resulting in this large sample of adolescents from each border region. School recruitment differed between countries, with all eligible schools invited in the Dutch and German border regions and a sampling procedure used in the Belgian border region. This resulted in a smaller Belgian sample and may have influenced participation rates, sample composition and the comparability of absolute prevalence figures between countries. Nevertheless, the sample supports cross-country comparisons and allows robust analyses. Second, the use of self-reported data may introduce social desirability bias. However, data were collected anonymously via a secure online platform, reducing this risk. Third, by focusing on alcohol, tobacco, and cannabis, the study allows for an in-depth and focused analysis, but the exclusion of other relevant health-related behaviours like mental health problems limits broader insight into the clustering of unhealthy behaviours among adolescents. Fourth, binge drinking was chosen over general alcohol consumption as a more specific indicator of substance use, though this may also

overlook more moderate but still risky drinking patterns. Fifth, while the study includes a wide range of individual and environmental factors, other unmeasured influences, like impulsivity or cultural norms, may also shape adolescent behaviour. Although the selection of variables was informed by existing literature and prevention frameworks, the relatively large number of tested associations warrants cautious interpretation. Confirmation in future hypothesis-driven studies would further strengthen the evidence for the observed associations and their meaningfulness. Sixth, although this study specifically targeted adolescents in border regions, we did not collect information on individual cross-border mobility or distance to the border. Our analyses therefore reflect differences between countries within border regions rather than the direct effects of crossing borders. Because no comparison group from non-border regions was included, the findings should not be interpreted as evidence of border-specific effects, but as patterns and associations observed within border regions. However, it cannot be excluded that adolescents in these regions are exposed to cross-border differences in policies and cultural norms, which future research should examine more directly. Finally, the cross-sectional design captures adolescent substance use at a single point in time but does not allow for causal conclusions. Observed associations should therefore not be interpreted as causal relationships. Still, the large and diverse sample across three countries ensures robust, generalizable findings that contribute to evidence-based prevention strategies.

Despite these limitations, the study remains a strong and reliable contribution to the understanding of adolescent substance use in border regions.

CROSS-BORDER POLICY IMPLICATIONS AND FUTURE RESEARCH

Our findings suggest that adolescent substance use in border regions should not be fully interpreted through national policies alone. In these border areas, adolescents may be simultaneously exposed to multiple systems, which could enable some adolescents to encounter or use more 'favourable' policy environment, for example lower age limits or cheaper availability across a nearby border. Such dynamics highlight the need for prevention strategies that look beyond country-specific frameworks and consider the Euregional context. Strengthening protective structures, such as parental involvement and meaningful leisure activities, remains relevant, but sustainable impact is more likely when such efforts are embedded in broader community collaborations. In line with frameworks such as CTC, cross-border community coalitions could be established to bring together schools, public health organisations, youth clubs, and law enforcement from neighbouring regions. By sharing data and resources, developing unified prevention campaigns, and organising community events that engage youth from all sides of the border, these coalitions may provide a consistently supportive environment. Although such initiatives

require commitment and resources that are often considered beyond local priorities, they offer a realistic step towards collective prevention in border regions. At a policy level, harmonisation of legal age limits, pricing policies, and enforcement remains challenging because such decisions are made nationally. Nevertheless, regional stakeholders could play a role by providing comparative evidence from border regions to national policy-makers, thereby supporting a stronger lobby for cross-border policy coordination. This type of evidence-based advocacy may help to reduce inconsistencies that adolescents can exploit by seeking the most 'favourable' policy context across borders.

Future research should therefore examine how divergent legislation, pricing and prevention frameworks across borders affect adolescent behaviour, and to what extent adolescents actively use these opportunities. Comparative studies between border and non-border regions could clarify whether border-specific factors amplify or reduce risks. In addition, studies are needed to evaluate the effectiveness of interventions explicitly designed for cross-border contexts. Such evidence would inform more targeted and context-sensitive prevention strategies that take into account the particular opportunities and vulnerabilities of border regions. This observation is consistent with research on Dutch-German-Belgian border regions showing that, despite European integration, both institutional arrangements and subtle cultural barriers continue to shape daily life, schooling, and leisure across borders (55).

CONCLUSION

This study highlights that adolescent substance use, including alcohol, tobacco and cannabis, remains prevalent across border regions despite differences in national regulations. The findings confirm the importance of individual and environmental factors associated with substance use, with peer influence and late-night socialisation showing the strongest associations with substance use. However, parental monitoring and structured leisure activities provide important protective effects. By comparing three neighbouring countries, the study shows that the observed patterns of vulnerability and protection are broadly consistent, yet their strength and expression vary according to the social and cultural environments shaped by both national and border-region contexts. The results therefore suggest that policy interventions should move beyond legal restrictions and take into account the broader social context in which adolescents in border regions grow up, particularly where overlapping national environments may shape the conditions under which substance-use behaviour develops.

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APPENDIX I: REGRESSION ANALYSIS BINGE DRINKING, SMOKING AND/OR VAPING WEEKLY AND CANNABIS USE IN THE LAST 4 WEEKS

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
	Netherlands OR [95% CI]	**Belgium** OR [95% CI]	**Germany** OR [95% CI]	**Netherlands** OR [95% CI]	**Belgium** OR [95% CI]	**Germany** OR [95% CI]	**Netherlands** OR [95% CI]	**Belgium** OR [95% CI]	**Germany** OR [95% CI]
INDIVIDUAL FACTORS - DEMOGRAPHIC FACTORS									
Being a Girl	1.088 [0.948, 1.250]	**0.673 [0.513, 0.883]****	0.895 [0.769, 1.042]	**1.331 [1.133, 1.563]*****	0.740 [0.518, 1.059]	**1.189 [1.007, 1.405]***	**0.658 [0.518, 0.835]****	**0.466 [0.273, 0.796]****	**0.664 [0.516, 0.856]****
In 4th grade	**2.617 [2.242, 3.055]*****	**2.261 [1.732, 2.952]*****	**3.038 [2.581, 3.577]*****	**1.412 [1.181, 1.688]*****	0.989 [0.692, 1.413]	**1.272 [1.073, 1.507]****	**2.453 [1.813, 3.321]*****	**1.893 [1.084, 3.308]***	**1.386 [1.054, 1.824]***
INDIVIDUAL FACTORS - PSYCHOSOCIAL FACTORS									
Total MHI5 score	0.998 [0.993, 1.003]	**0.988 [0.979, 0.997]****	**0.993 [0.988, 0.998]****	**0.991 [0.986, 0.996]****	**0.974 [0.964, 0.985]*****	**0.985 [0.980, 0.990]*****	**0.987 [0.980, 0.995]****	**0.980 [0.964, 0.996]***	**0.985 [0.978, 0.993]*****
Feels (very) often stressed by one or more of the following factors: school or homework, home situation, own problems, what others think of them, everything they have to do	1.075 [0.92, 1.256]	0.978 [0.735, 1.301]	**1.317 [1.107, 1.566]****	**1.433 [1.194, 1.720]*****	1.445 [0.975, 2.142]	**1.230 [1.010, 1.498]***	1.409 [1.068, 1.857]*	1.772 [0.973, 3.226]	1.113 [0.822, 1.506]
Can turn to someone when having a problem or feeling troubled	0.863 [0.654, 1.137]	**1.591 [1.041, 2.431]***	**1.424 [1.139, 1.781]****	0.957 [0.721, 1.270]	0.960 [0.602, 1.530]	1.052 [0.848, 1.306]	**0.599 [0.419, 0.858]****	1.083 [0.531, 2.206]	0.914 [0.672, 1.243]
Experiences performance pressure regularly/often (from themselves or others)	**0.795 [0.673, 0.939]****	0.843 [0.609, 1.167]	**0.763 [0.64, 0.909]****	**0.754 [0.621, 0.915]****	0.837 [0.550, 1.276]	**0.648 [0.531, 0.791]*****	1.065 [0.805, 1.410]	0.967 [0.526, 1.777]	0.751 [0.555, 1.015]

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
Experiences performance pressure from parent(s)/guardian(s)	**1.344 [1.074, 1.682]***	1.102 [0.723, 1.680]	1.138 [0.898, 1.441]	1.155 [0.901, 1.480]	1.014 [0.590, 1.745]	**1.535 [1.191, 1.979]****	1.102 [0.778, 1.560]	0.649 [0.296, 1.425]	1.214 [0.829, 1.777]
Experiences performance pressure from teachers/school	0.927 [0.733, 1.171]	1.062 [0.690, 1.633]	1.129 [0.893, 1.429]	0.928 [0.718, 1.199]	0.79 [0.445, 1.403]	0.829 [0.645, 1.065]	1015 [0.707, 1.459]	1764 [0.789, 3.941]	0.862 [0.594, 1.250]
Experiences performance pressure from friends	1.217 [0.95, 1.558]	1.467 [0.940, 2.290]	1061 [0.835, 1.347]	1.184 [0.907, 1.546]	0.708 [0.388, 1.292]	1.095 [0.851, 1.409]	0.693 [0.465, 1.032]	0.995 [0.438, 2.261]	1.201 [0.828, 1.744]
Experiences performance pressure from coach or trainer in sports	1.101 [0.811, 1.496]	0.757 [0.447, 1.279]	1.048 [0.777, 1.413]	0.903 [0.635, 1.286]	0.882 [0.419, 1.856]	0.658 [0.466, 0.931]*	0.779 [0.458, 1.325]	0.785 [0.263, 2.342]	1.173 [0.744, 1.850]
Bullied at school in the last 3 months	**1.336 [1.106, 1.614]****	0.744 [0.522, 1.060]	**1.240 [1.061, 1.449]****	1.226 [0.997, 1.506]	0.658 [0.416, 1.041]	1.092 [0.924, 1.289]	1.129 [0.831, 1.533]	0.665 [0.335, 1.318]	1.155 [0.899, 1.483]
Finds going to school pointless	**1.463 [1.257, 1.704]*****	**1.357 [1.008, 1.827]***	**1.325 [1.100, 1.597]****	**1.773 [1.506, 2.086]*****	**1.501 [1.046, 2.153]***	**1.302 [1.076, 1.576]****	**1.346 [1.060, 1.708]***	1.223 [0.713, 2.100]	**1.446 [1.100, 1.900]****
School experience in 3 categories:									
Okay	1.114 [0.961, 1.290]	1.047 [0.802, 1.366]	1.019 [0.870, 1.193]	1.060 [0.884, 1.270]	1.418 [0.980, 2.053]	1.089 [0.912, 1.302]	1.035 [0.781, 1.372]	0.964 [0.559, 1.663]	0.829 [0.626, 1.098]
Terrible	1.07 [0.882, 1.298]	0.974 [0.685, 1.385]	1.208 [0.992, 1.470]	1.286 [1.034, 1.598]*	1.047 [0.661, 1.656]	1.221 [0.990, 1.506]	1.290 [0.934, 1.781]	0.836 [0.428, 1.63]	1.002 [0.732, 1.371]
ENVIRONMENTAL FACTORS - PHYSICAL ENVIRONMENT									
Child is not at home for 3 days or more after 22:00	**2.950 [2.563, 3.396]*****	**3.427 [2.522, 4.656]*****	**2.624 [2.233, 3.083]*****	**3.047 [2.612, 3.554]*****	**4.445 [3.134, 6.305]*****	**3.152 [2.674, 3.715]*****	**3.634 [2.912, 4.535]*****	**3.291 [2.010, 5389]*****	**3.196 [2.535, 4.028]*****

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
On how many days of the week do you engage in music, singing, acting, drawing/ painting, or photography outside school hours with a club or association?									
Less than 1 day per week	0.984 [0.770, 1.258]	1.409 [0.888, 2.235]	1.135 [0.871, 1.481]	0.813 [0.610, 1.084]	0.738 [0.380, 1.434]	**0.711 [0.516, 0.979]***	0.991 [0.645, 1.522]	1.187 [0.463, 3.039]	0.712 [0.423, 1.199]
1 day per week	0.877 [0.696, 1.105]	1.189 [0.771, 1.833]	**0.772 [0.621, 0.959]***	**0.721 [0.541, 0.961]***	0.924 [0.522, 1.634]	**0.493 [0.376, 0.646]*****	0.845 [0.539, 1.325]	1.231 [0.522, 2.903]	**0.508 [0.328, 0.785]****
2 or 3 days per week	**0.762 [0.615, 0.945]***	1.035 [0.721, 1.486]	0.889 [0.718, 1.102]	**0.757 [0.589, 0.973]***	**0.407 [0.227, 0.729]****	**0.728 [0.571, 0.928]***	0.904 [0.613, 1.334]	0.691 [0.302, 1.582]	0.724 [0.490, 1.068]
4 to 6 days per week	0.771 [0.559, 1.064]	1.232 [0.680, 2.231]	0.896 [0.633, 1.268]	0.812 [0.565, 1.169]	0.411 [0.168, 1.005]	0.915 [0.625, 1.341]	1.120 [0.659, 1.902]	0.558 [0.150, 2.082]	1.153 [0.656, 2.026]
Every day	0.908 [0.695, 1.188]	1.135 [0.717, 1.796]	0.666 [0.457, 0.971]*	0.728 [0.535, 0.991]*	1.109 [0.638, 1.929]	0.765 [0.522, 1.119]	1.210 [0.790, 1.852]	2.069 [0.996, 4.295]	1.073 [0.640, 1.800]
On how many days of the week do you engage in activities outside school hours with a different kind of club, association, or organisation? (Ref: (Almost) never)									
Less than 1 day per week	1.171 [0.897, 1.528]	1.586 [0.996, 2.526]	**1.434 [1.099, 1.872]****	0.966 [0.709, 1.315]	0.715 [0.362, 1.414]	0.983 [0.711, 1.360]	0.725 [0.449, 1.171]	0.570 [0.191, 1.704]	1.102 [0.676, 1.798]
1 day per week	**1.277 [1.038, 1.571]***	1.239 [0.886, 1.732]	1.215 [0.963, 1.532]	0.887 [0.690, 1.141]	0.983 [0.632, 1.528]	0.986 [0.753, 1.291]	0.876 [0.600, 1.278]	0.543 [0.250, 1.176]	0.994 [0.651, 1.518]

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
2 or 3 days per week	**1.246 [1.055, 1.473]***	0.939 [0.664, 1.328]	**1.349 [1.095, 1.661]****	1087 [0.893, 1.323]	0.749 [0.455, 1.232]	1.105 [0.872, 1.400]	0.844 [0.621, 1.147]	0.907 [0.461, 1.783]	1.325 [0.929, 1.890]
4 to 6 days per week	1.288 [0.991, 1.675]	1.100 [0.672, 1.799]	0.979 [0.715, 1.340]	1035 [0.747, 1.433]	0.701 [0.324, 1.514]	1.146 [0.801, 1.640]	0.897 [0.551, 1.461]	0.976 [0.341, 2.794]	0.987 [0.575, 1.693]
Every day	0.695 [0.405, 1.194]	1.386 [0.561, 3.424]	1.590 [0.976, 2.589]	0.961 [0.525, 1.757]	1.217 [0.362, 4.086]	1.287 [0.753, 2.198]	0.482 [0.184, 1.262]	0.424 [0.049, 3.679]	1.596 [0.834, 3.052]
How often do you participate in sports at a club or gym? (Ref: (Almost) never)									
Less than 1 day per week	1.179 [0.805, 1.727]	1.193 [0.618, 2.301]	1.396 [0.971, 2.008]	0.924 [0.615, 1.390]	0.697 [0.316, 1.537]	0.966 [0.669, 1.393]	0.909 [0.522, 1.584]	0.728 [0.225, 2.359]	0.892 [0.498, 1.596]
1 day per week	1.028 [0.804, 1.315]	0.918 [0.571, 1.477]	**1.378 [1.064, 1.786]***	0.837 [0.641, 1.092]	1.200 [0.705, 2.044]	0.806 [0.609, 1.066]	**0.649 [0.425, 0.990]***	1.136 [0.514, 2.511]	**0.617 [0.383, 0.993]***
2 or 3 days per week	**1.359 [1.131, 1.633]****	**1.822 [1.292, 2.569]****	**1.385 [1.138, 1.687]****	**0.742 [0.609, 0.905]****	0.743 [0.490, 1.129]	**0.778 [0.634, 0.954]***	**0.619 [0.462, 0.829]****	0.701 [0.378, 1.301]	**0.688 [0.501, 0.944]***
4 to 6 days per week	1.176 [0.949, 1.457]	1.263 [0.852, 1.871]	**1.374 [1.095, 1.724]****	**0.523 [0.409, 0.670]*****	**0.410 [0.242, 0.695]****	**0.574 [0.443, 0.743]*****	**0.564 [0.399, 0.798]****	**0.347 [0.155, 0.778]***	**0.537 [0.366, 0.789]****
Every day	0.982 [0.692, 1.396]	0.960 [0.549, 1.681]	1.258 [0.909, 1.742]	**0.439 [0.284, 0.676]*****	**0.338 [0.154, 0.738]****	**0.635 [0.439, 0.918]***	**0.483 [0.260, 0.898]***	0.564 [0.205, 1.551]	0.622 [0.378, 1.025]
How often do you sport or move in your free time without a club or gym? (Ref: (Almost) never)									

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
Less than 1 day per week	0.914 [0.715, 1.170]	0.950 [0.619, 1.458]	1.171 [0.918, 1.493]	0.848 [0.648, 1.111]	0.795 [0.467, 1.354]	**0.607 [0.466, 0.790]*** **	1.093 [0.751, 1.591]	0.533 [0.223, 1.273]	0.670 [0.432, 1.039]
1 day per week	0.921 [0.748, 1.133]	0.842 [0.575, 1.233]	1.144 [0.918, 1.426]	**0.720 [0.570, 0.910]** **	**0.589 [0.359, 0.968]***	**0.637 [0.501, 0.809]*** **	**0.691 [0.487, 0.981]***	0.691 [0.332, 1.436]	0.910 [0.629, 1.316]
2 or 3 days per week	0.951 [0.788, 1.147]	0.744 [0.517, 1.070]	1.024 [0.834, 1.257]	**0.699 [0.568, 0.860]** **	0.900 [0.578, 1.402]	**0.710 [0.574, 0.878]** **	**0.626 [0.460, 0.852]** **	0.886 [0.464, 1.694]	0.971 [0.700, 1.346]
4 to 6 days per week	**0.641 [0.508, 0.809]*** **	0.627 [0.383, 1.026]	0,776 [0.59, 1.019]	**0.576 [0.442, 0.750]*** **	**0.442 [0.209, 0.932]***	**0.609 [0.453, 0.818]** **	**0.586 [0.399, 0.860]** **	0.689 [0.250, 1.897]	**0.614 [0.378, 0.998]***
Every day	**0.706 [0.549, 0.909]** **	1.120 [0.711, 1.766]	0,911 [0.683, 1.214]	0.775 [0.589, 1.020]	1.013 [0.574, 1.787]	**0.684 [0.503, 0.930]***	**0.655 [0.434, 0.988]***	0.984 [0.434, 2.229]	1.388 [0.910, 2.117]
ENVIRONMENTAL FACTORS - SOCIAL ENVIRONMENT									
Most to (almost) all friends drink alcohol	**9.558 [8.332, 10.964]*** **	**11.232 [8.764, 14.395]*** **	**9.106 [7.932, 10.455]*** **	**4.392 [3.714, 5.194]*** **	**7.546 [5.307, 10.728]*** **	**3.899 [3.319, 4.579]*** **	**4.553 [3.492, 5.936]*** **	**6.454 [3.725, 11.182]*** **	**5.308 [4.122, 6.835]*** **
Parents/guardians usually/always know where he/she is when not at home	**0.569 [0.469, 0.689]*** **	**0.567 [0.381, 0.843]** **	**0.756 [0.603, 0.946]***	**0.484 [0.399, 0.586]*** **	**0.408 [0.267, 0.623]*** **	**0.481 [0.39, 0.594]*** **	**0.479 [0.368, 0.624]*** **	**0.541 [0.294, 0.996]***	**0.415 [0.314, 0.548]*** **
Parents/guardians have clear rules about what the child can and cannot do	**0.836 [0.711, 0.982]***	**0.745 [0.566, 0.981]***	**0.723 [0.631, 0.828]*** **	0.84 [0.705, 1.001]	0.752 [0.535, 1.057]	0.910 [0.784, 1.056]	0.818 [0.636, 1.051]	0.693 [0.422, 1.138]	0.888 [0.707, 1.115]
Parents/guardians spend a lot of time with the child	**0.86 [0.742, 0.996]***	**0.753 [0.575, 0.988]***	**0.846 [0.732, 0.978]***	**0.767 [0.653, 0.901]** **	0.852 [0.607, 1.196]	**0.736 [0.630, 0.861]*** **	**0.663 [0.526, 0.836]** **	1.091 [0.658, 1.810]	**0.694 [0.546, 0.882]** **

	BINGE DRINKING			SMOKING/VAPING			CANNABIS USE		
ENVIRONMENTAL FACTORS - ECONOMIC ENVIRONMENT									
Experience some or significant difficulty managing finances at home	0.819 [0.625, 1.071]	1.212 [0.807, 1.821]	0.904 [0.726, 1.126]	1.361 [1.041, 1.780]*	1.979 [1.273, 3.078]**	**1.415 [1.150, 1.741]****	1.150 [0.784, 1.687]	1.712 [0.939, 3.122]	1.106 [0.805, 1.520]

Legend. Odds ratios (OR) with 95% confidence intervals (CI) from multivariable logistic regression analyses of binge drinking, smoking and vaping, and cannabis use in the past four weeks, stratified by country (Netherlands, Belgium, Germany). All independent variables were included simultaneously in each model. *p < 0.05, **p < 0.01, ***p < 0.001 indicate statistical significance.

Appendix II: Practical examples Chapter 7

This appendix presents selected practice documents that illustrate how themes addressed in Chapter 7 on adolescent alcohol use, smoking and vaping, and cannabis use were reflected in recent public health work in the Meuse-Rhine Euroregion.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

Results Euroregional Health Survey: Youth 12-26 years, 2021



This infographic presents results from the Euroregional Health Survey carried out within the euPrevent Social Norms Approach project. The online survey was conducted among young people aged 12-26 years from the Meuse-Rhine Euroregion and West-Eifel. It reports on demographics, identification, alcohol, cannabis and gaming, and visualises differences between actual behaviour and perceived peer behaviour. The infographic shows that young people often overestimated alcohol and cannabis use among peers, and it translates these findings into social norms messages that emphasise protective behaviours and healthier choices

Download via publication list: – euPrevent Publications
https://www.brigittevanderzanden.eu/en/publications.html
2021: *Results Euroregional Health Survey, youth.*

See next page for the full factsheet.

My Health, My Choice: Youth Campaign Flyer

This youth flyer was developed as part of the My Health, My Choice campaign within the euPrevent Social Norms Approach project. It explains to young people that they may overestimate how much peers drink alcohol, play video games or use cannabis, and that these misperceptions can influence their own behaviour. The flyer presents selected campaign messages, invites young people to take an online quiz, refers them to the campaign website and social media channels, and lists regional partner organisations that can provide support around health and addiction.

See next page for an impression of the flyer used in the campaign.



The basis of social norm theory is that an individual's behaviour and attitude are influenced by their perception of the attitude and behaviour of their peers, meaning the perception of the norms.

We can differentiate social norms into two types:

- descriptive social norms (behaviour): which refer to an individual's perception of the amount and frequency of peers' consumption of a substance
- injunctive social norms (attitude): which are based on the individual's perception of peer approval (of use) of this substance.

Those norms tacitly dictate the behaviour that is expected and seen as acceptable by the group. Usually, people tend to overestimate the unhealthy choices while underestimating the healthy choices made by their peers (i.e. think that peers drink more soda and eat less vegetables compared to themselves).

In short, SNA is based on:

- behaviours and attitudes being influenced by how the norms are perceived and interpreted;
- people usually misperceiving those norms (either over or underestimating them);
- these misperceived norms then increasing unhealthy and decreasing healthy choices;
- a necessity of developing actions promoting more protective and positive behaviours in order to rectify those erroneous perceptions.

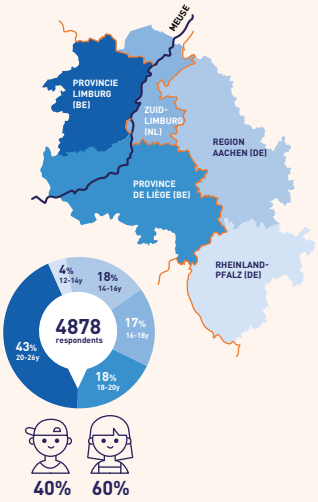
To ensure that one of the essential conditions for the implementation of a quality SNA was met in our population, i.e. the misperception of descriptive and injunctive norms, a large 'Euroregional Health Survey' was carried out.

Euroregional Health Survey

The 'Euroregional Health Survey' was carried out online from September 2019 until January 2020. The questionnaire was fully anonymous and the GDPR rules were respected. The themes that were incorporated in the questionnaire were: background information of the respondents (demographics), identification (the more an individual identifies with a given group, the greater the likelihood that he or she will submit to the social norm of that group), alcohol, cannabis and gaming.

Study population

Youth aged 12 – 26 years and living in the Euroregion Meuse-Rhine or West-Eifel were part of our study population. More specific, living in: South Limburg (NL), Province of Limburg (BE), Province of Liège, French speaking part (BE), Province of Liège, Ostbelgien (BE), Städteregion Aachen (DE), Kreis Heinsberg (DE), Kreis Euskirchen (DE) and Landkreis Bitburg-Prüm (DE).





44% of the youth is at risk

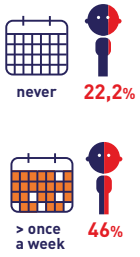
Riskgroups were determined in order to establish how many youth might be at risk of developing problematic behaviour in drinking alcohol, using cannabis or playing games. In general people in the riskgroups misperceive substance use of their peers. For more information about this group, check the report.

Youth at risk per substance:



Gaming

Almost half of the participants games multiple times a week or (almost) every day in the last month, with only 22,2% that had never gamed (descriptive norm). However, whereas they are playing a lot, not much impact on social or academic life has been reported. Indeed, the majority of the participants told us that they rather stop gaming and spend social time in real life than continue gaming. They also do not prefer gaming instead of doing their homework. Only 5% prefers gaming (very) often rather than spending time in real life with others or skips their homework.



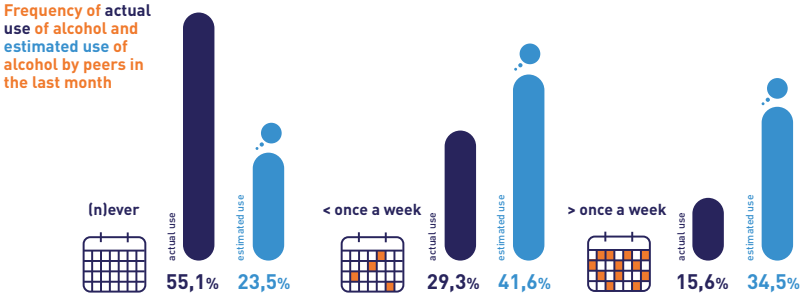




Alcohol

Overall, our respondents perceive their peers to drink more than themselves, whereas the results yield that more than half of the participants has either never drank alcohol in their life or has ever drank alcohol, but not in the last month (descriptive norm). Moreover, when we go further in the analyses, we can see that the 16-26 years old are the ones who, not only drink the most, but also overestimate their peers' consumption the most.

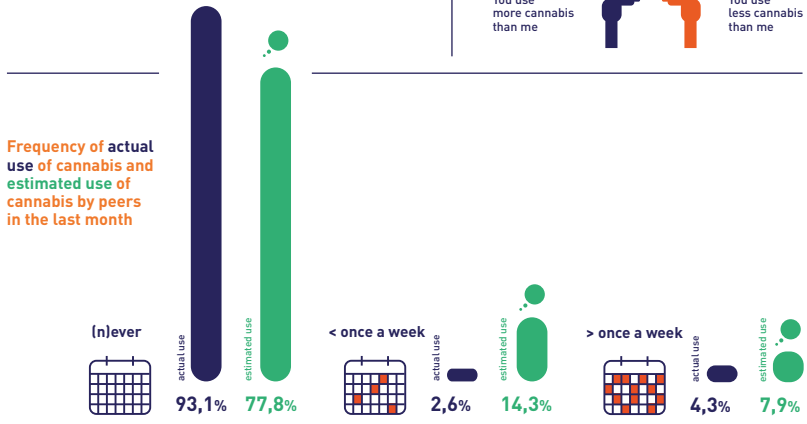




Cannabis

9 out of 10 respondents has either never used cannabis in their life or has ever used cannabis, but not in the last month (descriptive norm). Nonetheless, the younger citizens overestimate the use of cannabis by their peers.





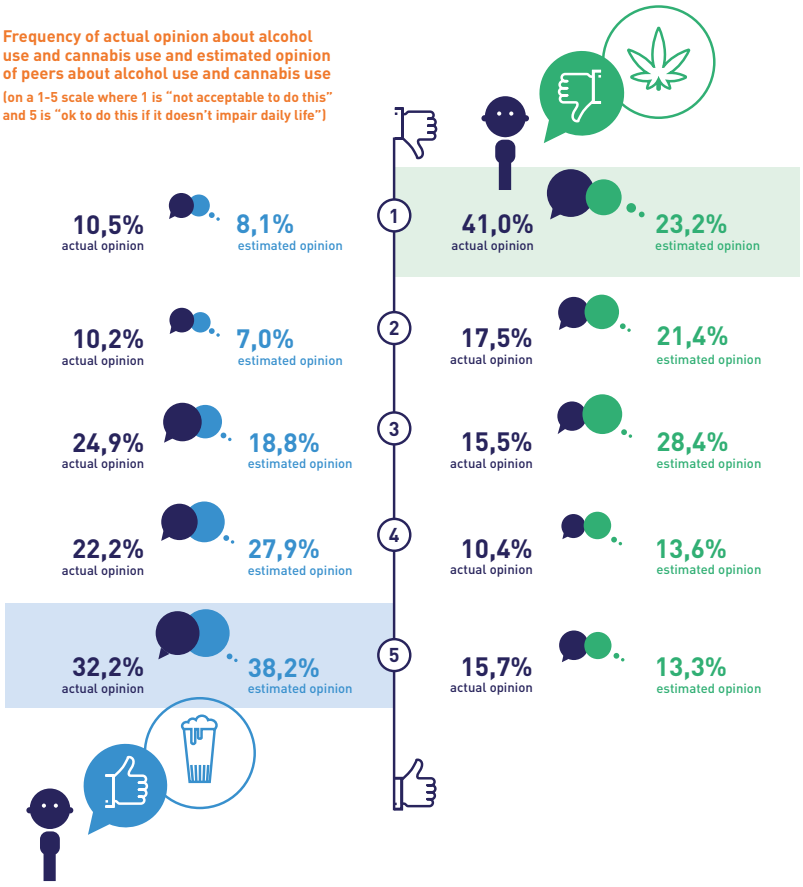
Opinion (injunctive norms)

The opinion (injunctive norm) of our respondents regarding the use of alcohol and cannabis have been measured using a scale of 1 to 5, where 1 means it is never okay to do and 5 means it is okay to do, if it is doesn't interfere with everyday life. Using the same scale, the respondents' perception of what their peers think about alcohol and cannabis use was also determined.

In general, our respondents reckon that their peers have a more positive opinion about the (over)use of alcohol, compared to themselves. Similarly, our respondents think that their peers are less likely than themselves to have a negative opinion about (over)using cannabis.

Frequency of actual opinion about alcohol use and cannabis use and estimated opinion of peers about alcohol use and cannabis use

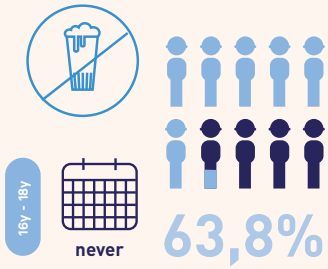
(on a 1-5 scale where 1 is "not acceptable to do this" and 5 is "ok to do this if it doesn't impair daily life")



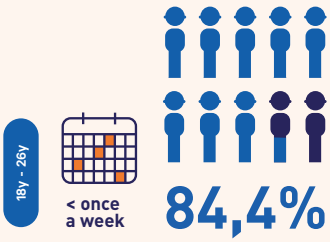
Message

SNA messages emphasise on the positive and protective behaviours and attitudes that the target group is actually engaging in, with the aim of convincing them to make healthier choices, by following those more positive social norms.

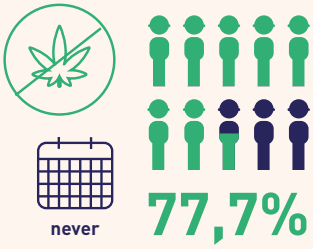
The general SNA messages for the target group youth (12 – 26 years) are:



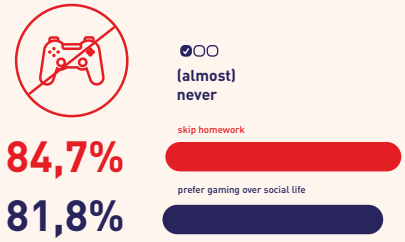
Do you know that the majority of people your age (63,8%) never drank alcohol or at least not in the last month!



Do you know the majority of people your age (84,4%) only drinks once a week or less.



Do you know that the majority of people your age (77,7%) don't smoke cannabis.



Most people your age stop gaming if they have better/other things to do. Keep track of your time spend on gaming.

Contactdetails / more information

Do you want to know more about this research and the results, check the project website, the Euregional Health Atlas, or check the whole report here. If you have any questions about these results please contact GGD ZL, projectpartner of the euPrevent SNA Project: Nicole.curvers@ggdzl.nl

The euPrevent Social Norms Approach project is being carried out within the context of Interreg V-A Euregio Maas-Rhine, with € 1.065.840,- from the European Regional Development Fund. The project also receives co-financing and project partners pay their own contribution.

TAKE OUR QUIZ!

Hey! We know everyone is unique.

We are not saying you don't know what's good for you, but we feel it is important you know how your mind can trick you.

That's why we have developed a quiz so you can see what you'd do in some situations and compare it to what your peers actually did in your region. How well do you estimate other people's behaviour?

Don't worry, there's no deadline and we don't give out grades!

CHECK OUT THIS FREE QUIZ! GO TO:
myhealth-mychoice.eu
or scan to QR-code

WE ARE SOCIAL

We are superactive on our social channels!

We'd love to hear from you, so connect with us, let us know how you feel about this campaign, participate in monthly challenges and dare others to join you.

@myhealth-mychoice

HELPFUL PARTNERS

Maybe you want to talk with a professional, tell your story or make a detailed planning on achieving your goals?

We have built a great network of partners and other companies that commit to health and addiction.

These companies and their trained professionals can help you build your future health.

Want to make a change in your life? Don't hesitate to investigate their website and contact one of our partners in your region. Trust us. They can help you achieve your goals.

Name organisation
Place/city org.
website organisation
Telephonenumber org.

Name organisation
Place/city org.
website organisation
Telephonenumber org.

FOR MORE HELPFUL ORGANISATIONS VISIT OUR SITE
myhealth-mychoice.eu
or scan to QR-code



MY HEALTH MY CHOICE
SINCE • 2021

TO DRINK ALCOHOL, PLAY VIDEO GAMES OR SMOKE WEED. IT'S MY CHOICE.

But did you know most people my age only do this in moderation or not at all?

Crossing borders in health

Made possible by:
Interreg Euregio Meuse-Rhine
European Regional Development Fund

YOU KNOW WHAT IS BEST FOR YOU, BECAUSE YOU KNOW YOU BEST!

But, what if you had to choose between studying and nailing that test or going to a party?

How do you decide?
Do you make a well thought out decision, or do you think: "What would my friends do?"

Comparing yourself with peers is a natural measure. But sometimes we make decisions based on things we think we know about other people our age.

We conducted a research, asking people your age (12-26) about their behavior when alcohol, drugs and gaming are involved. We also asked how they think others act in similar situations.

The results showed that we often think unrealistically about other people's use. These misconceptions could shape your own behavior.. and not always in a constructive way.

Our campaign 'My health. My Choice" offers you an insight. An insight in how other people your age actual think about alcohol, cannabis and gaming.

VISIT OUR WEBSITE FOR MORE INFORMATION!
myhealth-mychoice.eu
or scan to QR-code ▸

WHAT OUR RESEARCH SHOWED US:

over 77%
of people your age have **NEVER** smoked cannabis before?

while only 34%
of these same respondents estimated their peers never smoked weed.

62,4%
Way more than half of all people your age, spend **LESS THAN 1 HOUR** on gaming on a weekday.

while 41,4%
estimated people their age play **1 TO 3 HOURS** a week

1

2

75,8%
People your agegroup **NEVER DRINK MORE THAN 2 DRINKS** a week

while 47,7%
of the same people thinks people their age drink **WAY MORE** a week

THIS PROVES THE FACT PEOPLE OVERESTIMATE HOW MUCH OTHER PEOPLE SMOKE WEED, PLAY GAMES OR DRINK ALCOHOL.

BECAUSE PEOPLE OVERESTIMATE THE USE OF OTHERS, THEY TEND TO JUSTIFY THEIR OWN BEHAVIOUR AND ACTUALLY USE MORE THAN PLANNED.

CURIOUS ABOUT ALL THE NUMBERS?
myhealth-mychoice.eu
or scan to QR-code ▸


BE
NL
DE
CITIZENS
TABLE
VOICE

Chapter 8

Citizen participation across borders: institutional coordination and democratic participation in European border regions

Brigitte A.M. van der Zanden, Hui Wang, Alena Kamenshchikova, Astrid J.M. van der Zanden, Christian J.P.A. Hoebe & Klasien Horstman.

Submitted.

ABSTRACT

Citizen participation is considered important on local, national and international government level, yet little is known about participation in border regions. To address this gap, we studied four initiatives for cross-border citizen participation in the Meuse-Rhine and Rhine-Meuse-North Euroregions through qualitative document analysis of applications, minutes, guidelines and reports. The analysis showed that the agenda for citizen participation was shaped mainly top down. Standardised formats enabled cooperation across jurisdictions but constrained flexibility and local responsiveness. National recruitment and uneven multilingual support influenced inclusion and representativeness. Without a cross-border authority, follow-up was primarily administrative and coordinated policy action was missing. The findings show that cross-border participation is assembled through nationally administrative, financial, linguistic and accountability infrastructures. However, these infrastructures limit the democratic reach of participatory processes and its practical effects. Without cross-border governance structures, top-down organised cross-border participation remains challenging, while grassroots participatory actions in border regions may be more successful.



INTRODUCTION

Citizen participation is organised in a specific political landscape and refers to the relationship between citizens and their governments. Empirical research illustrates the breadth of contemporary innovations in practices of citizen participation in different political landscapes. In Belgium, inspired by ideas of Van Reybrouck (1), the G1000 (2011) brought together a thousand via lottery selected citizens to deliberate on the policy priorities of Belgium (1). Since 2019, East Belgium has institutionalised a permanent citizens' council ('Bürgerrat') based on random selection and rotation to set agendas and convene assemblies (2). At European level, Tomorrow's Europe (2007) was the first EU-wide deliberative poll, in which 350 randomly selected citizens from all member states deliberated about the future of Europe (3). Citizen participation in border regions, by contrast, has received considerably less scholarly attention. Unlike national or regional political settings, border regions generally lack a consolidated political centre that can receive, process, and act upon participatory outputs across jurisdictions. Border studies have shown that residents engage in cross-border practices such as work, leisure and shopping and that internal borders in Europe can become less prominent in parts of everyday life without losing their territorial and institutional significance (4, 5). While residents in border regions may orient parts of their everyday lives across borders, they remain embedded in different political and administrative systems, which complicates the organisation of citizen participation across borders. Studies of the social and economic impact of borders during COVID-19 reveal the limitations of nationally bounded governance and highlight the need for participation arrangements that match the realities of citizens living in a border region. Scholars like Michels (6) and Pigmans et al. (7) highlight in their research on citizen participation challenges related to inclusion, engagement and the wider impact of participatory processes, while Ulrich (8) shows that cross-border settings add further democratic and institutional challenges because governance operates across nationally bounded structures. In border regions these unique democratic and institutional challenges are compounded by differences in language and political cultures, as well as fragmented institutional mandates, which can complicate both cooperation and citizen involvement.

While citizen participation in national political and institutional settings (1, 9-11) has been studied extensively, considerable less is known about how citizen participation is organised across the nationally bounded political and administrative systems of border regions. This study addresses this gap and investigates how citizen participation takes shape in the transnational setting of a border region. The study focuses on four citizen participation initiatives in the border regions of two Euroregions, the Meuse-Rhine Euroregion, between The Netherlands, Belgium and Germany and the Rhine-Meuse-North Euroregion between The Netherlands and Germany. These initiatives addressed different themes and formats, allowing comparison of how participation was organised across

jurisdictions. Empirically, the initiatives were initiated by the professional organisation euPrevent, which aims to improve the health and quality of life of residents in the Meuse-Rhine border region through sustainable cross-border partnerships. As an organisation operating at the interface between regional authorities and local communities, euPrevent sought to engage citizens in discussions on regional health and wellbeing. In this article citizen participation in Euroregions is examined as a cross-border governance practice shaped by nationally embedded institutional infrastructures, situating the analysis within debates on border governance and cross-border participation. Next, we outline the theoretical background, describe the methodology and the four cases, present the results and discuss their implications for debates on citizen participation.

THEORETICAL BACKGROUND

In the literature on participation (9, 10, 12), three dimensions are considered important for understanding participation, namely institutional embeddedness, representativeness, and process quality and follow-up. In Euroregions, these dimensions unfold across national borders and are shaped by the interaction of different nationally embedded political, administrative and institutional systems. This makes citizen participation not only a question of participatory design, but also one of cross-border governance.

Institutional embeddedness refers to governance structures that shape participatory processes. Michels (6) shows how institutional arrangements influence who gets access to participatory processes and how citizen input relates to formal decision-making. In cross-border settings, Ulrich (13) emphasises that participatory governance is shaped by multi-level, administrative and cultural conditions across national borders including the involvement of different governmental levels, civil-society actors and linguistic groups. In practice this means that access to participation, the scope of issues open for deliberation and the extent to which citizen input can influence decision-making may differ across the national and institutional contexts involved. More broadly, Zumbusch and Scherer (14) show that cross-border governance is complicated by differences in cultural, institutional and legal systems, languages and policy cultures, requiring actors to bridge different administrative logics and establish a common basis for communication and cooperation. Fung (12) and Knibbe and Horstman (15) emphasise that institutional procedures are often fixed before citizens participate, largely defining the contours of their contribution. In line with this, scholars have pointed to the difference between symbolic participation and actual power sharing. Pateman (10) highlights that while small deliberative meetings can stimulate listening and learning, they often have limited impact. Knibbe and Horstman and Knibbe et al. (15-17) illustrates how participation processes in low-income neighbourhoods can be constrained by bureaucratic resistance and mutual mistrust. By contrast, Porto Alegre's experience with participatory budgeting shows how citizens,

when granted direct control over budgets, can exert tangible influence through concrete redistribution towards poorer neighbourhoods. When institutions recognise and follow up on citizens' input, this can strengthen the legitimacy of decision-making and restore trust in governance. Fishkin (11) shows in his work on deliberative polling that citizens perceive participation as meaningful when their recommendations are reflected in concrete policies. Pateman (10), and Van Reybrouck (1) warn that symbolic participation leads to disappointment and cynicism. The value of participation processes is determined by design, and by institutional follow-up. In border regions, this institutional embeddedness is further complicated because participatory governance has to connect institutions and actors operating within different national, administrative and cultural settings (13, 14). Ulrich (8) further argues that cross-border participation requires institutional structures capable of linking citizen input to decision-making and implementation.

Interestingly, the organisation of participation can itself be understood as a form of governance. Irvin and Stansbury (18) describes how, by formulating problem definitions, selecting actors and legitimising decisions, administrators create frameworks for participation. Kurkela et al. (19) and Bussu et al. (20) additionally emphasise that participation processes are shaped by their administrative environment. This entails that the practical design of participation is never neutral and produces specific outcomes. Fung (12), Rowe and Frewer (21) and Wallerstein (22) emphasise that choices about scale, timing, language and structure determine who can participate and how ideas and perspectives can be expressed.

A second characteristic of participation concerns representativeness. Woodford and Preston (23) emphasises that balanced representation of relevant publics contributes to legitimacy and democratic trust. On the construction of representativeness Irvin and Stansbury (18), Wallerstein (22) and Pateman (10) argue that choices about who is considered a legitimate participant and how participants are selected are strongly influenced by organisational and institutional factors including recruitment and selection mechanisms, resource conditions, facilitation and the organisation of deliberation and follow up. Citizen forums can, as scholars like Knibbe and Horstman and Knibbe et al. (15-17), Woodford and Preston (23) and Van Reybrouck (1) show, under the right circumstances unlock unique perspectives and local knowledge that would otherwise remain invisible. However, Fung (12) and Michels (6, 23), note that initiatives aiming to include marginalised voices often attract mainly middle-class, highly educated participants, as recruitment relies on existing networks or institutional gatekeepers and outspoken participants tend to dominate discussions. At the same time, Pateman (10) and Michels (6) note that small selected groups may face questions of legitimacy from the broader population, who may doubt whether their recommendations are representative of wider society. Procedures for random selection ('sortition') can address this critique. Niessen and Reuchamps (2) shows that in East Belgium's 'Bürgerrat', stratified lotting and rotation

reduced dominance by specific groups and increased diversity. These discussions make clear that representativeness is not given but actively constructed through institutional choices. Den Broeder et al. (24) and Knibbe and Horstman (15) show that choices about the scale of meetings, group composition and interaction forms determine who is actually heard: meetings scheduled on weekday evenings may exclude working parents, while the use of digital channels may disadvantage older people. Such organisational details reflect broader governance logics about feasibility and legitimacy. In cross-border settings, representativeness also concerns whether the participating public reflects the different national and linguistic communities that constitute the border region. Ulrich (13) explicitly identifies ethnic and linguistic diversity as an institutional consideration in participatory cross-border governance.

A third dimension concerns the quality of the process and follow-up of results. Carefully designed participatory processes can lead to better deliberations and more informed, sustainable and inclusive decisions. Practical examples illustrate how organisational choices shape process quality. Van Reybrouck (1) describes how the G1000 in Belgium was carefully set up with selection of participants by lottery, a day-long programme with plenary and small-groups sessions, and professional moderation. Niessen (2) shows that in East Belgium, frequency of meetings or financial compensation influenced the representation in the Bürgerrat. Luskin et al. (3), in their analysis of Tomorrow's Europe, show that multilingualism and simultaneous translation resulted in some participants contributing more intensively than others, depending on the language used. Choices, such as the language of instruction or the design of translation facilities, have direct effects on deliberative quality. Oross and Kiss (25) analysing participatory budgeting in Budapest, similarly shows that the presentation of proposals and the organisation of voting procedures shaped which initiatives gained support. Follow-up of participation outcomes is also a crucial aspect of process quality. Woodford and Preston (23) stresses that participation is credible only when it is clear what happens to citizens' contributions. Without such feedback, citizens perceive the process as symbolic or manipulative. Pateman (10) and Knibbe and Horstman (16) also note that without impact in political institutions, participatory initiatives do not affect existing power relations.

Studies show that participative processes are shaped by institutional and cultural dynamics as well as by practical-organisational and financial decisions. Notwithstanding the ideals of participation, in practice participatory processes always imply trade-offs between representativeness, deliberative quality, follow-up and feasibility. In border regions, these trade-offs acquire an additional territorial dimension because participation is organised across settings with different cultural, political, legal, organisational and administrative conditions (13, 14).



METHODOLOGY

We analysed four initiatives of cross-border citizen participation (CCP), conducted between 2019 and 2023 in two Euroregions to examine participation in the cross-border setting of border regions. We conceptualise Euroregions as cross-border governance arenas connecting regional and local institutions across borders while remaining embedded in national administrative and legal systems. These cases were purposefully selected to capture variation in thematic focus, organisational setting and coordination requirements across nationally bounded administrative routines. They addressed health equity (CCP1), cross-border experiences with the COVID-19 pandemic (CCP2), positive health and local well-being (CCP3), and loneliness and intergenerational dialogue (CCP4).

We conducted a qualitative document analysis. For data collection we used the archive of formal documents produced during the four CCP initiatives. This included 204 documents including applications, implementation plans, meeting minutes, recruitment texts, facilitator guidelines, training materials, participant manuals, final reports and conference presentations. These materials describe how participation was organised, what was discussed, which decisions and adjustments were made, and which issues were contested. Because many documents were version-controlled, we could trace how texts and decisions evolved across versions, for instance in EU grant applications or final reports. For readability, we cite documents using abbreviated case codes (CCP# plus document type) and add dates only when needed to distinguish documents within a case. Unique documents, like grant applications, are cited without dates.

The analysis was guided by the theoretical background and six analytical questions. We asked (1) how citizen participation was initiated and agenda setting occurred and by which actors, (2) what participatory formats were proposed, whether these were predefined or open-ended, (3) how citizens' roles and contributions were described, (4) what forms of accountability or reporting were emphasised and to whom, (5) how the cross-border setting shaped or constrained these processes, and (6) what rationales or justifications for participation were articulated. These questions served as sensitising concepts to guide data extraction and initial coding. Two authors (BZ and HW) independently reviewed the material and, guided by the research question and theoretical background, identified relevant passages. Differences were discussed until consensus. As the first author, BZ, had been engaged in the initiatives, her informal knowledge clarified contextual questions not immediately clear from the documents. Nevertheless, documents are the backbone of the study.

Positionality and ethics

The first author was directly involved in coordinating the four initiatives studied. This provided contextual knowledge but also risked bias. To safeguard transparency and to create distance to the materials, we applied a theoretical lens, analysed the materials independently and relied exclusively on documents such as minutes, reports and manuals. Background discussions and informal negotiations informed interpretation but were not used as empirical evidence. As the study analysed only documents, no ethical approval was required.

Case description

Between 2019 and 2023, four cross-border citizen participation cases (CCP) were organised in the Meuse-Rhine border region, spanning the Netherlands, Belgium and Germany. These cases differed in thematic focus, design, institutional embedding and operational set-up. CCP1 addressed equity in public health, CCP2 focused on experiences with the COVID-19 pandemic, CCP3 on positive health and local wellbeing, and CCP4 on loneliness and intergenerational dialogue. All CCPs were initiated by euPrevent, but organisational involvement varied across the cases. In CCP1, euPrevent was both initiator and practical coordinator. In CCP2, CCP3, and CCP4, euPrevent initiated and coordinated the overall process, but delegated operational tasks to regional partners. In CCP4, euPrevent coordinated the network while regional partners organised the participatory process.

The central themes were selected by the organising partners in response to policy trends, societal relevance and available funding. Table 1 summarises basic characteristics including duration, format, locations, institutional embeddedness and funding. CCP1 was linked to the organisation of a WHO conference in 2019 and therefore had a relatively high level of institutional visibility. CCP2 took place entirely online during the COVID-19 pandemic, which shaped both recruitment and participation.



Table 1. characteristics of cross-border citizen participation initiatives (2019-2023)

	CCP1	CCP2	CCP3	CCP4
Theme	Equity in health, participation, human resources	COVID-19 experiences	Positive health, COVID-19 experiences	Loneliness and intergenerational dialogue
Institutional embeddedness	Initiated by euPrevent and implemented in collaboration with partners from NL, DE and DE. The partners were a CB governance structure, a CB civic organisation and national oriented regional governments and public health authorities.	Initiated by euPrevent and implemented in collaboration with partners from NL, DE and DE. The partners were a CB civic association, and national oriented regional public health authorities, universities and knowledge institutes.	Initiated by euPrevent implemented in collaboration with partners from NL and DE. The partners were a CB civic organisation and national oriented regional public health authorities.	Initiated by euPrevent and implemented by partners from NL, DE and DE. The partners were national oriented civic organisations, regional public health authorities, universities and hospitals.
Year	2019	2021	2021-2022	2023
Number of meetings: planned/implemented	2/2	8/8	4/1	5/5
Time and duration	Saturday, during the day (approx. 6 hours)	Weekday evening (90 min)	Saturday, during the day (4 hours)	Weekday evening (3-4 hours)
Format	Physical	Digital	Physical and digital	Physical
Locations	Belgium, Germany	Online by border region	Netherlands, Germany	Netherlands, Germany, Belgium
Cross-border interaction	Mixed meetings	By language group	Domestic only	Partly mixed
Languages	1x German-French 1x German-Dutch	4x German, 3x Dutch, 1x French	3x German, 1x Dutch	2x Dutch, 1x German, 2x French
Target	General population	General population	Young people (primary), general population	Young and old (intergenerational)

Table 1. characteristics of cross-border citizen participation initiatives (2019-2023) (*continued*)

	CCP1	CCP2	CCP3	CCP4
Participants (registration/ participation) **BE = Belgium** **NL = Netherlands** **DE = Germany**	Total 163/117: BE: 81/53 DE: 82/64	Total 202/82: NL1: 29/6 NL2: 25/11 DE1: 25/18 DE2: 26/6 DE3: 16/2 BE1: 37/16 BE2: 8/2 BE3: 36/21	Total 46/36 NL1: 44/28 DE1: 2/0 DE2: 0/0 DE3: 0/8 (survey)	Total ?/95: DE1: 26/17 BE1: 21/18 BE2: ?/24 BE3: ?/11 NL1: ?/25
Recruitment channels	Local authorities, networks	Personal networks, newspapers, open calls	Local authorities, education, social media	Youth organisations, municipalities, health insurers
Funding	EU grant (Interreg)	EU grant (Interreg)	EU grant (Interreg)	EU grant (Interreg)
Budget for CCP (excluding staff costs): Available/ spent	Available: €31,767.50 Spent: Around €27,000.-	Available: €23,000.- Spent: €14,205.-	Available: €8,000.- Spent: €6,800.-	Available: €30,000.- Spent: €17,969.-
Report form	Overall report and Presentation WHO conference	Multilingual synthesis report (online)	Overall report and final conference presentation	Five translated session reports

RESULTS

The document analysis shows how CCP organisation reflected the specific conditions of the border region. Guided by the six analytical questions we synthesise findings into five cross-cutting themes. The results therefore address initiation and agenda setting, participatory formats, financial resources, recurring feasibility and accountability issues, representativeness and the follow-up, reporting and accountability of these participatory initiatives. Citizens' roles, contributions and rationales for participation are discussed within these themes, particularly in relation to initiation and participatory formats.

Initiation and agenda setting for citizen participation in a border region

The analysis shows that the agenda for citizens participation in the border region was not initiated by citizens, but by organisations working in a border region and operated within their own national administrative, legal and funding cultures. Although themes, formats and locations were predefined in transnational funding schemes, grant applications and preparatory meetings aligned the national institutions before any citizen engagement. The application for CCP1 stated that the objective was "to obtain citizens' views on the same substantive themes that will be discussed at the congress in June 2019. The substantive themes will be determined in the second half of 2018" (CCP1-GA). In late 2018, the project group formulated that the "three main content-related topics of the citizen summit will be: equity, participatory approach and human resources" (CCP1-PG-05-11-2018). The thematic scope was not developed bottom-up but predetermined by professionals for a WHO conference.

The same dynamic recurred in the other initiatives. The CCP2 application foregrounded pandemic experiences without prior discussion with citizens. "... to discuss with citizens how they experience COVID-19 in general and the cross-border elements" (CCP2-GA). CCP3 developed under the Interreg funding programme Sustainable Health, but national regions could not agree on a topic. Therefore, national regions chose their preferred topic. "Everyone should decide on a theme. And questions should also be determined now." (CCP3-PG-20-05-2021). Interestingly, here 'everyone' referred professionals, not citizens. The German regions focused on COVID-19 "COVID-19 and Long COVID" in Düsseldorf and "Mental health and the restrictions due to COVID-19" in Rhein-Kreis-Neuss (CCP3-PG-21-10-2021) while Dutch regions chose positive health. So, in the context of this cross-border participative initiative, national considerations determined themes for citizens participation in the own country. CCP4 stated from the outset that "Together with the concept of Healthy ageing, as defined by the World Health Organization (WHO), these will form the basis framework for PROFILE." (CCP4-GA). This approach was endorsed by the multinational management: themes and formats required prior approval of national institutions, leaving little room for bottom-up agenda setting.

The moderator guidelines that were developed in the participation initiatives further reinforced top-down agenda setting. Across CCPs, questions were formulated in advance, making participatory meetings resemble structured group interview rather than open dialogue. Citizen concerns were addressed only occasionally. In CCP2, three themes had been set initially by euPrevent and the national partner organisations, yet during the citizens summits, citizens raised questions with respect to vaccination. The report noted: "During the course of the project, we decided to incorporate a fourth topic regarding vaccination ... after the first two citizens' summits." (CCP2-CR) This example demonstrated that citizen input, although rare, could expand the agenda setting and was incorporated by professionals.

The analysis of participatory initiatives in the border region shows that initiation and agenda setting were shaped by a complex top-down machinery of European funding programme and national institutional consideration and priorities limiting resonance with citizens' concerns. Themes such as equity and healthy ageing aligned with a WHO conference framing without evidence in the documents that they originated from pressing local concerns. Due to the impact of different national pandemic responses to everyday life in a border region, the theme COVID-19 generated more documented citizen input, while the documents provide less evidence of engagement with the other themes.

Formats for citizen participation in a border region

The design and implementation of participation formats occurred in a cross-border setting involving organisations and authorities from three countries. As such, decisions on timing, structure, and participant engagement were shaped by practical considerations and the need to align procedures across different national administrative and legal systems. Decision-making on mandates, timing and duration, resources, translating services and practical arrangements, were shaped by these structures.

The documents show that decisions about the design of the participatory process often depend on hierarchical approval and internal mandates in national contexts. In CCP1 choices often required coordination with politicians at a national governance level for formal approval. This applied even for location choices as part of wider regional distribution of hosting responsibilities. “The location in Liege is not 100% cleared yet. The Province of Liege needs to take a formal decision.” (CCP1-PG-25-09-2018). In CCP4, the Management Board similarly documented that practical arrangements for the citizen summit were constrained by national procedural requirements and required formal internal decision-making: “Mrs X mentions the rules that need to be followed according to the German regulations.” (CCP4-MB-20-06-2022). Because the initiatives involved actors from three countries, practical decisions, such as locations, scheduling and recruitment, were often subject to formal coordination and alignment between institutions operating under different national systems. The practical organisation of recruitment also reflected

this reliance on national structures. In CCP1, for example, recruitment proceeded through the contacts of euPrevent and its regional partners in the different countries rather than through open calls. The minutes note: "Recruiting the 24 or 26 citizens per region is difficult… Via the contacts of euPrevent, students from School A, B and C will also be invited" (CCP1-PG-15-01-2019). This illustrates how recruitment depended on familiar national networks in the absence of a shared cross-border administrative or outreach infrastructure for these initiatives.

The continuous alignment of national institutional and hierarchical ideas about how to organise citizen participation in practice made planning quite difficult. The minutes of CCP2 in January 2021 stated for instance that "The summits will be held in April-May … Each summit lasts 2–3 hours … When the summits are held on various days, fewer moderators are necessary" (CCP2-PG-12-01-2021), but a month later, the timing was already revised: "Four citizen summits will be planned in May/June and the others in September/October … Primarily the Dutch summits will be organised; probably via Zoom." (CCP2-PG-09-02-2021). The move to online participation during the COVID-19 pandemic also introduced accessibility challenges. The CCP2 report noted that "COVID-19 made it impossible to organise physical citizens' summits… it was not always easy for everybody to participate, since it required access to Zoom… the no-show rate was rather high" (CCP2-CR). These practical constraints affected the reach of the summits and shaped how participation could be organised under pandemic conditions. In general, the Management Board explicitly acknowledged the tentative character of decisions, noting that "last minute changes in questionnaires and procedures must remain possible, adjustments in the planning are inevitable" (CCP2-MB-09-03-2021), reflecting both the ongoing COVID-19 crisis and the influence of nationally oriented partner organisations, which occasionally required rescheduling or procedural adjustments.

Choices regarding timing and duration of citizens participation in a border region reflected a balancing between reach of citizens and practical organisational feasibility. In CCP1, the summits were organised as large-scale Saturday events, each lasting six hours, enabling participants to travel and allowing for full-day programmes. This was explicitly stated in the application: "Two citizen summits … lasting six hours … one in Eupen and one in Aachen" (CCP1-GA). The same format was initially adopted in CCP3:"The group decides that the citizen summits must be held on a Saturday" (CCP3-PG-20-08-2020). Later, this was adjusted to a weekday evening: "The citizen summit will take place during the week and in the evening" (CCP3-PG-17-03-2022). Again, national institutional preferences played a role. In discussions about the physical or digital character of the citizens summits, the national partners did not agree. "The Dutch partners prefer digital, the German partners are divided" (CCP3-MB-19-08-2021). The moderator guidelines across the CCPs reveal how strictly formats for cross-border participation were pre-structured from a national perspective. Time frames, questions and moderation rules were worked out in

advance to ensure procedural uniformity across the countries: "The time frame is set at 4 hours… If only 3 hours are available, the last part 'ideas for action' could be shortened considerably" (CCP4-GL). Such detailed guidelines that cross-border participation had to be organised within different national and administrative systems. Professionals coordinating the CCPs considered standardisation necessary to ensure outcome comparability between countries and to create a common baseline that would align practices across regions. It also enabled them to do a comparison between the countries and to present cross-border results. At the same time, cross-border moderator guidelines were helping to contain national influence. Referring to cross-border comparability allowed the organisers to resist adjustments proposed by nationally oriented organisations who wished to adapt the content to domestic priorities. Thus, procedural standardisation functioned as a coordination tool to safeguard national administrative frames and the transnational scope of the CCPs simultaneously.

The analyses of the organisation of the concrete cross-border citizen summits shows that decisions were often subject to national hierarchical approval, while timing and duration were continually adapted to institutional contexts and national preferences.

Budgetary constraints for citizen participation in a border region

The analysis shows that financial frameworks largely determined how --border citizens' participation took shape in practice. Because the CCPs were implemented within an EU-funded, multi-national framework, budgeting and accountability had to comply with uniform programme procedures. In practice however, these European requirements interacted with divergent national rules that shaped what was financially and administratively possible. CCP4 illustrated this clearly: "The project partner responsible for a specific part of the budget will follow the rules of their own country. For example, in Belgium and Germany three offers are necessary to be compared" (CCP4-MB-13-04-2021). The resulting fragmentation affected even routine procedures, as partners struggled to work with incompatible formats and requirements: "Offers are not in English… It is still not clear what project partners need to ask, and what needs to be written down in an offer" (CCP4-MB-09-08-2022).

The cross-border character of the CCPs had direct implications for the allocation of funds. As language differences are a reality in a border region, budgets for the CCPs included provisions for multilingual communication, including translation, simultaneous interpretation, and multilingual reporting, provisions that were considered necessary to enable communication between citizens across language groups and to ensure that results could be compared between national contexts. As stated in the application documents: "Translation of official documents into four languages: Questionnaire, reports, final report" (CCP2-GA). In these initiatives, such budget lines reflected the need to accommodate different national administrative, financial and linguistic contexts.

The layered accountability structure for citizen participation in border regions also introduced constraints that impacted cross-border cooperation. In some national regions, citizens could not be reimbursed for participation, whereas limited compensation was permitted in others. As noted by a nationally oriented co-organiser, "is not allowed to pay the citizens who participate in the summit, and vouchers are also not allowed" (CCP4-MB-04-05-2022). These differences in national co-financing rules limited the possibilities to engage citizens in a comparable manner and made recruitment of citizens dependent on varying administrative interpretations. The focus on harmonisation and accountability also left little room to adjust budgets flexibly to the circumstances within the different countries. Although resources for translation, reporting and logistical arrangements were available, resources for recruitment of citizens and stimulating cross-border engagement were far less or lacking. For instance, CCP3 records that a cross-border organisation "… will coordinate the citizens' summits… but needs the help of the partner regions to invite citizens to these summits" (CCP3-PG-20-08-2020), indicating that recruitment was largely delegated to regional partners in the different countries, without additional funding or support. This discrepancy between financial design and the practical realities of organising cross-border participation constrained the resources available for recruitment and cross-border engagement.

The analyses made clear that budgets covered multilingual communication but underestimated the relational and institutional work needed for recruitment and engagement of citizens in a border region. Funds were available for cross-border travel, venues, translation, interpretation and reporting, but not for time-intensive processes to recruit participants across borders. The initiatives lacked shared cross-border administrative and communication channels, requiring recruitment and coordination to be organised through existing national and regional infrastructures. In a context without a clear cross-border institutional framework and where a shared tangible problem is often lacking, building mutual trust and collaboration between organisations from different countries required time, resources and coordination that the documents indicate were only partly available. This underinvestment in relational work was mirrored by a funding logic that prioritised administrative deliverables, such as reports, newsletters and multilingual documentation, over slower processes of durable cross-border participative engagement.

Representativeness of citizen participation in a border region

Representativeness is an important consideration in citizen participation, and all CCPs explicitly aimed to involve a "good cross section of the population", as illustrated by CCP 1, which took into account age, gender, ethnic background, social status and employment status in its recruitment approach, (CCP1-PG-25-2018). While such ambitions resemble national participation practices, the cross-border context introduced extra constraints.

First, representativeness was shaped by the absence of a shared administrative infrastructure in the border region through which residents of the border region could be invited to participate. This implied that recruitment of participants had to be organised through national channels. The minutes of CCP2 illustrate this clearly: "Each region has to invite 24 citizens in whichever way they want; it will be biased, not representative. There's no need for an at random selection… Be creative. Use your connections with organisations" (CCP2-PG-12-01-2021). Participation processes in a national setting can usually rely on a single administrative system and a shared set of outreach channels. In the CCPs, by contrast, recruitment had to be organised through three different outreach infrastructures. Such decentralised recruitment was for instance reflected in the distribution of responsibilities in CCP2: "Responsible for the groups of invitations per country: NL: person W; BE: person X; DE: person Y for Düren via internet homepage recruitment" (CCP2-PG-09-03-2021). These instructions show a unified cross-border infrastructure for participation was lacking.

The effects of this fragmentation became particularly visible in CCP3. Despite comparable preparation across regions, some partners were unable to mobilise participants at all. As the documents report: "The 1st citizen summit was supposed to take place on 30 October 2021, but we had no registrations, so the meeting was cancelled… Viersen also had to cancel because of too few participants" (CCP3-CL-02/04). These cancellations suggest that differences in recruitment outcomes were shaped, at least in part, by the uneven outreach capacities of the nationally embedded systems. The absence of a shared cross-border outreach mechanism further contributed to this variation, since partners were limited to the channels and networks available within their own regions. Although other factors, such as local circumstances or varying levels of citizen engagement, may have played a role as well, the documents indicate that these structural constraints played an important role in determining which citizens could be reached which directly influenced the representational breadth that could be achieved.

Second, representativeness was affected by the linguistic and communicative preconditions for participation. Although language was not a representativeness criterion in itself, the multilingual character of the border region meant that linguistic conditions became a practical determinant of access. Where participation takes place within a shared language context, language may remain largely implicit. In the cross-border context of the CCPs, however, opportunities for meaningful participation depended on citizens being able to engage in a language they understood, or on translation support being provided.

This was particularly visible in CCP2. Early project documents still envisaged a single joint cross-border discussion, stating that "citizens from the EMR can exchange their experiences during the corona period, with particular focus on the cross-border elements" (Guideline moderators CCP2, 2020) . Shortly afterwards, however, this ambition was adjusted. As the minutes record, "the next citizens' summits will consist of language groups (English,

Dutch, German)" (Minutes Project group CCP2, 2021). The shift to parallel linguistic discussions implied that representativeness was not shaped by a border regional logic, but by a linguistic logic. Instead of a cross-border dialogue, participation was organised through separate language groups.

These linguistic arrangements also influenced who could meaningfully participate. Citizens' opportunities to take part depended not only on their interest or availability but also on their proficiency in the languages used during the summits and on the organisational capacity to support multilingual communication. In CCP1, translation support was available, allowing citizens from different linguistic backgrounds to engage in a common discussion. In later CCPs, however, such arrangements were no longer feasible, which limited the range of citizens who could take part and made linguistic comfort a practical filter for inclusion. This aligns with the assessment in the CCP2 content report, which concluded that "though a cross-sectional representation of society is desired, realising this is not always possible. As a result, there is no guarantee that this representation was actually achieved" (CCP2-CR A). The documents also indicate that language choices were largely shaped by differences in the organisational capacity to provide translation or multilingual support. As a result, participation appeared to depend not only on formal selection criteria but also substantially on what partners could practically deliver within their own administrative and financial constraints.

Representativeness in cross-border participatory processes emerged at the intersection of administrative fragmentation and multilingual participation. These conditions structured the practical possibilities for inclusion and influenced how citizens could be brought together across the border.

The follow-up, reporting and accountability of citizen participation in a border region

The CCPs were set up with the expectation that the outcomes of the citizens' summits would be available for further use within cross-border collaborations. However, the analysis shows that, in the grant applications follow-up was primarily defined as the publication and dissemination of outputs (upward accountability), rather than in terms of policy impact. In CCP2, the expected follow-up was for instance described as the public presentation of communication products:

The findings of the citizens' summits will be incorporated in a report and will be presented at the conference in December 2021 … The report will be presented on the website of euPrevent. If the participants want to receive the report, they should provide their emails. (CCP2-GL).

A similar approach appeared in CCP1, where the outcomes of the participatory process had to be translated in "a film of the summit, a summary report and translations into three languages" (CCP1-CR) for dissemination across the participating regions. These examples indicate that follow-up focused on documenting and sharing the results rather than linking them to a policy process in which ideas of citizens could be addressed.

In the absence of a transnational, border region authority able to receive the outcomes and thus provide a clear accountability forum, on behalf of the border region, the results of participatory process circulated across transnational networks connected to the CCPs. In CCP1, the organisers addressed the outcomes simultaneously to several cross-border bodies, expressing their "sincere hope that the WHO RHN, CoR, EMR, euPrevent … will actively take into account what was said … and use those thoughts and ideas in their policies." (CCP1-CR). A comparable pattern appeared in CCP3, where dissemination relied on a cross-border communication structure: "Mrs X suggests passing on the links to the CSs to her to use for the Euregional Newsletter." (CCP3-PG-15-07-2021) In CCP4 the results were to be shared through a factsheet and newsletter item circulated within the euPrevent network (CCP4-MB-12-04-2021, CCP4-PG-08-03-2022). Across all CCPs, no indications were found that the outcomes were forwarded to national administrative bodies or incorporated into national policy channels. Results circulated across transnational networks that could distribute the results but lacked a mandate to process them or anchor them within a policy framework.

DISCUSSION

This study examined how citizen participation takes shape in a cross-border context. The analysis shows that, unlike national participation processes embedded in a single legal and administrative framework, the participatory processes in a border region operated in a polycentric environment without a shared authority, reflecting what Blatter (26) characterises as a multi-polity setting. Such settings require, according to Hooghe and Gary (27) continuous coordination across multiple jurisdictions, a challenge that, according to Zumbusch and Scherer (14), is further complicated in cross-border regions by different legal, cultural and administrative systems, and the analysis demonstrates how this need for alignment shaped participation throughout the process. Taken together, these dynamics show how border Euroregions are constituted as cross-border governance areas through coordination across jurisdictions, including standardised formats, reporting and relational work, even when authority and accountability remain nationally anchored.

First, the development of the agendas of cross-border participation was shaped primarily by top-down institutional coordination rather than by citizen involvement in agenda setting. Because cross-border citizen summits had to coordinate different national and

institutional priorities within a cross-border framework, themes were shaped by what could be agreed or accommodated across the participating organisations. Fung (12) emphasises that participation is never neutral, as institutional settings determine which topics are considered legitimate. In participatory processes in a border region this dynamic was reinforced by the requirements of cross-border funding programmes, which encouraged harmonisation and comparability across countries. As a result, the agendas largely reflected institutional priorities, while citizen concerns entered the process only after the initial agenda had already been defined.

Second, the cross-border setting shaped the organisational formats of participation. In the absence of shared border-region governance structure, procedures had to be aligned across several national administrations, each with its own accountability requirements. As Hooghe and Gary (27) notes, coordination needs increase as more jurisdictions participate, and this dynamic was clearly present in the cases we studied. The standardised formats, uniform moderation guidelines and strict reporting procedures reflected the importance of structured process in deliberative participation as mentioned by the OECD (28), while in the cases studied this standardisation also reduced opportunities for flexibility and local adaptation. These arrangements made the process administratively feasible, yet they also reflect a form of coordination that falls short of the collaborative governance described by Thomson and Perry (29) and Ansell and Gash (30), which involves mutuality, shared ownership and collective decision-making capacity. The procedural hierarchy supported comparability across countries but limited opportunities for local adaptation or for developing a genuinely shared cross-border deliberative space.

Third, the financial architecture of the citizen summits played a central role in the shaping of participation. The CCPs were financed through European and national cofinancing schemes, in which accountability and measurable outputs were central. This meant, for instance, that funds were available for staff and venues, while reimbursement options such as vouchers or travel costs were restricted or unavailable in some national contexts. Perkmann (31) shows how European funding programmes not only support cross-border cooperation but also shape its institutional organisation by requiring cross-border bodies to operate within programme rules, while Svensson (32) shows that Euroregions often depend on external project funding and the resources of participating organisations, which can steer cooperation towards activities for which funding is available. In the cases we studied, the form and purpose of participation were largely defined by the logic of programme management, where financial accountability and comparable output took precedence over investment in the relational work needed for cross-border civic engagement.

Fourth, the analysis shows that representativeness was shaped by the institutional conditions under which cross-border participation had to be organised. Whereas deliberative

theory on inclusion is generally developed within a single political framework and public sphere (6, 12, 33), there was no common demos or policy level in the border region. Participants engaged in what was framed as a cross-border participation process, yet their involvement remained organised through national channels and their contributions were assembled into a coordinated cross-border synthesis rather than arising from a shared public space. In the terms of Cheneval et al. (34) and Ulrich (13), this reflects a democratic constellation in which several political communities, or demoi, operate jointly without merging into a single sovereign public. Representativeness was therefore not defined solely by statistical reflection or formal selection, but also by the extent to which different national perspectives could be pragmatically connected within a cross-border dialogue. Inclusion and representativeness also reflected the demoi-cratic character of the cross-border setting, as recruitment was organised separately by country and participation shifted towards parallel language groups making linguistic comfort a practical filter when multilingual facilitation could not be sustained.

Finally, the CCPs show that the institutional logic of cross-border participation shaped not only process but also its follow up. Because no shared administrative level existed to receive or act on the outcomes, follow-up did not develop into a coordinated policy process but took the form of communicative accountability. Final reports were posted on the websites of euPrevent and various participating organisations, where they were made publicly available without indicating any specific authority responsible for follow-up. As Bussu et al. (20) argues that participatory processes need to be embedded in political and policy institutions to connect citizen input to decision-making and implementation. Papadopoulos (35) similarly emphasises the importance of coupling participatory deliberation to formal decision-making if it is to become consequential rather than remain only consultative. In the cases we studied this was the case: results were collected, anonymised and published through euPrevent, creating public visibility but without a formal mechanism linking these outputs to cross-border decision-making.

While residents in border regions may conduct parts of their everyday lives across borders, shared cross-border governmental structures are often absent and residents remain citizens of different states. The organisation of participation in such a setting is therefore complex. The analysis shows that cross-jurisdictional coordination simultaneously enables participation and constrains the space for locally responsive and flexible forms of deliberation.

Against this background, a strength of this study is the multi-case document corpus (204 documents across four CCPs, many stored in version-controlled systems), which allowed us to trace organisational decisions over time. Two authors independently reviewed the material and relied exclusively on formal documents to ensure a traceable and consistent analytical basis. Limitations are that the analysis focuses on a specific European cross-bor-

der context and is document-based, which cannot capture citizens' or policymakers' perspectives. Interviews and comparative or longitudinal designs could complement this evidence.

Policy implications and future perspectives

Our study shows that cross-border participation processes are shaped by top-down institutional coordination. This makes formal participation processes sensitive to procedural logics, yet it also creates new public arenas in which border regions become visible and politically meaningful. Interestingly, alongside these formal trajectories of participation, civic initiatives sometimes emerge independently of institutional coordination, illustrating that border regions can also function as shared spaces of public concern and public action. Examples include civic mobilisation around the nuclear power plant in Tihange (BE) (36), and the cross-border environmental initiatives in Eijsden (NL) (37), showing that citizens can articulate shared concerns across borders, even without formal governance structures. This does not call for abandoning formal top-down coordination processes, but for designing participatory processes in ways that resonate with everyday life in a border region and that support bottom-up citizen initiatives when they arise. Policy approaches that acknowledge both dynamics may enable more responsive and context-sensitive forms of cross-border participation.

CONCLUSION

This article examined how citizen participation takes shape in the cross-border context of a border region. The analysis shows that the characteristics of a border region and the lack of a shared cross-border governance structure shape citizen participation differently than participatory processes in a national context. In the absence of cross-border governmental structures, cross-border participation depends on institutional coordination between countries and organisations. This coordination enables joint action but also narrows the scope for flexible and locally responsive forms of deliberation. The findings show that borders remain institutionally present within participatory processes through nationally anchored administrative responsibilities, recruitment channels, linguistic arrangements and follow-up structures. This study highlights how institutional infrastructures shape the democratic reach of participation in settings without a common policy framework. Even without cross-border governmental structures, meaningful citizen participation remains feasible when organisers design explicitly for locally resonant agenda setting, sustained multilingual access, and a follow-up pathway that goes beyond dissemination.

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APPENDIX I: PRACTICAL EXAMPLES CHAPTER 8

This appendix presents selected practice documents that illustrate how themes addressed in Chapter 8 on citizen involvement, social networks, mental well-being and cross-border care were reflected in recent public health work in the Meuse-Rhine Euroregion.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

Social Networks, Mental Well-being and Cross-Border Care:
Factsheet for EMR Citizens, 2023



This SoMe factsheet for citizens presents results from a cross-border project on mental health and social networks in the Meuse-Rhine Euroregion. It describes interviews with EMR residents and people with experience of cross-border healthcare, focusing on social networks, social support, social participation, multilingualism and mental healthcare in a neighbouring country.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2023: *Factsheet SoMe for Citizens*

Citizen Summits, 2019



This report presents the outcomes of two bilingual citizen summits held in the Meuse-Rhine Euroregion in preparation for the conference "Keeping People at the Centre of Health and Sustainable Development Policies", hosted by the Euregio Meuse-Rhine, the European Committee of the Regions, euPrevent and the WHO Regions for Health Network. It shows how citizens' experiences on equity, participation and human resources in health were collected and translated into cross-border input for health and sustainable development policy discussions.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2019: *Citizen Summits in Eupen and Aachen*

Citizens' Summits on COVID-19, 2021



This report presents citizens' experiences collected during eight citizens' summits in the Meuse-Rhine Euroregion as part of the euPrevent COVID-19 project. Under the title "Suddenly the borders played a role again", it shows how national pandemic measures affected daily life, mental well-being, healthcare, vaccination, family contacts and cross-border routines in a region where borders had often been part of ordinary everyday mobility.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2021: *Citizens' Summits on COVID-19: "Suddenly the borders played a role again".*

Citizen Summits Executive Summary, 2019



This executive summary presents a compact version of the outcomes of the 2019 citizen summits in the Meuse-Rhine Euroregion. It highlights citizens' reflections on equity, participation and human resources in health, and captures the central message of the summits in three questions about being seen, considered and heard in health policy and care planning.

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Citizen Summits
Executive Summary



This report was prepared by EPECS, at the request of the EMR. EPECS was requested to organise two bilingual citizen summits in the EMR in order to engage citizens and to give input and feedback for the conference. The goal of the conference is to establish how to keep people at the centre of health and sustainable development policies.

This report focuses on what we can and may expect from our citizens. It is an overview of their stories and on how their stories and opinions will further sustainable development, thereby keeping them at the centre of health and at the centre of sustainable development policies.
The three main topics at the citizen summits were the same as the topics to be discussed by the professionals during the conference: equity, participatory approach and human resources in health. The overall goal was to ask the participants how these three topics could enhance and aid sustainable development.

The citizen summits took the form of round table settings with at each table a maximum of seven citizens and a specially trained moderator. The citizens came from all regions of the EMR. In total over 120 citizens participated.

The participants claim that they had hardly heard of the word equity in relation to health care. When asked what equity meant for them, they said: equity is "person-oriented", "tailor-made", or "adjusted equality". Participants were very clear on how to achieve equity. For the majority of the citizens, "accessibility for all" is fundamental to achieve equity. Furthermore, they feel that there must be affordable care and nutrition, methods of communication must change, innovations should be established and community initiatives and cross-border care should be encouraged and nourished.
Participants suggested that for receiving appropriate health care, whether in their country of residence or in a neighbouring country, they needed "a one-stop shop", or one person to guide them through the system(s). According to the participants, equity should go hand-in-hand with tailor-made approaches focusing more on individuals.

In order to determine whether a participatory approach was known to the participants, they were asked if they had ever been asked to participate in discussions on (the future of) health in general and health care in particular. Participants had scarcely been involved in discussions on health and health policies in the past. Participants said they were glad to have the opportunity to do so at the summits.

The project ‚Citizen Summit' is possible thanks to funding from People to People project Interreg V-A Euregio Meuse-Rhine, with support from the European Regional Development Fund (ERDF).

Crossing borders in health



Organisations and policy-makers should actively ask citizens for their know-how via citizens' conferences or other means. The goal must be to have a good cross-section of society, i.e. not limited to citizens who are able to express themselves more eloquently or are more financially sound. There should be more counselling, not just for citizens but also for professionals. They should be taught early during their training how to communicate with their future patients, thereby promoting the idea that patients should involve their network more actively in the whole process.

On the topic of human resources in health, in general, the participants want professionals to be nearby and to be very accessible, regardless of whether they live in a city or in the suburbs. The participants said that they are willing to travel for specialised care, but this should mean allowing them to visit the nearest specialist even if the latter does happen to practice in a neighbouring country.
The majority felt that professionals do not treat patients as individuals, but rather as their illness. The cause for this behaviour should mainly be sought in the lack of time professionals have to really listen to patients. The employment of volunteers, families or informal caretakers could provide professionals with the time they need. A volunteer could help by performing supporting tasks. Other participants strongly denounce the idea that volunteers should be involved in health care. Others suggested solutions deploying pensioners or migrants or even robotics/home automation. According to the participants the only way the above-mentioned solutions could work is with proper regulation, e.g. of volunteers.

The comments made and the stories told by citizens confirmed that the sustainable development and WHO goals are indeed a mirror of the wishes of people in their role as citizens.

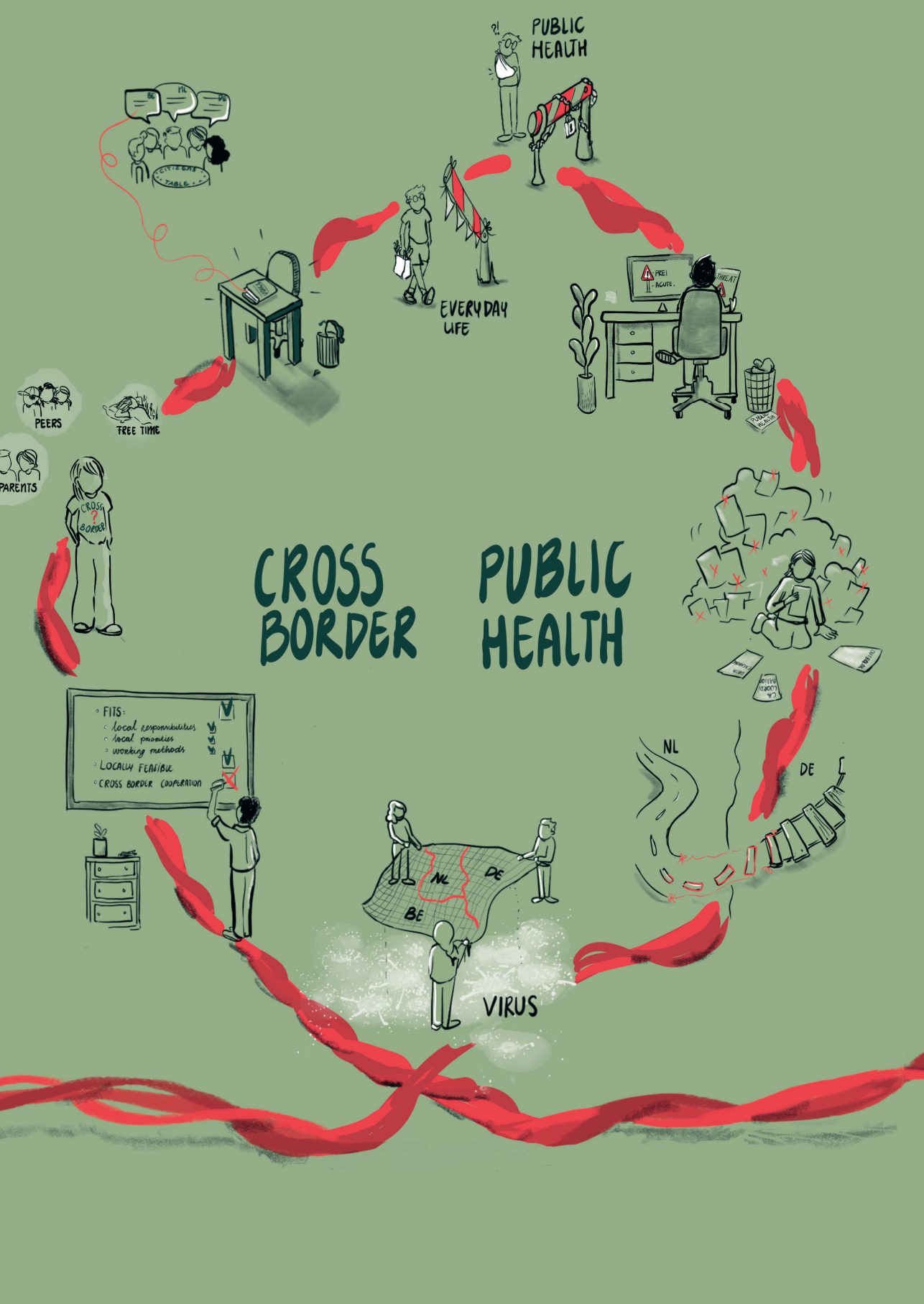
The questions that capture the essence of what participants wondered and wish for are these:

Do you see me as a human being when helping me?
Do you think of me when planning health care?
I would love to share my story and my experiences; will you give me that opportunity?



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Crossing borders in health


PUBLIC HEALTH
EVERY DAY LIFE
FREE TIME
PEERS
PARENTS
CROSS BORDER
PUBLIC HEALTH
FITS:
local responsibilities
local priorities
working methods
LOCALLY FEASIBLE
CROSS BORDER COOPERATION
NL
DE
BE
VIRUS

Chapter 9

General discussion



"I have to document it, otherwise it did not happen."

(Original quote: "Ik moet het vastleggen, anders is het niet gebeurd.") (Piet Stockmans)(1)

This thesis originated from a fascination with the tensions between the everyday lives of people in border regions and the predominantly national organisation of public health. Residents of border regions routinely cross borders for work, education, healthcare, shopping, leisure, and social relations, while national infrastructures, responsibilities, and routines continue largely to shape public health practices. This creates a persistent mismatch between the social reality of border regions and the institutional organisation of public health. The COVID-19 pandemic made this tension particularly visible: border residents often experienced border closures, introduced as a means of pandemic control, as a blunt and disruptive measure. My experiences working at euPrevent, a Euregional network dedicated to promoting health and quality of life in the Dutch-German-Belgian border region, further sharpened my interest in understanding these tensions. Against this background, this thesis examines the shaping of public health policies and practices in border regions. As discussed in the introduction, border regions are understood as regions adjacent to state borders, and public health in these regions is conceptualised not as the aggregate of multiple national public health systems, but as a field of cross-border and supranational collaborative practice. Empirically, the study focuses on two collaboration spaces along the same national border: the Meuse-Rhine Euroregion and the Rhine-Meuse-North Euroregion. The main research question is how public health policies and practices are shaped in adjacent border regions. This question is examined against the background that public health remains predominantly organised through national and subnational systems, with professional responsibilities, legal frameworks, and information systems structured accordingly. In this concluding chapter, I synthesise the main insights of this thesis. The study combined qualitative and quantitative methods to examine how different analytical sites shape cross-border public health practices, ranging from EU policy documents and the scientific literature to professional practices, GIS data, epidemiological lifestyle data, municipal policies, and citizen participation initiatives. This final chapter brings together the insights generated in the preceding chapters. First, I discuss how the empirical chapters contribute to answering the main research question. I then examine the conceptual contribution of this thesis to border studies and infrastructure studies. Subsequently, I formulate the main lessons learned and set out recommendations for policy and practice. The discussion then turns to the strengths and limitations of the study, before identifying directions for future research.

POLICIES AND PRACTICES IN BORDER REGIONS

This section examines how the empirical chapters contribute to understanding how public health policy and practice are shaped in border regions. For each chapter, it first briefly recalls the focus and main findings, and then discusses what these findings show about the possibilities and constraints of developing public health policy and practice across borders.

As I was interested how the EU gave attention to the specific characteristics of public health in border regions, in Chapter 2, I first examined how EU policy defines public health in border regions and puts it on the agenda as a European policy task. Inspired by the work of Barry (2, 3) and Bacchi (4-7) and using discourse analysis, I analysed how EU policy documents issued between 2002 and 2022 addressed and framed public health in border regions, including problem definitions, responsibilities, and policy instruments for cross-border public health. The analysis showed that EU policy documents discussed border regions mainly in relation to serious, acute cross-border threats, especially biological, chemical, and environmental risks. In line with this, EU action focused primarily on surveillance, early warning, preparedness, and response. EU public health policy generally recognised practices of prevention and health promotion as important but did not develop them as a specific cross-border task for border regions. Drawing on Barry (2, 3) and Bacchi (4-7), I concluded that this pattern reflects the conditions under which EU action in public health becomes legitimate and justifiable. In the EU, health and health care are primarily considered as national responsibilities, and action at EU level can only be justified if a problem exceeds what individual Member States can adequately address on their own. This implies that surveillance, preparedness, and response to acute cross-border threats align more readily with the EU's limited mandate and role in health issues. Prevention and health promotion, which are defined in public health as more an individual responsibility anyway, are less easily framed as acute risks that countries cannot address themselves and therefore remain less developed as specific cross-border policy concerns. Chapter 2 makes clear that EU policy only gives very specific space for public health policy and practices in adjacent border regions and that cross-border public health practices are more likely to develop when fitting existing justificatory infrastructures for threat detection, knowledge production and coordination. In EU policy, cross-border public health is mainly about disasters in a border region, and it is not about everyday processes of making a healthy society or a healthy environment. This raises the question how the international scientific public health landscape shapes cross-border public health.

In chapter 3 I studied how the international scientific landscape addresses and shapes cross-border public health. To that end, I conducted a scoping review of literature published between 1994 and 2025 on cross-border infectious disease prevention and control policies and practices in European border regions. Drawing on theoretical discussions



in border studies (8-11), I examined how this literature describes border regions, which public health problems it identifies, and which solutions it proposes. The scientific studies that I reviewed show that border regions mostly became a subject of study when coordination in public health across borders was considered urgent but under pressure because of incompatible surveillance and data infrastructures. The reviewed studies often linked these problems to divergent legal frameworks, mandates, and procedures. My review also shows that mutual interdependence for solving acute problems can enable faster alignment when cross-border partners had already shared routines, standards, and data practices. I concluded that the scientific landscape of cross-border infectious disease prevention and control focuses mainly on problems of coordination, surveillance and data sharing during outbreaks, while other infectious disease threats beyond this dominant outbreak focus, particularly emerging or rapidly evolving diseases such as vector-borne infections, remain less systematically examined.

After having analysed the framing of cross-border public health in EU policy and in the scientific landscape, chapter 4 focuses on professional practices in border regions. How do professionals in border regions organise cross-border public health collaborations given the national character of public health systems. Inspired by infrastructure studies and drawing on interviews with Dutch, German and Belgian public health professionals in border regions, I analysed how public health professionals organise cross-border collaboration and information exchange in day-to-day work while mandates, legal frameworks, and responsibilities remain nationally anchored. The interviews showed that public health professionals widely valued but often depended on temporary project funding and coordination, and personal commitment. When this temporary support lapsed, professional networks, routines, and working relations lost their organisational basis. In the absence of permanent coordinating structures and formalised roles and mandates, cross-border collaboration required repeated infrastructural work to restore contacts, align procedures, and justify ongoing cooperation after projects have ended within nationally organised public health systems and national cultures of accountability. The main challenge for cross-border public health that I identified in this chapter is therefore not to start collaboration, but to keep it supported and workable in a projectified world. The analysis shows that in border regions, collaboration remains institutionally fragile because of lack of infrastructural continuity of cross-border work.

Chapter 5 examines GIS data to address the questions whether cross-border transmission of SARS-CoV-2 played a substantial role relative to national COVID-19 burdens in four Euroregions and whether border closings were a fruitful instrument of pandemic control. During the COVID-19 pandemic several countries used borders as an instrument of pandemic control. Even in the Schengen zone, countries such as Belgium and Germany at some point closed borders to reduce infections, which created major problems for everyday cross-border travel for work, education and care. Of course, this raises the

question whether this was an effective and justifiable measure. Using national infectious disease surveillance data from 2020 to 2022, I examined whether statistically significant clusters of infections extended across national borders and, if this was the case, what this indicates about contribution of cross-border transmission to national COVID-19 burdens. The analysis shows that, during the study period, incidence of infections largely followed national trajectories, and that cross-border clustering was detectable mainly during periods of very high transmission rather than as an early or defining pattern. I concluded that cross-border transmission of SARS-CoV-2 in these Euroregions did not play a substantial role relative to national COVID-19 burdens in the studied border zone. This conclusion weakens the epidemiological rationale for the use of border closures as a pandemic control measure, particularly given the disruptive effects of border closures on everyday life in border regions. In line with the EU Regulation on serious cross-border threats to health, which underlines the importance of assessing proportionality in relation to the safeguarding of free movement (12) when considering border closings, the analysis raises questions about the assessment of proportionality of border closings specifically from the perspective of border regions. For, national surveillance systems produce the evidence used to justify border closings but do not pay special attention to border regions, while residents experience the unintended negative effects of those measures in everyday cross-border life. So, this chapter puts the rationale of border closings as an instrument of public health in border regions in perspective.

In chapter 6 I present an analysis of how municipal policies address the development of Senior Friendly Communities in a border region. I examined how age-friendly initiatives in the Meuse-Rhine Euroregion had to be aligned with responsibilities, priorities, and administrative routines of municipalities in different adjacent border regions. I analysed group interviews conducted with policy makers and local stakeholders at two moments during the development of these initiatives, approximately two years apart. This way I could grasp how expectations, experiences, and justifications of age-friendly community initiatives developed over time. It became clear that local concerns and interests mainly drove the development of these initiatives and that municipalities rarely articulated cross-border exchange as a core task, even when they acknowledged its potential value. Sometimes municipalities adopted working methods and instruments from another municipality across the border, but mostly only partially to prevent frictions in the administrative processes. In other words, municipal exchange with respect to ageing policies in a border region rarely developed into a sustained cross-border practice. The main difficulty was not unwillingness to learn, but the repeated need to align exchange with different national-municipal responsibilities, legal frameworks, and administrative contexts. Policy exchange and policy learning processes imply learning of other examples and selecting what fits in another context and adapting it in relevant ways. It is about selecting what is considered transferable and feasible (13, 14). In a cross-border context, this process becomes more difficult because what is considered transferable and feasible must

be aligned with different legal frameworks, institutional responsibilities and broader governance context across jurisdictions (15, 16). Not surprisingly, in this study it became clear again that initiating exchange was not that hard, but sustaining it beyond episodic learning moments was difficult, since cross-border continuity depended on repeated alignment work without a shared institutional infrastructure to carry that work forward. The issue of discontinuity is also important in the next chapter.

In international public health and health promotion, substance abuse among adolescents is high on the agenda. In border regions this problem is acknowledged as well. In fact, the fact that legal frames for selling and using alcohol and soft drugs differ between countries, may be extra challenging in a border region. For, while the border region is a shared everyday environment for adolescents, prevention frameworks - science, policy and practices - remained nationally organised. But how can one gain insight into substance use among adolescents in a border region spanning Germany, the Netherlands and Belgium? In chapter 7, drawing on the Youth Euregional Scan 2023, I analysed substance use in adolescence across three national contexts and examined what counts as comparable in a border region is. Using country-stratified regression models, I assessed which mechanisms of risk and protection recurred across the three border regional settings. Across the three countries, the dominant mechanisms showed a consistent pattern. Peer influence and frequently being out late were associated with higher use, while parental monitoring, clear rules, and participation in structured leisure activities were consistently associated with lower use. I showed that different national legislations and national differences in prevention regimes, such as different legal age limits for alcohol and different prevention frameworks, did not translate into fundamentally different patterns of risk and protection in adolescence within the studied border region. These findings suggest that prevention should not focus only on differences between national regimes, but also on the social conditions around parents, schools, peers, and leisure activities. The available data did not establish whether these social environments extended across the state border or whether cross-border exposure influenced adolescent substance use.

After studying public health in border regions through the sites of EU policy (Chapter 2), scientific research (Chapter 3) and professional practices (Chapter 4), and through three issue-specific analyses of cross-border public health practices (chapter 5-7) the final chapter turns to what may be the most important site of all, namely citizens participation. After all, public health is about publics. Chapter 8 examines how, in a border region, participatory initiatives invite and organise residents' voices with respect to health. I analysed how organisers designed and carried out four initiatives of cross-border citizen participation between 2019 and 2023. I studied documentation of these initiatives, including grant applications, recruitment materials, manuals, training materials, minutes, guidelines, and final reports. The analysis shows that across these cross-border initiatives, organisers shaped participation without a unified cross-border political community and

without a cross-border administrative infrastructure (17-19) able to respond to these voices. Policy programme requirements, standardisation, funding logics, and language provisions, rather than participants, largely shaped the processes of participation. While these infrastructural dynamics made the process workable and reportable, they also limited who could take part, which issues reached the agenda, and how far participants' contributions could be institutionally followed up. In a setting without a shared authority to receive outcomes, follow-up consisted of multilingual synthesis and dissemination of reports and not of concrete policy changes. The border regional participation processes in this study were top-down organised, and because of this top-down character, the different national institutional arrangements put a stamp on the organisation, the content and the outcome. The study suggests that to make participation across border successful, it must be organised bottom up, based in real life cross-border collectives and real-life collective cross-border concerns.

Taken together, the different chapters show that public health in adjacent border regions has developed through specific forms of alignment and misalignment between cross-border everyday life, public health issues and nationally organised public health systems. The fluidity of borders in everyday life does not align easily with the hardness of borders in European and national infrastructures of policy and administration, scientific research, professional practices and democracy. This tension helps to explain why it requires substantial work to develop and maintain sustainable cross-border collaborations. Apart from biological and chemical threats and disasters, EU policy provides only limited space for cross-border public health. The scientific landscape of cross-border public health shows that the literature focuses mainly on outbreak response, surveillance, and coordination, while prevention beyond acute outbreak response remains less systematically examined. Collaborative cross-border professional public health practices develop, but because funding and tasks are often temporary and project-based, professionals need to undertake a lot of infrastructural work to align practices across borders and to maintain networks in a sustainable way. Such networks often weaken or lapse once project structures come to an end. The organisation of practices of citizen participation demonstrates that the alignment with three different legal frameworks shapes the process, content and output of participation and limits the space available for citizens. The three examples of chapter 5, 6 and 7 underline these insights by showing that cross-border public health does not develop automatically from geographical proximity but depends on how specific public health issues can be aligned with nationally organised responsibilities, infrastructures, and routines. Cross-border public health is readily organised if it fits existing mandates, surveillance systems, coordination structures, accountability cultures and forms of justification. Cross-border public health is easier to organise in the field of disaster control, because serious cross-border threats can be framed through existing infrastructures of surveillance preparedness, response and coordination, and can therefore be justified as a cross-border public health task. The issue is not simply that actors

at different levels have different priorities, but that cross-border public health depends on the interaction between supportive governance conditions at policy level, organisational and information infrastructures, and the willingness and ability of professionals, policymakers, and citizens to act across borders. The fact that cross-border public health depends on alignment with different national organised public health systems also helps to explain why in public health it is so often called for stronger coordination, harmonised procedures, and better data sharing. Such calls reflect the continuous extra infrastructural work that professionals in cross-border practices are required to do in order to negotiate and align cross-border work with national public health systems.

This thesis includes empirical material from two euroregional settings, the Meuse-Rhine Euroregion and the Rhine-Meuse-North Euroregion. In relation to these two euroregional settings, the chapters suggest that public health professionals had to undertake broadly similar work to bring policy and practices into relation across borders. In both Euroregions, cross-border public health did not develop automatically from geographical proximity, but depended on repeated work to align national responsibilities, institutional procedures, and organisational infrastructures across borders. At the same time, the empirical material is somewhat richer for the Meuse-Rhine Euroregion, particularly in Chapters 4 and 8, which include more interview material and case-based detail from that setting, including the coordinating role of euPrevent. This does not alter the broader conclusion that, across both Euroregions, cross-border public health depended on continued work of alignment.

CONTRIBUTION TO BORDER STUDIES AND INFRASTRUCTURE STUDIES

In the Introduction, I referred to border studies to explain that national state borders between adjacent countries are not just formal dividing lines on a map. Rather, as Newman and Paasi (20) describe, borders are social and political constructions that acquire meaning through narratives, institutions and practices. Paasi (21) develops this further by conceptualising borders as social processes connected to territoriality, identity and institutions. As such, the meaning of borders is not only determined by states as formal territorial entities but is also shaped through the everyday life of citizens, policy makers and organisations. An important idea in border studies is that borders can be fluid. Fluid borders mean that borders do not only separate. In may border regions residents often cross state borders. They may live in one country and work in another, they may visit family, attend school, use services or participate in activities on the other side of the border. This also counts for professional practices like public health. Public health professionals may be in touch with colleagues on the other side of the border and public health or-

ganisations may participate in cross-border projects. In other words, borders are not only dividing lines, but also places of cross-border movement, contact and exchange.

However, the acknowledgement of the fluidity of borders does not imply that borders have disappeared and are not relevant anymore. Scholars' like Kolossov and Scott (11), Walters (9) and Aure (8) show in different ways and at different scales, that borders do not simply disappear when people, organisations and regions become more connected across borders. Borders may become more open to cross-border movement and professional or organisational exchange, but at the same time they are reorganised and continue to acquire political, administrative, social and symbolic meaning. The fact that borders can become more open and at the same time be reorganised means that borders continue to shape mobilities, the organisation of administrative responsibilities, the formation of identities and the steering of regional development. In their study of the Dutch-German and Dutch-Belgian border, Bos and Hogervorst (22) refer to a "glass wall". With the image of the "glass wall", Bos and Hogervorst (22) show that a border can be formally open with frequent cross-border mobility, while differences in language, institutions, rules, customs and orientations between countries continue to shape cross-border movement and professional cooperation. Decoville and Durand (23) show that the integration of adjacent border regions cannot be assessed only by looking at cross-border movement. They compare residents' cross-border activities with their perception of people on the other side of the border and show that frequent border crossings do not automatically lead to stronger social trust or more positive perceptions of cross-border neighbours (23).

Taken together, border studies show that borders can be fluid and persistent at the same time. Borders can be open to the mobility of residents, professional contact between public health professionals and the exchange of knowledge and working methods between public health organisations, while at the same time continue to shape governance, policy, identity, organisation, perception and everyday practice. The chapters of my thesis align with this idea. Residents move across the border and public health issues do not automatically stop at the national border. The cross-border character of public health issues applies, for example, to infectious diseases, lifestyle patterns and other prevention challenges discussed in the empirical chapters (Chapters 3, 5, 7 and 8). Public health professionals sometimes collaborate with colleagues on the other side of the border and public health organisations, municipalities and regional cooperation structures may participate in cross-border projects (Chapters 4 and 6).

My thesis contributes to border studies by showing how these ideas play out in cross-border public health practices. My study underlines the importance of the distinction between cross-border interaction and collaboration on the one hand and the capacity to develop cross-border public health practices on the other. The mobility of residents, professional contact between public health professionals and project-based cooperation

between public health organisations do not automatically mean that public health issues are also jointly defined, translated into policy, implemented and accounted for. In the border regions studied in this thesis, formal-legal public health tasks and mandates, data flows and accountability cultures remain organised nationally or subnationally. The thesis therefore shifts attention from cross-border fluidity to the question of how public health issues can be addressed jointly when the conditions for responding to those issues remain organised nationally or subnationally. Sohn et al. (24) show that proximity across a national border does produce the same interaction effects as proximity within a single national urban system, because borders continue to moderate relations between nearby cities, even when those cities are geographically close to one another. This thesis translates that insight to public health policy and practice: cross-border proximity, mobility and professional contact do not automatically lead to joint problem definition, policy-making, implementation and accountability in public health.

Discussions in infrastructure studies also inspired my thesis. I used the literature on infrastructure to explain that public health does not only consist of visible policies, organisations or professional actions, but also depends on underlying infrastructures. Bowker and Star (25) show that infrastructural classifications and standards shape what problems are made visible, comparable, recordable and practically manageable. So, infrastructures are crucial for developing collaborations. Star and Ruhleder (26), and Star (27), emphasise that these underlying infrastructures often only come to the fore when they fail or do not fit. Williams (28) and Karasti et al. (29) further show that infrastructures that allow for and organise collaboration do not continue by themselves but depend on boundary spanning, the linking of organisations and responsibilities, and long-term maintenance.

In the context of this literature, Chapters 3 to 8 show that public health infrastructures in the studied border regions do not have a self-evident cross-border character and that public health infrastructures do not automatically function outside the national context for which they were designed. This thesis uses infrastructure studies to shows the infrastructural work that is required to make public health work beyond national public health infrastructures (25-29). In adjacent border regions, public health requires not only substantive agreement and professional willingness, but also continuous practical, professional and administrative alignment between national public health systems; the alignment of the definition of public health problems, data, mandates, procedures, interventions and lines of accountability. National public health infrastructures implicitly assume a defined population, one authority with a mandate to act, shared classifications, data flows, known procedures and appropriate lines of accountability. In adjacent border regions in different countries, it becomes visible that these infrastructural conditions are organised differently at national or subnational level. These national and subnational differences show that public health infrastructures do not automatically connect in a cross-border context, but must be translated, aligned and connected. Even when this

succeeds, these infrastructural alignments remain fragile and temporary and depend on continuous maintenance work.

The work of scholars such as Strauss (30), Fujimura (31) and Allen (32) helps to understand the work needed to bring separate tasks, data, responsibilities and public health practices into a workable whole. Strauss (30) shows that distributed tasks do not automatically form one workable practice, Fujimura (31) shows that problems become practically manageable when methods, resources, organisational conditions and relevant social worlds can be aligned, and Allen (32) shows that coordination in healthcare requires translation between knowledge, rules, routines and organisational requirements. In my thesis, it has become clear that these insights do not only apply to infrastructures within a national context but are particularly relevant in border regions. Alignment and translation work is not only needed within national infrastructures, but also to connect different nationally organised public health systems. Policy and practice in public health only become workable in border regions when data, mandates, procedures, policy choices, interventions and lines of accountability are sufficiently aligned between nationally organised infrastructures.

Border studies and infrastructure studies both have helped to understand the particular dynamics of public health in border regions. My thesis underlines that cross-border fluidity in public health does not automatically lead to joint public health policy and joint public health practice. My thesis also shows that and that public health infrastructures because of their national character do not easily function across borders and are sometimes an obstacle for collaborative cross-border practices. Therefore, significant work is required to make infrastructural connections between nationally organised systems.

LESSONS LEARNED

The thesis makes clear that cross-border public health policy and practice is not (yet) stable and coherent. However, the thesis provides more specific insights and lessons about the development of public health in adjacent border regions. Across different themes and settings, this thesis indicates under which conditions cross-border cooperation becomes possible, when it remains fragile and what the main obstacles limits its sustainability. In this final section, I will elaborate on four lessons. First, practices of cross-border cooperation show that nationally shaped infrastructures of public health remain dominant. Second, cross-border collaborations in public health gains administrative traction mainly when it can be fitted into existing national frameworks. Third, cross-border cooperation in public health remains fragile and dependent on continued maintenance and alignment. Fourth, public health collaborations in adjacent border regions are still rarely approached from the perspective of citizens' cross-border everyday lives.



National infrastructures become apparent in cross-border public health cooperation

A first lesson is that initiatives for cross-border cooperation, paradoxically, expose how public health practices depend on nationally organised and often legally based infrastructures, including classifications, standards, data categories, competences, and lines of accountability. The chapters in this thesis show that many categories and routines in public health remain largely implicit because they are taken for granted in everyday public health work. In cross-border cooperation, however, these routines can no longer be assumed to be self-evident. Chapters 3 and 4 show this most directly, as differences in surveillance, data exchange, legal frameworks, mandates, procedures, and professional working practices repeatedly require alignment. It is further illustrated by Chapters 5, 6 and 7, where COVID-19, municipal policy exchange, and adolescent health promotion each show that data, responsibilities, target groups, implementation routes, and follow-up do not automatically connect across borders. What appears self-evident on one side of the border may be organised differently on the other, whether in the delimitation of target groups, the organisation of data exchange, the interpretation of case definitions, or the allocation of responsibility for follow-up. In other words, cross-border cooperation not only connects different systems, but makes visible the national character of infrastructures of policy and practice on which public health practices depend. From the perspective of infrastructure studies, a border region can therefore be understood as a form of infrastructural inversion, because organising public health across a border exposes the national infrastructures that usually remain implicit in public health practice (26, 27, 33).

One example that illustrates this clearly is vaccination. In the Netherlands the invitation for and registration of vaccination are primarily linked to place of residence, whereas in Belgium vaccination is organised through the school system. This difference matters because it affects how target groups are defined, through which route children are invited, where responsibility for follow-up is located, and in which system uptake is recorded. In border regions, where children cross the border on a daily basis to attend school in the neighbouring country, the choices that are embodied in a national vaccination practice and often taken for granted as 'natural givens', become visible. A child living in the Netherlands but attending school in Belgium may receive an invitation through the Belgian school system as well as through the Dutch municipality. By contrast, a child living in Belgium but attending school in the Netherlands may fall outside both systems, because the child is not invited through the Dutch municipality based on residence and not through the Belgian school system based on school attendance. Categories such as place of residence, target group, and registration unit are therefore not neutral, but shape who is approached, who remains out of sight, and how vaccination is organised, recorded and followed up in practice. Cross-border vaccination research underlines the broader relevance of underlying classification and registration infrastructures in border regions

by showing that vaccination behaviour in border regions can cross national systems and may complicate routine estimates based on administrative data from only one side of the border (34). Border studies help to understand why the organisation of public health in border regions cannot be understood as an organisational problem in a single national context. In border regions, everyday life often unfolds across borders, while public responsibilities remain territorially organised (8, 11, 20, 21).

Administrative traction depends on existing mandates

A second lesson of this thesis is that stronger cross-border public health infrastructures with their own mandates, routines, and lines of accountability remain largely absent. This implies that cross-border public health policy and practice only gain administrative traction through existing national and local structures and not through cross-border regional infrastructures. In different chapters it was shown that cross-border collaboration became workable only when it could be translated into national responsibilities, organisational routines, and follow-up structures in the different countries. This is shown most clearly in Chapters 2, 5, 6 and 8, where EU policy, pandemic control, municipal policy exchange and citizen participation each demonstrate that cross-border public health gains traction mainly when it can be connected to existing mandates, administrative routines and structures for follow-up. For acute and crisis related public health issues, this translation worked well. National organisations may be affected by disasters in border regions, and there is therefore more willingness to engage in some forms of cross-border collaboration, but even in this area there is no formal cross-border infrastructure for disaster management. By contrast, for infectious disease control, prevention and health promotion, age-friendly policies, and the prevention of substance use, this translation proved much more difficult. Here, cross-border public health concerns were seen as relevant, but it appeared too difficult to address them within existing national and local frameworks and infrastructures. As a result, cross-border public health has not become established as a stable administrative field. Bacchi's work helps to understand these findings (5, 7). She argues that policy problems are not fixed in advance but are framed in a particular way: problems are not considered as cross-border problems but as national problems because there is not a policy infrastructure to see and define problems from a cross-border perspective.

An infrastructural approach helps to understand how administrative traction develops. Action is not simply the result of policy intentions as expressed in policy documents, but of the many concrete administrative forms and routines through which action becomes possible in practice, including classifications, indicators, software, registrations, data routes, and mandates. Lascoumes and Le Galès argue that policy instruments are not neutral devices (35). Policy instruments help to organise how governing is made operational in practice and they shape which forms of action become administratively available (35). In cross-border public health, administrative traction therefore depends

on whether a problem of a border region can be identified, addressed, acted upon, and through cross-border responsibilities, organisational routines, and follow-up structures. Administrative relevance as such is not enough to bring about change. There must also be infrastructural means to act on an issue and carry it forward. Where existing infrastructures do not fully accommodate cross-border cooperation, actors may sometimes rely on workarounds - either to make cross-border collaborations fit into existing national and local structures or to develop cross-border collaborations by escaping national in infrastructures.

Cross-border public health requires active maintenance

A third lesson is that cross-border cooperation in public health does not constitute a stable scientific, professional and policy domain, but remains fragile and endures only insofar as cooperation is actively maintained. This lesson emerges most clearly from Chapter 4, where professionals describe how cross-border cooperation depends on repeated work to maintain contacts, align procedures, and justify cooperation within nationally organised public health systems. It is also reflected in Chapter 3, where scientific literature points to the vulnerability of weakly institutionalised and voluntary collaboration and in Chapters 6 and 8, where municipal policy exchange and citizen participation remain difficult to sustain beyond project-based structures. This analysis of professional practices in border regions showed that cross-border cooperation does not usually stop because willingness disappears, but because structural support is lacking and networks fall apart at some point. The vulnerability of voluntary and weakly institutionalised cooperation also explains why literature on cross-border infectious disease control calls for more durable forms of institutional cooperation rather than reliance on voluntary cooperation alone. Without durable institutional embedding, cross-border cooperation remains dependent on recurrent work of alignment, relationship maintenance, translation, and follow-up across institutional boundaries.

The lesson resonates with Williams' (28) work on boundary spanners in a national public administration, that is, professionals who make cooperation possible where responsibilities are dispersed across multiple organisations and administrative levels. In border regions, such work takes on a particular significance, because alignment does not occur within a single national administrative framework, but across national administrative frameworks. Border studies offer a similar insight that borders do not merely mark territorial dividing lines, but also organise responsibilities, coordination, and administrative space (9, 11, 20, 21). Scholars such as Karasti et al. (29) underline the importance of maintenance in sustaining cooperation over time. In their work on long-term collaborative processes, they show that infrastructures have a different temporality compared to projects, because they not only have to be built, but also require ongoing maintenance, continuity, and alignment. This temporal difference helps explain why cross-border cooperation may function well temporarily, but quickly becomes vulnerable once funding,

consultation structures, or key individuals disappear. In border regions, therefore, the issue is not only cooperation between organisations, but also infrastructural work that enables the maintenance of networks, procedures, information exchange, and responsibilities across borders. Border regions are not merely contexts in which cooperation takes place; they are settings in which borders shape the continuity, follow-up, and stability of cross-border cooperation.

Citizens' cross-border everyday lives remain insufficiently addressed

A fourth lesson is that public health in border regions is rarely approached from the perspective of citizens' cross-border everyday lives. In most practices examined, the point of departure was a disease, a crisis, a policy task, an intervention, or an administrative category and not the question of how public health connects to the everyday lives of citizens whose lives unfold across borders. Chapters 5, 6, 7 and 8 illustrate the pattern in relation to pandemic control, municipal policy exchange, adolescent health promotion and citizen participation, where public health work was more readily organised around tasks, interventions and institutional categories than around citizens' cross-border everyday lives. Such a point of departure is not in itself exceptional, because in national contexts public health and health promotion usually do not primarily depart from citizens' everyday lives either, but rather from professionally defined problems and interventions (36). In border regions, however, this lack of attention for citizens' perspectives and experiences takes on additional significance, because citizens' everyday lives are regularly organised across borders, while public health remains predominantly nationally ordered. For citizens, borders may be part of everyday mobility and social life, whereas for public health borders remain predominantly legal, territorial and administrative demarcations. Even in cross-border initiatives that explicitly sought to involve citizens, including initiatives regarding COVID-19, loneliness, and participation, organising cross-border citizen participation proved difficult. Moreover, a shared cross-border administrative structure is lacking through which the results and insights of participatory processes can be received, interpreted, and followed up.

In his analysis of border control, Walters (37) shows that borders are not only territorial dividing lines, but also governance divides. This idea helps to explain why public health initiatives in adjacent border regions do not depart from citizens' everyday lives, but primarily from nationally ordered administrative logics. Sohn (24), in his study of cross-border integration, shows that such integration does not simply result from the fading of borders, but from the ways in which borders are actively mobilised in social, economic and institutional practices. Sohn's analysis helps explain the finding in this thesis that citizens' everyday experiences with fluid borders are not translated into an organising point of departure for public health. Decoville and Durand (23) have shown that cross-border interactions form part of everyday life of residents living in border regions, while institutional and administrative frameworks do not align with them. This thesis shows that

public health is usually not built from that cross-border everyday life but departs from a national perspective and from national infrastructures for defining health risks and policies. Co-creating public health policies and practice is already difficult within a national context and becomes even more difficult in a cross-border one.

Taken together, this discussion shows that cross-border public health policies and practices in border regions are shaped in a variety of ways. It also becomes clear that these policies and practices are neither coherent nor stable by default but can function only insofar as the conditions for it are actively organised and sustained across the border. It is precisely here that the vulnerability of these cross-border policies and practices lies, because public health systems, mandates, categories, and lines of accountability remain predominantly nationally ordered. The central question of this thesis can therefore be answered as follows: public health policies and practices in border regions are organised and made workable by repeatedly aligning nationally anchored infrastructures, responsibilities, and relationships across the border.

POLICY AND PRACTICE RECOMMENDATIONS

The lessons developed in the previous section also have implications for public health policy and practice in border regions. The recommendations below indicate how cross-border public health can be made more workable, not by assuming that national systems can be fully harmonised, but by organising the conditions under which differences between systems can be recognised, connected, and followed up in practice.

Invest in cross-border infrastructural mapping

A first recommendation is that national and regional authorities, public health organisations, and cross-border cooperation structures should invest in systematic cross-border infrastructural mapping before cooperation is expected to function in practice. Cross-border public health can be organised more effectively when national and regional differences in classifications, data systems, registration routines, responsibilities, and implementation pathways are made explicit before incidents, crises, or temporary projects require cooperation. The aim of such mapping is not to harmonise all systems, but to clarify where systems differ, which differences matter in practice, and which agreements are needed to enable joint action despite those differences. Such mapping can take the form of a shared cross-border inventory of target groups, legal responsibilities, data sources, registration units, intervention routes, and follow-up responsibilities for a specific public health issue. This aligns with infrastructure studies, which understand classifications, standards, and registration routines as constitutive of what can be recorded, compared, coordinated, and followed up, and which show that infrastructures become particularly apparent when they do not fit or require maintenance (26, 27, 33).

For policy, this means that border regions should not only be approached as geographical areas, but also as places where different public health infrastructures meet. When new public health programmes are developed, policymakers should systematically assess how target groups, data flows, responsibilities, intervention routes, and follow-up are organised on both sides of the border. The WHO Essential Public Health Functions Framework may provide a useful starting point for such assessment. The WHO publication 'Cross-border public health in the Meuse-Rhine Euroregion: Applying a cross-border lens to the Essential Public Health Functions Framework' has already taken a first step in this direction by formulating questions that help examine how public health systems on either side of a border are organised, which policy measures exist, and what these may mean for citizens living in a border region (38).

For practice, this means that organisations should develop concrete cross-border working agreements on target group definitions, responsibilities for follow-up, possibilities and limitations of data sharing, comparability of indicators, and situations in which citizens live in one country but attend school, work, or use services in another. Such agreements do not only make cooperation technically more feasible. They also reduce the risk that citizens remain out of sight, are approached twice, or that responsibilities for follow-up remain unclear.

Create administrative routes for cross-border public health

Mapping cross-border infrastructural differences is a necessary first step but is not sufficient in itself. In practice, such mapping should be accompanied by the creation of administrative routes through which identified cross-border public health issues can be placed on the agenda, assigned to responsible actors, acted upon and followed up. Cross-border public health does not acquire administrative traction simply because an issue is substantively relevant for a border region. It must also be connected to mandates, responsibilities, evidence structures, policy instruments and accountability routines. Where such routes are absent, cross-border public health remains dependent on temporary projects, individual commitment or ad hoc problem-solving.

The need for such administrative routes can be understood through work on agenda-setting, problematisation, and policy instruments. Kingdon's work on agenda-setting shows that policy traction depends on the coupling of problem definitions, available solutions, and political-administrative opportunities (39). Bacchi's work on problematisation further shows that public problems do not exist as fixed entities but are constituted through policy frames (5, 7), while Lascoumes and Le Galès show that policy instruments help make particular forms of action administratively available (35).

For policy, this means that cross-border public health should be embedded more explicitly in existing public health frameworks, such as regional health agendas, crisis and

preparedness plans, prevention strategies, youth health policies, ageing policies, monitoring structures and accountability cycles. Such embedding should not only state that a cross-border issue is relevant, but should also clarify who can place it on the agenda, who has a mandate to act, what information is needed, and through which route decision-making and follow-up take place.

For practice, this means that professionals and organisations should know where cross-border signals, analyses or concerns can be brought forward. A signal concerning, for example, infectious disease risks, vaccination, adolescent health, ageing policy or citizen participation should not only be shared informally, but should have a clear route towards discussion, decision-making and follow-up within the organisations involved. In this way, cross-border public health becomes less dependent on incidental contacts and more firmly connected to routine public health practice.

Fund and mandate cross-border public health cooperation

Cross-border public health requires more than mapped infrastructures and administrative routes. It also requires structural capacity to maintain cooperation, coordinate across systems, and carry work forward over time. Policy and practice should therefore fund and mandate cross-border public health coordination as a structural public health function, rather than treating it as a temporary project activity. This is a demanding recommendation, because cross-border public health often has no self-evident institutional owner and because its urgency is not always recognised until a concrete problem or crisis occurs. Yet this is also why structural coordination is needed: without an organisational basis, cooperation has to be reconstructed repeatedly whenever cross-border issues become urgent, leading to duplication of effort, repeated start-up costs, and loss of institutional knowledge.

Thie argument is supported by Williams' work on boundary spanners, which shows that cooperation between organisations depends on professionals who maintain relationships, connect responsibilities and enable action where authority is dispersed (28). It also aligns with Karasti et al.'s distinction between project time and infrastructure time (29). Projects are oriented towards bounded outputs within a limited period, whereas infrastructures require maintenance, continuity and cumulative alignment over time.

For policy, this means that cross-border public health coordination should be structurally embedded in public health organisations, regional cooperation structures and Euregional organisations. This requires clear assignments, mandates, funding arrangements and accountability lines for maintaining cooperation, supporting agenda-setting, connecting information between systems, and ensuring that agreements and signals are followed up. Such structural coordination may also include a recurring cycle, for instance every four years, in which infrastructural mapping is updated, administrative routes are reviewed,

and cross-border public health priorities are reassessed. The main point, however, is that this work needs an organisational home and structural funding.

For practice, this means that professionals need time, role descriptions and organisational support for cross-border coordination and maintenance work. Maintaining contacts, preparing meetings, explaining differences between systems, aligning procedures, supporting follow-up and preserving institutional memory should not be treated as additional work alongside regular responsibilities, but as part of public health practice in border regions. It also means that shared responsibility requires a clearly designated coordinating actor or function. Designating a coordinating actor or function does not transfer responsibility for cross-border public health to one organisation or individual. It makes shared responsibility workable by ensuring that partners are convened, information is connected across systems, momentum is maintained, and agreements are followed up. In this way, cross-border public health becomes less dependent on temporary projects and incidental individuals and can develop into a more durable practice.

Connect public health policy and practice to citizens' cross-border everyday lives

Citizen-centred public health in border regions should be extended beyond territorial mandates and organisational boundaries. Citizens' cross-border everyday lives should therefore serve both as a starting point and as a test for policy and practice. This requires two interrelated movements: public health policy and practice should be aligned with cross-border patterns of everyday life, and citizens should be meaningfully involved in agenda-setting, design, implementation and evaluation. Both are needed if public health is to connect more closely to lives that, in practice, unfold across borders.

A citizen-centred approach to cross-border public health can draw on everyday-life perspectives in health promotion, which understand health-related practices in relation to the circumstances and routines of daily life (36). It also aligns with border studies, which show that cross-border mobility and interaction do not automatically lead to institutional or administrative integration (23, 24). For cross-border public health, this means that citizens' everyday lives are not only the context in which policy takes effect, but also a starting point for defining relevant issues, designing interventions, organising participation and arranging follow-up.

For policy, this can be organised through a cross-border everyday-life check when new public health measures are developed, implemented or evaluated. The central question is then: what does this measure mean for the cross-border everyday lives of citizens in a border region? Such a check can subsequently assess whether implementation processes, such as invitation, registration, communication and follow-up, fit citizens' cross-border routines; where gaps, duplications, barriers, cross-border behavioural shifts or unequal

access may arise; and which organisations are responsible for coordination, signalling and follow-up. Meaningful citizen involvement also requires administrative space for agenda-setting, feedback and follow-up, so that participation is not limited to consultation or project-based reporting.

For practice, this means that a citizen-centred approach within an organisation's own mandate is not automatically sufficient for cross-border public health issues. Formal participation should therefore be combined with systematic attention to citizens' cross-border everyday lives in regular contacts, outreach, monitoring and local needs assessments. Existing instruments for citizen participation, community assessment, health promotion or municipal public health planning can be used for this purpose, provided that they are applied with a cross-border lens. The specific instrument is less important than the shift in perspective: public health issues should also be considered from the perspective of citizens whose everyday lives unfold across national borders. This can be done by adding questions about living, working, schooling, use of care, access to information and services, and social relations across the border. Citizen participation can help to understand these questions more clearly, but it must be connected to institutional capacity to interpret experiences and signals, provide feedback and organise follow-up.

STRENGTHS AND LIMITATIONS

I based this thesis on a multi-site design in which I examined public health in border regions across policy, scientific knowledge production, and professional and administrative practice, using both qualitative and quantitative studies. This design was fruitful and productive because the research question could not be addressed from one setting alone. Developments in public health require work at the level of policy, knowledge production, the development of professional practices and ongoing engagements with everyday life. Studying these different settings made it possible to gain understanding of how these different domains supported cross-border public health. I also based the choice of cases and methods on pragmatic considerations, such as data availability. Nevertheless, the overall design made it possible to examine how public health policies and practices in adjacent border regions developed, and which obstacles shaped these dynamics. The theoretical inspiration from border studies and infrastructure studies helped to interpret the findings in the different studies and to see the broader picture.

The thesis also has limitations. The chosen design does not provide a long-term in-depth study of one single organisation, practice, or institutional context, nor does it aim to produce one fully integrated account across all chapters. Its strength lies in bringing together different methods, materials, and settings to identify patterns across them. Its limitation is that this breadth comes at the expense of depth within each individual site. The use

of heterogeneous materials also requires careful interpretation, since policy documents, interviews, review material, and quantitative analyses do not produce the same kinds of claims and cannot be treated as equivalent forms of evidence. The next section therefore presents the lessons learned as recurring mechanisms across themes and settings, rather than as conclusions tied to one chapter or one evidentiary register. Empirically, there is some imbalance between the data available for the two border regions: the Rhine-Meuse-North Euroregion is represented somewhat less extensively than the Meuse-Rhine Euroregion, but both regions are represented in all chapters, namely Chapters 4 to 8, that deal with cross-border public health practices. The findings suggest that patterns for cross-border collaboration in both regions are rather similar and there is no indication that cross-border collaborations in public health can be more easily developed in one of these regions than in the other.

FUTURE RESEARCH

This discussion provides ideas for future research, in particular concerning the question how public health policies and practices in border regions can be developed.

A first line of inquiry concerns the significance of the geography of border regions and everyday cross-border mobility for public health. This thesis showed that public health in border regions rarely departs from everyday border cross mobility of residents, even though their lives regularly unfold across borders. In Chapter 3, it became clear that, in infectious disease control, mobility and cross-border contacts are often taken into account in analyses of spread, surveillance, and response. In the domain of prevention and health promotion this is much less the case. It is therefore important to develop research that examines how mobility, service use, and preventive practices are organised across borders in border regions. This involves not only comparison between adjacent border regions, but also the study of border regions as a shared geographical and social space. Future research could also examine to what extent border commuters or other groups with cross-border routines display different patterns from citizens whose everyday lives remain largely within national borders.

A second line of inquiry concerns the impact of life in adjacent border regions on public health. This thesis has shown how border regions differ in policy, organisation, infrastructures, and cooperation, and which questions of alignment arise from these differences. A next step is to investigate to what extent such differences are also associated with differences in public health outcomes. This applies, for example, to the question whether differences in prevention policy, screening practices, vaccination organisation, or municipal public health approaches not only lead to differences between adjacent regions, but also shape dynamics across the border within one border region, for instance in reach,

accessibility, and health outcomes. It is equally relevant to ask to what extent border mobility itself has an impact on public health, not only in terms of risk or spread of infectious diseases, but also in terms of access to and use of services, and the fit between public health provision and cross-border everyday lives.

A third line of inquiry concerns what cross-border cooperation can yield in administrative, substantive, and societal terms. Much research and policy advice on border regions maps differences in legislation, policy rules, competences, financing, and data infrastructures, and identifies the problems that follow from these differences. This is relevant, but often leaves open the question of what is nevertheless possible despite or sometimes because of such conditions. Under which conditions does cross-border cooperation lead not only to better alignment, but also to health gains, efficiency, or other forms of societal and economic added value? Which forms of joint cross-border policymaking or coordination are actually feasible, and for which public health tasks? And which mandates, infrastructures, and accountability structures are needed not only to make such cooperation possible temporarily, but also to embed it more durably? Such research may help shift cross-border public health away from a primary focus on obstacles. It may also help move cross-border public health beyond projectified and fragile practices towards more robust and sustainable forms of cooperation.

A fourth line of inquiry concerns whether the patterns identified in this thesis also emerge in other European border regions. This thesis focused on two Euroregional settings along the Dutch-German-Belgian border and showed how cross-border public health depends on repeated work of alignment between nationally organised infrastructures, responsibilities, and routines. Future research could examine to what extent similar dynamics emerge in other European border regions with different institutional, linguistic, geographical, and political configurations. Comparative research across several border regions could help establish which mechanisms are more general to cross-border public health in Europe and which are more specific to particular border settings. Such research would also make it possible to assess whether certain forms of institutional support, coordination, or border regional organisation create more favourable conditions for sustaining cross-border public health practices.

A fifth line of inquiry concerns the everyday cross-border lives and perspectives of citizens living in border regions. This thesis showed that public health in border regions is only rarely approached from the perspective of citizens whose everyday lives unfold across borders, while Chapter 8 demonstrated how difficult it is to organise cross-border participation in ways that allow for meaningful follow-up. Future research should therefore examine more directly how residents in border regions live with, move through, and make use of different social, institutional, and public health environments across borders in their everyday lives. This includes the question of which health-related issues citizens

themselves experience as specifically cross-border, how they navigate different systems of prevention, care, support, and participation in practice, and where mismatches arise between their everyday routines and nationally organised public health arrangements. It should also examine under which conditions institutions can take up citizens' perspectives in forms of participation that are not only consultative but also institutionally receivable. Future research could also develop and evaluate cross-border adaptations of existing tools for citizen participation, community assessment, health promotion and municipal public health planning, and examine how citizens' experiences can be translated into policy-relevant knowledge for border regions. Such research would help to develop public health in border regions not only as an administrative or professional field, but also from the perspective of the citizens whose lives it is meant to support.

These lines of inquiry are of course interrelated. Where citizens, mobility, service use, and policy effects are not confined to a national public health system, the question is not only what that cross-border dynamics look like, but also whether public health professionals and organisations are sufficiently equipped to recognise the cross-border dynamics, to interpret it, and to act on them. This raises the question which forms of knowledge, competences, and organisational capacities public health organisations need to develop cross-border public health policies and practices.



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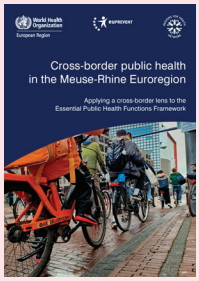
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APPENDIX I: PRACTICAL EXAMPLES CHAPTER 9

This appendix presents selected practice documents that illustrate how themes addressed in Chapter 9 were reflected in examples of policy, practice, implementation and professional tools in public health.

The documents included in this appendix are presented as contextual practice examples, not as additional empirical material analysed in the thesis chapter. Links and QR codes are provided where available to enable access to further information and archived materials.

Cross-border public health in the Meuse-Rhine Euroregion, 2025

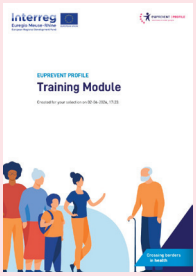


This WHO Regional Office for Europe report applies a cross-border lens to the Essential Public Health Functions Framework. It discusses public health policies, interventions and challenges in the Meuse-Rhine Euroregion and argues for stronger governance, workforce development, sustainable financing, comparable data and better integration of cross-border public health into national frameworks.

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2025: *Cross-border public health in the Meuse-Rhine Euroregion: applying a cross-border lens to the Essential Public Health Functions Framework.*

ISBN PDF 9789289061926

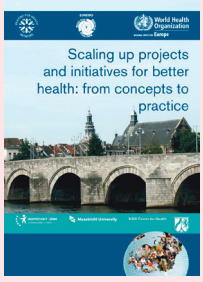
euPrevent PROFILE Training Module, 2026



This training module was developed within the euPrevent PROFILE project as a practical tool for professionals and volunteers working with loneliness among older people. It combines theoretical background on loneliness, ageism and risk factors with practical guidance on communication, identifying needs, discussing loneliness, selecting interventions and reflecting on professional roles and boundaries.

Download via publication list – euPrevent Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2026: *euPrevent PROFILE Training Module*

Scaling up projects and initiatives for better health, 2016



This WHO Regional Office for Europe and Regions for Health Network publication provides practical guidance for scaling up health promotion and public health projects. Based on a narrative literature review, a survey among key informants from ten WHO Member States and regional case studies, it identifies factors that support or hinder scaling up and offers tools for assessing scalability, planning, implementation and transfer to other settings.

Download via publication list – Regional and International Publications:
https://www.brigittevanderzanden.eu/en/publications.html
2016: *Scaling up projects and initiatives for better health*

ISBN 9789289051552

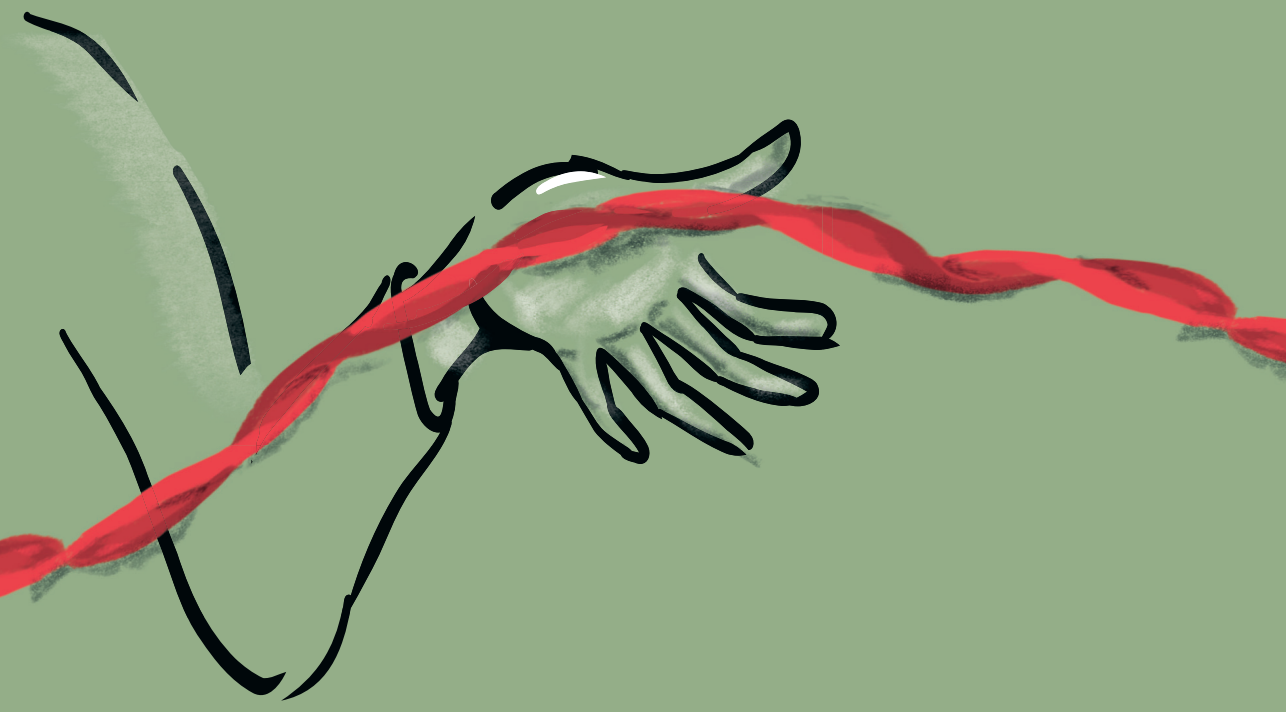
Best practice in the Euregio Meuse-Rhine, 2019

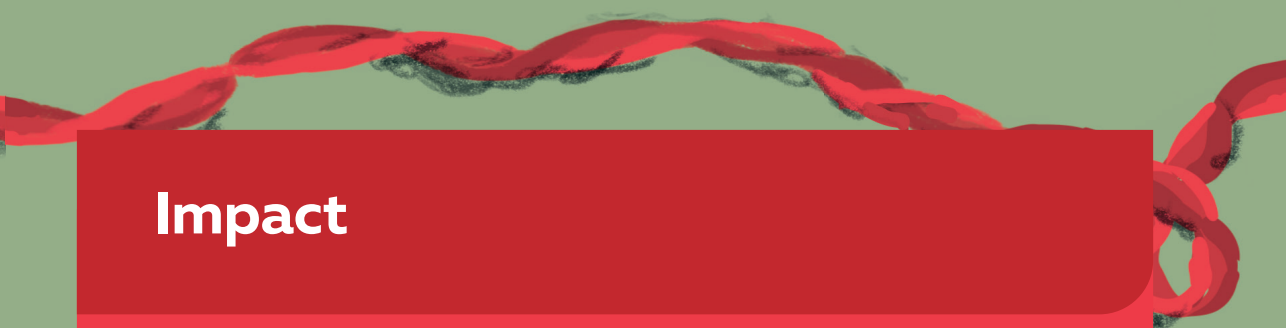


This vademecum presents 31 public health initiatives from the Meuse-Rhine Euroregion, collected in preparation for the conference on keeping people at the centre of health and sustainable development policies. It brings together examples on equity, participation, human resources and Health in All Policies, illustrating how broad public health principles were translated into regional practice.

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https://www.brigittevanderzanden.eu/en/publications.html
2019: *Best practice in the Euregio Meuse-Rhine*

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Impact



In this chapter, I reflect on the societal, scientific, professional, and infrastructural relevance of this thesis, and on the ways in which its findings may be of value beyond academia. This thesis examined how public health in border regions is organised in practice under conditions of cross-border interdependence and nationally structured responsibilities. Its findings show that the difficulties and possibilities of public health in cross-border regions are not located only in formal policy or legal arrangements, but also in the everyday work of coordination across fragmented institutional, administrative, and knowledge infrastructures. This is relevant not only for academic debate, but also for policymakers, public health professionals, cross-border networks, public health education and training, and knowledge institutions concerned with health and governance in European border regions.

A central insight of this thesis is that public health in border regions is organised in settings where everyday life often extends across borders, while mandates, funding arrangements, data infrastructures, and accountability remain largely organised at national or subnational level. The tension between cross-border everyday life and the national organisation of public health is therefore not incidental, nor limited to moments of crisis, but a structural feature of public health in European border regions. This matters because it affects how public health problems are recognised, how responsibilities are interpreted, and what can be organised in practice across borders. From that perspective, the impact of this thesis lies both in clarifying these dynamics and in contributing to reflection, collaboration, and practice in settings where borders continue to matter in everyday public health work.

The theoretical perspective of infrastructure studies helps to further specify why this tension matters in practice. Border studies draw attention to the continuing significance of borders under conditions of interdependence, while infrastructure studies make visible how this significance is organised in classifications, reporting routines, information systems, and coordination practices. Interventions, policy decisions, standards, and categories organise public work and shape what can be recorded, compared, coordinated, and acted upon in formal systems. Border regions make these issues particularly visible, because categories, standards, and routines do not move automatically across national systems. In that sense, cross-border regions reveal with particular clarity how public health depends on infrastructures that often remain taken for granted elsewhere.

I distinguish three interrelated lines of impact in this thesis. The first concerns the everyday life of citizens and professionals in border regions. The second concerns policy and public health practice. The third concerns science and the development of knowledge infrastructures. Across all three, the central question is how knowledge from cross-border regions, including the experiential knowledge of citizens and professionals, can be or-

ganised and used in ways that are both socially meaningful and administratively relevant, without losing its practical grounding.

IMPACT ON EVERYDAY LIFE

With regard to everyday life, the main contribution of this thesis lies in making citizens' perspectives and border experiences more intelligible within professional, administrative, and educational contexts. The impact here does not primarily lie in immediate institutional change, but in the way this thesis helps to interpret the experiences of residents in border regions more precisely, to identify border-specific bottlenecks more clearly, and to support actors who engage with citizens directly, represent their interests, or prepare students for practice through education and training.

One concrete route through which this impact takes shape is the connection between citizens' perspectives and cross-border cooperation. EPECS is a citizens' initiative that seeks to give residents a voice in cross-border cooperation with the aim of improving quality of life in border regions. This thesis offers a way of understanding citizens' experiences not merely as isolated stories or signals, but as forms of situated knowledge about the points were border differences and institutional boundaries shape everyday life. This makes it possible to relate citizen input more directly to the conditions under which participation becomes meaningful, including multilingualism, representativeness, responsiveness, feedback, and the institutional capacity to act upon citizen input. The contribution of this thesis lies, above all, in showing that experiential knowledge from everyday life in border regions is highly relevant for understanding where institutions and everyday practices do not align, and what institutions require to take up such knowledge more seriously in practice. I also discussed these issues in several meetings with EPECS board members. As one concrete follow-up, I drafted and submitted proposals for Bachelor's and Master's student placements at EPECS, allowing this theme to move beyond discussion alone and into further practical development.

A second route through which this impact extends is education and training. I have translated insights from this thesis into annual guest lectures in the European Public Health programme at Maastricht University and into the supervision of medical students. In this way, I introduce students to cross-border public health not as an exceptional setting, but as a normal public health context in which administrative, legal, and data-related conditions shape practice. The societal impact here lies less in immediate policy change than in capacity building: in familiarising future professionals with a way of thinking that is still not self-evident within nationally organised curricula.



More broadly, the societal relevance of this thesis lies in the more precise interpretation and use of citizens' perspectives, practical knowledge, and border experiences in professional, administrative, and educational settings. Through such intermediary actors, knowledge rooted in border regions can come closer to the cross-border everyday lives of residents, even if this impact does not yet extend directly to a broad public. In that respect, this thesis shows that meaningful use of citizen input depends not only on participation itself, but also on the institutional capacity through which institutions can receive, interpret, and follow up such input in practice.

IMPACT ON POLICY AND PRACTICE

In relation to policy and practice, the main impact of this thesis lies in clarifying under what conditions cross-border public health comes into view in public health decision-making, how measures are justified, and how proportionality is assessed. The thesis shows that public health in border regions requires not only goodwill and local willingness to cooperate, but also the administrative, infrastructural, and governance conditions needed to support coordinated and sustained action across borders.

This became particularly visible through engagement with professional networks, including the Euroregional working groups within euPrevent. From the beginning of this PhD trajectory, I brought insights from the research into euPrevent, a Euroregional network aimed at promoting health and quality of life in the Dutch-German-Belgian border region. Within this network, it became clear that professionals widely saw cross-border cooperation as relevant and necessary in everyday practice, yet much less firmly embedded institutionally. The strong reliance on projects reflected not only thematic choices, but also an administrative and financial reality in which structural support was granted only temporarily and regional co-financing remained difficult to secure. The forms of cooperation needed in everyday professional practice did not automatically align with the mandates, lines of accountability, and organisational conditions of the institutions involved. This helps explain why the euPrevent board decided to discontinue the network in 2025, despite its widely recognised added value. At the same time, the continuation of contacts and renewed exchange initiated by professionals through other routes, such as the February 2026 meeting on Euroregional substance abuse prevention, illustrates that the practical need for cross-border collaboration did not disappear. Rather, professionals reconstituted it in other configurations wherever professionals continued to see concrete value in it.

A second example is GRENSimpact, which illustrates the policy-related relevance of this thesis in relation to how measures in border regions are assessed and how nationally framed assumptions may create blind spots. GRENSimpact focused on analysing and

visualising infection dynamics and societal impact in selected border regions in order to inform more tailored policy responses. Chapter 5 provides an important analytical basis for this work. The resulting cross-border digital COVID-atlas and a factsheet translated these findings into a more accessible form for policymakers and decision-makers and showed that border closures during the period under study did not make a significant contribution to containment, while their societal consequences could be substantial. In this way, the thesis creates room for a more critical assessment of far-reaching measures such as border closures, not only in terms of epidemiological effectiveness but also in terms of proportionality and collateral consequences for citizens, employment, education, and social relations in border regions.

These findings also have a broader policy relevance in the current geopolitical context. Recent years have seen a renewed emphasis, both within and beyond Europe, on national control, strategic autonomy, and the delineation of national responsibilities. At the same time, crises and international tensions have repeatedly demonstrated how deeply countries remain and need to be interconnected in practice, including in the domain of health. The COVID-19 pandemic made this especially visible: developments in one country quickly shaped policy considerations, administrative decisions, and public health practice in another. In border regions, this tension becomes particularly tangible, because cross-border interdependence and nationally organised responsibilities meet there on a daily basis. For that reason, the policy relevance of this thesis extends beyond the border region itself. It speaks to a broader question of how public health can remain responsive under conditions in which national systems remain the primary framework of action, while important health dynamics transcend those national boundaries.

The policy and practice impact of this thesis therefore lies less in directly changing policy than in making clearer why cross-border public health is often difficult to sustain, even where its practical relevance is widely recognised. It also clarifies why this issue becomes more salient in periods of geopolitical uncertainty and mutual dependence. One of the most important practical contributions of the thesis is to strengthen recognition among policymakers, administrators, and public health professionals that border regions cannot be treated as a marginal concern in public health. Public health in border regions is not sustained by local willingness to cooperate alone, but depends on mandate, governance, data coordination, and continued alignment across systems with different lines of authority and accountability.

In that respect, the thesis also strengthens the argument that public health in border regions requires boundary spanning: the continuing work of translation, coordination, and alignment between nationally organised systems. The planned assessment in the Meuse-Rhine Euroregion offers a concrete avenue for taking this line of impact forward, and Nivel, Maastricht University, and AWPG Mosa will carry it out jointly. This assessment

focuses on five selected Essential Public Health Functions, using a World Health Organization framework that has also been discussed in relation to resilient public health systems. By applying these functions in a border setting, the assessment may help make more visible to what extent border effects are, or are not, considered in public health policy, coordination, and implementation.

SCIENTIFIC IMPACT AND IMPACT ON KNOWLEDGE INFRASTRUCTURES

This thesis also contributes to science and to the development of knowledge infrastructures by helping to strengthen cross-border public health as a recognised field of inquiry, collaboration, and institutional development. Public health in border regions is often addressed in fragmented ways: through separate projects, policy documents, temporary collaborations, and ad hoc funding arrangements. By bringing together insights from European policy, scientific literature, professional practice, epidemiology, municipal policy, and citizen participation, this thesis helps to articulate cross-border public health more clearly as a coherent field of inquiry and action. Its impact therefore lies not only in the production of knowledge, but also in the strengthening of the scientific, professional, and institutional infrastructures needed to sustain that field over time.

A first concrete expression of this impact was the WHO publication on cross-border public health in the Meuse-Rhine Euroregion. That publication was closely intertwined with this thesis and emerged from collaboration between euPrevent, GGD Zuid-Limburg and regional and international public health partners, including members of the WHO Regions for Health Network. In developing that publication, the authors used empirical material, conceptual insights, and comparative perspectives from this thesis, including the analysis of European policy, the comparative description of public health systems, and data on populations living in border regions. At the same time, the WHO publication fed back into the thesis by sharpening the comparative understanding of public health organisation in the Netherlands, Belgium, and Germany and by strengthening the elaboration of the Meuse-Rhine Euroregion as a concrete example. Its impact therefore lies not only in the publication as a separate product, but also in the reciprocal exchange through which the thesis informed a WHO-oriented knowledge output and that broader international framing in turn strengthened the thesis.

A second, more structural, form of impact lies in the contribution of this thesis to the establishment and development of the WHO Collaborating Centre Regions for Health and Cross-Border Public Health in Maastricht. This Collaborating Centre is embedded in Maastricht University, more specifically within CAPHRI and the Department of Social Medicine, and works in close relation with regional, national, and international partners. Its devel-

opment also builds on longstanding collaboration with euPrevent, GGD Zuid-Limburg, the Living Lab Public Health Mosa (Academische Werkplaats Publieke Gezondheid Mosa), Maastricht UMC+, ASPHER, the WHO Regions for Health Network, and cross-border partners in the Meuse-Rhine Euroregion. The thesis has contributed substantively to the intellectual agenda of the Collaborating Centre by helping define its thematic orientation, conceptual language, and practical relevance. Conversely, the Collaborating Centre provides a durable institutional infrastructure through which the insights of the thesis can continue to shape research, education, training, capacity building, networking, and policy translation in the years ahead. In that sense, the impact of this thesis extends beyond a set of publications and contributes to the creation of a longer-term platform for the further development of cross-border public health.

This thesis also contributes to the CAPHRI research line Health Inequities and Societal Participation (HISP), a collaborative programme of the Departments of Medical Microbiology, Social Medicine, and Health, Ethics & Society. It provides a strong example of the HISP approach because it takes a transdisciplinary perspective on cross-border public health. The thesis combines biomedical and epidemiological insights with policy analysis and social science perspectives, thereby addressing public health not only in terms of disease patterns and risks, but also in terms of governance, inequalities, participation, and societal organisation. In doing so, it illustrates the added value of the HISP approach for understanding and addressing complex public health challenges.

The scientific relevance of the thesis also lies in its contribution to the strengthening of border regions as a legitimate and productive setting for public health research. This thesis approaches border regions not as peripheral exceptions to nationally organised systems, but as analytically revealing sites where the organisation of public health becomes especially visible. This has relevance for the further development of comparative public health research, cross-border epidemiology, public health governance studies, and implementation-oriented research. By connecting empirical studies on EU policy, cross-border infrastructures, infectious disease control, municipal policy, citizen participation, COVID-19, and youth health promotion, the thesis demonstrates that cross-border public health is not a narrow topic confined to crisis response. It is a broader field that also concerns governance, prevention, participation, and everyday health practices. In that way, the thesis offers a stronger basis for future comparative studies, doctoral research, teaching activities, and interdisciplinary collaboration.

The societal and professional impact of the thesis has also taken shape through agenda-setting and knowledge exchange in regional, European, and international networks. During the development of the thesis, I repeatedly discussed its themes and findings in workshops, presentations, and professional meetings within the WHO Regions for Health Network, where participants addressed cross-border public health as a broader

regional and European concern rather than as a purely local issue. The thesis also fed into discussions within EUREGHA, including its cross-border health activities, and into wider exchange at the European Public Health Conference and other public health fora. In these settings, the work helped place border regions more clearly on the agenda as contexts in which differences in legal frameworks, administrative mandates, surveillance routines, service access, and policy traditions shape both everyday public health practice and crisis response. The impact here lies in the fact that the thesis not only documented these dynamics, but also helped develop a conceptual and professional language through which networks and institutions could discuss them.

At regional level, the thesis connects directly to longstanding infrastructures of collaboration in the Dutch-German-Belgian border area, including euPrevent, the Meuse-Rhine Euroregion, the Rhine-Meuse-North Euroregion and professional and policy networks linking public health actors across the Netherlands, Belgium, and Germany. It also resonates with the broader mission of the Living Lab Public Health Mosa / AWPG Mosa, which aims to connect research, policy, and practice in ways that generate societal value. In this sense, the thesis contributes to regional capacity building by offering a more explicit understanding of how cross-border public health is organised, where its bottlenecks lie, and under which conditions collaborative practices can be sustained. This is relevant not only for infectious disease preparedness, but also for broader themes such as health promotion, ageing, youth health, and citizen participation.

The impact of this thesis is therefore not confined to academic dissemination. It also lies in the way the thesis has translated knowledge from border regions into institutional development, international networking, comparative learning, education, and practical agenda-setting. At the same time, the thesis shows that much of this field still depends on temporary projects, motivated individuals, and fragile collaborative routines. A continuing challenge is therefore to embed cross-border public health more firmly in scientific frameworks, educational programmes, governance arrangements, and administrative infrastructures.

CONCLUDING REFLECTION

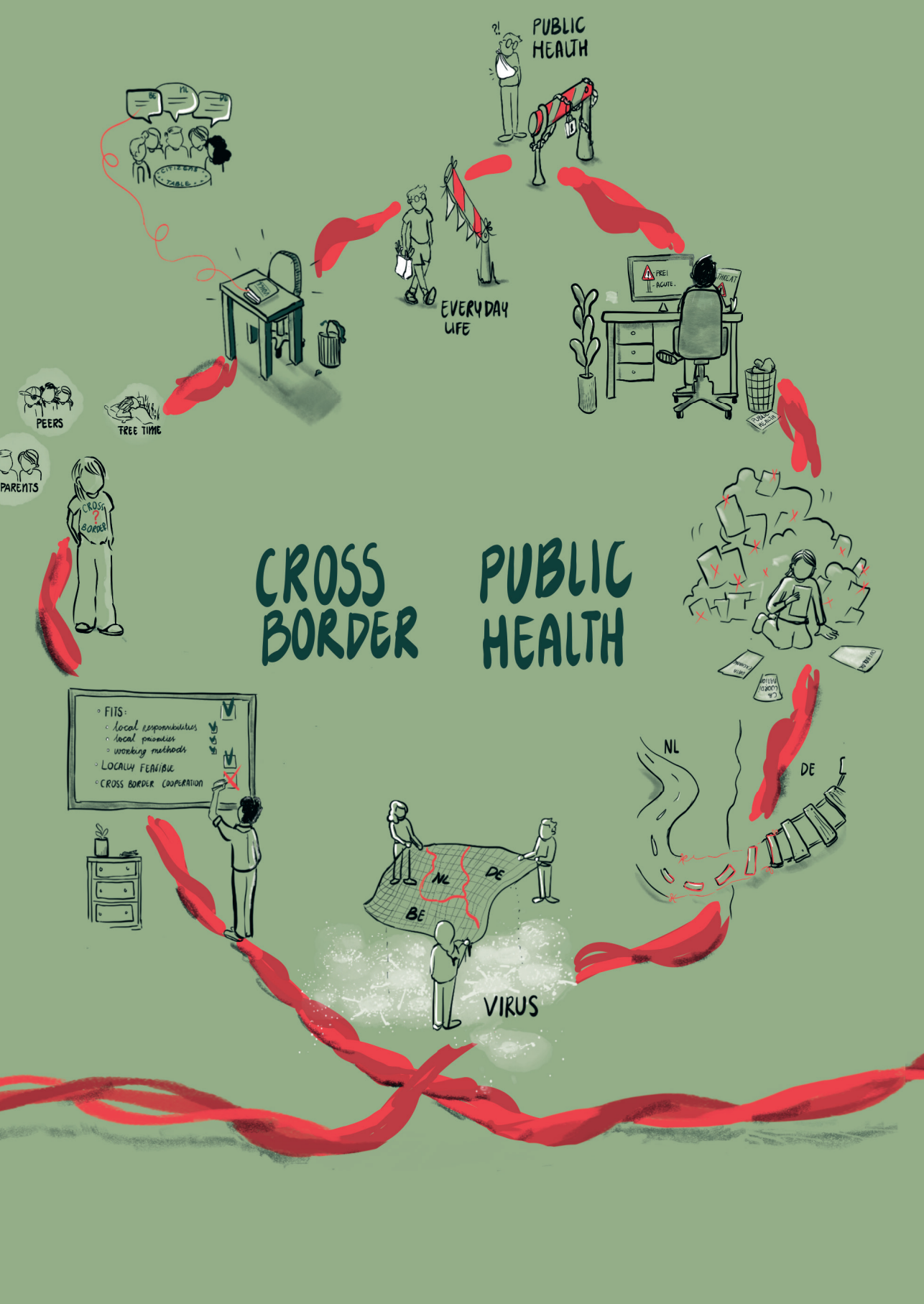
Taken together, this thesis contributes not only new knowledge on public health in border regions, but also a stronger platform from which that knowledge can circulate, accumulate, and be used. By connecting Maastricht University, CAPHRI, the HISP research line, the Departments of Social Medicine, Medical Microbiology, and Health, Ethics & Society, Maastricht UMC+, GGD Zuid-Limburg, the Living Lab Public Health Mosa, the WHO Collaborating Centre, the WHO Regions for Health Network, ASPHER, euPrevent, EUREGHA,

and the Meuse-Rhine cross-border setting, the thesis forms part of a broader knowledge infrastructure in which research, policy, practice, and training can reinforce one another.

In that respect, the impact described here did not begin only after completion of the research. It already took shape during the thesis itself, as actors in professional networks, policy-oriented activities, educational contexts, and institutional developments interpreted, translated, discussed, and took up knowledge from border regions. At the same time, much remains to be consolidated. The continuing challenge is to ensure that cross-border public health does not remain dependent on temporary projects, individual commitment, or ad hoc cooperation, but becomes more firmly embedded institutionally, administratively, scientifically, and educationally. In that sense, this thesis contributes not only to a better understanding of public health in border regions, but also to a stronger basis for treating the border region as a normal, productive, and necessary context for public health.






PUBLIC HEALTH
NL
CITIZENS TABLE
EVERY DAY LIFE
PEERS
FREE TIME
PARENTS
CROSS BORDER
PUBLIC HEALTH
FITS:
local responsibilities
local priorities
working methods
LOCALLY FEASIBLE
CROSS BORDER COOPERATION
NL
DE
BE
VIRUS

Summary



SUMMARY

Introduction, Chapter 1. The central question of this thesis is how public health in border regions is organised and made workable as a field of policy and practice. Depending on the readability of the text, I use both the term 'public health in border regions' and 'cross-border public health' for this. In both cases, I refer to cooperation in the field of public health between neighbouring regions in different countries. This adjacent border-regional setting forms the central starting point of this thesis. In doing so, I do not proceed from the assumption that this already constitutes a self-evident and coherent domain. Rather, the central question is how this domain takes shape in border regions where the everyday lives of citizens and professionals unfold across national borders, while national and subnational authorities continue to organise responsibilities, competences and information provision. To analyse this question, I combine insights from border studies and infrastructure studies. In doing so, I examine both the significance of borders for governance and cooperation, and the registrations, standards and routines through which public health is organised in practice. Drawing on border studies, I approach borders not only as formal state borders, but also as institutional and administrative arrangements that help determine what is possible in the practice of public health. At the same time, drawing on infrastructure studies, I focus on the categories, registrations, standards, information flows and coordination routines that link policy and practice. It is precisely through these connections that it becomes clear how public health in border regions is organised in practice and made workable.

In **Chapter 2,** we examine how EU policy defined public health in border regions and under what conditions it developed into a European policy task. Our analysis showed that border regions featured prominently within EU public health policy primarily in relation to serious cross-border threats, particularly biological, chemical and environmental risks. In that context, the emphasis was on surveillance, early warning, preparedness and response. Broader European public health policy recognised prevention and health promotion as important, but did not develop them as a specific cross-border public health task for border regions. It thus became clear that, at EU level, public health in border regions gained policy traction primarily when problems aligned with existing infrastructures for early warning, knowledge production and coordination, and when EU institutions could administratively justify action.

In **Chapter 3,** we use a scoping review to examine how the scientific literature described cross-border infectious disease control in European border regions. In doing so, we identified which infectious diseases and border regions were most frequently studied, which problems in cross-border cooperation were described, and which cross-border recommendations for improvement the literature provided. Based on a systematic inventory and thematic analysis of the available literature, showed that this field of research

was relatively narrow in scope and geographically concentrated on a limited number of border regions and infectious diseases. The included studies primarily highlighted structural bottlenecks, particularly in the areas of surveillance, monitoring, data exchange, governance, and legal and procedural coordination. The included studies mainly made recommendations to structurally strengthen cross-border cooperation, particularly through closer institutional cooperation, better coordinated surveillance, and improved data exchange. It thus became clear that the scientific literature primarily approached cross-border infectious disease control as an issue of structural alignment and system coordination, while preventive alignment outside outbreak situations remained less developed.

In **Chapter 4,** we examine how public health professionals in the border region between the Netherlands, Germany and Belgium experienced and maintained cross-border cooperation. Based on nineteen interviews with professionals, we analysed the challenges they identified in this cooperation and the work required to keep cooperation, coordination and information exchange going across the border. The interviews showed that public health professionals widely valued cross-border cooperation, but that it was also vulnerable due to differences in national rules, procedures and accountability expectations, and because cooperation often remained dependent on temporary projects and personal commitment. To keep cooperation workable nonetheless, professionals indicated that they were constantly engaged in coordination, organisation, maintaining personal contacts, and making cross-border activities within their own organisations understandable and defensible.

In **Chapter 5,** we analyse the COVID-19 pandemic as a situation in which state borders were once again deployed as a tool for pandemic control. We investigated whether cross-border transmission of SARS-CoV-2 played a significant and substantial role in the COVID-19 burden within four Euroregions along the Dutch-German-Belgian border. Based on a GIS analysis and a space-time cluster analysis of over four million recorded COVID-19 cases between March 2020 and October 2022, it emerged that incidence largely followed national patterns during the period under investigation. Cross-border clustering did occur, but mainly during periods of very high transmission and not as an early or defining pattern in the course of the pandemic. These findings provided no epidemiological justification for extensive border closures as a central measure of pandemic control. Such measures were, however, justified on the basis of nationally bounded surveillance systems, while the consequences were felt most acutely in the everyday cross-border lives of residents in these regions.

In **Chapter 6,** we examine how municipalities in the Meuse-Rhine Euroregion assess the relevance and feasibility of cross-border policy exchange for age-friendly initiatives, and which barriers and facilitating factors play a role in this. Based on semi-structured group

interviews with participants from 33 municipalities, we analysed how municipalities within the Senior Friendly Communities project dealt with policy examples and initiatives from across the border. The analysis showed that cross-border policy exchange was rarely an end in itself for municipalities, but was primarily approached as a selective source for the development of local policy. Whether municipalities deemed examples from across the border useful depended on the extent to which they could align them with their own responsibilities, priorities and working methods within fragmented institutional contexts. It also emerged that more sustainable forms of cross-border policy exchange depend not only on local willingness, but also on administrative and organisational conditions that support coordination, translation and continuity. It thus became clear that cross-border public health policy at the local level does not arise automatically from proximity, but takes shape through selection, adaptation and integration within existing policy and administrative frameworks.

In **Chapter 7,** we examine how individual and environmental factors are associated with substance use among adolescents in border regions of the Netherlands, Belgium and Germany. Based on a large-scale survey of school pupils in these border regions, we analysed differences in binge drinking, smoking and vaping, and cannabis use, as well as their associations with psychosocial characteristics and factors in adolescents' immediate social and physical environment. The analysis showed that various factors played a role, but that peer influence, frequent late-night outings, parental supervision and participation in structured leisure activities were the factors that emerged most consistently across the three national contexts. This chapter thus makes it clear that observed patterns of substance use between countries cannot be understood solely in terms of differences in national policy, but should also be considered in relation to the social environment in which adolescents in these border region grow up.

In **Chapter 8,** we examine how citizen participation in border regions is organised in a situation where there is no shared level of government and no stable cross-border administrative infrastructure is available. Based on a document analysis of four cross-border participation initiatives, we analysed how agendas, participation formats, representativeness and follow-up were organised in the border region of the Netherlands, Belgium and Germany. The analysis showed that coordination between organisations from different countries, requirements relating to funding and accountability, and practical choices concerning standardisation, recruitment and multilingualism strongly shaped these participation processes. As a result, cross-border participation became organisable, but the scope for locally responsive deliberation and the possibilities for broad and balanced representation were also limited. It also emerged that the outcomes were primarily collated, reported and disseminated within cross-border networks, and much less frequently led to joint policy follow-up. Thus, this chapter demonstrates that citizen participation in border regions depends on institutional coordination that enables joint action. At the

same time, the lack of a shared agenda, a body capable of receiving and following up on the outcomes, and a common policy framework limits its scope and impact. Thus, this chapter emphasises that public health in border regions does not constitute a self-evident cross-border domain, but must be made organisationally and institutionally workable on a case-by-case basis.

Discussion. In this thesis, I have shown that public health in border regions cannot be understood as a self-evident sum of national systems, nor as an already fully developed cross-border policy domain. Public health in border regions takes shape in the way problems are defined, responsibilities are allocated, data are produced and used, and co-operation is maintained in practice. A first lesson is that cross-border cooperation reveals that public health relies on national classifications, registrations, standards and routines that usually remain in the background within a single country and are therefore hardly noticeable. It is only through cooperation with a neighbouring country, where problems, data and responsibilities are organised differently, that it becomes clear that these infrastructures are not neutral, but help determine what counts as a relevant problem, who becomes visible and how policy is made practically feasible.

A second lesson is that, for the time being, cross-border public health mainly gains administrative traction when it fits within existing national frameworks of problem definition, mandate, evidence and accountability. Precisely because a stronger cross-border infrastructure with its own mandates and lines of accountability is largely absent, national policy frameworks remain the guiding principle in determining what is administratively manageable, defensible and sustainably organisable. As a result, cross-border cooperation often only progresses when it fits within existing responsibilities and routines.

A third lesson is that cross-border cooperation is not a stable given, but remains vulnerable and can only remain functional if continuity, follow-up and coordination are actively maintained across nationally anchored systems. Precisely because cooperation here does not take place within a single shared administrative and organisational framework, but between systems with different responsibilities, procedures and lines of accountability, it requires constant coordination, translation and maintenance. Without sustainable embedding, cooperation and coordination therefore easily revert to temporary projects, personal commitment and remedial work.

A fourth lesson is that in border regions there is a persistent tension between the cross-border everyday lives of citizens and the predominantly nationally organised structure of public health. Citizens' everyday lives do not stop at the border, but the organisation of public health largely does. Consequently, citizens' living environment does not run parallel to the area within which public health organisations bear responsibility. In the practices I investigated, diseases, crises, policy tasks and administrative categories

therefore much more often formed the starting point than the question of how public health connects with lives that, in practice, unfold across borders.

The four lessons also lead to recommendations for policy and practice. Cross-border public health requires the systematic mapping of differences in classifications, data, responsibilities and implementation pathways, administrative channels for agenda-setting, decision-making and follow-up, and structural funding and mandates for cross-border coordination. Furthermore, policy and practice should more consistently assess how public health measures affect citizens who live, work, study, use healthcare or maintain social relationships across borders.

In addition to recommendations, the thesis also makes a conceptual contribution to border studies and infrastructure literature. For border studies, it demonstrates that cross-border mobility, professional contact and project-based cooperation do not automatically lead to joint policy, implementation and accountability in public health. For infrastructure literature, it demonstrates that public health infrastructures do not automatically move across national borders, but must be actively coordinated, translated and maintained between nationally organised systems in border regions.

Based on these findings, the key conclusion of this thesis is that public health in border regions is organised and made workable as a field of policy and practice by continually realigning nationally anchored infrastructures, responsibilities and relationships across the border. Consequently, public health in border regions is not a fixed domain, but a fragile and unfinished field that must be established anew time and again in administrative, organisational and practical terms.

SAMENVATTING

Inleiding, hoofdstuk 1. De centrale vraag van dit proefschrift is hoe publieke gezondheid in grensregio's wordt georganiseerd en werkbaar wordt gemaakt als een veld van beleid en praktijk. Afhankelijk van de leesbaarheid van de tekst gebruik ik hiervoor zowel de term 'publieke gezondheid in grensregio's' als 'grensoverschrijdende publieke gezondheid'. In beide gevallen doel ik op samenwerking op het gebied van publieke gezondheid tussen aangrenzende regio's in verschillende landen. Deze context van aangrenzende grensregio's vormt het centrale vertrekpunt van dit proefschrift. Daarbij ga ik er niet van uit dat dit al een vanzelfsprekend en samenhangend domein vormt. De centrale vraag is juist hoe dit domein vorm krijgt in grensregio's waar het dagelijks leven van burgers en professionals zich over nationale grenzen heen afspeelt, terwijl nationale en subnationale overheden verantwoordelijkheden, bevoegdheden en informatievoorziening blijven organiseren.

Om deze vraag te analyseren combineer ik inzichten uit border studies en infrastructuurstudies. Daarbij onderzoek ik zowel de betekenis van grenzen voor bestuur en samenwerking als de registraties, standaarden en routines waarmee publieke gezondheid in de praktijk wordt georganiseerd. Vanuit border studies benader ik grenzen niet alleen als formele staatsgrenzen, maar ook als institutionele en bestuurlijke ordeningen die mede bepalen wat in de praktijk van publieke gezondheid mogelijk is. Tegelijk richt ik mij vanuit infrastructuurstudies op de categorieën, registraties, standaarden, informatiestromen en coördinatieroutines die beleid en praktijk met elkaar verbinden. Juist door deze verbindingen wordt zichtbaar hoe publieke gezondheid in grensregio's in de praktijk wordt georganiseerd en werkbaar wordt gemaakt.

In **hoofdstuk 2** onderzoeken we hoe EU-beleid publieke gezondheid in grensregio's definieerde en onder welke voorwaarden dit zich ontwikkelde tot een Europese beleidstaak**.** De beleidsanalyse liet zien dat grensregio's binnen het EU-volksgezondheidsbeleid vooral naar voren kwamen in relatie tot ernstige grensoverschrijdende dreigingen, met name biologische, chemische en omgevingsgebonden risico's. In die context lag de nadruk op surveillance, vroegsignalering, paraatheid en respons. Het bredere Europese volksgezondheidsbeleid erkende preventie en gezondheidsbevordering wel als belangrijk, maar werkte deze niet uit als een specifieke grensoverschrijdende publieke gezondheidstaak voor grensregio's. Zo werd duidelijk dat publieke gezondheid in grensregio's op EU-niveau vooral beleidsmatige tractie kreeg wanneer problemen aansloten bij bestaande infrastructuren van vroegsignalering, kennisproductie en coördinatie, en wanneer EU-instellingen optreden bestuurlijk konden rechtvaardigen.

In **hoofdstuk 3** gebruiken we een scoping review om te onderzoeken hoe de wetenschappelijke literatuur grensoverschrijdende infectieziektebestrijding in Europese grensregio's beschreef. Daarbij identificeerden we welke infectieziekten en grensregio's het vaakst werden onderzocht, welke problemen in grensoverschrijdende samenwerking werden beschreven, en welke grensoverschrijdende aanbevelingen voor verbetering de literatuur gaf. Op basis van een systematische inventarisatie en thematische analyse van de beschikbare literatuur bleek dat dit onderzoeksveld inhoudelijk relatief smal was en zich geografisch op een beperkt aantal grensregio's en infectieziekten concentreerde. In de geïncludeerde studies keerden vooral structurele knelpunten terug, met name op het gebied van surveillance, monitoring, data-uitwisseling, governance en juridische en procedurele afstemming. De geïncludeerde studies deden vooral aanbevelingen om grensoverschrijdende samenwerking structureel te versterken, met name via nauwere institutionele samenwerking, beter op elkaar afgestemde surveillance en betere gegevensuitwisseling. Zo werd duidelijk dat grensoverschrijdende infectieziektebestrijding in de wetenschappelijke literatuur vooral werd benaderd als een vraagstuk van structurele afstemming en systeemcoördinatie, terwijl preventieve afstemming buiten uitbraaksituaties minder ontwikkeld bleef.

In **hoofdstuk 4** werd onderzocht hoe publieke gezondheidsprofessionals in de grensregio tussen Nederland, Duitsland en België grensoverschrijdende samenwerking ervoeren en in stand hielden. Op basis van negentien interviews met professionals werd geanalyseerd welke uitdagingen zij in deze samenwerking signaleerden en welk werk nodig was om samenwerking, coördinatie en informatie-uitwisseling over de grens gaande te houden. De interviews lieten zien dat publieke gezondheidsprofessionals grensoverschrijdende samenwerking breed waardeerden, maar ook kwetsbaar was door verschillen in nationale regels, procedures en verantwoordingsverwachtingen, en doordat samenwerking vaak afhankelijk bleef van tijdelijke projecten en persoonlijke inzet. Om samenwerking toch werkbaar te houden, gaven professionals aan dat zij voortdurend bezig waren met afstemmen, organiseren, persoonlijke contacten onderhouden en grensoverschrijdende activiteiten binnen hun eigen organisatie begrijpelijk en verdedigbaar maken.

In **hoofdstuk 5** werd de COVID-19-pandemie als een situatie geanalyseerd waarin staatsgrenzen opnieuw werden ingezet als instrument van pandemiebestrijding. Er werd onderzocht in hoeverre grensoverschrijdende transmissie van SARS-CoV-2 in vier Euroregio's langs de Nederlands-Duits-Belgische grens bijdroeg aan de COVID-19-last. Een GIS-analyse en een space-time clusteranalyse van ruim vier miljoen geregistreerde COVID-19-gevallen tussen maart 2020 en oktober 2022 lieten zien dat de incidentie grotendeels nationale patronen volgde. Grensoverschrijdende clustering trad wel op, maar vooral tijdens perioden van zeer hoge transmissie en niet als een vroeg of bepalend patroon in het verloop van de pandemie. Deze bevindingen boden geen epidemiologische onderbouwing voor vergaande grenssluitingen als centrale maatregel van pande-

miebestrijding. Zulke maatregelen werden wel gerechtvaardigd op basis van nationaal begrensde surveillancesystemen, terwijl de gevolgen juist sterk werden ervaren in het dagelijkse grensoverschrijdende leven van bewoners van deze regio's.

In **hoofdstuk 6** onderzoeken we hoe gemeenten in de Euregio Maas-Rijn de relevantie en haalbaarheid van grensoverschrijdende beleidsuitwisseling voor leeftijdsvriendelijke initiatieven beoordelen, en welke barrières en bevorderende factoren daarbij een rol spelen. Op basis van semigestructureerde groepsinterviews met deelnemers uit 33 gemeenten analyseerden we hoe gemeenten binnen het Senior Friendly Communities-project omgingen met beleidsvoorbeelden en initiatieven van over de grens. De analyse liet zien dat grensoverschrijdende beleidsuitwisseling voor gemeenten zelden een doel op zichzelf was, maar vooral werd benaderd als een selectieve bron voor de ontwikkeling van lokaal beleid. Of voorbeelden van over de grens bruikbaar werden geacht, hing af van de mate waarin zij konden worden afgestemd op de eigen verantwoordelijkheden, prioriteiten en werkwijzen binnen gefragmenteerde institutionele contexten. Ook bleek dat duurzamere vormen van grensoverschrijdende beleidsuitwisseling niet alleen afhankelijk zijn van lokale bereidheid, maar ook van bestuurlijke en organisatorische voorwaarden die coördinatie, vertaling en continuïteit ondersteunen. Zo werd duidelijk dat grensoverschrijdend publiek gezondheidsbeleid op lokaal niveau niet vanzelf uit nabijheid ontstaat, maar vorm krijgt via selectie, aanpassing en integratie binnen bestaande beleidsmatige en bestuurlijke kaders.

In **hoofdstuk 7** onderzoeken we hoe individuele en omgevingsfactoren samenhangen met middelengebruik onder adolescenten in de grensregio's van Nederland, België en Duitsland. Op basis van een grootschalig vragenlijstonderzoek onder scholieren in deze grensregio's analyseerden we verschillen in binge drinking, roken en vapen, en cannabisgebruik, evenals de samenhang daarvan met psychosociale kenmerken en factoren in de directe sociale en fysieke omgeving van adolescenten**.** De analyse liet zien dat verschillende factoren een rol speelden, maar dat vooral invloed van leeftijdsgenoten, vaak laat buiten zijn, ouderlijk toezicht en deelname aan gestructureerde vrijetijdsactiviteiten het meest consistent terugkeerden in de drie nationale contexten. Zo laat dit hoofdstuk zien dat waargenomen patronen van middelengebruik tussen landen niet uitsluitend kunnen worden begrepen vanuit verschillen in nationaal beleid, maar ook moeten worden beschouwd in relatie tot de sociale omgeving waarin adolescenten in deze grensregio's opgroeien**.**

In **hoofdstuk 8** onderzoeken we hoe burgerparticipatie in grensregio's wordt georganiseerd in een situatie waarin geen gedeelde bestuurslaag bestaat en ook geen stabiele grensoverschrijdende administratieve infrastructuur beschikbaar is. Op basis van een documentanalyse van vier grensoverschrijdende participatie-initiatieven werd geanalyseerd hoe agenda's, participatieformats, representativiteit en follow-up werden georga-

niseerd in het grensgebied van Nederland, België en Duitsland. De analyse liet zien dat deze participatieprocessen sterk werden gevormd door afstemming tussen organisaties uit verschillende landen, door eisen vanuit financiering en verantwoording, en door praktische keuzes rond standaardisering, werving en meertaligheid. Daardoor kon grensoverschrijdende participatie wel worden georganiseerd, maar werden ook de ruimte voor overleg dat aansloot bij lokale vragen en omstandigheden en de mogelijkheden voor brede en evenwichtige vertegenwoordiging beperkt. Ook bleek dat de uitkomsten vooral werden samengebracht, gerapporteerd en verspreid binnen grensoverschrijdende netwerken, en veel minder vaak leidden tot een gezamenlijk beleidsmatig vervolg. Zo laat dit hoofdstuk zien dat burgerparticipatie in grensregio's afhankelijk is van institutionele coördinatie die gezamenlijke actie mogelijk maakt. Tegelijk begrenzen het ontbreken van een gedeelde agenda, een partij die de uitkomsten kan ontvangen en opvolgen, en een gemeenschappelijk beleidskader de reikwijdte en doorwerking ervan. Zo onderstreept dit hoofdstuk dat publieke gezondheid in grensregio's geen vanzelfsprekend grensoverschrijdend domein vormt, maar telkens organisatorisch en institutioneel werkbaar moet worden gemaakt.

Discussie. In dit proefschrift heb ik laten zien dat publieke gezondheid in grensregio's niet kan worden begrepen als een vanzelfsprekende optelsom van nationale systemen, en evenmin als een reeds uitgewerkt grensoverschrijdend beleidsdomein. Publieke gezondheid in grensregio's krijgt vorm in de manier waarop problemen worden afgebakend, verantwoordelijkheden worden verdeeld, gegevens worden geproduceerd en gebruikt, en samenwerking in de praktijk wordt onderhouden. Een eerste les is dat grensoverschrijdende samenwerking zichtbaar maakt dat publieke gezondheid steunt op nationale classificaties, registraties, standaarden en routines die binnen één land meestal op de achtergrond blijven en daardoor weinig opvallen. Pas in de samenwerking met een buurland, waar problemen, gegevens en verantwoordelijkheden anders worden geordend, wordt duidelijk dat deze infrastructuren niet neutraal zijn, maar mede bepalen wat als relevant probleem geldt, wie zichtbaar wordt en hoe beleid praktisch uitvoerbaar wordt gemaakt.

Een tweede les is dat grensoverschrijdende publieke gezondheid voorlopig vooral bestuurlijke tractie krijgt wanneer zij past binnen bestaande nationale kaders van probleemdefinitie, mandaat, bewijs en verantwoording. Juist omdat een sterkere grensoverschrijdende infrastructuur met eigen mandaten en verantwoordingslijnen grotendeels ontbreekt, blijven nationale beleidskaders leidend in wat bestuurlijk hanteerbaar, verdedigbaar en duurzaam organiseerbaar is. Daardoor komt grensoverschrijdende samenwerking vaak alleen verder wanneer zij past binnen bestaande verantwoordelijkheden en routines.

Een derde les is dat grensoverschrijdende samenwerking geen stabiel gegeven is, maar kwetsbaar blijft en alleen functioneel kan blijven wanneer continuïteit, opvolging en afstemming actief worden onderhouden over nationaal verankerde systemen heen. Juist doordat samenwerking hier niet plaatsvindt binnen één gedeeld bestuurlijk en organisatorisch kader, maar tussen systemen met verschillende verantwoordelijkheden, procedures en verantwoordingslijnen, vraagt zij steeds opnieuw om afstemming, vertaling en onderhoud. Zonder duurzame inbedding vallen samenwerking en afstemming daardoor gemakkelijk terug op tijdelijke projecten, persoonlijke inzet en herstelwerk.

Een vierde les is dat in grensregio's een blijvende spanning bestaat tussen het grensoverschrijdende dagelijks leven van burgers en de overwegend nationaal geordende organisatie van publieke gezondheid. Het dagelijks leven van burgers stopt niet bij de grens, maar de organisatie van publieke gezondheid wel grotendeels. Daardoor loopt het leefgebied van burgers niet parallel aan het gebied waarbinnen publieke gezondheidszorgorganisaties verantwoordelijkheid dragen. In de praktijken die ik onderzocht, vormden ziekten, crises, beleidstaken en administratieve categorieën daarom veel vaker het vertrekpunt dan de vraag hoe publieke gezondheid aansluit op levens die zich in de praktijk over grenzen heen afspelen.

De vier lessen leiden daarnaast tot aanbevelingen voor beleid en praktijk. Grensoverschrijdende publieke gezondheid vraagt om het systematisch in kaart brengen van verschillen in classificaties, gegevens, verantwoordelijkheden en uitvoeringsroutes, om bestuurlijke routes voor agendering, besluitvorming en opvolging, en om structurele financiering en mandaten voor grensoverschrijdende coördinatie. Daarnaast zouden beleid en praktijk consequenter moeten toetsen hoe publieke gezondheidsmaatregelen uitwerken voor burgers die over grenzen heen wonen, werken, leren, zorg gebruiken of sociale relaties onderhouden.

Naast aanbevelingen levert het proefschrift ook een conceptuele bijdrage aan border studies en infrastructuurliteratuur. Voor border studies laat het zien dat grensoverschrijdende mobiliteit, professioneel contact en projectmatige samenwerking niet vanzelf leiden tot gezamenlijk beleid, uitvoering en verantwoording in publieke gezondheid. Voor infrastructuurliteratuur laat het zien dat publieke gezondheidsinfrastructuren niet vanzelfsprekend meebewegen over nationale grenzen heen, maar in grensregio's actief moeten worden afgestemd, vertaald en onderhouden tussen nationaal georganiseerde systemen.



Op basis van deze bevindingen luidt de kernconclusie van dit proefschrift dat publieke gezondheid in grensregio's wordt georganiseerd en werkbaar gemaakt als een veld van beleid en praktijk door nationaal verankerde infrastructuren, verantwoordelijkheden en relaties steeds opnieuw over de grens heen op elkaar af te stemmen. Daarmee is publieke gezondheid in grensregio's geen vaststaand domein, maar een kwetsbaar en onvoltooid veld dat telkens opnieuw bestuurlijk, organisatorisch en praktisch tot stand moet worden gebracht.

ZUSAMMENFASSUNG

Einleitung, Kapitel 1. Die zentrale Frage dieser Dissertation lautet, wie die öffentliche Gesundheit in Grenzregionen organisiert und als Politik- und Praxisbereich umsetzbar gemacht wird. Je nach Lesbarkeit des Textes verwende ich hierfür sowohl den Begriff „öffentliche Gesundheit in Grenzregionen" als auch „grenzüberschreitende öffentliche Gesundheit". In beiden Fällen beziehe ich mich auf die Zusammenarbeit im Bereich der öffentlichen Gesundheit zwischen angrenzenden Regionen in verschiedenen Ländern. Dieser angrenzende grenzregionale Kontext bildet den zentralen Ausgangspunkt dieser Dissertation. Dabei gehe ich nicht von der Annahme aus, dass dies bereits einen selbstverständlichen und zusammenhängenden Bereich darstellt. Im Mittelpunkt steht vielmehr die Frage, wie dieser Bereich in Grenzregionen Gestalt annimmt, in denen sich das tägliche Leben von Bürgern und Fachkräften über nationale Grenzen hinweg abspielt, während Zuständigkeiten, Befugnisse und Informationsversorgung weiterhin auf nationaler und subnationaler Ebene organisiert sind. Um diese Frage zu analysieren, kombiniere ich Erkenntnisse aus den Border Studies und den Infrastrukturstudien. Dabei betrachte ich sowohl die Bedeutung von Grenzen für Verwaltung und Zusammenarbeit als auch die Registrierungen, Standards und Routinen, mit denen die öffentliche Gesundheit in der Praxis organisiert wird. Ausgehend von den Border Studies betrachte ich Grenzen nicht nur als formale Staatsgrenzen, sondern auch als institutionelle und administrative Ordnungen, die mitbestimmen, was in der Praxis der öffentlichen Gesundheit möglich wird. Gleichzeitig richte ich aus der Perspektive der Infrastrukturstudien den Fokus auf die Kategorien, Erfassungen, Standards, Informationsflüsse und Koordinationsroutinen, die Politik und Praxis miteinander verbinden. Gerade durch diese Verbindungen wird deutlich, wie die öffentliche Gesundheit in Grenzregionen in der Praxis organisiert und umsetzbar gemacht wird.

In **Kapitel 2** untersuchen wir, wie die EU-Politik die öffentliche Gesundheit in Grenzregionen definierte und unter welchen Bedingungen sie sich zu einer europäischen politischen Aufgabe entwickelte. Unsere Analyse zeigte, dass Grenzregionen innerhalb der EU-Gesundheitspolitik vor allem im Zusammenhang mit schwerwiegenden grenzüberschreitenden Bedrohungen, insbesondere biologischen, chemischen und umweltbedingten Risiken, in den Vordergrund traten. In diesem Zusammenhang lag der Schwerpunkt auf Überwachung, Frühwarnung, Vorsorge und Reaktion. Prävention und Gesundheitsförderung wurden zwar in der allgemeinen europäischen Gesundheitspolitik als wichtig anerkannt, jedoch nicht als spezifische grenzüberschreitende Aufgabe der öffentlichen Gesundheit für Grenzregionen konkretisiert. So wurde deutlich, dass die öffentliche Gesundheit in Grenzregionen auf EU-Ebene vor allem dann als politisches Handlungsfeld an Bedeutung gewann, wenn Probleme an bestehende Infrastrukturen für Frühwarnung, Wissensgenerierung und Koordination anknüpften und wenn die EU-Institutionen ein Tätigwerden administrativ rechtfertigen konnten.

In **Kapitel 3** untersuchen wir mittels einer Scoping-Review, wie die wissenschaftliche Literatur die grenzüberschreitende Bekämpfung von Infektionskrankheiten in europäischen Grenzregionen beschrieb. Dabei ermittelten wir, welche Infektionskrankheiten und Grenzregionen am häufigsten untersucht wurden, welche Probleme bei der grenzüberschreitenden Zusammenarbeit beschrieben wurden und welche grenzüberschreitenden Empfehlungen die Literatur zur Verbesserung gab. Auf der Grundlage einer systematischen Bestandsaufnahme und thematischen Analyse der verfügbaren Literatur zeigte sich, dass dieses Forschungsfeld inhaltlich relativ eng gefasst war und sich geografisch auf eine begrenzte Anzahl von Grenzregionen und Infektionskrankheiten konzentrierte. In den einbezogenen Studien tauchten vor allem strukturelle Engpässe auf, insbesondere in den Bereichen Überwachung, Monitoring, Datenaustausch, Governance sowie rechtliche und verfahrenstechnische Abstimmung. Die einbezogenen Studien gaben vor allem Empfehlungen zur strukturellen Stärkung der grenzüberschreitenden Zusammenarbeit, insbesondere durch engere institutionelle Zusammenarbeit, besser aufeinander abgestimmte Überwachung und einen besseren Datenaustausch. So wurde deutlich, dass die grenzüberschreitende Bekämpfung von Infektionskrankheiten in der wissenschaftlichen Literatur vor allem als eine Frage der strukturellen Abstimmung und Systemkoordination betrachtet wurde, während die präventive Abstimmung außerhalb von Ausbruchsituationen weniger entwickelt blieb.

In **Kapitel 4** untersuchen wir, wie Fachkräfte des öffentlichen Gesundheitswesens in der Grenzregion zwischen den Niederlanden, Deutschland und Belgien die grenzüberschreitende Zusammenarbeit erlebten und aufrechterhielten. Auf der Grundlage von neunzehn Interviews mit Fachkräften analysierten wir, welche Herausforderungen sie in dieser Zusammenarbeit identifizierten und welche Arbeit erforderlich war, um Zusammenarbeit, Koordination und Informationsaustausch über die Grenze hinweg aufrechtzuerhalten. Die Interviews zeigten, dass die grenzüberschreitende Zusammenarbeit zwar allgemein geschätzt wurde, aber auch durch Unterschiede in nationalen Vorschriften, Verfahren und Rechenschaftserwartungen sowie dadurch gefährdet war, dass die Zusammenarbeit oft von befristeten Projekten und persönlichem Engagement abhängig blieb. Um die Zusammenarbeit dennoch funktionsfähig zu halten, gaben die Fachkräfte an, dass sie ständig damit beschäftigt waren, sich abzustimmen, zu organisieren, persönliche Kontakte zu pflegen und grenzüberschreitende Aktivitäten innerhalb ihrer eigenen Organisation verständlich und vertretbar zu machen.

In **Kapitel 5** analysieren wir die COVID-19-Pandemie als eine Situation, in der Staatsgrenzen erneut als Instrument der Pandemiebekämpfung eingesetzt wurden. Wir untersuchten, ob die grenzüberschreitende Übertragung von SARS-CoV-2 eine signifikante und wesentliche Rolle bei der COVID-19-Belastung in vier Euroregionen entlang der niederländisch-deutsch-belgischen Grenze spielte. Auf der Grundlage einer GIS-Analyse und einer Raum-Zeit-Clusteranalyse von über vier Millionen registrierten COVID-19-Fällen im

Zeitraum von März 2020 bis Oktober 2022 zeigte sich, dass die Inzidenz im untersuchten Zeitraum weitgehend nationalen Mustern folgte. Grenzüberschreitende Clusterbildung trat zwar auf, jedoch vor allem in Phasen sehr hoher Übertragung und nicht als frühes oder bestimmendes Muster im Verlauf der Pandemie. Diese Ergebnisse lieferten keine epidemiologische Begründung für weitreichende Grenzschließungen als zentrale Maßnahme der Pandemiebekämpfung. Solche Maßnahmen wurden zwar auf der Grundlage national begrenzter Überwachungssysteme gerechtfertigt, während die Folgen gerade im täglichen grenzüberschreitenden Leben der Bewohner dieser Regionen stark zu spüren waren.

In **Kapitel 6** untersuchen wir, wie Gemeinden in der Euregio Maas-Rhein die Relevanz und Durchführbarkeit eines grenzüberschreitenden Politikaustauschs für altersfreundliche Initiativen bewerten und welche Hindernisse und fördernden Faktoren dabei eine Rolle spielen. Auf der Grundlage halbstrukturierter Gruppeninterviews mit Teilnehmern aus 33 Gemeinden analysierten wir, wie Gemeinden im Rahmen des Projekts „Senior Friendly Communities" mit politischen Beispielen und Initiativen von der anderen Seite der Grenze umgingen. Die Analyse zeigte, dass der grenzüberschreitende Austausch von politischen Maßnahmen für die Gemeinden selten ein Ziel an sich war, sondern vor allem als selektive Quelle für die Entwicklung lokaler Politik betrachtet wurde. Ob Beispiele von der anderen Seite der Grenze als nutzbar angesehen wurden, hing davon ab, inwieweit sie auf die eigenen Zuständigkeiten, Prioritäten und Arbeitsweisen innerhalb fragmentierter institutioneller Kontexte abgestimmt werden konnten. Es zeigte sich auch, dass nachhaltigere Formen des grenzüberschreitenden Politikaustauschs nicht nur von der lokalen Bereitschaft abhängen, sondern auch von administrativen und organisatorischen Rahmenbedingungen, die Koordination, Anpassung und Kontinuität unterstützen. So wurde deutlich, dass grenzüberschreitende Politik im Bereich der öffentlichen Gesundheit auf lokaler Ebene nicht automatisch aus der geografischen Nähe entsteht, sondern durch Auswahl, Anpassung und Einbettung in bestehende politische und administrative Rahmenbedingungen Gestalt annimmt.

In **Kapitel 7** untersuchen wir, wie individuelle und umfeldbezogene Faktoren mit dem Substanzkonsum bei Jugendlichen in Grenzregionen der Niederlande, Belgiens und Deutschlands zusammenhängen. Auf der Grundlage einer groß angelegten Umfrage unter Schülern in diesen Grenzregionen analysierten wir Unterschiede beim Rauschtrinken, beim Rauchen und beim Konsum von E-Zigaretten sowie beim Cannabiskonsum und deren Zusammenhänge mit psychosozialen Merkmalen und Faktoren im unmittelbaren sozialen und physischen Umfeld der Jugendlichen. Die Analyse zeigte, dass verschiedene Faktoren eine Rolle spielten, dass jedoch vor allem der Einfluss von Gleichaltrigen, häufiges spätes Draußensein, elterliche Aufsicht und die Teilnahme an strukturierten Freizeitaktivitäten in den drei nationalen Kontexten am konsistentesten auftraten. Damit macht dieses Kapitel deutlich, dass die beobachteten Muster des Substanzkonsums in den

verschiedenen Ländern nicht allein anhand von Unterschieden in der nationalen Politik verstanden werden können, sondern auch im Zusammenhang mit dem sozialen Umfeld betrachtet werden müssen, in dem Jugendliche in diesen Grenzregionen aufwachsen.

In **Kapitel 8** untersuchen wir, wie Bürgerbeteiligung in Grenzregionen organisiert wird, wenn keine gemeinsame Verwaltungsebene existiert und auch keine stabile grenzüberschreitende Verwaltungsinfrastruktur zur Verfügung steht. Auf der Grundlage einer Dokumentenanalyse von vier grenzüberschreitenden Beteiligungsinitiativen analysierten wir, wie Agenden, Beteiligungsformate, Repräsentativität und Nachbereitung im Grenzgebiet der Niederlande, Belgiens und Deutschlands organisiert wurden. Die Analyse zeigte, dass diese Partizipationsprozesse stark durch die Abstimmung zwischen Organisationen aus verschiedenen Ländern, durch Anforderungen hinsichtlich Finanzierung und Rechenschaftspflicht sowie durch praktische Entscheidungen zu Standardisierung, Rekrutierung und Mehrsprachigkeit geprägt waren. Dadurch wurde grenzüberschreitende Partizipation zwar organisierbar, doch wurden auch der Spielraum für lokal orientierte Deliberation und die Möglichkeiten für eine breite und ausgewogene Vertretung eingeschränkt. Es zeigte sich auch, dass die Ergebnisse vor allem innerhalb grenzüberschreitender Netzwerke zusammengetragen, berichtet und verbreitet wurden und weitaus seltener zu gemeinsamen politischen Folgemaßnahmen führten. So zeigt dieses Kapitel, dass Bürgerbeteiligung in Grenzregionen von institutioneller Koordination abhängt, die gemeinsames Handeln ermöglicht. Gleichzeitig schränken das Fehlen einer gemeinsamen Agenda, einer Stelle, die die Ergebnisse entgegennehmen und weiterverfolgen kann, sowie eines gemeinsamen politischen Rahmens deren Reichweite und Wirksamkeit ein. So unterstreicht dieses Kapitel, dass die öffentliche Gesundheit in Grenzregionen keinen selbstverständlichen grenzüberschreitenden Bereich darstellt, sondern jeweils organisatorisch und institutionell umsetzbar gemacht werden muss.

Diskussion. In dieser Dissertation habe ich gezeigt, dass die öffentliche Gesundheit in Grenzregionen weder als selbstverständliche Summe nationaler Systeme noch als bereits ausgearbeiteter grenzüberschreitender Politikbereich verstanden werden kann. Die öffentliche Gesundheit in Grenzregionen nimmt Gestalt an in der Art und Weise, wie Probleme abgegrenzt, Zuständigkeiten verteilt, Daten erzeugt und genutzt sowie die Zusammenarbeit in der Praxis gepflegt wird. Eine erste Erkenntnis ist, dass die grenzüberschreitende Zusammenarbeit deutlich macht, dass die öffentliche Gesundheit auf nationalen Klassifikationen, Registrierungen, Standards und Routinen beruht, die innerhalb eines Landes meist im Hintergrund bleiben und daher kaum auffallen. Erst in der Zusammenarbeit mit einem Nachbarland, in dem Probleme, Daten und Zuständigkeiten anders geordnet sind, wird deutlich, dass diese Infrastrukturen nicht neutral sind, sondern mitbestimmen, was als relevantes Problem gilt, wer sichtbar wird und wie Politik praktisch umsetzbar gemacht wird.

Eine zweite Erkenntnis ist, dass grenzüberschreitende öffentliche Gesundheit vorerst vor allem dann administrative Traktion erhält, wenn sie in bestehende nationale Rahmenbedingungen hinsichtlich Problemdefinition, Mandat, Evidenz und Rechenschaftspflicht passt. Gerade weil eine stärkere grenzüberschreitende Infrastruktur mit eigenen Mandaten und Rechenschaftspflichten weitgehend fehlt, bleiben nationale politische Rahmenbedingungen maßgeblich dafür, was administrativ handhabbar, vertretbar und nachhaltig organisierbar ist. Dadurch kommt die grenzüberschreitende Zusammenarbeit oft nur dann voran, wenn sie in bestehende Zuständigkeiten und Routinen passt.

Eine dritte Erkenntnis ist, dass grenzüberschreitende Zusammenarbeit kein stabiler Zustand ist, sondern fragil bleibt und nur dann funktionsfähig bleiben kann, wenn Kontinuität, Nachfolge und Abstimmung über national verankerte Systeme hinweg aktiv aufrechterhalten werden. Gerade weil die Zusammenarbeit hier nicht innerhalb eines gemeinsamen administrativen und organisatorischen Rahmens stattfindet, sondern zwischen Systemen mit unterschiedlichen Zuständigkeiten, Verfahren und Rechenschaftspflichten, erfordert sie immer wieder neu Abstimmung, Übersetzung und Pflege. Ohne nachhaltige Verankerung verfallen Zusammenarbeit und Abstimmung daher leicht in temporäre Projekte, persönliches Engagement und Nachholarbeit.

Eine vierte Erkenntnis ist, dass in Grenzregionen eine anhaltende Spannung zwischen dem grenzüberschreitenden Alltag der Bürger und der überwiegend national geordneten Organisation der öffentlichen Gesundheit besteht. Der Alltag der Bürger endet nicht an der Grenze, die Organisation der öffentlichen Gesundheit jedoch größtenteils schon. Dadurch verläuft der Lebensraum der Bürger nicht parallel zu dem Gebiet, in dem Organisationen des öffentlichen Gesundheitswesens Verantwortung tragen. In den von mir untersuchten Praktiken bildeten daher Krankheiten, Krisen, politische Aufgaben und administrative Kategorien viel häufiger den Ausgangspunkt als die Frage, wie die öffentliche Gesundheit an Leben anknüpft, die sich in der Praxis grenzüberschreitend abspielen.

Die vier Erkenntnisse führen zudem zu Empfehlungen für Politik und Praxis. Grenzüberschreitende öffentliche Gesundheit erfordert die systematische Erfassung von Unterschieden bei Klassifikationen, Daten, Zuständigkeiten und Umsetzungswegen, administrative Wege für die Agenda, Entscheidungsfindung und Nachverfolgung sowie strukturelle Finanzierung und Mandate für die grenzüberschreitende Koordination. Zudem sollten Politik und Praxis konsequenter prüfen, wie sich Maßnahmen im Bereich der öffentlichen Gesundheit auf Bürger auswirken, die grenzüberschreitend leben, arbeiten, lernen, Gesundheitsleistungen in Anspruch nehmen oder soziale Beziehungen pflegen.

Neben Empfehlungen leistet die Dissertation auch einen konzeptionellen Beitrag zu Border Studies und der Infrastrukturliteratur. Für die Border Studies zeigt sie, dass grenzüberschreitende Mobilität, berufliche Kontakte und projektbezogene Zusammenarbeit

nicht automatisch zu gemeinsamer Politik, Umsetzung und Rechenschaftspflicht im Bereich der öffentlichen Gesundheit führen. Für die Infrastrukturliteratur zeigt sie, dass sich Infrastrukturen des öffentlichen Gesundheitswesens nicht selbstverständlich über nationale Grenzen hinweg mitbewegen, sondern in Grenzregionen aktiv zwischen national organisierten Systemen abgestimmt, übersetzt und gepflegt werden müssen.

Auf der Grundlage dieser Erkenntnisse lautet die zentrale Schlussfolgerung dieser Dissertation, dass die öffentliche Gesundheit in Grenzregionen als ein Feld von Politik und Praxis organisiert und funktionsfähig gemacht wird, indem national verankerte Infrastrukturen, Zuständigkeiten und Beziehungen immer wieder grenzüberschreitend aufeinander abgestimmt werden. Damit ist die öffentliche Gesundheit in Grenzregionen kein feststehender Bereich, sondern ein fragiles und unvollendetes Feld, das immer wieder neu auf administrativer, organisatorischer und praktischer Ebene gestaltet werden muss.

RÉSUMÉ

Introduction, chapitre 1. La question centrale de cette thèse est de savoir comment la santé publique est organisée dans les régions frontalières et comment elle est mise en œuvre en tant que domaine de politique et de pratique. En fonction de la lisibilité du texte, j'utilise à cet effet aussi bien le terme « santé publique dans les régions frontalières » que celui de « santé publique transfrontalière ». Dans les deux cas, je fais référence à la coopération en matière de santé publique entre des régions limitrophes situées dans différents pays. Ce contexte régional frontalier constitue le point de départ central de cette thèse. Je ne pars pas du principe que ce domaine constitue déjà un ensemble homogène et cohérent. La question centrale est au contraire de savoir comment ce domaine prend forme dans les régions frontalières où la vie quotidienne des citoyens et des professionnels s'étend au-delà des frontières nationales, alors que les responsabilités, les compétences et la diffusion de l'information restent organisées aux niveaux national et infranational. Pour analyser cette question, je combine des perspectives issues des études sur les frontières et des études sur les infrastructures. Je m'intéresse ainsi à la fois à la signification des frontières pour la gouvernance et la coopération, et aux registres, normes et routines qui organisent la santé publique dans la pratique. Dans le cadre des études sur les frontières, j'aborde les frontières non seulement comme des lignes étatiques formelles, mais aussi comme des dispositifs institutionnels et administratifs qui déterminent en partie ce qui est possible dans la pratique de la santé publique. Parallèlement, en m'appuyant sur les études sur les infrastructures, je me concentre sur les catégories, les registres, les normes, les flux d'informations et les routines de coordination qui relient la politique et la pratique. C'est précisément à travers ces liens que l'on comprend comment la santé publique est organisée et rendue opérationnelle dans les régions frontalières.

Au **chapitre 2,** nous examinons comment la politique de l'UE a défini la santé publique dans les régions frontalières et dans quelles conditions celle-ci s'est développée en tant que mission politique européenne. Notre analyse a montré que, dans le cadre de la politique de santé publique de l'UE, les régions frontalières étaient principalement mises en avant en relation avec des menaces transfrontalières graves, notamment des risques biologiques, chimiques et environnementaux. Dans ce contexte, l'accent était mis sur la surveillance, l'alerte précoce, la préparation et la réponse. La prévention et la promotion de la santé étaient certes reconnues comme importantes dans la politique européenne de santé publique au sens large, mais n'étaient pas développées en tant que mission spécifique de santé publique transfrontalière pour les régions frontalières. Il est ainsi apparu clairement qu'au niveau de l'UE, la santé publique dans les régions frontalières ne bénéficiait d'une véritable impulsion politique que lorsque les problèmes s'inscrivaient dans le cadre des infrastructures existantes d'alerte précoce, de production de connaissances et de coordination, et lorsque les institutions de l'UE pouvaient justifier administrativement leur intervention.

Dans **le chapitre 3,** nous examinons, à travers une revue exploratoire, comment la littérature scientifique a décrit la lutte transfrontalière contre les maladies infectieuses dans les régions frontalières européennes. Nous avons ainsi recensé les maladies infectieuses et les régions frontalières les plus fréquemment étudiées, les problèmes rencontrés dans la coopération transfrontalière qui ont été décrits, ainsi que les recommandations transfrontalières formulées dans la littérature en vue d'une amélioration. Sur la base d'un inventaire systématique et d'une analyse thématique de la littérature disponible, il est apparu que ce domaine de recherche était relativement restreint sur le plan thématique et se concentrait géographiquement sur un nombre limité de régions frontalières et de maladies infectieuses. Dans les études incluses, ce sont surtout des obstacles structurels qui revenaient, notamment dans les domaines de la surveillance, du suivi, de l'échange de données, de la gouvernance et de l'harmonisation juridique et procédurale. Les études incluses formulaient principalement des recommandations visant à renforcer structurellement la coopération transfrontalière, notamment par une coopération institutionnelle plus étroite, une surveillance mieux coordonnée et un meilleur échange de données. Il est ainsi apparu clairement que, dans la littérature scientifique, la lutte transfrontalière contre les maladies infectieuses était principalement abordée comme une question d'alignement structurel et de coordination des systèmes, tandis que la coordination préventive en dehors des situations d'épidémie restait moins développée.

Dans **le chapitre 4,** nous examinons comment les professionnels de la santé publique de la région frontalière entre les Pays-Bas, l'Allemagne et la Belgique ont vécu et maintenu la coopération transfrontalière. Sur la base de dix-neuf entretiens avec des professionnels, nous avons analysé les défis qu'ils ont identifiés dans cette coopération et le travail nécessaire pour maintenir la coopération, la coordination et l'échange d'informations au-delà des frontières. Les entretiens ont montré que la coopération transfrontalière était largement appréciée, mais qu'elle était également fragilisée par les différences entre les règles, les procédures et les attentes en matière de responsabilité au niveau national, et par le fait que la coopération restait souvent tributaire de projets temporaires et de l'engagement personnel. Afin de maintenir la coopération viable, les professionnels ont indiqué qu'ils s'efforçaient en permanence de coordonner, d'organiser, d'entretenir des contacts personnels et de rendre les activités transfrontalières compréhensibles et défendables au sein de leur propre organisation.

Dans **le chapitre 5,** nous analysons la pandémie de COVID-19 comme une situation dans laquelle les frontières nationales ont été réutilisées comme instrument de lutte contre la pandémie. Nous avons examiné si la transmission transfrontalière du SARS-CoV-2 jouait un rôle significatif et substantiel dans la charge de COVID-19 au sein de quatre Eurorégions situées le long de la frontière entre les Pays-Bas, l'Allemagne et la Belgique. Sur la base d'une analyse SIG et d'une analyse de clusters spatio-temporels portant sur plus de quatre millions de cas de COVID-19 enregistrés entre mars 2020 et octobre 2022, il est

apparu que l'incidence au cours de la période étudiée suivait largement des schémas nationaux. Des clusters transfrontaliers sont bien apparus, mais surtout pendant les périodes de transmission très élevée et non comme une tendance précoce ou déterminante dans l'évolution de la pandémie. Ces résultats n'ont pas fourni de justification épidémiologique à des fermetures de frontières étendues en tant que mesure centrale de lutte contre la pandémie. De telles mesures ont pourtant été justifiées sur la base de systèmes de surveillance limités au niveau national, alors que leurs conséquences ont été fortement ressenties dans la vie quotidienne transfrontalière des habitants de ces régions.

Dans **le chapitre 6**, nous examinons comment les communes de l'Euregio Meuse-Rhin évaluent la pertinence et la faisabilité des échanges transfrontaliers de politiques pour les initiatives favorables aux personnes âgées, ainsi que les obstacles et les facteurs favorables qui jouent un rôle à cet égard. Sur la base d'entretiens de groupe semi-structurés avec des participants issus de 33 communes, nous avons analysé la manière dont les communes, dans le cadre du projet Senior Friendly Communities, ont abordé les exemples de politiques et les initiatives provenant de l'autre côté de la frontière. L'analyse a montré que l'échange transfrontalier de politiques était rarement une fin en soi pour les communes, mais qu'il était surtout considéré comme une source sélective pour l'élaboration de politiques locales. La pertinence des exemples transfrontaliers dépendait de la mesure dans laquelle ils pouvaient être adaptés aux responsabilités, priorités et méthodes de travail propres à chaque commune, dans des contextes institutionnels fragmentés. Il est également apparu que des formes plus durables d'échanges transfrontaliers en matière de politiques ne dépendent pas seulement de la volonté locale, mais aussi de conditions administratives et organisationnelles qui favorisent la coordination, l'adaptation et la continuité. Il est ainsi apparu clairement que les politiques transfrontalières en matière de santé publique au niveau local ne découlent pas automatiquement de la proximité, mais prennent forme par le biais d'une sélection, d'une adaptation et d'une intégration au sein des cadres politiques et administratifs existants.

Au **chapitre 7,** nous examinons comment les facteurs individuels et environnementaux sont associés à la consommation de substances chez les adolescents dans les régions frontalières des Pays-Bas, de la Belgique et de l'Allemagne. Sur la base d'une enquête à grande échelle menée auprès d'élèves de ces régions frontalières, nous avons analysé les différences en matière d'alcoolisation ponctuelle importante, de tabagisme, de consommation de cigarettes électroniques et de consommation de cannabis, ainsi que leurs associations avec des caractéristiques psychosociales et des facteurs relevant de l'environnement social et physique immédiat des adolescents. L'analyse a montré que différents facteurs jouaient un rôle, mais que l'influence des pairs, le fait de rester souvent dehors tard le soir, la surveillance parentale et la participation à des activités de loisirs structurées revenaient de manière particulièrement constante dans les trois contextes nationaux. Ce chapitre montre ainsi que les tendances observées en matière de consom-

mation de substances dans les différents pays ne peuvent être comprises uniquement à partir des différences entre les politiques nationales, mais doivent également être considérées en relation avec l'environnement social dans lequel grandissent les adolescents de ces régions frontalières.

Dans **le chapitre 8,** nous examinons comment la participation citoyenne est organisée dans les régions frontalières dans un contexte où il n'existe pas de niveau administratif commun et où aucune infrastructure administrative transfrontalière stable n'est disponible. Sur la base d'une analyse documentaire de quatre initiatives de participation transfrontalière, nous avons analysé comment les agendas, les formats de participation, la représentativité et le suivi étaient organisés dans la zone frontalière entre les Pays-Bas, la Belgique et l'Allemagne. L'analyse a montré que ces processus de participation étaient fortement façonnés par la coordination entre les organisations de différents pays, par les exigences en matière de financement et de responsabilité, ainsi que par des choix pratiques concernant la normalisation, le recrutement et le multilinguisme. Cela a certes rendu la participation transfrontalière organisable, mais a également limité l'espace dédié à une délibération sensible aux enjeux locaux et les possibilités d'une représentation large et équilibrée. Il est également apparu que les résultats étaient principalement compilés, rapportés et diffusés au sein de réseaux transfrontaliers, et conduisaient beaucoup moins souvent à un suivi politique commun. Ainsi, ce chapitre montre que la participation citoyenne dans les régions frontalières dépend d'une coordination institutionnelle permettant une action commune. Parallèlement, l'absence d'un agenda commun, d'une partie capable de recevoir et d'assurer le suivi des résultats, et d'un cadre politique commun limite la portée et l'impact de celle-ci. Ainsi, ce chapitre souligne que la santé publique dans les régions frontalières ne constitue pas un domaine transfrontalier a priori, mais doit à chaque fois être rendue opérationnelle sur le plan organisationnel et institutionnel.

Discussion. Dans cette thèse, j'ai montré que la santé publique dans les régions frontalières ne peut être comprise ni comme une simple somme des systèmes nationaux, ni comme un domaine politique transfrontalier déjà bien établi. La santé publique dans les régions frontalières prend forme dans la manière dont les problèmes sont délimités, les responsabilités réparties, les données produites et utilisées, et la coopération entretenue dans la pratique. Une première leçon est que la coopération transfrontalière met en évidence que la santé publique repose sur des classifications, des registres, des normes et des routines nationales qui, au sein d'un même pays, restent généralement en arrière-plan et passent donc inaperçues. Ce n'est que dans le cadre de la coopération avec un pays voisin, où les problèmes, les données et les responsabilités sont organisés différemment, qu'il apparaît clairement que ces infrastructures ne sont pas neutres, mais qu'elles contribuent à déterminer ce qui est considéré comme un problème pertinent, qui est mis en avant et comment les politiques sont rendues concrètement applicables.

Une deuxième leçon est que, pour l'instant, la santé publique transfrontalière ne bénéficie d'une impulsion administrative que lorsqu'elle s'inscrit dans les cadres nationaux existants de définition des problèmes, de mandat, de preuve et de responsabilité. C'est précisément parce qu'une infrastructure transfrontalière plus solide, dotée de mandats et de lignes de responsabilité propres, fait largement défaut que les cadres politiques nationaux continuent de dicter ce qui est gérable sur le plan administratif, défendable et organisable de manière durable. De ce fait, la coopération transfrontalière ne progresse souvent que lorsqu'elle s'inscrit dans les responsabilités et les routines existantes.

Une troisième leçon est que la coopération transfrontalière n'est pas une donnée stable, mais reste fragile et ne peut rester fonctionnelle que si la continuité, le suivi et la coordination sont activement maintenus au-delà des systèmes ancrés au niveau national. C'est précisément parce que la coopération ne s'inscrit pas ici dans un cadre administratif et organisationnel unique, mais entre des systèmes aux responsabilités, procédures et lignes de responsabilité différentes, qu'elle exige sans cesse une coordination, une adaptation et un entretien renouvelés, une nouvelle traduction et un nouvel entretien. Sans ancrage durable, la coopération et la coordination retombent donc facilement dans des projets temporaires, l'engagement personnel et des efforts de réparation.

Une quatrième leçon est qu'il existe, dans les régions frontalières, une tension permanente entre la vie quotidienne transfrontalière des citoyens et l'organisation de la santé publique, principalement structurée au niveau national. La vie quotidienne des citoyens ne s'arrête pas à la frontière, contrairement à l'organisation de la santé publique, qui s'y arrête en grande partie. De ce fait, l'espace de vie des citoyens ne correspond pas à la zone dans laquelle les organismes de santé publique assument leurs responsabilités. Dans les pratiques que j'ai étudiées, les maladies, les crises, les missions politiques et les catégories administratives constituaient donc bien plus souvent le point de départ que la question de savoir comment la santé publique s'articule avec des vies qui, dans la pratique, se déroulent au-delà des frontières.

Ces quatre enseignements débouchent en outre sur des recommandations pour les politiques et la pratique. La santé publique transfrontalière nécessite un recensement systématique des différences en matière de classifications, de données, de responsabilités et de voies de mise en œuvre, ainsi que des voies administratives pour l'inscription à l'ordre du jour, la prise de décision et le suivi, et enfin un financement structurel et des mandats pour la coordination transfrontalière. Par ailleurs, les politiques et la pratique devraient évaluer de manière plus systématique l'impact des mesures de santé publique sur les citoyens qui vivent, travaillent, étudient, recourent aux soins ou entretiennent des relations sociales au-delà des frontières.



Outre des recommandations, la thèse apporte également une contribution conceptuelle aux études sur les frontières et à la littérature sur les infrastructures. En ce qui concerne les études sur les frontières, elle montre que la mobilité transfrontalière, les contacts professionnels et la coopération par projet ne conduisent pas automatiquement à une politique, une mise en œuvre et une responsabilisation communes en matière de santé publique. En ce qui concerne la littérature sur les infrastructures, elle montre que les infrastructures de santé publique ne s'étendent pas automatiquement au-delà des frontières nationales, mais doivent être activement harmonisées, adaptées et entretenues dans les régions frontalières entre des systèmes organisés au niveau national.

Sur la base de ces constatations, la conclusion principale de cette thèse est que la santé publique dans les régions frontalières s'organise et se concrétise en tant que domaine de politique et de pratique grâce à une harmonisation constante, par-delà les frontières, des infrastructures, des responsabilités et des relations ancrées au niveau national. La santé publique dans les régions frontalières n'est donc pas un domaine figé, mais un champ fragile et inachevé qui doit être sans cesse recréé sur les plans administratif, organisationnel et pratique.





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Een dankwoord is het enige hoofdstuk van een proefschrift zonder hoofdvraag, analyses, tabellen of conclusies. Nu uitsluitend aandacht voor de mensen die met mij meedachten, meeschreven, meeluisterden en mijn gemopper soms opmerkelijk professioneel negeerden. Dit hoofdstuk gaat over hen. En, beloofd, ik zal niemand vergeten.

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De hoofdstukken in dit proefschrift kwamen tot stand met verschillende coauteurs. Omdat ik in dit dankwoord geen nieuwe discussie over auteursvolgorde wil openen, laat ik het alfabet beslissen: Koen Gorgels, Volker Hackert, Mitch van Hensbergen, Christian Hoebe, Klasien Horstman, Alena Kamenshchikova, Boris Kauhl, Mignon Schichel, Marja Veenstra, Marjolein de Vugt, Frans Verhey, Stephanie Wagner, Hui Wang en als laatste coauteur, wetenschappelijk gezien een uitstekende plek, Astrid van der Zanden.

Mijn dank gaat ook uit naar het toenmalige bestuur van euPrevent. Jullie vonden het belangrijk om het werk dat binnen euPrevent jarenlang was opgebouwd niet alleen uit te voeren, maar ook wetenschappelijk te onderzoeken, te onderbouwen en vast te leggen. Jullie boden mij de ruimte om daar in een promotietraject vorm aan te geven. Dat vertrouwen en die handreiking hebben mede geleid tot dit proefschrift. Een aantal mensen heeft mij daarbij in het bijzonder gestimuleerd om deze stap daadwerkelijk te zetten. Karl-Heinz Feldhoff, Fons Bovens en Nanne de Vries zagen al vroeg dat het werk van euPrevent inhoudelijke verdieping en wetenschappelijke onderbouwing verdiende

en geloofden dat ik daaraan vorm kon geven. Karl-Heinz, jouw rotsvaste geloof in het thema, in Europa, in euPrevent en in mij heeft niet alleen aan de basis van dit proefschrift gestaan, maar ook een belangrijke rol gespeeld in mijn loopbaan. Op jouw steun kon ik altijd en in alles rekenen. Fons, jij was er gewoon altijd. Je had tijd voor mij, vond steeds een positief en oprecht woord en twijfelde geen moment aan mijn kunnen in dit traject. Je maakte daar nooit veel woorden aan vuil, maar jouw vertrouwen was altijd voelbaar. Nanne zag als hoogleraar direct de wetenschappelijke waarde ervan en was vanaf het begin een uitgesproken voorstander. Hij kan de afronding van dit traject helaas niet meer meemaken. Zijn betrokkenheid, vertrouwen en steun blijven voor mij onlosmakelijk verbonden met het begin van dit proefschrift.

Daarnaast zijn er de honderden mensen met wie ik in al die jaren via euPrevent heb samengewerkt. In programma's, werkgroepen, onderzoeken, bijeenkomsten, netwerken, congressen en ontelbaar veel overleggen waarin grenzen soms het onderwerp waren en soms vooral de praktische hindernis. Samen probeerden we publieke gezondheid in een grensregio niet alleen te bespreken, maar ook echt vorm te geven. Daarbij ontstond ook iets wat zich moeilijker in plannen laat vastleggen: een Euregionale cultuur, een gevoel van 'wij' en persoonlijke verbindingen die vaak veel langer standhielden dan de programma's en projecten waarbinnen zij waren ontstaan. Dat ging met enthousiasme, overtuiging, geduld, improvisatie, humor en af en toe een gezond gebrek aan realiteitszin. Niet alles lukte, niet alles bleef bestaan en sommige ideeën bleken vooral heel goed op papier. Maar al die samenwerkingen, gesprekken en ervaringen hebben mijn werk gevormd en liggen mede aan de basis van de vragen in dit proefschrift. Aan ieder van jullie, zonder uitzondering, heel veel dank.

Hui Wang en Marleen Struß waren mijn laatste collega's bij euPrevent. Onze groepsapp heette niet voor niets 'Werkpaarden'. En werkpaarden waren jullie. Altijd loyaal, altijd bereid om door te gaan en nooit te beroerd om nog nét even dat extra te doen. Samen vormden we een ongekend team. Er werd hard gewerkt, veel gelachen en meestal zonder veel omhaal gewoon gedaan wat nodig was. Betere collega's had ik mij niet kunnen wensen. Paul Mevis, officieel stond je misschien niet op de loonlijst, maar in de praktijk hoorde je er gewoon bij. Ook op jou was altijd te rekenen. Hui, dat jij vandaag ook als paranimf naast mij staat, maakt onze gezamenlijke weg extra bijzonder.

Ook mijn collega's bij de Academische Werkplaats Publieke Gezondheid Mosa wil ik bedanken. Ik was misschien de collega die jullie het minst vaak zagen en voelde mij tussen veel jongere wetenschappers soms een beetje de oma die ook nog dacht een proefschrift te moeten schrijven. Voor alle duidelijkheid, dat gevoel hebben jullie mij nooit gegeven. Integendeel. Ik heb jullie steun altijd ervaren en genoot van de momenten waarop ik er wel bij was. Vooral de uitjes leverden memorabele herinneringen op. Zo stelde ik mijn gezicht belangeloos ter beschikking aan de wetenschap om te onderzoeken hoeveel

wasknijpers eraan konden hangen en mocht ik bij een andere gelegenheid voor lijk spelen. Deze experimenten hebben dit proefschrift niet gehaald, maar behoren wel tot de momenten die ik niet snel zal vergeten. Dank voor de collegialiteit, de humor en de fijne tijd samen.

Eén uitzondering maak ik graag. Elfi Brouwers verdient een bijzondere plaats. Wij waren elkaars medestanders in het enigszins merkwaardige plan om als senioren naast een drukke baan ook nog even een PhD te doen. Anderen noemen dat misschien ambitie. Achteraf bezien kun je ook andere woorden bedenken. Het hielp in ieder geval enorm om iemand te kennen die begreep waarom je vrijwillig je avonden en weekenden besteedt aan revisies, methodologische discussies en zinnen die na twee uur nadenken uiteindelijk toch weer worden zoals ze oorspronkelijk waren.

Ook mijn vrienden wil ik bedanken. Jullie vroegen hoe het ging, leefden mee met de voortgang en luisterden naar verhalen over artikelen, reviewers en hoofdstukken waarvan de details voor jullie waarschijnlijk niet altijd even boeiend waren. Toch bleven jullie vragen. Dat alleen al zegt veel.

Eén van hen raakte bovendien letterlijk betrokken bij dit proefschrift. Ingrid Nouwens, jij luisterde steeds opnieuw naar mijn verhalen, twijfels en frustraties. Dat is op zichzelf al een aanzienlijke vriendschappelijke prestatie. En zoals het een echte vriendin betaamt, gaf je mij natuurlijk altijd gelijk, of dat nu terecht was of niet. Vervolgens heb je ook nog aangeboden om dit boekje te illustreren. Daarmee heb je mijn ideeën over rode draden, grenzen, burgers en andere soms nauwelijks uit te leggen beelden daadwerkelijk zichtbaar gemaakt. Het proefschrift is daardoor niet alleen inhoudelijk, maar ook visueel veel meer van mij geworden.

Pa en ma, vijftig jaar geleden werden jullie de trotse 'eigenaren' van dit schepsel. Een kind dat al vroeg, eerst naar haar ouders en daarna naar zichzelf wijzend, de wijze wiskundige woorden sprak: 'Min maal min is plus.' Wat hebben we daar door de jaren heen vaak om gelachen. Van jullie heb ik geleerd om op mezelf te vertrouwen, nieuwsgierig te blijven, stevig in het leven te staan en de humor niet te verliezen. Dat zijn misschien geen formele competenties voor een promovendus, maar ik heb er tijdens dit traject waarschijnlijk meer aan gehad dan aan menig handboek. Tot op de dag van vandaag leven jullie mee met alles wat ik onderneem. Zelfs mijn Engelstalige artikelen probeerden jullie te lezen. Ma, jij belde dan om te zeggen: 'Ik heb het gelezen hoor, maar ik snap het niet helemaal. Kun je het me nog eens uitleggen?' Om vervolgens, op basis van iets wat je in de krant had gelezen, uitgebreid te bevestigen dat ik natuurlijk gelijk had. Pa, jij vroeg niet alleen naar de inhoud, maar hield ook nauwkeurig bij waar ik ongeveer in het proces stond. Had ik al iets gehoord? Hoe stond het met dat artikel? Was die volgende stap inmiddels gezet?

Astrid, mijn zusje, misschien wel de persoon die het vaakst in mijn werk en leven terugkomt. Soms dachten mensen dat we een tweeling waren, soms een lesbisch stel. Eén ding stond in ieder geval altijd vast: het was wij tegen de wereld. En eigenlijk is dat nog steeds zo. We verschillen behoorlijk van elkaar en zijn meedogenloos eerlijk tegen elkaar. I've got your back, you've got mine is ons op het lijf geschreven. Wee degene die een van ons onrecht aandeed. Dan ging die persoon zonder pardon voor de bikkels. Jij was de ongewilde aanstichter van mijn carrière in de publieke gezondheid, werd later coauteur en staat nu als paranimf naast mij. Dat lijkt achteraf bijna zorgvuldig gepland, maar dat was het bepaald niet. Jij bent al mijn hele leven een rode draad, niet alleen privé, maar ook door mijn werk en uiteindelijk door dit proefschrift. René, jij hoort vanzelfsprekend bij dat verhaal. Dank dat je onze hechte band altijd zo vanzelfsprekend hebt omarmd en inmiddels onlosmakelijk bij ons verhaal hoort.

Rolf, jij hebt het hele traject van het meest dichtbij meegemaakt. De oorsprong daarvan ligt in een inmiddels befaamde treinrit naar het mooie Twente. Toen ik vertelde dat ik Christian wilde voorstellen iemand te zoeken die op het onderwerp kon promoveren, vroeg jij eenvoudigweg: 'Waarom doe je het niet zelf?' Die ene vraag leidde uiteindelijk tot dit proefschrift. Daar ben ik je dankbaar voor hoor, hoewel ik je tijdens het traject regelmatig de veelzeggende blik heb gegeven waaruit bleek dat we daar misschien nog eens kritisch op moesten reflecteren..... Je hebt het traject vervolgens ook echt met mij gedragen. Je luisterde wanneer ik mijn verhaal kwijt moest, las tekst wanneer ik het even niet meer zag, hielp mij stoom af te blazen en ging blindelings voor mij. Als er iets lukte, was jij soms nog blijer dan ik. Mijn successen waren ook een beetje die van jou. En bovenal zijn we samen blijven lachen. Dat is voor mij misschien wel het mooiste van alles.

En dan iedereen die ik hier niet bij naam heb genoemd. Ook jullie ben ik dankbaar. Omdat je vroeg hoe het ging en bereid was het antwoord ook echt aan te horen. Omdat je belangstelling toonde, meedacht, hielp, relativeerde of op het juiste moment over iets heel anders begon. Omdat je vandaag bij mijn promotie aanwezig bent, of op een andere manier met mij meeleeft.

En natuurlijk omdat je de moeite hebt genomen om in ieder geval het belangrijkste onderdeel van dit promotieboekje te lezen. Het dankwoord.

P.S. En dan nog één klein B-moment...

Aan het einde van een dag waarop ik mijn twee promotoren nog een uur digitaal had gesproken, ging ik met mijn zwager René en Charlie, hun geweldige Australian Labradoodle, wandelen. In het losloopgebied raakte Charlie aan de praat met een andere hond en ik met de vrouw die daarbij hoorde.

Op een gegeven moment zei ik: 'Je komt me bekend voor. Je lijkt op iemand die ik vanmiddag heb gesproken.' Zij antwoordde: 'Jij mij ook, maar dan vanmorgen.' Toen ze vroeg op wie ze volgens mij leek, zei ik: 'Op Klasien Horstman.'

'Ja,' zei ze, 'dat ben ik.'

René stond erbij en keek ernaar. Klasien en ik lagen dubbel. We spraken elkaar al maanden iedere paar weken digitaal. Drie uur eerder nog een heel uur. En toch herkenden we elkaar in het echt niet. Ik zal maar niet beschrijven hoe wij er allebei bijliepen, maar het was in ieder geval overduidelijk dat we vrije tijd hadden.

P.P.S. International version: Thanks! Danke! Merci! For a complete translation of this 'Dankwoord', I recommend Google Translate or ChatGPT.

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BZ brigittevanderzanden

EUPREVENT
crossing borders in health

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This thesis examines how public health in European border regions, particularly between the Netherlands, Belgium and Germany, is organised and made workable. It concludes that this requires the continual realignment of nationally anchored infrastructures, responsibilities and relationships across borders. Public health in border regions is therefore not a fixed domain, but a fragile and unfinished field that must repeatedly be established in administrative, organisational and practical terms.

