

BMJ Open Population health differences in cross-border regions within the European Union and Schengen area: a protocol for a scoping review

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ABSTRACT

Introduction Along with European integration and the harmonisation of living conditions, improvements in health have been observed over the past decades. However, sociospatial inequalities within and across member states still exist today. While drivers of these health inequalities have been widely researched on a national and regional scale, cross-border regions remain understudied. The removal of border controls within the European Union (EU) member states has facilitated economic convergence and created new opportunities, including cross-border cooperation in the healthcare systems. However, whether and how these developments have influenced the population health in the respective cross-border regions is unclear. Hence, this scoping review aims to examine the empirical literature on the changes in health outcomes over time at the population level in EU cross-border areas. Additionally, we aim to identify the type of evidence and available data sources in those studies. Finally, we will determine the research gaps in the literature.

Methods and analysis We will follow the Joanna Briggs Institute methodology for this scoping review. The 'Population-Concept-Context' framework will be used to identify the eligibility criteria. A three-step search strategy will be conducted to find relevant studies in the databases of PubMed, Web of Science, Scopus and EBSCOhost (SocIndex). Additionally, we will search on websites of international governmental institutions for further reports and articles. The finalisation of the search is planned for August 2023. The extracted data from the scoping review will be presented in a tabular form. A narrative summary of the selected studies will accompany the tabulated results and describe how they answer the research questions.

Ethics and dissemination We will exclusively use secondary data from available studies for our analysis. Therefore, this review does not require ethical approval. We aim to publish our findings at (inter-)national conferences and as an open-access, peer-reviewed journal article.

INTRODUCTION

In the past three decades, European living situations, working conditions and health outcomes have consistently improved. European integration refers to the ongoing process of political, economic and social

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study follows the Joanna Briggs Institute methodology for scoping reviews, ensuring a structured and recognised review approach.
- ⇒ The scoping review acknowledges the multidisciplinary and diverse nature of research on health in cross-border regions, allowing for the inclusion of various study designs beyond intervention effectiveness.
- ⇒ The reliance on published studies and reports may introduce publication bias, as unpublished or grey literature is not included in the review.
- ⇒ Our search is limited to English publications only. Hence, we may omit relevant studies in other languages.

cooperation among European countries to foster unity and solidarity within the continent. The Maastricht Treaty, signed in 1992 by the then 12 member states of the European Economic Community, played a crucial role in this integration by establishing the European Union (EU) and introducing the elimination of border controls allowing the free movement of people, goods and capital. Those European integration processes play an essential role in the development of health. Particularly, countries and regions that are less economically prosperous can benefit from open borders. Member states have experienced economic growth since joining the EU.^{1,2} On average, gross domestic product (GDP) per capita in EU member states more than doubled between 1990 and 2020.³ While Central European and the Baltic countries that have acceded to the EU after 2004 remain far below the EU average, these countries have also experienced a significant increase in GDP per capita in the current US\$ (1990: \$2314 and 2021: \$18 569).⁴ Several studies show that economic growth positively affects the population's health. Preston⁵ was the first to describe this positive relationship

between GDP per capita and life expectancy at birth on a cross-sectional level. Later studies have shown that, in the long run, an increase in countries' GDP per capita is associated with an increase in life expectancy.^{6–8} Furthermore, removing hard borders strengthened economic and political cooperation and cultural exchange, contributing to the harmonisation of living conditions. Also, the freedom to live and work in another member state and the possibility to use its infrastructure, such as healthcare, can positively impact overall life satisfaction, which in turn has a positive effect on health.^{9 10}

Reducing health inequalities between regions is essential to achieving economic and social cohesion.¹¹ It is, therefore, one of the central aims of the EU. With the Directive 2011/24/EU on the application of patient's rights in cross-border healthcare, the EU sets standards that enable citizens to receive healthcare across member states without further costs. Moreover, it aims to stimulate cooperation among national healthcare systems leading to the convergence of health differences among EU member states. However, member states remain responsible for their healthcare systems, which are usually complex and interwoven. A recent study by the European Commission and the European Public Health Alliance¹² showed that the EU still needs to achieve its goal of synchronising social and healthcare. In that context, it is particularly relevant to look at population health developments regarding European integration and the resulting opening of the national borders among EU member states. Cross-border regions, in particular, could be considered experimental laboratories due to their proximity and close cooperation. Populations on both sides of the border may share a similar cultural and historical background but are exposed to different institutional settings, including the healthcare system. On the other hand, residents are permitted to use the health infrastructures of the member state on the opposite side of the border. Despite these particularities of cross-border regions, the effects on health outcomes remain understudied.

Compared with cross-border regions, various EU and country-level studies document health improvements over time. Although obesity and chronic conditions have increased in the EU on average due to population ageing,¹³ infant mortality has decreased significantly in all EU member states.¹⁴ On average, life expectancy in the European region has risen from 74 to 80 years¹⁵ between 1990 and 2020. South and Central European countries and the Baltic countries especially showed a significant increase in life expectancy. However, compared with the EU average, these countries still lag.^{16 17} Inequalities in health do not only exist across but also within countries of the EU.^{16 18–20} For instance, it is shown that health inequalities in urban areas appear to be greater than in rural regions within EU countries.^{21 22} Another example is that Southern Italians are more at risk of experiencing unmet medical needs than Italians living in the North of the country.²³ Furthermore, Maier *et al*²⁴ found that with increasing area deprivation in Germany, the risk of type 2

diabetes prevalence rises. Regional inequalities in health are the largest in France, Germany and the UK, and the smallest in Scandinavian countries.¹¹ More recently, regional inequalities were also present during the ongoing COVID-19 pandemic.²⁵ Cross-border regions were particularly affected, as borders again had to be closed partly or entirely for the first time since the EU accession.

While there are an increasing number of studies on regional health developments, little is known about cross-border regions. They are essential for understanding the overall picture of health development in the EU and European integration. Many border regions were peripheral and relatively rural regions, especially before the opening of national borders within the EU, that could be characterised by marginality regarding the economy, transport, infrastructure, accessibility and population decline that may have resulted from migration towards the cities.²⁶ The interplay of the core–periphery concept has been widely discussed among geographers. It is rooted in the 60s, established by Friedmann,^{27 28} where he argued that peripheral regions become dependent on central regions. Over the decades, however, the model has been revisited several times and adapted to developments over time. Krugman^{29 30} pointed out that the geographical location within the area experiencing economic growth is essential. Additionally, Keim³¹ suggests that peripheralisation and centralisation are mutually dependent processes that, despite their relative stability, are effective over limited periods and can therefore be reversible due to economic growth and reorganisation of the activities in space.³² Cross-border areas may experience such a transformation process from dependent peripheries to a region that attracts new industries due to European integration and globalisation processes.³³ The opening of national borders for the free movement of people has not only contributed to the harmonisation of living conditions but also has been associated with an increase in regional economic activity for the inner-European border regions.³⁴ Additionally, cross-border cooperation among local and regional authorities has increased over time^{35 36} and positively affects the economy.³³ Finally, the construction of new transport routes between two border regions, such as the Oresund Bridge or the Eurotunnel, fostered cross-border economic cooperation and contributed to the development of those regions.³⁷

Due to the constantly growing cooperation and the resulting exchange of knowledge, cross-border regions are essential drivers for European integration. Moreover, cross-border cooperation in the health sector can serve as an exciting learning example regarding the endeavour for health harmonisation in the EU, as it emerged from the EU Directive 2011. Studies on health in the EU have mainly focused on state-level comparisons. Even when looking at studies considering the regional level, comparisons rarely go beyond borders. Additionally, cross-border and population health studies can be widely interdisciplinary and are scattered across journals from different fields. An overview of the existing evidence is needed

to grasp the current knowledge of population health in cross-border regions across EU and Schengen area member states. This scoping review, therefore, aims to assess the availability of empirical studies on the development of health outcomes over time and in the context of different health policies for the population living in cross-border areas among the member states of the EU and the Schengen area. Furthermore, it intends to identify the sources of evidence, the use of cross-border data and the gaps in the literature. This leads us to the following research questions:

- What is known about the differences in health outcomes of the population living in EU cross-border regions since the implementation of the Maastricht Treaty in 1992?
- What type of empirical evidence and data on cross-border health differences is available?
- What gaps in the current body of literature can be identified?

METHODS

A preliminary search of PubMed/MEDLINE, the Cochrane Database of Systematic Reviews and Joanna Briggs Institute Evidence Synthesis was conducted, and no current or underway systematic or scoping reviews on the topic were found. The purposes of scoping reviews, defined by Arksey and O'Malley,³⁸ are to investigate the extent and range of literature, summarise research findings and identify gaps in the current body of literature. In contrast to a systematic review, a scoping review can enfold a wide variety of study designs and include research that does not necessarily relate to intervention effectiveness.^{39 40} Since research on health in cross-border regions is multidisciplinary and diverse, we believe that conducting a scoping review is an appropriate method for this paper. We will follow the Joanna Briggs Institute methodology for scoping reviews.⁴⁰ Furthermore, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR)⁴¹ will be used as a guide to answering the proposed research question. We will document alterations of the protocol, if any, along with the reason for them in the final review.

Eligibility criteria

The inclusion and exclusion criteria will be based on the Population, Concept and Context approach as recommended by the Joanna Briggs Institute (see [figure 1](#)).

Population

The study population consists of all residents in every age group residing in a cross-border region. Preferably, we will include studies that compare the respective (regional) population groups on all sides of the border. However, the proximity to the adjacent member states or other cross-border effects can explain patterns. In that case, we will add studies that compare cross-border regions with non-cross-border regions of a country to the review. Countries that will be included are all member states of the EU and

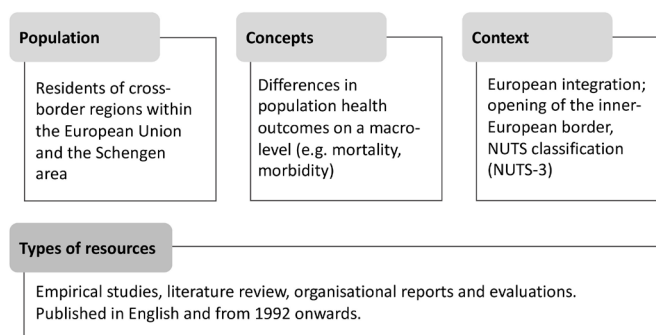


Figure 1 Eligibility criteria. Population, Concepts and Context and types of resources. NUTS, nomenclature of territorial units for statistics.

the Schengen area. As island states, the UK and Ireland are exceptional cases, but we will include them in the analysis and consider Brexit if necessary.

Concept

The central concept of this scoping review will be the differences or similarities in the health outcomes of the European cross-border population and their development over time. Considering the health outcomes, we will look at studies that use standard measures for population health, such as mortality and life expectancy. Next, we will look at morbidity measures, such as prevalence, incidences of communicable and non-communicable diseases, and the burden of diseases as a combined measure of morbidity and mortality.

Context

We will investigate how the health outcomes in the selected studies developed over time with consideration of European integration. The setting for this scoping review will be the cross-border regions of the EU member states and the Schengen area. To identify those regions, we will use the nomenclature of territorial units for statistics, also known as NUTS classification, defined by Eurostat. They define border regions as NUTS-3 regions situated either along a land border or where over 50% of the population resides within a 25 km proximity to the said border.⁴²

Types of sources

This scoping review will consider quantitative and qualitative studies as long as they meet the above criteria. Policy reports, working papers or organisational reports will also be considered for inclusion in this scoping review. For this purpose, we will search for studies published in English exclusively. Furthermore, we will only include studies published from 1992 until today. This period coincides with the Maastricht Treaty, which was concluded in 1992 and entered into force in 1993.

Search strategy

Following the Joanna Briggs guidelines for scoping reviews,^{40 41} a three-step search strategy approach is used for the proposed scoping review, as presented in [figure 2](#). This search strategy aims to locate eligible studies. First,

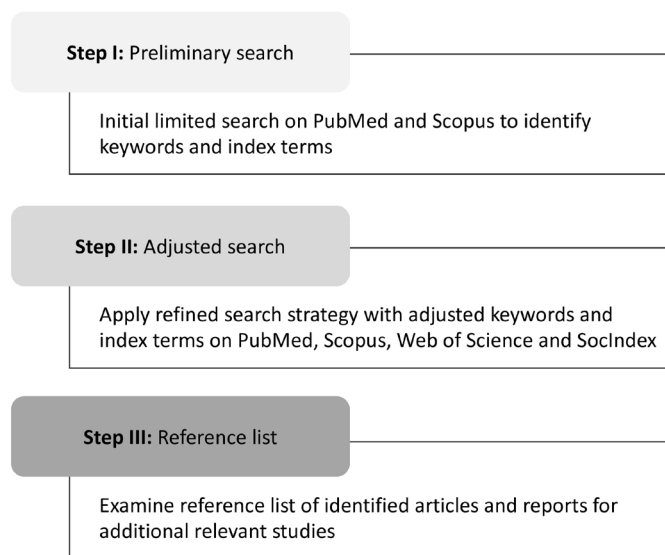


Figure 2 Three-step search strategy recommended by the Joanna Briggs Institute (Peters *et al*⁴⁰).

we undertook a limited preliminary search under the eligibility criteria on PubMed and Scopus, followed by an analysis of text words in the titles and abstracts as well as index terms to refine the search. Second, we applied the refined search with the adjusted keywords and index terms anew on PubMed, Scopus, Web of Science and SocIndex (EBSCOhost). These first two steps were conducted in June 2022. The complete search strategy syntax of all databases mentioned is listed in online supplemental appendix A. Third, the reference list of all identified articles and reports will be examined for additional relevant studies. Additionally, we will search the websites of the Publication Offices of the European Union and the WHO for further reports and articles. We conducted a preliminary search strategy on 22 August 2022. However, after the peer review process has been completed, we will run the search again with the adjusted syntax, if applicable. We will consider any new article that has been published in the meantime. The updated search is planned for August 2023.

Selection procedure and data management

After the search is completed, all identified citations will be collated and uploaded into the citation manager Zotero (V.6.0.10, 2022). Duplicates can be identified through this software and will be systematically removed. Subsequently, with the help of the software Rayyan, titles and abstracts will be screened by two independent reviewers for assessment against the eligibility criteria of this review. Two or more independent reviewers will thoroughly assess the full text of selected citations. Reasons for exclusion after reading the entire text will be recorded and reported in the final scoping review. Any disagreements that arise between the reviewers at each stage of the selection process will be resolved through discussion or with an additional independent reviewer. The inclusion and exclusion procedure results will be fully reported in the

Table 1 Extraction fields and their description

Key information	Description
Bibliographical details	Author, year of publication
Study design	Research aim/objectives, methodology
Data characteristics	Source of data, type of data, variables
Geographical location	Country of location, NUTS classification
Study population	Socioeconomic background of the population (eg, age, sex, occupation, income, etc)
Outcomes	Main results of the study
Other findings relevant to the review question	Gaps in the literature, strength and limitations of the study
NUTS, nomenclature of territorial units for statistics.	

final scoping review and presented in the PRISMA-ScR flow diagram.⁴¹

Patient and public involvement

We did not involve patients or the public while designing this protocol.

ANALYSIS

Data extraction

We will develop a logical and descriptive summary of the results by charting the data as a table. It will line up with the research objective and questions of this review. A preliminary version of the charting table with the key information, including a description, is provided in [table 1](#). Additions or refinements are expected since it needs several studies to extract all relevant results. In the current version of the charting table, we define the following key information: bibliographical details, study design, data characteristics, geographical location, study population, outcomes and other findings relevant to the review questions.

Data analysis

For the evidence found, we will provide descriptive information in the form of frequencies, percentages or absolute numbers for the data charted in the extraction table. We will make use of software and visualisation tools to conduct those analyses. Important to mention that we will neither report on the risk of bias across the studies nor conduct additional analyses such as meta-regressions since, different than systematic reviews, this is not applicable for scoping reviews.⁴¹

Presentations of results

The results of the scoping review will be presented in a tabular form. A narrative summary of the selected studies will accompany the tabulated results and describe how they relate to the review. A hypothetical example is given

in online supplemental appendix B to provide a better understanding of the planned presentation of the results. In the final review, this overview may alternate from the proposed one after completing the data extraction. In alignment with the second objective of this review, which is to identify sources of evidence and the availability of cross-border data for the selected study, we will enrich the data presentation section with two visualisations. First, we will create a time series in the form of a Gantt chart to show the period of the data analysed in the respective studies. Second, to show the geographical coverage and granularity of the data, we will develop a map that will show the countries or regions and, if identifiable, the NUTS classification.

Ethics and dissemination

This scoping review aims to portray existing studies in the current body of literature on the development of health outcomes over time in cross-border regions within the EU and the Schengen area. Furthermore, it will identify research gaps that may eventually benefit EU citizens' health if interventions and best practices are implemented. It will primarily inform researchers about the need to conduct more research on different dimensions of cross-border health differences and drivers. This study is part of a larger project. The larger project by the 'Cross-Border Institute of Healthcare Systems and Prevention' consists of researchers, practitioners, policymakers and societal stakeholders who will be informed about this publication.

Since we do not collect primary data ourselves but exclusively use existing empirical studies for our analysis, ethical approval is not required for this review. Regarding disseminating the results, we anticipate presenting our findings to scholars within the field at an international conference. Furthermore, we plan to publish the scoping review in a peer-reviewed journal focusing on public health and demography that is openly accessible.

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Contributors The study was initiated and conceptualised by TV. SSt wrote the draft of the protocol. TV, VA and SSch contributed to the drafting and editing of the manuscript. SSt and TV developed the search strategy. All the authors reviewed the protocol and approved the final version of the paper.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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