



BMJ Open Expert consensus on a protocol for conducting bibliometric analysis of scientific articles on global migration health (GMH)

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ABSTRACT

Background Migration and health are key priorities in global health and essential for protecting and promoting the health of migrants. To better understand the existing evidence on migration health, it is critical to map the research publication activity and evidence on the health of migrants and mobile populations. This paper presents a search strategy protocol for a bibliometric analysis of scientific articles on global migration health (GMH), leveraging the expertise of a global network of researchers and academics. The protocol aims to facilitate the mapping of research and evidence on the health of international migrants and their families, including studies on human mobility across international borders.

Methods A systematic search strategy using Scopus will be developed to map scientific articles on GMH. The search strategy will build upon a previous bibliometric study and will have two main search components: (1) 'international migrant population', covering specific movements across international borders, and (2) 'health'. The final search strategy will be implemented to determine the final set of articles to be screened for the bibliometric analysis. Title and abstract screening will exclude irrelevant articles and classify the relevant articles according to predefined themes and subthemes. A combination of the following approaches will be used in screening: applying full automation (ie, DistillerSR's machine learning tool) and/or semiautomation (ie, EndNote, MS Excel) tools, and manual screening. The relevant articles will be analysed using MS Excel, Biblioshiny and VOSviewer, which creates a visual mapping of the research publication activity around GMH. This protocol is developed in collaboration with academic researchers and policymakers from the Global South, and a network of migration health and research experts, with guidance from a bibliometrics expert.

Ethics and dissemination The protocol will use publicly available data and will not directly involve human participants; an ethics review will not be required. The findings from the bibliometric analysis (and other research that can potentially arise from the protocol) will be disseminated through academic publications, conferences and collaboration with relevant stakeholders to inform

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A major strength of the study is the collaboration with different researchers and/or experts on global migration health including from the Global South.
- ⇒ This study will provide an up-to-date and comprehensive mapping of scientific articles on global migration health published from 2017 to 2022, which will then be housed in a searchable online public repository.
- ⇒ Assessing the status of research publication activity on global migration health is critical to map the existing evidence base, identifying gaps and advancing evidence-informed policies and practices at the national, regional and global levels.
- ⇒ By classifying articles into predefined themes using a human-trained machine learning tool, the current methodology goes beyond the conventional bibliometric approach.
- ⇒ The bibliometrics method has inherent limitations, where the research output is dependent on the search strategy, the scope and indexed journals of the citation database, and the analysis software; its aim is primarily to quantify research productivity and not to assess the study quality of included articles and therefore limited in providing insights into the impact on policy, society or practical applications.

policies and interventions aimed at improving the health of international migrants and their families.

INTRODUCTION

Migration and human mobility are key social determinants of health. The bidirectional relationship between migration and health is a complex and dynamic one.¹ Scholars caution generalisability between and within migrant groups.^{2 3} A high degree of heterogeneity across migrant groups and movement/mobility patterns mean differing social

determinants, health risks and health impacts across the migration phases.⁴ Migrants may be exposed to various health risks at each stage of the migratory process: from leaving their place of origin, during travel/transit, through arrival at destination, and even upon their return. Conversely, migration may also enable and promote the health of migrants directly through better access to healthcare at their destination, or through remittance flows to migrant households, thereby improving nutrition and healthcare accessibility. Migrant populations have varying vulnerabilities and resiliencies/protective factors depending on their sociodemographic profile, legal status or phase of the migration process.¹⁵ Moreover, restrictive migration policies, inadequate integration practices and anti-migrant sentiments may inhibit migrants' access to healthcare, education, and safe and dignified living and working conditions.^{6,7}

The health of migrants is a key global health priority and critical for achieving the Sustainable Development Goals.¹⁻³ Assessing the status of research publication activity in global migration health (GMH) is critical to map the existing evidence base, identifying gaps, and advancing evidence-informed policies and practices at the national, regional and global levels. The second Global Consultation on Migrant Health (2017) recognised the need to 'take stock of current research, map the existing literature, identify areas of focus and gaps, and establish a global research agenda on migration health'.⁷ The consultation emphasised the importance of analysing the globally published peer-reviewed literature in the field of GMH. Further, strengthening data and research capacity was one of the expected outcomes in the third Global Consultation on the health of refugees and migrants held in June 2023.⁸

Mapping research evidence on migration health: a priority

Bibliometric analysis is the quantitative analysis of publications (eg, research articles and books) using bibliographic data (ie, author information, citation and publication information) to produce measures of 'research activity or research publication activity' (ie, number of publications), 'research impact' (ie, citation counts, journal impact factor, etc), and national or international collaborations of authors, institutions or organisations, and countries (based on the coauthorship affiliation). Although the bibliometric method does not provide analysis and interpretation of the content and quality of a research publication, it provides useful information on the growth and impact of research publications, including important gaps, trends, emerging fields and research networks, within a particular field or discipline.^{9,10} Hence, bibliometrics is firmly established as a scientific specialty and an integral part of research evaluation methodology.

In 2019, a coalition of organisations (ie, Organization for Migration (IOM), Migration Health for South Asia or MiHSA network and its flagship Strengthening Policy and Research Capacities Project funded by the British Council, African Centre for Migration & Society, and

Migration Health and Development Research Initiative or MHADRI) facilitated two migration health research workshops in Nepal and South Africa. These meetings highlighted the importance of undertaking national, subregional and regional 'deep dives' into mapping migration health research output for both international and internal migrants.

Recognising the need to build research capacity to identify the gaps in research output on migration and health, IOM, together with MHADRI and MiHSA, organised a workshop on undertaking bibliometric analysis in late 2019. The workshop was attended by research scholars and policymakers from South and Southeast Asia. This undertaking led to the formation of the 'Manila consensus on methodological guidelines in migration health bibliometric analysis' (hereafter referred to as 'Manila Consensus Group') that aims to advance actions towards providing greater conceptual and methodological clarity and analytical rigour for bibliometric analysis, as well as applying such standards to the migration health research field. One of the overarching aims of the Manila Consensus Group includes examining research publication activity in the following areas: global migration health (ie, international migration or movement), internal migration and health, migration health assessments of migrants and migrant health outcomes in areas ranging from infectious disease, non-communicable disease and occupational health South and Southeast Asia.¹¹

The underlying search strategy in this protocol was initially developed through an expert consensus in the 'Manila Consensus Group' following a critical review of key search terms, and builds upon the foundational work by Sweileh *et al* on GMH research (2000–2016).¹² The current paper presents the protocol for mapping scientific articles on GMH published from 2017 to 2022. Specifically, a bibliometric analysis will be conducted to determine the research publication activity trends/patterns by author, country, institution/organisation, predefined health themes and specific international migrant/migration topics (eg, international migration type, migrant population) including 'international human mobility'. Further, this analysis will provide an up-to-date and comprehensive mapping of the latest research evidence on the health of international migrants (ie, including the families of international migrants and short-term international migrant populations, for example, tourists, travellers and seasonal workers). Ultimately, the relevant articles from this study will be housed in a searchable online public repository and may serve as a starting point for high-level evidence reviews by country, regional and/or specific themes.

The seminal bibliometric analysis published in 2018 led to a few relevant research evidence mapping studies at the regional level, including a 2021 study that looked at the scientific research on the health of low-income migrants, including internally displaced populations and refugees in South Asia.¹³ Another related work was done in response to the growing research on COVID-19, which looked at human mobility, migration and health.¹⁴

An information platform on health and migration in the Americas also highlights the growing interest and significance of this field.¹⁵

METHODOLOGY

As there is no standard for reporting protocols of bibliometric studies, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses¹⁶ is used to guide the protocol development. This study will apply the bibliometric analysis method to map scientific articles on the health of international migrants and their families, including ‘international human mobility’. The protocol will cover articles published from 2017 to 2022, updating the coverage of articles by publication year (ie, 2000–2016) in the previous work by Sweileh *et al*, in 2018,¹² defining the scope of ‘international migration’ (including mobility across borders), and enhancing rigour through the use of a prospectively defined and publicly available protocol. The study commenced in September 2023 with an estimated completion in September 2024.

Citation database

Scopus, an abstract and citation database of peer-reviewed literature developed by Elsevier, will be used to retrieve scientific articles on migration and health. Scopus provides a comprehensive overview of global research output in different disciplines and covers 100% of MEDLINE articles. Scopus has been shown to have more complete coverage of publications in health and medical sciences than Web of Science or Dimensions.¹⁷ Further, Scopus was the data source used for the 2000–2016 period,¹² and so this database was selected for this update for comparability.

Search strategy and selection criteria

Development of the search strategy

The identification and selection of keywords will be based on the ‘definition of terms’ provided (see boxed text) along with the search strategy and keywords from the previous GMH study,¹² and other relevant systematic reviews on health.^{18 19} This study will build on the existing search queries to cover international migration, international human mobility, international migrant populations and their families, based on IOM’s definition of migrants and broader search terms on health.⁹

The previous GMH study by Sweileh *et al* covered articles on the health of specific international migrant populations from publication years 2000–2016 (ie, migrant workers, refugees/asylum seekers/displaced people (not internally displaced), international students, trafficked victims/victims of human smuggling, patients’ mobility across borders and international migrants/immigration), but did not look at other international migrant populations (eg, migrant families, travellers, etc).¹² A bibliometrics expert will review and validate the methodological

rigour of the search strategy using the Peer Review of Electronic Search Strategies guideline.²⁰

The search strategy will have two search components. The first component, ‘global migration’, will consist of a general query for ‘international migrant and migration’ and specific queries on select ‘international migrant categories’ that will not be captured in the general query, such as refugees and asylum seekers, trafficked and smuggled migrants, migrant patient across international borders (or ‘medical tourists’) and international students. The query for ‘international migrant and migration’ covers all terms related to ‘migrant’, ‘immigration’, ‘emigration’ and ‘international human mobility’ which will serve as an overarching search query in the succeeding search queries of each migrant category. The outcome of these search queries will be combined using the Boolean operator ‘OR’. The final combined terms for migration will be applied in the article title to reduce the number of irrelevant articles.

The second search component will pertain to health. The search terms on health will be selected based on a careful review of previous bibliometric and systematic reviews. Search queries on health include generic terms relating to health, disorder, injury, clinical examination, diagnosis, treatment, therapy, health risks, epidemiology, disease categories (ie, communicable diseases, non-communicable diseases) and other areas in health (eg, maternal and reproductive health, nutrition and mental health).

The resulting query on health will be applied to the title–abstract–keywords fields.

The overall queries for the two search components will be combined using the Boolean operator ‘AND’ to produce the ‘global migration health’ search query.

Applying exclusion steps within the search strategy

The following steps will be applied to the resulting ‘global migration health’ search query to reduce the number of irrelevant articles or false-positive results (ie, irrelevant articles retrieved by the search query):

1. Restrict years to the following period: 2017–2022 (NB: this refers to the year of publication of the articles; this will be applied using the built-in filters in Scopus).
2. Limit document type to research articles and reviews (NB: Scopus defines ‘research articles’ as original research or opinion, whereas ‘reviews’ refers to an article with a significant review of original research, also includes conference papers).²¹
3. Limit source type to journals (NB: per Scopus definition, this refers to any peer-reviewed serial journal publication).
4. Exclude articles indexed in subject areas other than human health (eg, Veterinary and Planetary Science) after careful review of the retrieved articles (NB: Scopus classifies articles into one or more subject areas).
5. Exclude articles with irrelevant or out-of-scope topics using the following exclusion criteria:

Definition of terms

The following definition of terms related to migration and human mobility is provided to give context and clarity on the scope of this paper. The migrant categories mentioned are not meant to imply or create any new legal category of migrant populations.

- ⇒ *Human mobility* is 'a generic term covering all the different forms of movements of persons', thus encompassing migration.³⁰
- ⇒ *International human mobility and international migration* refers to movement of persons across international borders away from his/her usual place of residence regardless of the cause, legal status and length of the stay.³⁰
- ⇒ *Migration* refers to the movement of persons whether within a country (ie, internal migration) or across international borders (ie, international migration).³⁰
- ⇒ *Migrant* is an umbrella term that is not defined under international law. Two approaches are generally adopted to define the term 'migrant': a broad definition considers the term 'migrant' as covering all forms of movements; while a more selective definition excludes those who flee wars or persecution (ie, refugees, asylum seekers.³¹ The International Organization for Migration, the United Nations' Migration Agency, adopts the broad definition of 'migrant' to cover 'all individuals who move away from their place of usual residence, whether within a country (ie, internal migrant) or across international borders (ie, international migrant), temporarily or permanently, and for a variety of reasons.' This definition applies regardless of the person's legal status, causes for movement, length of stay, and whether the movement is voluntary or forced (or involuntary).³⁰
- ⇒ *International migrant* refers to individuals who move away from their place of usual residence across international borders.³⁰
- ⇒ *International migrant worker* refers to an individual who is currently employed, or unemployed and seeking employment in a country that is not their usual country of residence for the purpose of employment.³¹
- ⇒ *Refugee* is an individual who, owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his/her nationality and is unable or, owing to such fear, is unwilling to avail of the protection of that country; or who, not having a nationality and being outside the country of his/her former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it.³¹
- ⇒ *Asylum seeker* refers to an individual who is seeking international protection. In countries with individualised procedures, an asylum seeker is someone whose claim has not yet been finally decided on by the country in which he or she has submitted it. Not every asylum seeker will ultimately be recognised as a refugee, but every recognised refugee is initially an asylum seeker.³¹
- ⇒ *Trafficked international migrant* refers to an international migrant who was abused or exploited by traffickers (a crime against human rights).^{32 33}
- ⇒ *Smuggled international migrant* refers to an international migrant who avails services of smugglers to facilitate movement across international borders where they are not a national or permanent resident (a crime against a state).^{31 34}
- ⇒ *International student* refers to an international migrant who moved for the purpose of education or who is enrolled outside of their country of origin.³⁵
- ⇒ *Migrant patient across international borders* (also referred to as 'medical tourists') refers to international migrants who travel to

Continued

Definition of terms Continued

access medical treatment or cure that is often lacking and/or costly in their usual country of residence.³⁶

- Articles pertaining to animal, non-human studies or cell migration.
- Articles that do not discuss health and/or well-being of international migrant populations.
- Articles retracted (or only cited the original publication in the erratum).

Validity of the search strategy

A two-step approach will be used to validate the search strategy.

First, the search strategy will be adjusted if known relevant articles are not captured in the search. The known relevant articles will be preselected by the research team from included studies of the previous systematic reviews and the research team's file. This step will determine the sensitivity of the search strategy. The known relevant articles used for testing will be documented.

Second, the first 200 retrieved records per publication year, including title and abstract (if available), will be screened using MS Excel or EndNote to identify irrelevant articles. Further, the built-in analysis feature in Scopus will be used to check journals and subject areas. These irrelevant articles will be examined to determine if they were retrieved by search terms that need to be modified, or if 'not' statements could safely exclude the selected record. In each step of the search query, a sample of the search results will be screened for validity. The search will be adjusted based on the quality of the screened sample until over 70–75% of the retrieved articles are relevant or until no further improvements in precision can be obtained.

Data items and data extraction in Scopus

The Scopus search output will be exported into several formats including CSV (for screening, classification, analysis and visualisation), RIS (for screening duplicates in EndNote) and BibTex (for analysis). All fields will be exported including the broad categories, citation information, bibliographic information, abstract and keywords, funding details (where available) and cited references.

Exported Scopus output will be screened for duplicates using MS Excel or EndNote based on the following parameters: author names; article title; source title; and volume and issue number. To further facilitate duplicate screening, a systematic review software called DistillerSR (Evidence Partners, Ottawa, Canada) will be used prior to screening of relevant articles.

Screening and classification of relevant articles

Screening of relevant articles

For the title–abstract screening of retrieved articles from the Scopus database, full automation (ie, DistillerSR's machine learning-based algorithm that ranks articles for screening given the estimated relevance of articles) and semiautomation (using EndNote and MS Excel) will be applied (whichever is feasible).^{22 23} These combined approaches are expected to reduce the screening and classification (if an article is identified as relevant) workload versus the manual screening process.²⁴ Articles will be identified as 'included' and 'excluded'. Articles identified as 'included' will then be classified into relevant migration health-related topics.

The following additional exclusion criteria will be applied at the title and abstract screening:

- ▶ Articles pertaining to non-relevant migrant populations: internal migrants and/or internal migration (urban to rural migration, migration within countries) and/or internal human mobility (movement within countries).
- ▶ Articles pertaining to brain drain and migrant nurses or physicians or health professions (NB: this was listed as an exclusion in Sweileh *et al*¹²; further, an initial review of search terms linked to brain drain, nurses and health professionals captured many irrelevant publications).

Initially, manual title–abstract screening and classification will be done by the authors. This manual process will serve as the training set for the machine learning tool. To support the accuracy of the training set, full-text articles may be screened if the information from the title–abstract screening precludes a clear determination of whether the population and/or human mobility pertains to an international migrant population and/or movement across countries. This will serve as the training set of articles for the machine learning tool. Once sufficient training examples are available, as determined by the system, further eligibility screening will be done through machine learning with human intervention where the machine is unable to make a confident determination of eligibility.

Classification of relevant articles

Below is a list of classifications and subclassifications (table 1), following the previous GMH paper²³ and a health and migration dashboard in the Americas.¹⁵ Classification of eligible articles will be applied using machine learning tool and/or semiautomation (ie, search article title, abstract and/or keywords using MS Excel or EndNote), whichever is applicable. Where available, database descriptors such as age, sex and medical subject headings terms will be considered in the classification. Therefore, the list of proposed classifications and subclassifications is dependent on the functionality of the machine learning and semiautomation tools, and the quality of the training set (ie, initial set of manually screened articles).

Bibliometric analysis of relevant articles

MS Excel and Biblioshiny (RStudio) will be used to analyse bibliometric information including authors, citations, articles and sources (or journals). Biblioshiny is an open-source web-interfaced bibliometrics tool that uses the R program, a statistical software package.²⁵ Biblioshiny provides metrics on intracountry and inter-country collaboration including a summary of single-authored and multiple-authored articles. MS Excel will be used to produce descriptive counts and percentages of classified articles by theme, subtheme, migrant topic and country topic/coverage.²⁶ It is important to note that bibliometric analysis relies mainly on the quantitative analysis of bibliometric information, and the qualitative analysis is an interpretation only. Further, the bibliometrics method is used when the scope is broad, and the dataset is too large for manual review.²⁷

Visualisation mapping VOSviewer V.1.6.19,²⁸ a software tool for constructing and visualising bibliometric networks, will be used to analyse and visualise the networks of coauthorship relations among authors, countries and institutions, and co-occurrence relations between keywords. To present a clean map, VOSviewer thesaurus files will be prepared to standardise terms and exclude generic and out-of-scope terms.²⁹

Patient and public involvement

None.

Limitations

The depth and breadth of the findings from bibliometric analysis will depend on the information available in Scopus and the search strategy applied. Limitations inherent in a bibliometric study are as follows: first, relevant articles might be missed, particularly, those published in preprint servers. Research papers in the online preprint servers are not indexed in Scopus as these have yet to be peer reviewed or accepted by traditional academic journals. Nevertheless, articles in press (ie, prepublished versions of accepted research articles) are included in Scopus. Second, new articles might be missed due to time lag in the Scopus indexing (NB: fully indexed articles are estimated to appear in Scopus within 3–4 weeks of the article appearing on the publisher's website). Third, bibliometrics only measures impact in terms of research publication activity and not the research quality. Fourth, search results reflect how the article information was recorded and presented in Scopus. For example, active institutions, author names and countries with different spellings will be spread out in the results. Another example is that relevant articles are not captured because the title and/or abstract do not contain the identified search terms. A possible reason for such scenario is when authors of the relevant articles do not indicate the term 'migrant' in the title and/or abstract when referring to some migrant populations that they may not recognise and/or classify as 'international migrant' (eg, populations crossing the shared Bangladesh and India border).

**Table 1** List of proposed classifications and subclassifications of relevant articles

Classification	Subclassification (code/notes)
Year of publication	<Per actual year> <i>Note: coverage of included articles is from 2017 to 2022</i>
Language	[as classified by Scopus]
Article type	Article, review [as classified by Scopus]
Study design	Systematic review, cohort, case-control, etc
Author/s	<Name/s of author/s>
International migrant type (study population topic/data)	Asylum seeker, displaced population, migrant, immigrant, student, refugee, etc
Associated dataset	Primary, secondary, combination
Flow of migration	Immigration/in-migration/in-bound [immigration]; emigration/out-migration; outbound [emigration]; return [return]
Study setting	Camp setting; detention (and incarceration); urban; rural; humanitarian emergency
Phase of migration	Pre-migration [premigration]; transit [transit]; arrival [arrival]; return [return]
Type of migration/movement/mobility	Irregular migration [irregular]; regular migration [regular]; forced migration [forced]; resettlement [resettlement]; circular migration [circular]; climate migration
Country topic/coverage/implementation	<Country name/s>; not specified <i>Note: country topic refers to the country of study or implementation, country of origin, nationality or citizenship of study population, country source data, and/or country key or main topic of article.</i>
Country topic—income classification	Low-income country [LIC]; lower middle-income country [LMIC]; upper middle-income country [UMIC]; high-income country [HIC] <automate in Excel>
Region topic	<automate in Excel> <i>Note: region topic refers to the region of the specified country of study or implementation (see country as described above).</i>
Country of origin	<as is, if applicable only>
Period of study	<Year start>—<Year end>
Population group by age	Infant; child; adolescent; adult; older adult; working age (18–59 years); not specified
Population group by sex and gender	Women of reproductive age (15–49 years); women; men; trans; LGBTQIA+ (lesbian, gay, bisexual, transgender, queer, intersex, asexual, and other people who use other terms or none to describe their sexual orientation, gender identities, gender expressions and sex characteristics); not specified
Diseases and health conditions	Child health; infectious diseases; disability; non-communicable diseases; sexually transmitted infections; malnutrition; maternal health; sexual health; reproductive health; psychosocial; mental health and well-being; vaccine-preventable diseases
Determinants of health*	Individual factors (demographics, hereditary); lifestyle/behavioural factors; living conditions (access to safe housing, water, sanitation); sociocultural factors (discrimination, stigma, social inclusion); governance (legislation, policies) Political determinants (wars, conflicts, policy); commercial determinants; environmental determinants
Health promotion and education	Social behavioural change communication; health literacy (and health information)
Health systems and policies	Healthcare policies; healthcare models; healthcare services; healthcare financing; healthcare access; health workforce; health information systems; human rights; gender-sensitive policies; SDGs on health; universal health coverage; health system strengthening; financial protection/insurance; equity in healthcare; migration-specific policies; migration governance; migrant inclusion; migrant integration; procurement system
Environmental health	Climate-related migration; SDGs on environmental health; disaster risk reduction
Occupational health	Work-related stress; work-related injuries; work-related disability; skin conditions; allergy and asthma; musculoskeletal disorders; chemical exposures; noise-induced hearing loss
Migration specific	Travel-related health assessment; other health-related travel assistance; border management; flow monitoring; emergency response

*Health of Migrants: <https://www.migrationdataportal.org/themes/migration-and-health>.
SDGs, Sustainable Development Goals.

Application of the protocol

This protocol will be useful for researchers who wish to do a similar mapping specific to their region or countries of interest. Further, findings from this protocol will be a useful starting point for content analysis on specific migration health themes and/or international migrant population.

ETHICS AND DISSEMINATION

This bibliometric analysis will draw on publicly available data and will not directly involve human participants; ethical review will not be required. The findings from the bibliometric analysis (and other related research that can potentially arise from the protocol) will be disseminated through academic publications, conferences and other forms of collaboration with relevant stakeholders to inform policies and interventions aimed at improving the health of international migrants and their families.

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Contributors KW conceived the idea for the study. KW, SP-A, MACB and JL were involved in the development of the study protocol. SP-A prepared the first draft of the study protocol based on extensive consultations with the 'Manila consensus on methodological guidelines in migration health bibliometric analysis' as scientific advisors. MS reviewed and validated the search strategy development. All authors (ie, KW, MACB, JL, MS, AK, MG, CH, BB, RA, LPJ, TRUM, MAL) critically reviewed, revised, and approved the subsequent and final version of the protocol.

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