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Research Article

Digital health interventions in primary care in low- and middle-income countries: a systematic scoping review protocol

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Background

The integration of digital health (eHealth) interventions into primary healthcare systems has gained recognition lately in Low- and Middle-Income Countries (LMICs) to enhance healthcare quality, accessibility, and efficiency. These interventions may offer effective strategies in mitigating the burden of chronic diseases by facilitating access to remote healthcare and optimising its processes. This scoping review aims to identify and assess eHealth interventions implemented in primary care settings in LMICs for further development and adaptation.

Methods and analysis

We will search two electronic databases, such as Scopus and Embase, to identify peer-reviewed studies reporting on eHealth interventions implemented in primary care settings within LMICs. This review will encompass evidence published in the English language without a time frame restriction. We will remove duplicates from the search, and two reviewers will independently assess all articles for eligibility by first screening the title and abstract, followed by a full-text review. Eligible articles will be extracted, and data will be charted according to types of intervention and settings using a standardised form.

Ethics and dissemination

There is no ethical review required for this scoping review. We plan to disseminate the findings by presentations at conferences and publishing in open-access journal.

In recent years, the integration of digital health (eHealth) interventions into primary care systems has garnered significant attention, especially in low- and middle-income countries (LMICs).[1] This emerging trend is propelled by several factors, including technological advancements, increased accessibility to mobile devices, and the growing recognition of primary care's role in enhancing population health and achieving universal health coverage.[2-4] Compared to high-income countries (HICs), LMICs encounter substantial challenges in delivering accessible and equitable healthcare services to their populations.[1,5] Rural and remote areas, in particular, face limited access to healthcare facilities and skilled healthcare professionals.[6] eHealth interventions offer a promising solution to bridge this gap by providing remote access to healthcare services, thereby enhancing healthcare accessibility for underserved populations.[7] The recent pandemic has further highlighted the importance of eHealth interventions in healthcare delivery. Remote consultations, telemedicine, and eHealth monitoring tools are needed during the pandemic to reduce the risk of disease transmission in healthcare settings and to ensure continuity of care. Consequently, there has been a surge of urgency to accelerate the adoption and implementation of eHealth solutions, particularly in LMICs, to address both existing healthcare disparities and emerging challenges exacerbated by global health crises.

The burden of chronic diseases, including diabetes, hypertension, cardiovascular diseases, asthma, and chronic obstructive pulmonary disease, is escalating in LMICs due to urbanisation, evolving lifestyles, air pollution and ageing populations. Primary care assumes a pivotal role in the prevention, early detection, and management of these chronic conditions. eHealth interventions, which encompass mobile health applications, remote monitoring devices, and telemedicine platforms, can bolster primary care providers'

capacity to deliver timely and effective care for chronic diseases.[7] By leveraging on digital technologies, primary care practitioners can remotely monitor patients' health status, provide personalised interventions, and offer timely medical advice, thereby mitigating the complications associated with chronic diseases. Furthermore, eHealth interventions have the potential to empower patients by promoting self-management strategies, enhancing health literacy, and fostering active participation in their care plans. Thus, the integration of eHealth solutions into primary care settings represents a promising approach to addressing the burgeoning burden of chronic diseases in LMICs, ultimately improving health outcomes and quality of life for affected populations.

LMICs are highly diverse, encompassing a wide range of economic, social, and healthcare infrastructure conditions. For instance, while some LMICs have made significant strides in internet penetration and mobile technology adoption, others still struggle with basic healthcare infrastructure and digital connectivity. These variations can profoundly influence the feasibility and success of eHealth interventions. Moreover, contextual factors such as cultural norms, political stability, and the existing technological ecosystem play crucial roles in shaping the implementation and effectiveness of eHealth initiatives. For example, cultural attitudes towards technology and healthcare can either facilitate or hinder the adoption of digital health solutions. Political and regulatory environments can also impact the scalability and sustainability of these interventions. Understanding these diverse contexts is essential for identifying the unique challenges and opportunities within different LMIC settings.

It is paramount to strengthen primary care systems in LMICs to achieve sustainable healthcare outcomes eHealth interventions have the potential to enhance primary care delivery by improving data collection, health information management, and healthcare delivery processes.[8] These interventions empower primary care providers to track patient health indicators more effectively, monitor treatment adherence, and coordinate care across different levels of the healthcare system.[9] eHealth interventions offer cost-effective solutions for expanding healthcare access and improving health outcomes, especially in resource-constrained settings.[10] Moreover, cultural beliefs, social norms, and demographic characteristics significantly shape healthcare-seeking behaviours and preferences for healthcare delivery modalities. Therefore, eHealth interventions must be culturally sensitive, contextually relevant, and user-friendly to effectively engage diverse populations in LMIC settings and foster community trust and acceptance, thereby enhancing their adoption and impact. Ultimately, integrating culturally sensitive eHealth solutions into primary care systems holds promise for advancing healthcare access, improving health outcomes, and promoting equitable healthcare delivery in LMICs.

The scoping review objectives are to:

1. Assess the existing literature gap around eHealth interventions' applications, use, and impact in primary care settings within LMICs.
2. Identify eHealth interventions implemented in primary care settings within LMICs.
3. Analyse the characteristics and outcomes of eHealth interventions in LMIC primary care settings.
4. Elucidate the influence of cultural, social, and demographic factors on the implementation and effectiveness of eHealth interventions in LMIC primary care settings.

METHODS

CONTEXT AND CONCEPT

The proposed systematic scoping review aims to explore the landscape of eHealth interventions implemented in primary care settings within LMICs. The following definitions will guide the scope of the review:

1. eHealth Interventions: Interventions that encompass a wide range of technologies and platforms designed to improve healthcare delivery, access, and outcomes using digital tools. These interventions may include but are not limited to mobile health applications, telemedicine platforms, remote monitoring devices, and electronic health records systems.
2. LMICs: LMICs are characterised by lower levels of income and economic development compared to HICs as defined by the World Bank.
3. Primary Care in LMICs: Primary care refers to the essential healthcare services provided at the first point of contact within the healthcare system, focusing on preventive, promotive, curative, and rehabilitative care.

SCOPING REVIEW DESIGN

Our protocol adheres to the methodological framework outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) and the Guidance for Conducting Systematic Scoping Reviews by Peters et al.[11,12] We will primarily follow the checklist provided in the PRISMA-ScR. Should supplementary information be required, we will refer to the guidance provided or as described by Peters et al. for clarification. The review will apply the PRISMA extension for scoping reviews to present the results. The final results of the search will be reported in full in the final report and presented in a PRISMA flow diagram.

SEARCH STRATEGY

We will search in two electronic databases, Scopus and Embase, using the following keywords and Medical Subject Headings (MeSH) terms:

- "Digital Health" OR "eHealth" OR "mHealth" OR "telehealth"
- AND "Interventions" OR "Programmes" OR "Initiatives"
- AND "Low-Income Countries" OR "LMICs"
- AND "Primary Care" OR "Family Medicine" OR "General Practice"

These keywords will be combined using Boolean operators to ensure retrieval of relevant literature. Search results from Scopus and Embase will be exported into Excel spreadsheets. The detailed PUBMED search strategy is shown in Table S1 in the Online Supplementary Document.

DATA EXTRACTION

The Rayyan software will be utilised for the screening process, where two independent reviewers will screen titles and abstracts of retrieved records against predefined inclusion and exclusion criteria. Full-text articles will be obtained for potentially relevant records and again assessed for eligibility based on the inclusion and exclusion criteria.

INCLUSION CRITERIA

1. Studies that implemented eHealth interventions in primary care settings were conducted in LMICs.
2. Studies focusing on eHealth interventions implemented specifically in primary care settings.
3. Studies published in peer-reviewed journals.
4. Studies reporting on the characteristics, outcomes, implementation processes, or evaluations of eHealth interventions.
5. Studies involving healthcare providers, patients, or stakeholders directly involved in the delivery or utilisation of eHealth interventions in primary care settings.

EXCLUSION CRITERIA

1. Studies conducted in high-income countries or regions outside the scope of LMICs.
2. Studies that focus solely on non-eHealth interventions or interventions not implemented in primary care settings.
3. Studies not published in peer-reviewed journals (e.g., grey literature, conference proceedings, case reports, editorials, commentaries, and opinion pieces without original research data).

These criteria will be used by the reviewers to determine the eligibility of retrieved records during the screening process. Any disagreements between reviewers regarding the inclusion or exclusion of studies will be resolved through discussion or consultation with a third reviewer.

DATA MAPPING

After the completion of data extraction, the collected literature will be thematically organised according to different types of eHealth interventions implemented in primary care settings within LMICs. subsequently data mapping will be done. Firstly, key concepts related to eHealth interventions in LMIC primary care will be identified and mapped, with the aim of gaining an understanding of the available evidence. Through this process, we will synthesise the existing research findings and identify patterns and trends in the literature regarding the implementation and outcomes of eHealth interventions in LMIC primary care settings. A draft data charting form, developed based on the PRISMA-ScR guidelines and guidance for scoping reviews by Peters et al.,[12] will guide the recording of characteristics of the included studies and relevant key information. This form will include author(s), year of publication, source origin/country of origin, study design, aims/purpose, study population and sample size, methodology, intervention type, comparator, concept, method of administration, duration of the intervention, outcomes, and limitations of the studies. The detailed data extraction sheet is shown in Table S2 in the Online Supplementary Document.

The key findings will be presented to portray profiles of eHealth interventions in LMIC primary care settings. The synthesis process will aim to not only summarise existing research but also identify gaps in the literature, particularly focusing on areas where further investigation is needed to enhance understanding and inform future research and practice in the field of eHealth in LMICs.

To ensure cultural relevance and user engagement, our scoping review protocol will incorporate several methodological considerations: Community Involvement, Co-Design Approach, Cultural Adaptation, and Training and Capacity Building of healthcare providers. Practical implementation strategies will include pilot testing, iterative design, case studies, regular evaluations, and incorporating user feedback. By integrating these methodological considerations, we aim to enhance the cultural relevance and practical applicability of eHealth interventions. This approach will offer valuable insights for policymakers, healthcare practitioners, and researchers, ensuring that digital health solutions are effectively tailored to the diverse cultural contexts of LMICs.

DISCUSSION

The review will provide a review of eHealth interventions in LMIC primary care settings, enableing policymakers and practitioners to make an informed decision in advancing healthcare delivery in LMICs. This review may be limited by risk of publication bias and exclusion of non-English literature and heterogeneity in interventions, settings, and variability in study quality, limiting the representativeness of findings. The findings from this systematic scoping review will ensure ethical considerations are upheld throughout the research process and be disseminated via publication in journals and presented at national and international conferences in eHealth, primary care, and global health. Moreover, we will share our findings with key stakeholders involved in primary care settings within LMICs, including healthcare providers, policymakers, and community organisations, to facilitate discussions on how the insights gained from the review can inform clinical practice, policy development, and resource allocation to enhance healthcare delivery in LMICs. Through these interactions, we hope to foster collaboration and knowledge exchange to drive further research and innovation in the field. Furthermore, based on the research gaps identified during the review process, we anticipate that new research questions will emerge, formulating novel insights and strategies for

improving primary care in LMICs. These insights may contribute to developing or revising treatment guidelines and policies and improve the quality, accessibility, and efficiency of healthcare delivery for underserved populations in LMICs.

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ETHICS APPROVAL

Research ethics approval is not required for this scoping review because no primary data will be collected.

DATA AVAILABILITY

As this is systematic scoping review this section is not applicable

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AUTHORSHIP CONTRIBUTIONS

JJ and DA designed the protocol and wrote the manuscript. FB, LB, IP, NR, AK, and EMK contributed to the intellectual content of and critically appraised the protocol. All the authors edited and approved the manuscript before submission.

COMPETING INTERESTS

None declared.

PATIENT CONSENT FOR PUBLICATION

Not required.

PROVENANCE AND PEER REVIEW

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REFERENCES

1. Xiong S, Lu H, Peoples N, Duman EK, Najarro A, Ni Z, et al. Digital health interventions for non-communicable disease management in primary health care in low-and middle-income countries. *Npj Digit Med*. 2023;6(1):12. doi:10.1038/s41746-023-00764-4

2. Lewis T, Synowiec C, Lagomarsino G, Schweitzer J. E-health in low- and middle-income countries: findings from the Center for Health Market Innovations. *Bull World Health Organ*. 2012;90(5):332-340. doi:10.2471/BLT.11.099820

3. Abernethy A, Adams L, Barrett M, Bechtel C, Brennan P, Butte A, et al. The Promise of Digital Health: Then, Now, and the Future. *NAM Perspect*. 2022:2022. doi:10.31478/202206e

4. Labrique AB, Wadhwani C, Williams KA, Lamptey P, Hesp C, Luk R, et al. Best practices in scaling digital health in low and middle income countries. *Glob Health*. 2018;14(1):103. doi:10.1186/s12992-018-0424-z

5. Dawkins B, Renwick C, Ensor T, Shinkins B, Jayne D, Meads D. What factors affect patients' ability to access healthcare? An overview of systematic reviews. *Trop Med Int Health*. 2021;26(10):1177-1188. doi:10.1111/tmi.13651

6. Haleem A, Javaid M, Singh RP, Suman R. Telemedicine for healthcare: Capabilities, features, barriers, and applications. *Sens Int*. 2021;2:100117. doi:10.1016/j.sintl.2021.100117

7. Kasoju N, Remya NS, Sasi R, Sujesh S, Soman B, Kesavadas C, et al. Digital health: trends, opportunities and challenges in medical devices, pharma and bio-technology. *CSI Trans ICT*. 2023;11(1):11-30. doi:10.1007/s40012-023-00380-3

8. Erku D, Khatri R, Endalamaw A, Wolka E, Nigatu F, Zewdie A, et al. Digital Health Interventions to Improve Access to and Quality of Primary Health Care Services: A Scoping Review. *Int J Environ Res Public Health*. Published online September 28, 2023. doi:10.3390/ijerph20196854

9. World Health Organization. *WHO Guideline: Recommendations on Digital Interventions for Health System Strengthening*. World Health Organization; 2019. Accessed February 27, 2024. https://iris.who.int/handle/10665/311941

10. Murray E, Hekler EB, Andersson G, Collins LM, Doherty A, Hollis C, et al. Evaluating Digital Health Interventions: Key Questions and Approaches. *Am J Prev Med*. 2016;51(5):843-851. doi:10.1016/j.amepre.2016.06.008

11. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850

12. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*. 2015;13(3):141-146. doi:10.1097/XEB.0000000000000050

SUPPLEMENTARY MATERIALS

Online Supplementary Document

Download: https://www.joghr.org/article/120508-digital-health-interventions-in-primary-care-in-low-and-middle-income-countries-a-systematic-scoping-review-protocol/attachment/233792.docx