BMJ Open

Mapping the use of interactive voice response (IVR) in healthcare in Africa: a scoping review protocol

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To cite: Kihumuro RB, Ochen E, Atimango L, *et al*. Mapping the use of interactive voice response (IVR) in healthcare in Africa: a scoping review protocol. *BMJ Open* 2026;**16**:e118406. doi:10.1136/bmjopen-2026-118406

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2026-118406).

Received 15 February 2026
Accepted 23 June 2026

Check for updates

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ABSTRACT

Introduction Africa faces a substantial health burden characterised by a dual burden of communicable and non-communicable diseases compounded by persistent health system and infrastructure constraints. Digital health interventions offer scalable opportunities to strengthen healthcare delivery. Interactive voice response (IVR), an automated telephone-based technology, shows promise across African health settings; however, existing evidence is dispersed across isolated studies and demonstrates variability in outcomes and implementation approaches. This scoping review maps existing evidence on the use of IVR in healthcare in Africa, focusing on applications, outcomes and implementation experiences.

Methods and analysis Eligible studies will include all designs that evaluate IVR-based health interventions in African healthcare settings, while non-voice digital interventions and non-empirical publications will be excluded. We will conduct a scoping review guided by the Arksey and O'Malley framework and the Joanna Briggs Institute and report findings using Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines. We will systematically search bibliographic databases and grey literature from 2000 to the end of 2025. Two independent reviewers will screen studies, extract data and chart evidence on IVR characteristics, implementation strategies, barriers and facilitators and outcomes. A third reviewer will resolve disagreements. We will synthesise findings descriptively and thematically, presenting results in tables, visual maps and an equity-focused analysis guided by PROGRESS-Plus.

Ethics and dissemination Ethical approval is not required because this scoping review synthesises previously published, publicly available literature and does not involve human participants or primary data collection. We will share the findings through a peer-reviewed publication and conference presentations, and we will discuss the results with digital health stakeholders, clinicians and policymakers to inform future IVR work in Africa.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The methodology draws on Arksey and O'Malley, and on Joanna Briggs Institute guidance, with reporting following Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).
⇒ A health sciences librarian co-developed the search across eleven bibliographic and grey-literature sources, including three African-focused databases (African Index Medicus, African Journals OnLine and the Pan African Clinical Trial Registry).
⇒ Two reviewers will independently screen titles, abstracts and full texts after a calibration exercise; a third reviewer adjudicates disagreements, and data charting uses a piloted Joanna Briggs Institute-derived form.
⇒ A PROGRESS-Plus analysis maps how each included study addresses dimensions such as place of residence, socioeconomic status, education and gender.
⇒ English-only eligibility may miss relevant work in French, Portuguese, Arabic and indigenous African languages; this is partly mitigated by including the major African biomedical databases (African Index Medicus, African Journals OnLine and the Pan African Clinical Trial Registry), in which English is the dominant indexing language.

INTRODUCTION

Africa continues to grapple with persistent health challenges, carrying more than 20% of the global disease burden.[1] Communicable, maternal, perinatal and nutritional conditions account for the largest share at 59%, while non-communicable diseases (NCDs) such as mental illness and hypertension contribute 31% and are rising rapidly with urbanisation and lifestyle changes.[1] NCDs are projected to become the leading cause of death on the continent by 2030.[1] Malaria, HIV/AIDS and tuberculosis remain the leading infectious killers, with Africa bearing 94% of global malaria cases and deaths and nearly 70% of the global HIV burden.[1] Maternal mortality also remains unacceptably high, with several countries recording rates above 500 deaths per 100 000 live births.[1]

These challenges are compounded by severe health worker shortages, weak infrastructure

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and limited government commitment to improving health service delivery.[2 3] Such structural limitations contribute to persistent gaps between evidence-based interventions and their effective delivery at scale. Innovative, scalable approaches that can strengthen service delivery, improve patient engagement and extend the reach of health systems are urgently needed.

Digital health tools offer promising, cost-effective and scalable solutions to address system-level constraints in many African health systems. Africa's youthful population is generally receptive to digital innovations, including mobile health interventions.[4] At the same time, rising mobile phone ownership and expanding internet connectivity across the continent provide an unprecedented opportunity to deliver digital health interventions at scale.[5–9] This expansion creates practical avenues to deliver health services, appointment reminders, health education, screening and follow-up support remotely. Digital interventions can help mitigate workforce shortages, reduce geographic and transportation barriers, standardise aspects of service delivery, support continuity of care and narrow persistent evidence-to-practice gaps. Importantly, even basic feature phones can function as effective bridges between communities and health systems, particularly when interventions are adapted to local languages and sociocultural contexts.[10]

In recent years, interactive voice response (IVR) has shown promise in studies conducted across the continent. IVR is an automated phone system that engages callers through prerecorded or text-to-speech messages and allows them to respond using keypad tones (dual-tone multi-frequency, DTMF) or speech recognition without requiring a live operator.[11–13] IVR systems can be designed as outbound, where the system initiates calls to deliver a service, or inbound, where users dial in; hybrid models may combine both functions. Designs range from simple menu-based systems to more advanced platforms incorporating artificial intelligence, including natural language processing capable of interpreting spoken responses.[12 13] Peer-reviewed work on IVR in healthcare has set out the main design choices, use cases and methodological considerations.[14–16]

Evidence highlights the potential of IVR across diverse health domains in Africa. Features such as low operating cost once the system is built, patient confidentiality, the ability to reach people with limited literacy or smartphone access, support for multiple local languages and the option to deliver standardised, repeated contacts over long follow-up periods make it a digital-health tool of choice in Africa.[14–16] Globally, IVR has improved self-management and clinical outcomes in chronic conditions such as diabetes, hypertension and heart failure. It has also been used to improve medication adherence and behaviour change for depression, alcohol use and smoking cessation, and to increase the uptake and timeliness of immunisation reminders.[14–16] In Africa, IVR has demonstrated its effectiveness in improving adherence to antiretroviral therapy for people with HIV, retention in care and viral suppression[17]; screening for obstetric fistula[18]; promoting health education and awareness[10 19]; and supporting chronic disease management. IVR systems have been adapted to local languages and cultural contexts[19 20] and have been shown to be cost-effective in some settings.[21] Despite these advantages, knowledge on IVR use in African healthcare remains dispersed, with most programmes reported in isolation. This limits synthesis of findings, cross-context learning and informed integration into health systems. Gaps remain in how IVR should be designed and deployed across diverse African contexts, what practical considerations should be addressed, and which strategies can overcome barriers such as limited phone ownership, declining user engagement and the costs of airtime and localisation.[17 18] IVR is also most useful as an adjunct to clinic-based care; the evidence is thinner in acute surgical and oncologic conditions and in conditions that need physical examination or laboratory diagnosis. Mapping the conditions in which IVR has been used in African settings, against those in which it has shown value elsewhere, can guide where digital-health investment is most likely to pay off.

The WHO emphasises that digital health interventions strengthen service delivery and improve patient outcomes when embedded within health systems.[22] It is therefore crucial to map and consolidate the evidence on the use of IVR in healthcare in Africa. This review seeks to provide a clear picture of what is known, what has been achieved, and what lessons can guide further research, adoption and implementation of IVR in healthcare.

OBJECTIVE

This scoping review aims to map and synthesise existing evidence on the use of IVR in healthcare across Africa.

The review will examine how IVR interventions have been designed and applied for health communication, screening, treatment adherence support, health education and patient monitoring across diverse healthcare settings.

METHODOLOGY

This protocol is for a scoping review of literature to assess how IVR has been applied in healthcare. This review will employ the methodological framework originally described by Arksey and O'Malley and subsequently refined by Levac *et al* and the Joanna Briggs Institute (JBI). Specifically, the review will follow five stages: (1) formulating research questions, (2) identifying relevant studies, (3) selecting eligible studies, (4) charting the data and (5) collating, summarising and reporting the results. Reporting will adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR),[23] a 22-item checklist for the reporting of scoping reviews and the mapping of available evidence. The review will be carried out between June and December 2026. Database searches will be

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executed at the start of this period; screening, charting, stakeholder consultation and write-up will then proceed in sequence.

Stage 1: formulating research questions

The main research question is: How has IVR been applied in healthcare across Africa, and what outcomes and implementation experiences have been reported?

The research subquestions are:

- How has IVR been delivered across different healthcare settings across Africa over time?
- In which specific areas of health service delivery or disease focus has IVR been used?
- What implementation strategies, barriers and facilitators have been reported in the use of IVR in healthcare?

Stage 2: identifying relevant studies

A comprehensive search strategy (online supplemental appendix I) will be developed in collaboration with a health sciences librarian. The following databases will be searched: Medline (Ovid), Embase.com (Elsevier), Core Collection (Web of Science), Cochrane Central Register of Controlled Trials (Ovid), Africa Wide (EBSCO), African Index Medicus, Pan African Clinical Trial Registry, African Journals OnLine (AJOL), Policy Commons, WHO Institutional Repository for Information Sharing (IRIS) and medRxiv. These sources will also capture grey literature. WHO IRIS will be hand searched, and citation chasing will be performed across all sources. Records from medRxiv will be labelled as preprints during data charting and reported separately from peer-reviewed evidence. For each preprint, we will check whether a peer-reviewed version has since been published and, if so, use it as the primary source in place of the preprint.

Stage 3: selection of eligible studies

All retrieved citations will be imported into Zotero (V.7; Corporation for Digital Scholarship, Vienna, VA, USA) for deduplication, then uploaded into a systematic review platform, Covidence,[24] for screening. Screening will occur in two stages. First, titles and abstracts will be independently screened by two reviewers (either of RBK, LA and EO) against a predefined eligibility criterion. This will be followed by the full-text screening of potentially eligible articles identified during stage 1 by two independent reviewers (either of RBK, LA and EO). Discrepancies will be resolved through discussion or adjudication by a third reviewer. The selection process will be summarised in a PRISMA-ScR flow diagram. Before formal screening begins, all reviewers will apply the eligibility criteria independently to a random sample of about 50 titles and abstracts and to 10 full-text articles. The team will then meet to compare results and resolve disagreements, and the eligibility criteria will be refined if needed. The exercise will be repeated whenever a new reviewer joins.

Eligibility criteria

Eligibility will be guided by the Population, Concept, Context framework.

Inclusion criteria

The population includes patients, caregivers, health workers or community members who engage with IVR-based health interventions.

The concept includes IVR systems defined as automated, computer-driven telephone systems that deliver prerecorded or synthesised voice messages and allow user input through keypad DTMF or speech recognition. For this review, an eligible IVR system meets three criteria: (1) the main user interaction is voice-mediated, with audio output and either voice or DTMF keypad input; (2) the system is automated and runs without a live human operator in the conversational loop; and (3) it is delivered over the public telephone network or its functional equivalent, such as a cellular voice channel. Speech-enabled IVR systems that use natural language processing or large language models to interpret user speech remain eligible, provided the interaction happens as a real-time telephone call. Text-based systems such as SMS-based chatbots, web chatbots, unstructured supplementary service data (USSD) menus and mobile-application chatbots are excluded, even where they offer optional voice features. Voice-enabled chatbots that run over data channels (eg, voice notes on messaging apps or web voice assistants) without using a telephone voice channel are also excluded. A third reviewer will adjudicate any borderline cases.

The context includes healthcare and public health settings across African countries, including both public and private sectors and spanning facility-based, community-based, home-based and remote monitoring environments.

All empirical study designs will be included. These include quantitative, qualitative and mixed-methods studies, pilot studies, clinical trials, trial protocols, process evaluations, implementation studies and relevant grey literature.

The review will include studies published between 1 January 2000 and 31 December 2025. Only studies published in English will be included. Africa has an estimated 2000–3000 native languages alongside four colonial-era working languages (English, French, Portuguese, Arabic). However, our team is English-speaking only and lacks resources for systematic translation; English is also the main indexing language of the major African biomedical databases included in our search (African Index Medicus, African Journals OnLine and the Pan African Clinical Trial Registry).

Exclusion criteria

Studies will be excluded if they focus solely on digital health modalities without an automated voice component, including SMS only interventions, mobile application only interventions, unstructured supplementary

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service data (USSD systems without voice interaction, chatbots or live operator only call centres.

Studies conducted outside a healthcare or public health context will be excluded. Interventions unrelated to patients, caregivers, health workers or community members will also be excluded.

Opinion pieces, editorials, commentaries and conceptual papers without empirical data will not be included.

Conference abstracts will be excluded unless sufficient methodological and outcome data are available and a full text can be accessed. Studies for which the full text cannot be retrieved after reasonable efforts will also be excluded.

Stage 4: data charting

Data will be extracted using a piloted data charting form adapted from JBI templates, which will be included in online supplemental appendix II. Two reviewers (selected from RBK, LA and EO) will independently extract data, with discrepancies resolved through discussion.

Extracted data will include bibliographic details (author, year, country and study design); population characteristics (sample size, demographics and target group); IVR intervention characteristics (purpose, delivery mode, interaction type, frequency, technology platform and level of integration into the health system); implementation features (implementation strategies, barriers, facilitators, cost considerations and equity dimensions); reported outcomes.

Outcomes will be categorised into clinical outcomes (eg, disease control, viral suppression, blood pressure control), service delivery outcomes (eg, retention in care, appointment attendance, adherence support), implementation outcomes (eg, acceptability, feasibility, adoption, fidelity, sustainability) and economic outcomes where reported. Qualitative findings, including perceptions of acceptability, privacy concerns, user experiences and contextual influences, will also be extracted.

Critical appraisal of sources of evidence

We will not conduct a formal quality appraisal or risk-of-bias assessment. We will extract author-reported strengths and limitations of each source, and flag any with too little methodological detail for meaningful extraction.

Management of overlapping publications

Where multiple records describe the same intervention, identified by matching intervention name, country, lead investigators and study period (eg, a protocol, pilot, process evaluation, effectiveness trial and cost-effectiveness analysis of one IVR programme), we will treat the most complete or most recent peer-reviewed publication as the primary record and link the rest as companion publications. We will extract data from companion publications only when they add information that the primary record does not contain. We will report the number of underlying interventions and the number of included publications. If it is unclear whether two records describe the same intervention, we will contact the authors.

Stage 5: collating, summarising and reporting results

We will present findings using approaches consistent with scoping review methodology. We will start with a descriptive numerical summary of included studies, organised by publication year, country, population, health domain, IVR design features and outcomes assessed. We will then conduct a thematic synthesis of implementation and user-experience findings to identify and summarise recurring strategies, barriers, facilitators and perceptions of IVR use across diverse healthcare settings in Africa. Tables, matrices and visual maps will illustrate patterns across regions, health areas, study designs and delivery features. For the equity analysis, we will extract data on each PROGRESS-Plus dimension[25] (place of residence; race, ethnicity, culture and language; occupation; gender or sex; religion; education; socioeconomic status; and social capital) and the 'Plus' attributes (age, disability, sexual orientation and features of relationships such as caregiver status or living arrangement). For each study, we will record whether each dimension was used to define the population, reported as a participant characteristic, examined as an effect modifier or moderator of IVR uptake or outcomes, or not reported. Where possible, we will harmonise labels across studies using study-reported terminology. We will present the results as a narrative synthesis with a PROGRESS-Plus matrix that maps how equity dimensions have been considered and highlights populations and dimensions under-represented in the African IVR evidence base.

Ethics and dissemination

Ethics approval is not required for this study as it involves the synthesis of published and publicly available literature and does not include human participants or primary data collection.

The findings of this review will be disseminated through publication in a peer-reviewed journal and presentation at relevant academic and policy conferences. Results may also be shared with digital health stakeholders and policymakers to inform future IVR implementation and research across African healthcare settings.

DISCUSSION

This scoping review will map how IVR has been designed and delivered across healthcare settings in Africa, including its use for communication, screening, adherence support, education and patient monitoring. The current evidence base sits across isolated studies; bringing it together should clarify the health domains in which IVR has been applied, the implementation strategies and contextual factors that shape its use, and which equity dimensions have or have not been considered. We will examine reported clinical, behavioural and implementation outcomes and identify recurring barriers and facilitators across diverse African contexts. The review will also highlight gaps in populations, regions and service areas. The planned output is a scoping review manuscript which will be a transparent and reproducible base for future research, implementation planning and policy decisions on IVR in Africa.

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Acknowledgements We thank Dr Kintu Timothy and Dr Kanyike Andrew Marvin for their support during the development of the study. We also thank the HBNU Fogarty Global Health Training Programme for their support.

Contributors RBK and LMB conceived and designed the study. RBK, EO and LA drafted the initial version of the protocol manuscript. RBK, LMB, EO, LA and ML developed the search strategy. All authors (RBK, LMB, EO, LA, ML, JH, RS, SM and SK) contributed to refining the protocol, critically revised the manuscript for important intellectual content and approved the final version for submission. RBK is the guarantor.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

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 applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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