Undiagnosed and uncontrolled hypertension in rural African adults

A scoping review protocol of primary health care interventions

BMJ Open

Undiagnosed and uncontrolled hypertension in rural African adults: a scoping review protocol of primary health care interventions

Sandra Peniston [1,2,3] Divya Sivaramakrishnan [1,2] Aisha Holloway[1]

To cite: Peniston S, Sivaramakrishnan D, Holloway A. Undiagnosed and uncontrolled hypertension in rural African adults: a scoping review protocol of primary health care interventions. *BMJ Open* 2024;**14**:e081937. doi:10.1136/bmjopen-2023-081937

► 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-2023-081937).

Received 09 November 2023
Accepted 04 March 2024

[1]Nursing Studies, School of Health in Social Science, The University of Edinburgh, Edinburgh, UK
[2]Scottish Collaboration for Public Health Research and Policy, The University of Edinburgh, Edinburgh, UK
[3]School of Nursing, Faculty of Health, York University, Toronto, ON, Canada

Correspondence to
Sandra Peniston;
s.peniston@sms.ed.ac.uk

ABSTRACT

Introduction Non-communicable diseases cause 74% of global deaths, with cardiovascular diseases as the major contributor. Hypertension, a primary risk factor for cardiovascular disease, is highly prevalent in Africa. Diagnosis, treatment and control rates are notably limited in rural areas. This limitation results in increased risks of premature mortality and complications such as stroke due to socioeconomic, cultural and geographical challenges. Progress in African countries enhancing hypertension services through primary health care interventions exists. However, a comprehensive review of all primary health care interventions addressing undiagnosed and uncontrolled hypertension in rural African settings is lacking. This scoping review aims to categorise primary health care interventions targeting undiagnosed and uncontrolled hypertension in rural African adults. Intervention components will be mapped to the four stages outlined in the hypertension care cascade to develop a pilot intervention logic model for rural African adults with hypertension.

Method and analysis The scoping review protocol will adhere to the Joanna Briggs Institute methodology and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. Studies considered for inclusion will include any intervention delivered by any healthcare provider in a rural African primary care setting targeting any stage of hypertension care. Eight databases will be searched without date restrictions, supplemented by grey literature and reference list searches. A two-stage screening process (title/abstract and full text) will determine evidence source eligibility. All eligible sources of evidence will be extracted, charted and evaluated using the Template for Intervention Description and Replication checklist. A pilot logic model categorising and mapping interventions to the four stages of the hypertension care cascade will be visually presented and analysed using narrative synthesis.

Ethics and dissemination No primary data will be collected; therefore, ethics approval is not required. Findings will be disseminated to local health authorities in Ghana and other African Regions and through national and international conferences and publications in peer-reviewed journals.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Prioritising transparency and reproducibility, the scoping review protocol meticulously documents the methodology, including the search strategy, selection criteria and data extraction process.
⇒ Developed in collaboration with an experienced Academic Support Librarian, our comprehensive search strategy encompasses multiple databases, grey literature sources and no date restrictions, enhancing the likelihood of capturing diverse and relevant literature.
⇒ Integrating specific extraction variables aligned with the criteria outlined by the validated Template for Intervention Development and Replication checklist, this scoping review protocol acknowledges that not all studies may report all checklist components, representing a limitation of the protocol.
⇒ Omitting a comprehensive quality assessment of individual studies for methodological rigour, a practice typical in systematic reviews but not scoping reviews, this scoping review protocol prioritises broader exploration over detailed evaluation.

INTRODUCTION

Non-communicable diseases (NCDs) constitute a staggering 74% of the global mortality.[1] This category encompasses ailments such as cardiovascular diseases (CVDs), strokes, cancer, diabetes and chronic lung conditions, placing a substantial strain on healthcare systems.[2] As reported by WHO,[1] among NCDs, CVDs stand as the foremost cause of death worldwide. Notably, three-quarters of these CVD-related fatalities are concentrated in low-income and middle-income countries (LMICs).

Hypertension (HTN), also referred to as high or elevated blood pressure (BP), is characterised by a BP exceeding 140/90 mm Hg.[3 4] It is the primary risk factor for CVD and is one of the foremost contributors to global mortality and morbidity.[4–6] The recent WHO Global Report on HTN underscores that the

African Region displays a significantly higher HTN prevalence rate of 36% compared with the global rate of 33%.[6] Furthermore, forecasts for the prevalence of HTN predict that African countries could experience a further escalation of HTN prevalence of over 25% by 2030.[7] Diagnosis, treatment and control rates in this region are of significant concern.[8 9] The global report reveals that the African Region possesses the second-lowest diagnosis coverage (43%), the lowest treatment coverage (27%) and the lowest effective treatment coverage or HTN control (12%).[6] HTN affects young adults in the African Region and contributes significantly to premature mortality, making it the primary preventable risk factor for death in this region.[10 11] Undiagnosed HTN, where individuals are hypertensive but do not report having been told by a health professional that they have HTN[12] and uncontrolled HTN, characterized by a BP>140/90 mm Hg in patients taking antihypertensive treatment,[13] results in complications, specifically strokes.[14–16] The African Region witnesses the highest incidence of stroke,[16 17] particularly among younger adults in their most productive years.[18 19]

The impact of HTN is particularly consequential in rural African settings where prevalence is as high as in urban areas, but awareness, treatment and control rates are lower.[20–22] HTN, often known as the 'silent killer',[6] typically presents with no symptoms,[9] leading to more severe complications in rural adults diagnosed later in the course of the disease. Due to socioeconomic, cultural and geographical barriers, rural adults have limited access to quality healthcare for early detection and management of HTN.[23 24] Undiagnosed and uncontrolled HTN is more prevalent in rural African communities[25 26] with lower socioeconomic contexts,[3] including lower educational levels[8 27] and chronic poverty stressors.[28] Numerous studies conducted within Ghana[29–31] emphasise high health illiteracy rates among rural adults, leading to challenges in understanding HTN, low awareness rates and inadequate knowledge of risk factors and prevention strategies.[30 32] Research conducted on hypertensive adults in Tanzania[33] revealed that good knowledge of, positive attitudes towards and appropriate practices concerning HTN was correlated with improved HTN control. Cultural variations in the concepts of illness chronicity and incurability of HTN[34 35] have contributed to increased health disparities in rural African settings. Geographical access to healthcare for HTN is a significant challenge, given the dispersed rural settlements, inadequate healthcare infrastructure and limited availability of trained healthcare providers and HTN-focused interventions in rural communities.[36–38]

Global efforts to reduce HTN have gained momentum after the endorsement of the United Nations (UN) 2030 Agenda for Sustainable Development.[39] This was further reinforced by including the Sustainable Development Goal target 3.4, which aims to decrease premature mortality from NCDs by one-third through preventative measures and treatment. The WHO advocates using a primary health care (PHC) approach for the early detection, screening, and control of HTN and other NCDs in resource-limited settings.[6 40–42] A scoping review[9] addressing HTN care and factors contributing to suboptimal BP control among 10 Eastern sub-Saharan African (SSA) countries concluded that managing and controlling HTN relies significantly on the foundational support provided by PHC. The review identified that insufficient early detection, inadequate treatment and poor treatment adherence are the main contributors to poor BP control, all of which can be addressed through the framework of PHC. A study projecting the escalating prevalence of HTN in African countries by 2040 emphasises the importance of implementing effective PHC interventions, such as educating individuals about HTN risk factors and adhering to recent guidelines for HTN management, including risk evaluation and treatment strategies.[7] Several African countries are improving their PHC services for HTN in rural settings by implementing tailored interventions. Examples include an annual screening programme for high-risk HTN patients in Kenya,[43] task-shifting or task-sharing of skills to nurses for HTN care delivery in Ghana[44 45] and South Africa,[46] medication adherence clubs in Kenya,[47] HTN diagnosis and management using mobile phones throughout Africa,[48] community health campaigns including linkage to care for HTN in Ethiopia[49] and Uganda,[50 51] and integrated care delivery with HIV in SSA countries.[52]

What is missing from the literature is a comprehensive examination of all existing PHC interventions and their components targeting undiagnosed and uncontrolled HTN in rural African settings. A scoping review is an effective way to examine the existing body of literature. It provides the flexibility to explore, define and consolidate the available PHC interventions and their specific components. To categorise PHC interventions addressing undiagnosed and uncontrolled HTN, the authors will use the four stages outlined in the HTN care cascade.[53] These connected stages—screening, diagnosis, treatment and control—will form the basis for mapping PHC interventions, culminating in the development of a pilot intervention logic model (online supplemental appendix 1). It is important to clarify that this review will not assess or evaluate the HTN care cascade itself. This framework serves as a tool to evaluate the effectiveness of health systems in providing care for HTN,[54 55] a scope that falls outside the purview of this review.

The motivation for this scoping review is rooted in the alarmingly high prevalence of HTN in rural Ghanaian adults. Recent evidence[22] underscores a notable surge in morbidity and mortality in Ghana owing to undiagnosed and uncontrolled HTN. The most vulnerable population affected by this issue resides in Ghana's rural areas, where essential resources such as screening, health education, treatment, medication access, adherence support and referrals to specialists are lacking.[38] A preliminary review,[44 45 56–68] conducted by the authors, exploring PHC models for HTN management in rural Ghana revealed

three key literature gaps: the absence of intervention coproduction, human resources for health limitations and a need for integrated HTN care. A more extensive examination explored PHC models for HTN management beyond Ghana, revealing noteworthy rural PHC models in the Democratic Republic of Congo,[69] Kenya,[70] Ethiopia,[49] Uganda,[71] Cameroon,[72] Tanzania[73] and South Africa.[46] Therefore, the authors decided to broaden this scoping review to investigate PHC models for HTN across all African countries. This scoping review marks the initial step in a programme of work to develop and test the feasibility of a coproduced PHC intervention for adults with undiagnosed and uncontrolled HTN in rural Ghana.

A preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews and the JBI Evidence Synthesis revealed no scoping reviews (published or ongoing) that mapped the evidence on PHC-focused HTN interventions addressing undiagnosed and uncontrolled HTN in rural African adults. One systematic review[74] conducted a thematic analysis of PHC interventions to develop a conceptual model of care for NCDs in SSA, and a scoping review[75] categorised interventions targeting HTN and diabetes mellitus (DM) at community and PHC levels in LMICs. Neither of the reviews provided a comprehensive overview of studies that examined PHC interventions and their components targeting undiagnosed and uncontrolled HTN in rural adults in the African Region.

The primary objective of this scoping review is to identify and categorise PHC interventions and their components implemented in rural African settings to address undiagnosed and uncontrolled HTN in adults. Using a data extraction form that includes items from the Template for Intervention Description and Replication (TIDieR) checklist,[76] this scoping review will compile a description of key intervention components (intervention goals and theory of change, intervention design, materials and resources including human resources for health and implementation procedures), which will, in turn, be mapped to the four connected stages of the HTN care cascade. The authors acknowledge the limitation of uniformly generalising interventions for HTN across African countries due to differences in health systems. However, the aim of this scoping review is to provide a broad overview and map of the existing evidence of all PHC models for HTN care across Africa. The collated evidence will allow readers to interpret the review findings in alignment with their respective countries' contexts and health systems.

REVIEW QUESTIONS

What is the available evidence regarding PHC-focused interventions and their components in rural African settings to address undiagnosed and uncontrolled HTN in adults?

Items from the TIDieR checklist[76] will frame the subquestions for this review.

1. Intervention goals and theory of change: What is (are) the rationale(s) and goal(s) underlying interventions and are there underpinning theories of change for intervention development and implementation?
2. Intervention design: How are the interventions designed, specifically, with or without target community and/or healthcare provider input?
3. Materials, procedures and resources: What physical or informational materials are used in interventions, including what is provided to participants and what is used in training intervention providers? What are the procedures, activities and processes used in the intervention? What human resources for health (intervention providers), including specific training, are required to implement interventions?
4. Implementation procedures: What is the mode of delivery of the intervention, including individual or group delivery, location, frequency, duration and any tailoring for individuals/groups or modifications required for the intervention?

METHODS AND ANALYSIS

To ensure rigour and facilitate replicability of the scoping review, the Joanna Briggs Institute (JBI) methodology for scoping reviews[77] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA- ScR) reporting checklist[78] will be followed. The planned start date is late October 2023, with a completion date of March 2024.

Eligibility criteria

In accordance with the JBI guidance,[77] the criteria for inclusion and exclusion in this scoping review are organised with respect to participants, concept, context, and sources of information. Studies will be included that meet the full inclusion criteria (table 1).

Participants

This scoping review will consider all studies describing their participants as black African adults aged >18 years, residing in a rural or semirural setting (defined in context) within a country in the African Region. Studies that cite participants as African American will be excluded.

Concept

The concept of interest examined in this scoping review is any intervention delivered by any healthcare provider in a rural African primary care setting targeting any stage of HTN care in adults. In this scoping review, HTN can be alternatively referred to as elevated or high BP. It will adhere to the diagnostic criteria established by the WHO,[4] where HTN is defined as having a BP>140/90 mm Hg. A PHC intervention encompasses various measures, services and approaches crafted to promote and maintain individuals' and communities' health and welfare. These interventions are delivered at the primary care level, often at the first point of contact between individuals and the healthcare system.[79] This review will consider studies

Table 1 Inclusion and exclusion criteria

Criteria	Inclusion criteria	Exclusion criteria
Participants	Adult, black African Age≥18 Rural/semirural African countries	Age<18, non-black African Urban, semiurban, metropolitan, city or not specified. Non-African countries African American participants
Concept	Any intervention delivered by any healthcare provider in a rural African primary care setting targeting any stage of hypertension (HTN)/high blood pressure (BP) care in adults. At least Including screen, management, treatment, prevention, control, adherence, referrals (other associated terminology) Accept community healthcare intervention but must be in rural setting Studies that deliver a primary healthcare (PHC) intervention for HTN in conjunction with another disease, such as diabetes mellitus (DM), HIV or tuberculosis (TB), will be eligible for inclusion if data related explicitly to HTN interventions targeting any or all aspects of the HTN care can be extracted.	Studies that do not report HTN/high BP diagnosis, control, screening, prevention, management, treatment, adherence, referrals Epidemiology data only (prevalence, risk factors, determinants, aetiology/causes) Tertiary care, specialised care, hospital care HIV/TB and/or DM studies where HTN data cannot be extracted.
Context	Rural, African Region Rural (Rurality will be based on the study identifying participants as from rural, remote, non-urban or non-metropolitan locations) Primary care/community care settings	Urban, semiurban, metropolitan, city or not specified Non-African Non-primary care/community care setting
Sources (types of studies)	Empirical studies published in peer-reviewed journals and unpublished studies and grey literature Qualitative, quantitative, mixed methods English only No date restriction	Study protocols, texts, opinion papers, dissertations, theses and conference abstracts Non-English

examining any PHC intervention addressing any or all stages of the HTN cascade, including raising awareness and screening, facilitating diagnosis, enabling treatment and effectively controlling HTN. This review will consider PHC interventions delivered by any healthcare provider, including professional healthcare workers, such as nurses and doctors, and community health workers (CHWs). CHWs are healthcare practitioners residing in the communities they serve, and they typically undergo less formal education and training than healthcare professionals.[80] Studies that describe a PHC intervention for HTN in conjunction with another NCD, such as diabetes mellitus (DM), or other communicable diseases, such as human immunodeficiency virus (HIV) or tuberculosis (TB), will be eligible for inclusion if data related explicitly to HTN interventions targeting any or all stages of the HTN care cascade can be extracted.

Context

This review will include studies conducted in any country in the African Region and interventions delivered in rural primary care settings. Only access to PHC will be considered, which includes 'first contact' primary health clinics and/or community-based clinics and services.[81] Excluded contexts include hospital and tertiary care settings unless the intervention involves care coordination or a referral system from a primary care setting to a hospital or tertiary care setting. Finding an international definition for 'rural' proves challenging, given the diverse definitions of 'urban' and 'rural' that vary across countries.[82] Rural population refers to people living in rural areas as defined by national statistical offices.[83] In recognising the differences in national definitions of 'urban' and 'rural' areas, multinational entities, such as the UN and the World Bank, have sought to establish a more universally applicable approach based on the 'degree of urbanisation'.[84 85] This approach has been used to categorise territories as either cities, towns and semidense areas, or rural areas, which can be divided into three classes: villages (small settlements), dispersed rural areas (low-density areas) and mostly uninhabited areas (very low-density area). Applying the term 'rural' in our search strategy was planned to capture studies that had used the word 'rural' in the title or abstract. For the purposes of this scoping review, the authors will consider any study in which the authors classified the setting as rural in the methods section and any study in an area designated as rural by the country's census geographical entity. Where the setting is mixed urban/rural, the study will be included if the rural data can be examined independently.

Types of sources

This scoping review will examine primary studies that employ quantitative, qualitative or mixed methods. The search will include relevant reviews that meet the eligibility criteria and the original papers of such reviews will be searched for inclusion. Additionally, unpublished papers, reports and other grey literature will be considered. However, texts, opinion papers, study protocols, dissertations, theses and conference abstracts will be excluded from this review.

Search strategy

The search strategy (online supplemental file) was developed using an iterative approach, with three rounds of preliminary searches and refinement of the strategy based on initial search results. Each preliminary search was conducted through MEDLINE (R) ALL (Ovid) during September and October 2023. Textual terms found in the titles and abstracts of relevant sources and the indexing terminology used to describe these sources were employed in creating a comprehensive initial search strategy for MEDLINE(R) ALL (Ovid). This search strategy, encompassing all the identified keywords and index terms, will be adjusted for each database or source of evidence that is included. The databases to be searched include MEDLINE(R) ALL (Ovid), Global Health (Ovid), Embase (Ovid), CINALH PLUS (EBSCO), Scopus (Elsevier), the Cochrane Central Register of Controlled Trials, the African Journal Online and Google Scholar. Unpublished studies and grey literature will be searched on the WHO website and the WHO Institutional Repository.

Study/source of evidence selection

After the search, all identified evidence sources will be collated and imported into the reference management software Covidence (Veritas Health Innovation, Melbourne, Australia), where titles and abstracts will be screened against the eligibility criteria. Any duplicate entries will be removed. To ensure a thorough and consistent review process, the following steps will be followed: (1) Two independent reviewers will undergo comprehensive training regarding the review's objectives and eligibility criteria, (2) The independent blinded screening and selection phases will be piloted by the reviewers on a randomly selected sample (n=20) of evidence sources to ensure alignment with the eligibility criteria, (3) Following the pilot test, the independent reviewers will assess the titles and abstracts of the evidence sources for conformity with the eligibility criteria and (4) Screening will officially commence once a minimum consensus of 75% is reached.

Subsequently, the independent reviewers will comprehensively evaluate the full texts of the chosen evidence sources to determine eligibility. The final scoping review will include documentation and explanations for excluding full-text evidence that do not meet the eligibility criteria.

In case of discrepancies during the title/abstract or full-text screening, the independent reviewer team will engage in discussions to reach a consensus. If a consensus cannot be reached, a third independent reviewer, not involved in the initial screening, will be consulted to decide whether to include the study. The final scoping review will provide detailed information on the search results and study inclusion process and will be presented in a flow diagram using the PRISMA-ScR flow diagram.[78]

Data extraction

A preliminary data extraction instrument (online supplemental appendix 2) has been developed based on the scoping review's primary objective and research questions. The data extracted will include study description, study design, a brief name or phrase that describes the intervention, identification of the intervention according to the four stages of the HTN care cascade, participant information, country, goal/rationale and theory of change, intervention design and specific extraction variables relevant to the criteria identified by the TIDieR checklist.[76]

Two independent reviewers will extract data from the included evidence sources using the preliminary data extraction instrument. The independent reviewers will conduct a pilot test of the data extraction instrument using a random sample of evidence sources (n=5) identified through the search strategy. Each reviewer will extract data independently and be blinded from each other during the pilot test. Discussions among the independent reviewers will address any disparities or uncertainties, leading to potential adjustments in the eligibility criteria and definitions. The finalised and mutually agreed upon data extraction tool will then be applied to all the selected papers.

Given the dynamic nature of the scoping review process, the independent reviewers may further refine the data extraction tool as they progress to ensure the comprehensive capture of all essential information. Similar to the selection of studies or sources of evidence, if discrepancies arise during the data extraction, the independent reviewer team will engage in discussions to achieve consensus. In cases where a consensus is not reached, a third independent reviewer will be consulted to make the final decision.

The comprehensive scoping review will document any final data extraction tool modifications. Additionally, if deemed appropriate, the authors of selected evidence sources may be contacted to request any missing or supplementary data necessary for the review.

Sources of evidence will not be excluded in cases where not all data items can be extracted. The primary objective of this scoping review is to identify and categorise PHC interventions and their components implemented in rural African settings to address undiagnosed and uncontrolled HTN in adults. Hence, the eligibility of studies for inclusion in this scoping review is based on the relevance of the evidence source to the research objective

and questions, regardless of whether all the data can be extracted from them.

Data analysis and presentation

The extracted data on the details of PHC interventions and their components will be analysed to provide a comprehensive overview of the array of PHC interventions and key components reported in the literature targeting undiagnosed and uncontrolled HTN in rural African settings. This scoping review will describe key intervention components, including intervention goals and theory of change, intervention design, materials and resources, including human resources for health, and implementation procedures. The extracted data will be summarised and presented in a tabular and diagrammatic format. Subsequently, the data summary will be categorised and mapped to the four stages of the HTN care cascade (awareness (screening), diagnosis, treatment and control). A pilot intervention logic model (online supplemental appendix 1) will illustrate the mapping of PHC interventions onto the stages of the HTN care cascade. Specific interventions for each HTN care cascade stage will be populated from the scoping review. A written overview will be provided alongside the graphical representations of the findings. This narrative summary will delineate the interventions and their components and elucidate how the results are interconnected with the review's objectives and questions.

Patient and public involvement

None.

DISCUSSION

There is an urgent need to improve the health of rural adults in Africa suffering from undiagnosed and uncontrolled HTN. Several African countries are making progress in improving services for HTN through PHC interventions targeting diagnosis, treatment and control of HTN in resource-limited settings. However, the literature does not comprehensively examine all existing PHC interventions and their components specific to rural African settings. Intervention categorisation according to the four stages of the HTN care cascade serves as an initial step in comprehending the breadth of PHC interventions directed at different stages of the HTN care cascade.

The results of this novel scoping review will provide the evidence to develop further a unifying framework and subsequent pilot PHC intervention model to improve the care continuum for HTN from diagnosis to control in rural African primary care settings.

Ethics and dissemination

This scoping review protocol involves no human participants; hence, approval is not required from a human research ethics committee. Findings of the scoping review will primarily be disseminated to local health authorities in Ghana as this scoping review marks the initial step in a programme of work to develop and test the feasibility of a coproduced PHC intervention for adults with undiagnosed and uncontrolled HTN in rural Ghana. Subsequently, findings will be disseminated through conference presentations and publications in peer-reviewed journals.

X Aisha Holloway @mastersnurseed

Acknowledgements Rowena Stewart, Academic Support Librarian, University of Edinburgh, for assistance in developing the search strategy.

Contributors SP is responsible for conceptualising, writing and drafting the protocol and designing the search strategy with the Academic Support Librarian. AH and DS provided supervision and review by contributing to the protocol's conceptualisation and providing critical feedback. All authors approved the final manuscript.

Funding SP is the recipient of a School of Health in Social Science PhD Studentship, University of Edinburgh, which supports their PhD programme of study.

Disclaimer This scoping review will contribute towards a PhD in Nursing Studies for SP.

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.

ORCID iDs

Sandra Peniston http://orcid.org/0000-0002-5489-8341

Divya Sivaramakrishnan http://orcid.org/0000-0002-3013-4793

REFERENCES

1 WHO. Noncommunicable diseases: WHO. 2022. Available: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
2 Pervaiz R, Ercantan Ö. The burden of non-communicable diseases in relation to economic status of countries. *Biomed Res Ther* 2018;5:1967–74.
3 WHO - African Region. Cardiovascular diseases. n.d. Available: https://www.afro.who.int/health-topics/cardiovascular-diseases
4 WHO. Hypertension. 2023. Available: https://www.who.int/news-room/fact-sheets/detail/hypertension#:~:text=Hypertension%20(high%20blood%20pressure)%20is,get%20your%20blood%20pressure%20checked
5 Nguyen TN, Chow CK. Global and national high blood pressure burden and control. *Lancet* 2021;398:932–3.
6 WHO. *Global report on hypertension: the race against a silent killer*. Geneva: WHO, 2023.
7 Boateng EB, Ampofo AG. A glimpse into the future: modelling global prevalence of hypertension. *BMC Public Health* 2023;23:1906.
8 Okello S, Muhihi A, Mohamed SF, *et al*. Hypertension prevalence, awareness, treatment, and control and predicted 10-year CVD risk: a cross-sectional study of seven communities in East and West Africa (Sevencewa). *BMC Public Health* 2020;20:1706.

9 Sorato MM, Davari M, Kebriaeezadeh A, *et al*. Reasons for poor blood pressure control in Eastern sub-Saharan Africa: looking into 4p's (primary care, professional, patient, and public health policy) for improving blood pressure control: a Scoping review. *BMC Cardiovasc Disord* 2021;21:123.
10 Agongo G, Nonterah EA, Amenga-Etego L, *et al*. Blood pressure indices and associated risk factors in a rural West African adult population: insights from an AWI-Gen Substudy in Ghana. *Int J Hypertens* 2020;2020:4549031.
11 Nsanya MK, Kavishe BB, Katende D, *et al*. Prevalence of high blood pressure and associated factors among adolescents and young people in Tanzania and Uganda. *J of Clinical Hypertension* 2019;21:470–8. 10.1111/jch.13502 Available: https://onlinelibrary.wiley.com/toc/17517176/21/4
12 Choo EH, Ihm S-H, Lim S, *et al*. A simple screening score for Undiagnosed hypertension. *Int J Cardiol* 2014;172:e465–7.
13 James PA, Oparil S, Carter BL, *et al*. 2014 evidence-based guideline for the management of high blood pressure in adults. *JAMA* 2014;311:507.
14 Agyemang C, Nyaaba G, Beune E, *et al*. Variations in hypertension awareness, treatment, and control among Ghanaian migrants living in Amsterdam, Berlin, London, and Nonmigrant Ghanaians living in rural and urban Ghana - the RODAM study. *J Hypertens* 2018;36:169–77.
15 Guwatudde D, Nankya-Mutyoba J, Kalyesubula R, *et al*. The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study. *BMC Public Health* 2015;15:1211.
16 Akinyemi RO, Ovbiagele B, Adeniji OA, *et al*. Stroke in Africa: profile, progress, prospects and priorities. *Nat Rev Neurol* 2021;17:634–56.
17 Uwishema O, Berjaoui C, Correia IFS, *et al*. Current management of acute ischemic stroke in Africa: A review of the literature. *Eur J Neurol* 2022;29:3460–5.
18 Boot E, Ekker MS, Putaala J, *et al*. Ischaemic stroke in young adults: a global perspective. *J Neurol Neurosurg Psychiatry* 2020;91:411–7.
19 Adoukonou T, Kossi O, Fotso Mefo P, *et al*. Stroke case fatality in sub-Saharan Africa: systematic review and meta-analysis. *Int J Stroke* 2021;16:902–16.
20 Sani RN, Connelly PJ, Toft M, *et al*. Rural-urban difference in the prevalence of hypertension in West Africa: a systematic review and meta-analysis. *J Hum Hypertens* April 16, 2022.
21 Ranzani OT, Kalra A, Di Girolamo C, *et al*. Urban-rural differences in hypertension prevalence in low-income and middle-income countries, 1990-2020: A systematic review and meta-analysis. *PLoS Med* 2022;19:e1004079.
22 Bosu WK, Bosu DK. Prevalence, awareness and control of hypertension in Ghana: A systematic review and meta-analysis. *PLoS ONE* 2021;16:e0248137.
23 Nelson F, Nyarko KM, Binka FN. Prevalence of risk factors for non-communicable diseases for new patients reporting to Korle-bu teaching hospital. *Ghana Med J* 2015;49:12–8.
24 Teshome DF, Balcha SA, Ayele TA, *et al*. Undiagnosed hypertension and its determinants among hypertensive patients in rural districts of Northwest Ethiopia: a mediation analysis. *BMC Health Serv Res* 2023;23:222.
25 Mosha NR, Mahande M, Juma A, *et al*. Prevalence,awareness and factors associated with hypertension in North West Tanzania. *Glob Health Action* 2017;10:1321279.
26 Muhihi AJ, Anaeli A, Mpembeni RNM, *et al*. Prevalence, awareness, treatment, and control of hypertension among young and middle-aged adults: results from a community-based survey in rural Tanzania. *Int J Hypertens* 2020:9032476.
27 Geldsetzer P, Manne-Goehler J, Marcus M-E, *et al*. The state of hypertension care in 44 low-income and middle-income countries: a cross-sectional study of nationally representative individual-level data from 1.1 million adults. *The Lancet* 2019;394:652–62.
28 Stringhini S, Forrester TE, Plange-Rhule J, *et al*. The social patterning of risk factors for *Noncommunicable* diseases in five countries: evidence from the modeling the epidemiologic transition study (METS). *BMC Public Health* 2016;16:956.
29 Sanuade OA, Boatemaa S, Kushitor MK. Hypertension prevalence, awareness, treatment and control in Ghanaian population: evidence from the Ghana demographic and health survey. *PLoS One* 2018;13:e0205985.
30 Sanuade OA, Awuah RB, Kushitor M. Hypertension awareness, treatment and control in Ghana: a cross-sectional study. *Ethn Health* 2020;25:702–16.
31 Nyaaba GN, Masana L, de-Graft Aikins A, *et al*. Factors hindering hypertension control: perspectives of front-line health professionals in rural Ghana. *Public Health* 2020;181:16–23.
32 Capistrant BD, Charlton K, Snodgrass J, *et al*. Do determinants of hypertension status vary between Ghana and South Africa? study on global ageing and adult health. *SAHJ* 2019;16.
33 Maginga J, Guerrero M, Koh E, *et al*. Hypertension control and its correlates among adults attending a hypertension clinic in Tanzania. *J Clin Hypertens (Greenwich)* 2016;18:207–16.
34 Dosoo DK, Nyame S, Enuameh Y, *et al*. Prevalence of hypertension in the middle belt of Ghana: A community-based screening study. *Int J Hypertens* 2019;2019:1089578.
35 Juma PA, Juma K, Yonga G. Non-communicable disease epidemics: approaches to prevention and control in sub-Saharan Africa. In: Mazibuko Z, ed. *Epidemics and the Health of African Nations*. Oxford: African Books Collective, 2019.
36 Cappuccio FP, Miller MA. Cardiovascular disease and hypertension in sub-Saharan Africa: burden, risk and interventions. *Intern Emerg Med* 2016;11:299–305.
37 de-GraftA. Chapter 8: the socio-cultural and socio-economic context of Africa's chronic disease burden. In: de-GraftA, Agyei-Mensah S, Agyemang C, eds. *Chronic Non-communicable Diseases in Ghana - Multidiscplinary Perspectives*. Accra, Ghana: Sub-Saharan Publishers, 2013.
38 Nyaaba GN, Masana L, Aikins A de-Graft, *et al*. Lay community perceptions and treatment options for hypertension in rural northern Ghana: a qualitative analysis. *BMJ Open* 2018;8.
39 UN - Department of economic and social affairs. Transforming our world: the 2030 agenda for sustainable development. 2015.
40 Building the primary health care workforce of the 21st century. Geneva: World Health Organization; 2018. Available: Contract No.: WHO/HIS/SDS/2018.48
41 WHO. Tackling Ncds - 'best BUYS' and other recommended interventions for the prevention and control of Noncommunicable diseases. 2017.
42 WHO & UNICEF. A vision for primary health care in the 21st century: towards universal health coverage and the sustainable development goals. Geneva: World Health Organization; 2018. Available: 2018. Contract No.: WHO/HIS/SDS/2018.15
43 Ogola EN, Mbau L, Gachemba YM, *et al*. May measurement month 2019: an analysis of blood pressure screening results from Kenya. *Eur Heart J Suppl* 2021;23:B86–8.
44 Adler AJ, Laar A, Prieto-Merino D, *et al*. Can a nurse-led community-based model of hypertension care improve hypertension control in Ghana? results from the Comhip cohort study. *BMJ Open* 2019;9:e026799.
45 Ogedegbe G, Plange-Rhule J, Gyamfi J, *et al*. Health insurance coverage with or without a nurse-led task shifting strategy for hypertension control: A pragmatic cluster randomized trial in Ghana. *PLoS Med* 2018;15:e1002561.
46 Fairall LR, Folb N, Timmerman V, *et al*. Educational outreach with an integrated clinical tool for nurse-led non-communicable chronic disease management in primary care in South Africa: a pragmatic cluster randomised controlled trial. *PLoS Med* 2016;13.
47 Khabala KB, Edwards JK, Baruani B, *et al*. Medication adherence clubs: a potential solution to managing large numbers of stable patients with multiple chronic diseases in informal settlements. *Trop Med Int Health* 2015;20:1265–70.
48 Oronti IB, Iadanza E, Pecchia L. Hypertension diagnosis and management in Africa using mobile phones: A Scoping review. *IEEE Rev Biomed Eng* 2022.
49 Mamo Y, Seid E, Adams S, *et al*. A primary Healthcare approach to the management of chronic disease in Ethiopia: an example for other countries. *Clin Med (Lond)* 2007;7:228–31.
50 O'Neil DS, Lam WC, Nyirangirimana P, *et al*. Evaluation of care access and hypertension control in a community health worker driven non-communicable disease programme in rural Uganda: the chronic disease in the community project. *Health Policy Plan* 2016;31:czw006:878–83.:.
51 Kotwani P, Balzer L, Kwarisiima D, *et al*. Evaluating linkage to care for hypertension after community-based screening in rural Uganda . *Tropical Med Int Health* 2014;19:459–68. 10.1111/tmi.12273 Available: https://onlinelibrary.wiley.com/toc/13653156/19/4
52 Kivuyo S, Birungi J, Okebe J, *et al*. Integrated management of HIV, diabetes, and hypertension in sub-Saharan Africa (INTE-AFRICA): a pragmatic cluster-randomised, controlled trial. *The Lancet* 2023;402:1241–50.
53 Chikafu H, Chimbari M. Hypertension care Cascade in the Ingwavuma rural community, uMkhanyakude district, Kwazulu-natal province of South Africa. *PeerJ* 2021;9:e12372.
54 Jobe M, Mactaggart I, Hydara A, *et al*. Evaluating the hypertension care Cascade in middle-aged and older adults in the Gambia: findings from a nationwide survey. *eClinicalMedicine* 2023;64:102226.
55 Peters MA, Noonan CM, Rao KD, *et al*. Evidence for an expanded hypertension care Cascade in Low- and middle-income countries: a Scoping review. *BMC Health Serv Res* 2022;22:827.

56 Tesema A, Joshi R, Abimbola S, *et al*. Addressing barriers to primary health-care services for Noncommunicable diseases in the African region. *Bull World Health Organ* 2020;98:906–8.
57 Okyere E, Mwanri L, Ward P. Is task-shifting a solution to the health workers' shortage in northern Ghana *PLoS One* 2017;12:e0174631.
58 Gyamfi J, Plange-Rhule J, Iwelunmor J, *et al*. Training nurses in task-shifting strategies for the management and control of hypertension in Ghana: a mixed-methods study. *BMC Health Serv Res* 2017;17.
59 Iwelunmor J, Gyamfi J, Plange-Rhule J, *et al*. Exploring Stakeholders' perceptions of a task-shifting strategy for hypertension control in Ghana: a qualitative study. *BMC Public Health* 2017;17:216.
60 Iwelunmor J, Onakomaiya D, Gyamfi J, *et al*. Adopting task-shifting strategies for hypertension control in Ghana: insights from a realist synthesis of Stakeholder perceptions. *Glob Heart* 2019;14:119–27.
61 Blackstone S, Iwelunmor J, Plange-Rhule J, *et al*. Sustaining nurse-led task-shifting strategies for hypertension control: A concept mapping study to inform evidence-based practice. *Worldviews Evid Based Nurs* 2017;14:350–7.
62 Blackstone S, Iwelunmor J, Plange-Rhule J, *et al*. I believe high blood pressure can kill me:' using the PEN-3 cultural model to understand patients' perceptions of an intervention to control hypertension in Ghana. *Ethn Health* 2019;24:257–70.
63 Nyame S, Iwelunmor J, Ogedegbe G, *et al*. Capacity and readiness for implementing evidence-based task-strengthening strategies for hypertension control in Ghana: a cross-sectional study. Glob Heart 2019;14:129.
64 Gyamfi J, Allegrante JP, Iwelunmor J, *et al*. Application of the consolidated framework for implementation research to examine nurses' perception of the task shifting strategy for hypertension control trial in Ghana. *BMC Health Serv Res* 2020;20:65.
65 Haykin LA, Francke JA, Abapali A, *et al*. Adapting a nurse-led primary care initiative to cardiovascular disease control in Ghana: a qualitative study. *BMC Public Health* 2020;20:745.
66 Laar AK, Adler AJ, Kotoh AM, *et al*. Health system challenges to hypertension and related non-communicable diseases prevention and treatment: perspectives from Ghanaian Stakeholders. *BMC Health Serv Res* 2019;19:693.
67 Adler AJ, Laar AK, Kotoh AM, *et al*. Barriers and Facilitators to the implementation of a community-based hypertension improvement project in Ghana: a qualitative study of comHIP. *BMC Health Serv Res* 2020;20:67:67.:.
68 Wood EP, Garvey KL, Aborigo R, *et al*. Constructing a nurse-led cardiovascular disease intervention in rural Ghana: a qualitative analysis. *Ann Glob Health* 2021;87:121.
69 Lulebo AM, Kaba DK, Atake S-H, *et al*. Task shifting in the management of hypertension in Kinshasa, democratic Republic of Congo: a cross-sectional study. *BMC Health Serv Res* 2017;17:698.
70 Heller DJ, Balzer LB, Kazi D, *et al*. Hypertension testing and treatment in Uganda and Kenya through the SEARCH study: an implementation fidelity and outcome evaluation. *PLoS ONE* 2020;15:e0222801.
71 Stephens JH, Addepalli A, Chaudhuri S, *et al*. Chronic disease in the Community (CDcom) program: hypertension and Noncommunicable disease care by village health workers in rural Uganda. *PLoS ONE* 2021;16:e0247464.
72 Labhardt ND, Balo J-R, Ndam M, *et al*. Task shifting to non-physician Clinicians for integrated management of hypertension and diabetes in rural Cameroon: a programme assessment at two years. *BMC Health Serv Res* 2010;10:339.
73 Miselli A, Cavallin F, Itambu R, *et al*. A new integrated management system for non-communicable diseases in Iringa District Council. *BMC Proc* 2022;16.
74 Kane J, Landes M, Carroll C, *et al*. A systematic review of primary care models for non-communicable disease interventions in sub-Saharan Africa. *BMC Fam Pract* 2017;18:46.
75 Correia JC, Lachat S, Lagger G, *et al*. Interventions targeting hypertension and diabetes mellitus at community and primary Healthcare level in Low- and middle-income countries:a Scoping review. *BMC Public Health* 2019;19:1542.
76 Hoffmann TC, Glasziou PP, Boutron I, *et al*. Better reporting of interventions: template for intervention description and replication (Tidier) checklist and guide. *BMJ* 2014;348:bmj.g1687.
77 Peters MDJ, Khalil H. Chapter 11: Scoping reviews (2020 version). In: Aromataris EMZ, ed. *JBI Manual for Evidence Synthesis: JBI*. 2020.
78 Tricco AC, Lillie E, Zarin W, *et al*. PRISMA extension for Scoping reviews (PRISMA-SCR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
79 Behera BK, Prasad R. Primary health-care goal and principles. In: *Healthcare Strategies and Planning for Social Inclusion and Development*. . 2019: 2022. 221–39.
80 WHO. *What do we know about community health workers? A systematic review of existing reviews*. Geneva: WHO, 2020.
81 WHO & UNICEF. Operational framework for primary health care - transforming vision into action. Geneva; 2020.
82 Busingye D, Arabshahi S, Subasinghe AK, *et al*. Do the socioeconomic and hypertension gradients in rural populations of Low- and middle-income countries differ by geographical region? A systematic review and meta-analysis. *Int J Epidemiol* 2014;43:1563–77.
83 The World Bank. Metadata glossary - rural population. n.d. Available: https://databank.worldbank.org/metadataglossary/world-development-indicators/series/SP.RUR.TOTL
84 Bank W, European Commission, ILO, FAO, OECD, UN-Habitat. A recommendation on the method to delineate cities, urban and rural areas for International statistical comparisons. 2020.
85 Food and Agriculture Organization of the United Nations. Guidelines on defining rural areas and compiling indicators for policy development. 2018.