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Current hypertension care practice in Sub-Saharan Africa and need for creating hypertension care ecosystem: An explanatory Review

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ABSTRACT

Background: A comprehensive ecosystem for hypertension care is needed, particularly in Sub-Saharan Africa (SSA), to address disproportionately increasing hypertension prevalence and poor blood pressure (BP) control. Therefore, this explanatory review was conducted to present the ecosystem for providing hypertension care in resource-limited settings from a sub-Saharan African perspective.

Methods: We searched articles written in the English language from January 2000 to January 2020 from the following databases: PubMed, Embase, Scopus, Web of Science, and Google Scholar with a systematic search query.

Results: We identified 3,451 articles, abstracted 143 articles, read full text 101 articles, and included 97 articles in the final Review. Hypertension control in SSA is poor due to the interaction of a complex network of factors involving patients (lack of awareness, poor treatment adherence), the healthcare system (lack of early screening, lack of access to medicines, under treatment, poor research involvement), community (inequities), environment (air pollution), economy (poverty), poor political commitment, lack of strong policies and leadership support, and weak networking and collaboration. The Healthcare system in SSA needs strengthening concerning; health promotion and hypertension prevention, scale-up of cost-effective screening approaches, aggressive treatment of hypertension, and

researching country-specific approaches for managing hypertension.

Conclusion: Hypertension control in SSA needs a comprehensive ecosystem view involving all relevant stakeholders. Therefore, improving health promotion and disease prevention activities to improve patient and public awareness of hypertension prevention and control; restructuring hypertension care approach to environmentally appropriate and cost-efficient methods; introducing cost-effective FDC medications in the national drug lists to improve treatment adherence; designing strategies to address SDH health and reducing health inequities, strengthening implementation of HiAP with due consideration to determinants of hypertension control, and improving collaboration and networking of existing cardiovascular societies, an international society of hypertension and world hypertension league, and other funding agencies are critical success factors for improving hypertension control in SSA.

Keywords: Hypertension care ecosystem, cardiovascular disease care continuum, Social determinants of health, Hypertension, Sub-Saharan Africa, An explanatory Review.

Introduction

Hypertension is responsible for at least 45% and 51% of deaths due to heart disease, and stroke, respectively (1). There is a huge disparity among global regions concerning hypertension prevalence. The estimated global age-standardized prevalence of hypertension in adults aged ≥ 20 years in 2010 was 28.5% and 31.5% in high-income and low and middle-income countries, respectively (2). A study conducted to evaluate long-term and recent trends in hypertension awareness, treatment, and control in 12 high-income countries involving people aged 40-79 years showed that treatment coverage was 80%, and control rates were less than 70% (3). In reality, BP targets can be achieved in about 70 - 80% of patients by improving adherence and/or intensifying therapy (4, 5).

Africa is facing an epidemic of cardiovascular disease (CVD), with surprising morbidity and mortality (6). In contrast to many countries worldwide where high BP rates are slowly decreasing, the prevalence of hypertension is increasing in most countries in Sub-Saharan Africa (7). About 18% of people with hypertension were receiving appropriate hypertension treatment and 7% (5 - 8%) hypertensive population in Sub-Saharan Africa (SSA) have controlled their blood pressure (8-12).

Comprehensive care based on the total CV risk approach is more effective and less costly than the single-risk-factor approach because treatment is limited to individuals with a high total CV risk (13, 14). The World Health Organization and the International Society of Hypertension (ISH) recently developed a set of CV risk prediction charts for use in all regions of the world (15). Adopting a total risk approach and WHO guidelines recommendations would restrict unnecessary drug treatment and reduce the drug costs significantly. Therefore, limited resources can be more efficiently used to target high-risk people who will benefit the most (16).

A comprehensive hypertension care ecosystem is looking beyond clinical care to address all visible and invisible risk factors of poor blood pressure control (17). The reasons why we need a comprehensive ecosystem for hypertension care particularly in SSA were prevalence of hypertension is disproportionately increasing; hypertension control is the worst; hypertension is a risk factor for several CVDs and non-cardiovascular diseases; the current antihypertensive drug treatment failed to control about five to 20% of the hypertensive population (18, 19); and social determinants are contributing to the significant share of population health outcomes. Therefore, this explanatory review was conducted to present the ecosystem for providing hypertension care in resource-limited settings from the SSA perspective.

Materials and Method

Methods

We used the following eight approaches to develop hypertension care ecosystem. Reviewing cardiovascular and non-cardiac diseases that are associated with hypertension; reviewing continuum of cardiovascular disease risk factors for the development of ischemic heart disease and the role of hypertension; exploring the reasons of poor blood pressure control in SSA; exploring factors visible and invisible for clinicians during hypertension management in clinics; exploring the evidence on the role of social determinants of health on

hypertension prevention and control in SSA; exploring health inequities in cardiovascular disease care in SSA; and identifying evidence on political commitment, policy support, and collaboration. Finally, we mapped hypertension prevention and control from an ecosystem perspective.

Source of evidence

We searched articles written in English language from January 2000 to January 2020 from the following databases: Pubmed/Medline, Embase, Scopus, Web of Science, and Google Scholar with a systematic search query. Key search terms used were Hypertension AND Hypertension care ecosystem AND cardiovascular disease care continuum AND social determinants of health AND blood pressure control AND sub-Saharan Africa (available in supplementary file).

Study types

Randomized controlled trials, cohort studies, cross-sectional studies addressing cardiovascular and non-cardiac diseases that are associated with hypertension; a continuum of cardiovascular disease risk factors for the development of ischemic heart disease and the role of hypertension; the reasons of poor blood pressure control in SSA; factors visible and invisible for clinicians during hypertension management; the role of social determinants of health on hypertension prevention and control in SSA; exploring health inequities in cardiovascular disease care in SSA; and political commitment, policy support, and collaboration.

Inclusion and exclusion criteria

Randomized controlled trials, cohort studies, cross-sectional studies addressing cardiovascular and non-cardiac diseases that are associated with hypertension; a continuum of cardiovascular disease risk factors for the development of ischemic heart disease and the role of hypertension; the reasons for poor blood pressure control in sub-Saharan Africa; factors visible and invisible for clinicians during hypertension management in clinics; the role of social determinants of health on hypertension prevention and control in SSA; exploring health inequities in cardiovascular disease care in SSA; and political commitment, policy support, and collaboration are included. Studies conducted before January 2000, systematic reviews, guidelines, short communications, and conference proceedings, and articles that don't meet quality evaluation criteria are excluded.

Study selection and data abstraction

From a total of 3,451 articles identified by literature search 143 potentially relevant articles were selected. After applying the inclusion-exclusion criteria listed above only 97 articles were found to be relevant. These 97 articles were included in the final review (20) (figure 1).

Data analysis

Evidence synthesis

We qualitatively described and summarized the evidence on the ecosystem for providing hypertension care in resource-limited settings from the sub-Saharan Africa perspective. We stratified results by cardiovascular and non-cardiac diseases that are associated with hypertension; a continuum of cardiovascular disease risk factors for the development of ischemic heart disease and the role of hypertension; the reasons of poor blood pressure control in SSA; factors visible and invisible for clinicians during hypertension management; the role of social determinants of health on hypertension prevention and control in SSA; exploring health inequities in cardiovascular disease care in SSA; and political commitment, policy support, and collaboration. Finally, appropriate conclusions and recommendations will be made based on the results of the included studies.

Results

Description of studies

We identified 3,451 articles, abstracted 143 articles, read full text 101 articles, and included 97 articles in the final Review. We used the following five approaches to develop a hypertension care ecosystem. Reviewing cardiovascular and non-cardiac diseases that are associated with hypertension (21-30); reviewing continuum of cardiovascular disease risk factors for the development of ischemic heart disease and the role of hypertension (14, 31-49); exploring the reasons for poor blood pressure control in sub-Saharan Africa; exploring factors visible and invisible for clinicians during hypertension management in clinics (50, 51); exploring the evidence on the role of social determinants of health on hypertension prevention and control in SSA (52-67); exploring health inequities in cardiovascular disease care in SSA (68-75); and identifying evidence on political commitment, policy support, and collaboration (6, 76-80).

Hypertension care continuum and complications

Hypertension is a risk factor for coronary heart disease and stroke-related deaths, non-fatal stable angina, non-fatal unstable angina, heart failure, nonfatal myocardial infarction, non-fatal ischemic stroke, subarachnoid hemorrhage, intracranial hemorrhage, transient ischemic attack, peripheral arterial disease, and

abdominal aortic aneurism (21-23); chronic kidney disease (24), heart failure (25), chronic obstructive pulmonary disease (26), diabetes (27), rheumatic diseases(28) and psychiatric diseases (29, 30).

Understanding the continuum of cardiovascular disease risk factors for the development of ischemic heart disease is important (31). Before the development of fatal and debilitating complications of cardiovascular disease (CVD), there is a long latency period. This is because atherosclerosis which is the main pathological process leading to coronary artery disease, cerebral artery disease, and peripheral artery disease begins early in life and progresses gradually through adolescence and early adulthood with no symptoms (32-35).

Most of the known risk factors for raised blood pressure are modifiable (tobacco use and/or secondhand smoke, alcohol use, poor nutrition, physical inactivity, obesity, sedentary lifestyle, pollution, and low socioeconomic status) (36, 37). Therefore, designing the primary healthcare system to provide comprehensive care based on a total risk approach is an important policy level response to control and prevent hypertension and related complications (14, 32-35, 38-40). The comprehensive hypertension care approach should include the following technical packages; tobacco control, increasing physical activity, salt reduction and eliminating industrially-produced trans-fat from the food supply, screening high-risk population and strengthening the management of CVDs in primary health care (36, 41-45). Provision of comprehensive primary care could be influenced by limited access and capacity to primary care providers; lack of access to medicines; poor financial protection; lack of community awareness; poor political environment; healthcare budget constraint; poor quality healthcare; inefficient health systems; poor care coordination; poor integration of technology and lack of community involvement (46-49).

Iceberg for hypertension care

Clinicians are dealing with an iceberg of hypertension in which visible and invisible factors are driving disease development and progression (50, 51). Factors that are visible for clinicians during the management of hypertension include raised blood pressure, dyslipidemia, blood glucose, serum electrolytes, serum creatinine, estimated glomerular filtration rate, heart rate, atrial fibrillation, left ventricular hypertrophy, ischemic heart disease; atherosclerosis, stenosis; renal disease, adrenal lesions, other abdominal pathology; retinal changes, hemorrhages, papilledema, ischemic or hemorrhagic brain injury, peripheral artery disease; aldosterone-renin ratio, plasma free metanephrines, salivary or blood cortisol level; urinary albumin/creatinine ratio; serum uric acid levels, and patient behavior-related factors (50, 51). However, socioeconomic conditions, lack facilities for physical activity, food insecurity, family or social responsibility, daily living conditions (housing, employment, education, social support, crime, and safety) are mainly visible to patients. Similarly, clinicians and patients have little influence on access to medicines and essential technologies, health workforce capacity, CVD prevention, and control policies, government commitment to implement policies, transparency in leadership and health governance structure, ecological, economic, and social structures, power & wealth distribution (i.e. equity) (figure 2) (50, 51).

Social determinants of hypertension control

Social determinants of health (SDH) influence a person's opportunity to be healthy, risk of illness, and life expectancy. These SDH includes income level, educational opportunities, occupation, employment status, and workplace safety, gender inequity, ethnic inequality, food insecurity and inaccessibility of nutritious food choices, access to housing and utility services, early childhood experiences and development, social support, and community inclusivity, crime rates and exposure to violent behavior and availability of transport. The SDH can be grouped into five areas: economic stability (unemployment, food insecurity, housing instability, and poverty); education and literacy; social and community context (civic participation, discrimination, imprisonment, and social cohesion); health and health care; neighborhood and environment (access to foods that support healthy eating patterns, access to clean water, crime and violence, environmental conditions, quality of housing, clean air) (52-54). The relative contribution of the determinants of health includes; health behaviors 30% (smoking 10%, diet and exercise 10%, alcohol 5%, and poor sexual health 5%); socioeconomic factors 40% (education 10%, employment 10%, income 10%, family/social support 5%, and community safety 5%); clinical care 20% (access to care 10% and quality of care 10%); and environment 10% (environmental quality 5% and built environment 5%) (55).

Poverty is directly related to poor governance and the inequitable distribution of public wealth. It is case and consequence of poor health. For example, poverty is directly related to food insecurity, and food insecurity is related to

childhood obesity which future risk factor of cardiovascular diseases (63, 64). In 2018, African account for two-thirds of the more than 643 million people across the world living in extreme poverty. The worst affected countries are Nigeria, the Democratic Republic of Congo, Ethiopia, Tanzania, Mozambique, Kenya, and Uganda (56-60). Tackling the structural causes of poverty and poor health requires measures to tackle inequality and injustices (58, 61). Quality education can reduce poverty. For example, if every adult received two or more years of education or completed secondary school, it could alleviate 60 million people from poverty. However, prioritizing education in a resource-limited setting has another challenge (i.e. education fever). Education is a solution to poverty, but it can't function properly with societal setbacks, that is why it is so important to understand the relationship between education and poverty (62).

The environment should be viable, sustainable, and livable to ensure health system performance. A study conducted to summarize evidence on the cardiovascular effects of indoor air pollution (IAP) from solid fuel in low and middle-income countries showed that the proportion of households using solid fuels (biomass) was the highest in sub-Saharan Africa. Premature CVD deaths and disability can be averted in SSA by addressing biomass fuel usage by disadvantaged populations (65). Another review showed that SSA cities exhibit higher ambient air pollution (AAP) than WHO standards (i.e. 10-20 fold higher levels). People from low and middle-income countries are disproportionately affected by the global burden of adverse health effects caused by ambient air pollution (AAP). Efforts are needed to monitor AAP in African cities, identify its main sources, and reduce adverse health effects by enforcing legislation (66). Climate change vulnerabilities are key environmental and SDH in SSA. NCDs like, cardiovascular disease and diabetes are on the increase in sub-Saharan African urban areas and can be further aggravated by climate change (67).

Inequities in healthcare and hypertension prevention and control

The study published on the Lancet commission about the future potential of SSA to improve health on its terms, and largely with its resources showed that major health inequities exist and that health outcomes are worst in fragile countries, rural areas, urban slums, and conflict zones, and among the poor, disabled, and marginalized. The future of health in Africa is bright, but only if no one is left behind (68). According to various indicators, the main factors influencing health inequalities are wealth, spatial location (rural/urban), and mothers' education level (69-72). Various governments have developed policies to address health inequality and its determinants. However, socioeconomic issues that aggravate health inequalities, striking disparities in health status still exist within and among countries in SSA (73, 74). A review conducted to assess operational difficulties of community health insurance (CHI) in SSA showed the following major difficulties faced by CHI: lack of clear legislative and regulatory framework; insufficient risk management measures; weak managerial capacity; and high overhead costs. Greater commitment towards the development of adequate legislation; increasing uptake of measures to expand equitable enrolment; adoption of adequate risk management measures in all schemes; improving managerial capacity; and collective efforts to contain overhead costs are recommended (75).

Political commitment, policy support, and collaboration

Available national policies have failed to stop the increasing prevalence of chronic diseases due to political/policy level failure to implement low-cost and highly effective solutions for the prevention of chronic diseases (76). During the third high-level meeting of the General Assembly on the prevention and control of NCDs held on September 27, 2018, the following obstacles for the implementation of proven interventions for NCDs were identified in developing countries like sub-Saharan Africa. These major obstacles include lack of political will, commitment, capacity, and action; lack of policies and plans for NCDs; difficulty in priority-setting; the impact of economic, commercial, and market factors; insufficient technical and operational capacity; insufficient financing to scale up national NCD responses; and lack of accountability (77, 78). Age-specific mortality rates from chronic diseases as a whole are higher in SSA than in virtually all other regions of the world. Africa faces significant challenges in chronic disease research, practice, and policy due to constrained health budgets and the prioritization of infectious diseases (79). To improve this, close collaboration between the health and higher education sectors is needed and comprehensive competency-based capacity building plans for various health worker cadres along the education and training continuum, and researching governance and policy; education, training, and management and service delivery are required (80).

Hypertension care ecosystem

Blood pressure control, and reducing cardiac and non-cardiac complications of hypertension requires the interplay between the healthcare system (prevention, screening, diagnosis and treatment, and research), community (livable, convivial and equitable), environment (livable, viable, and sustainable), economy (sustainable and equitable), Political commitment, policy and leadership support, and network and collaboration. Equity, conviviality, viability, and sustainability (3, 6, 14, 21-114). Involvement of all stakeholders in hypertension care decision making will improve policy, politically doable solutions, provides reassurance, creates support for change, saves money, makes policies work, create long-lasting change, supports vision, generates political capital and provides more options for action, improved blood pressure control and reduce complications (figure 3) (115, 116).

Discussion

In this explanatory review, we described the importance of a comprehensive hypertension care ecosystem to improve the prevention and control of hypertension and related complications in SSA. The prevalence of hypertension and age-adjusted mortality are disproportionately increasing in this region. This increase can be explained by a complex network of factors involving patients (lack of awareness, poor treatment adherence), healthcare system (poor awareness creation, lack of early screening, lack of access to medicines, under treatment, poor research involvement), community (lack of peace and security and inequities), environment (air pollution), economy (poverty, inequity), poor political commitment, lack of strong policies and leadership support, and weak within the country and between country networking and collaboration (3, 6, 14, 21-114).

National health systems in SSA need strengthening to meet the growing challenge of hypertension in the region. Factors that limit countries' capacity to implement proven strategies for chronic diseases involves constraints in health financing, governance, health workforce, health information, health promotion, screening of the high-risk population, access to medicines and technologies, poor coordination of care delivery, social determinants, political commitment, and policy and leadership support (44, 117-122). Therefore, implementing health in all policies (HiAP) and health for all policies with due consideration of determinants of hypertension control is a critical success factor for hypertension prevention and control in SSA (123, 124). However, the level of understanding and implementation of HiAP in SSA was poor. For example, health policy analysis on Kenya's HiAP showed that on the policy level, little is known about HiAP in other government ministries and HiAP is still perceived by many stakeholders as the business of the health sector, rather than a policy for the whole government and beyond (125). Implementing cost-efficient screening strategies and investing in active detection, prevention, and control of CVD can reduce screening and large-scale healthcare expenses on hospitalizations related to cost in SSA (126).

Another important issue is adherence to antihypertensive medications. A great majority of hypertensive patients in SSA were non-adherent to medications. For example, 94.9%, 78%, and 82.0% were not taking antihypertensive medications in Malawi, Rwanda, and Zambia respectively (86-104). Barriers to medication adherence are related to out-of-pocket expenses for medical care and medications, medication availability, healthcare availability, the complexity of medical regimens, patient knowledge, patient motivation, and variation in physician practice (127, 128). Improving medication adherence for hypertensive patients is important for improving BP control and reducing hypertension-associated complications and confirming the diagnosis of treatment-resistant hypertension (129, 130). Today, FDCs are recommended by most hypertension management guidelines (30, 48, 131). FDCs can be cost-effective, improve medication adherence, and may improve clinical outcomes and improve health system efficiency for hypertension management by simplifying drug supply and procurement logistics (132-135). Inclusion of affordable FDCs in essential medicines lists and creating and implementing simple, practical, hypertension treatment protocols incorporating FDCs combinations as a core medication is an effective and resource-efficient BP control approach (136). However, lack of access to FDCs may challenge the introduction of these medicines in national drug lists and formularies in developing countries like East Africa. Access to medicines can be improved through several strategies including improving the regulatory process, and capacity of regulatory agencies (137).

Inadequate healthcare financing is one of the reasons for constrained access to essential medicines in developing countries. In contrast to this inadequacy, approximately 20-40% of all resources spent on healthcare were wastage (138, 139). Major reasons for wastage include

inappropriate medicine use, inappropriate health task force mix, medication errors, suboptimal quality of care, corruption, and poor integration of health facilities (138, 140). The availability of a system for monitoring CVD prevention and control programs is important for improving system efficiency, quality of care, and patient outcomes (141). Therefore, working on leadership and system governance to improve transparency and accountability can contribute significantly to reduce the wastage of healthcare resources.

Many of the SDH have social, environmental, and economic origins that extend beyond the direct influence of the health sector and health policies (142-144). Addressing SDH is a critical success factor for improving hypertension prevention and control. Addressing the social determinants of health through multi-sectoral collaboration and reducing health inequalities requires action on; giving every child the best start in life, enabling all children, youths, and adults to control their overall health, creating fair employment and good work for all, ensuring the healthy standard of living for all, creating and developing healthy and sustainable places and communities, and strengthening the role and impact of ill-health prevention (58, 145).

There are major health inequities in Africa and health outcomes are worst in fragile countries, rural areas, urban slums, and conflict zones, and among poor, disabled, and marginalized people (68). Opportunities to reduce health inequalities include: improving the socioeconomic position of people; improving participation of people with health problems; improving living and working conditions and lifestyle; and accessibility and quality of care (146). The key challenge is how to translate research on the SDH into public health practice. The research agenda needs to move beyond documenting health inequalities to include efforts to support policy development to reduce inequality and improve healthy living conditions for the most vulnerable populations. Community-based health promotion, improving access to health services, implementing pro-poor activities like cash transfers to minimize social disparities (147).

Several opportunities exist to alter the increasing prevalence of hypertension in SSA but require committed policymakers, functional health systems, restructuring of our typical approach to hypertension management into one that is more appropriately aligned with the local environment involving all relevant stakeholders (114). During the third high-level meeting of the General Assembly on the prevention and control of NCDs held on September 27, 2018, the following obstacles for the implementation of proven interventions for NCDs were identified in developing countries like sub-Saharan Africa. These major obstacles include lack of political will, commitment, capacity, and action; lack of policies and plans for NCDs; difficulty in priority-setting; the impact of economic, commercial, and market factors; insufficient technical and operational capacity; insufficient financing to scale up national NCD responses; and lack of accountability (77, 78). Reversal of the increasing burden of hypertension in SSA requires improving health leadership, partnership, network and collaboration of existing cardiovascular societies, strategic planning, learning from and sharing best practices and experiences, advocacy of health promotion, and preventive actions (121, 122).

Conclusion

Hypertension control in SSA is poor due to the interaction of a complex network of factors involving patients, healthcare system, community, environment economy, and poor political commitment, lack of strong policies and leadership support, and weak within the country and between country networking and collaboration. Therefore, based on our hypertension care ecosystem perspective, we recommend the following actions to improve hypertension prevention and control in SSA. These include: designing a comprehensive ecosystem-based care approach that is appropriate to a local environment; Integration of hypertension care based on the total risk approach at all levels; Implementation of cost-effective screening methods to improve early detection and reduce costs of hospitalization; Inclusion of cost-effective FDCs approved by WHO; addressing social determinants of health; Improving understanding of relevant stakeholders on principles of HiAP, and Improving investment in health research to design locally appropriate health policies to improve hypertension control since one size does not fit for all.

Figures

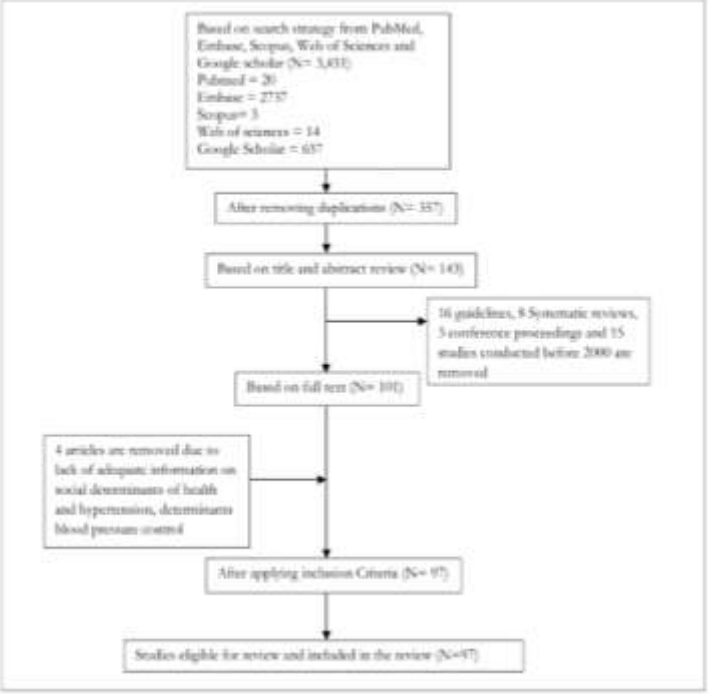
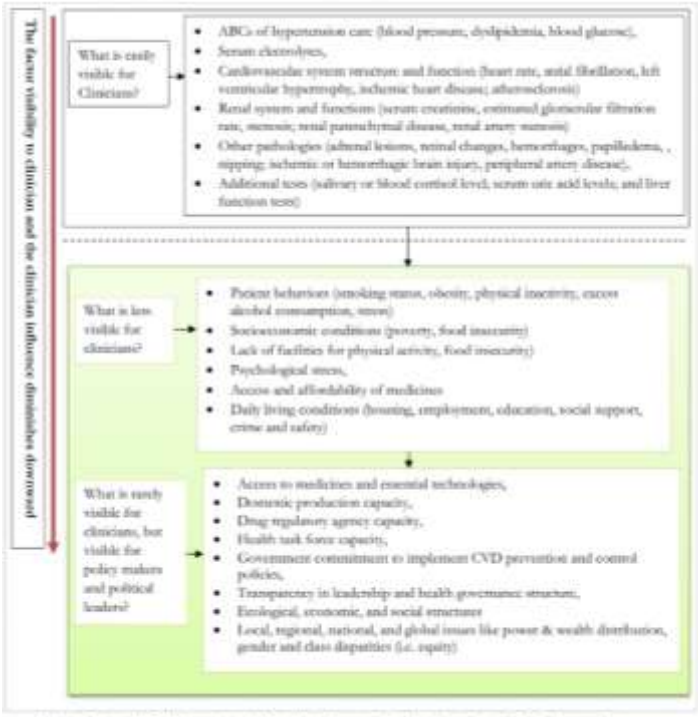


Figure 3. PRISMA Flowchart representing the result of search and the number of articles excluded in explanatory Review of hypertension care ecosystem



Abbreviations: ABCs (Hemoglobin A1C%, Blood pressure, Blood cholesterol); CVD (Cardiovascular Disease);

Figure 2. Hypertension care Iceberg: Source Authors

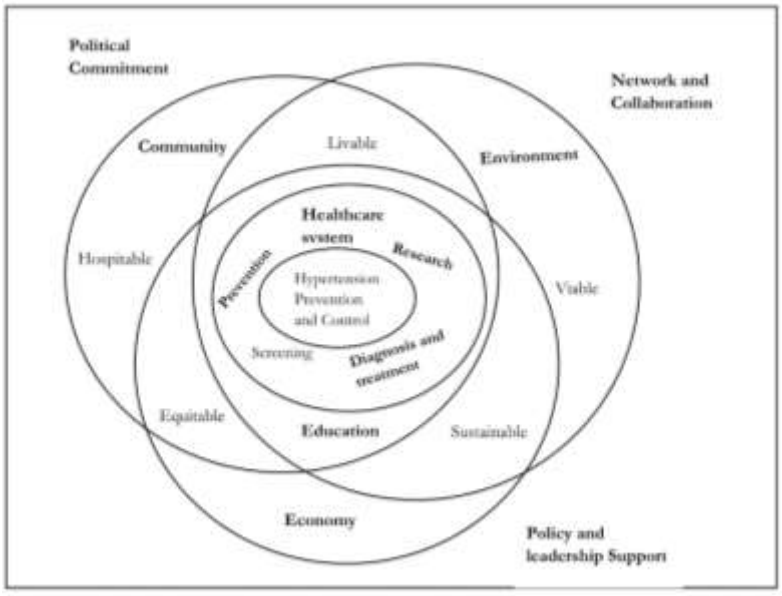


Figure 1. Hypertension care ecosystem: Source Authors

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