

## Hypertension in low and middle-income countries: Challenges, gaps and limited resources specific strategies

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### Abstract

In this article we aim to discuss the burden of hypertension in middle-income countries, the challenges and

opportunities, identify some implementation gaps in some of the published initiatives and propose a few pillars that could benefit an upstream population health and health promotion. One billion people suffer from hypertension worldwide; however, the prevalence of hypertension in low and middle-income countries is higher than that in the industrialized countries. Hypertension affects 45% of African adults aged 25 and above, compared to the 36% North American prevalence rate; moreover, the death rate from hypertension in LMICs is higher than that of the European countries (141 vs 93 per 10000, respectively). The association between increased systolic blood pressure and income reversed between the early 80s and the first decade of the 20<sup>th</sup> century; the higher the per capita income the lower the risk of hypertension. Hence, unless an effective interventions, such as improving diagnosis and treatment, lowering salt intake, enhancing access and availability of fresh fruit and vegetable, and increasing leisure time physical activities are implemented, then low income countries epidemic is inevitable. In this article we aim to discuss the global burden of hypertension in low and middle-income countries, the gaps and challenges, identify the high-risk groups and propose a prevention and cost effective treatment strategic framework.

**Key words:** Hypertension; Screening; Low and middle-income countries; Socioeconomic characteristics; Strategic framework

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**Core tip:** The burden of hypertension in middle-income countries is high. There are many challenges and opportunities, including lack of reliable accurate data and facing the existing correlation between socioeconomic characteristics and hypertension. A few successful models are presented and we suggest a strategic framework that would promote Population health approach.

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## INTRODUCTION

In this article we aim to discuss the burden of hypertension in middle-income countries, the challenges and opportunities, identify some implementation gaps in some of the published initiatives and propose a few pillars that could benefit an *upstream* population health and health promotion.

## THE BURDEN

From 1990 to 2010, hypertension had jumped from 4<sup>th</sup> to 1<sup>st</sup> place as a leading risk factor of the years of life lost and years lived with disability; making hypertension the leading global burden of disease risk factor<sup>[1]</sup>. Moreover, more than 25% of the adult population suffers from hypertension globally, and more than three quarters of them reside in low and middle-income countries (LMIC); defined by the world Bank identifies the LMICs as those having per capita gross annual income of less than \$12275 USD<sup>[2-4]</sup>. Furthermore, hypertension affects 45% of African adults aged  $\geq 25$  years, compared to the 36% North American prevalence rate, and hypertension mortality rates in LMICs are higher than those of European countries (141 vs 93 per 10000, respectively)<sup>[5]</sup>.

A recent meta-analysis of 242 published studies, and 1.5 million adults having blood pressure  $\geq 140/90$  mmHg or self reported use of BP medications estimates the 2015's hypertension prevalence of 37.8% in middle income countries, with a projected 30% increase by the year 2025<sup>[6]</sup>. Consequently > 75% of the global hypertensive population will be living in LMICs; in addition, the prevalence was 53%-78% in the elderly population  $\geq 65$  years old, 46.4% in the overweight or obese sector with BMI  $\geq 25$ , 50.2% in non-formally educated individuals, 32.7% in urban and 25.2% in rural communities and 39.1% in South America compared to 26.5% in the Middle East. No gender difference was observed<sup>[6,7]</sup>.

Furthermore, the systolic blood pressure severity is constantly increasing in LMICs compared to high class. Between 1990 and 2008, Kenya had 5-mmHg increases in SBP, and this coincided with 3-mmHg drop in the United States<sup>[8,9]</sup>.

## CHALLENGES

### **Strained healthcare systems**

Effective hypertension management is multifactorial and complex. LMICs lack effective screening and diagnosis, suboptimal life style modification strategies, lack of non-pharmacological upstream approach, and limited funding for in depth hypertension research and

strained resources. In addition, healthcare systems are not well equipped, are consumed and directed towards communicable disease management rather than non-communicable disease prevention. Consequently, these factors were the reason more than 2/3 of the eligible population in India and Chennai did not receive guideline driven hypertension management. Similarly 43% lack awareness and 31% are sub-optimally treated in China, while only 2% have a good control rate in Africa<sup>[4,10]</sup>.

### **Lack of access and disparity**

WHO survey in 2007-2010 among five LMICs on 1867 subjects illustrated both lack of access, and access disparity based on the patients' socioeconomic status, and showed that proper access was available in 16% in Uganda and 49% in Jordan, while those with insurance coverage were three times more likely to have access compared to those without<sup>[11]</sup>.

### **Lack of reliable accurate data**

The lack of geographically representative, accurate, and reliable national or multinational databases and/or registries in LMIC, impedes further development of evidence based policies and guidelines<sup>[12]</sup>. Consequently, LMICs are forced to rely on the data and models that are developed in high income groups that have higher public awareness and more established healthcare policies. Such reliance might affect accuracy and size of the magnitude of the problem and adversely affect outcome by taking expensive measures that are directed to the part and not all segments of the problem.

### **Research misconduct**

Research misconduct has been a global and is not exclusively a LMICs phenomenon; for instance, authorship misuse is prevalent with an average rate of 55%, South Africa (64%), India (38%), Bangladesh (60%) and China (34%)<sup>[13-15]</sup>.

## SOCIOECONOMIC CHARACTERISTICS (SES)

### **Correlation between SES and hypertension**

The common wisdom theory of the linear negative correlation between SES and hypertension has been challenged in the literature. The correlation between the SES and population health outcome is internationally recognized<sup>[16,17]</sup>.

There is a prevalence of 23.1% hypertension in LICs; in comparison to 37% and 31% of that in middle and high-income countries respectively<sup>[6]</sup>. Moreover, education level was observed to have positive association with hypertension risk in South Asia; in contrast to an inverse relation in East Asia<sup>[18]</sup>.

### **Education gradient paradox**

A recent systematic review of 36 articles from 15 countries, challenged the negative correlation between

education and hypertension, and concluded the absence of any significant correlation<sup>[18]</sup>. In another study, education had no significant correlation to the prevalence of hypertension, and contrary to expectations, there was an inverse gradient between the SES and hypertension<sup>[19]</sup>.

### ***Self-reporting vs standardized methods of screening***

Although self-reporting, the commonly used public screening method of hypertension in LMICs is simple, easy, and cost effective, it may underestimate the prevalence of the disease; compared to the more resource intensive standardized symptom/criterion-based measures<sup>[20]</sup>.

## **LESSONS LEARNED FROM RECENT INTERVENTIONS**

### ***Healthcare access based intervention in Uganda***

A nurse-led program in Uganda focusing on knowledge, skills and attitudes (KSA) of hypertensive patients in the outpatient setting showed marked improvement. Seven nurses had 50 patients attending daily with either hypertension or diabetes, who received 22 h of face-to-face training sessions, and home study CD-ROMs<sup>[21]</sup>.

### ***Mobile digital intervention in Mexico and Honduras***

This study illustrated an example of efficient use of mobile technology, automated phone call messaging, email communication and home blood pressure monitoring initiative in 181 patients with low SES in Mexico and Honduras. The patients received automated phone calls focusing on self-management skills, health education, medicine intake reminders baseline and 6-wk office visits with either a physician or a nurse practitioner, and pre and post questionnaires that measured perceived mental and physical health, end user experiences, and overall satisfaction. Post intervention, there was a modest, yet statistically significant SBP decrease, depressive symptom improvement (-2.5 points), medication adherence improvement, sense of well being perception, and favorable patient experiences<sup>[2]</sup>.

### ***Health education and awareness initiative in Pakistan***

A two-year research guided health promotion initiative family based home health education by trained healthcare workers, in Pakistan, received three-monthly education sessions at home by 6 healthcare workers. The initial session was 90 and the rest were 30 min each. The primary outcome measure was 3-consecutive BP readings and BMI value at the end of the 2 years. This resulted in statistically significant decrease in both systolic and diastolic BP but non-statistically significant change in smoking cessation rate or in BMI value<sup>[22,23]</sup>.

### ***The 12<sup>th</sup> five-year plan in China***

In 2009, China elected to administer top-down implementation of healthcare system reform (also known as the 12<sup>th</sup> five year plan). The Chinese government performed

mass media campaigns, regulated nutritional labeling, enforced time allocation for daily exercise at schools, and tried to enforce some antismoking efforts, the detailed results of individual NCDs such as hypertension and diabetes are not yet published.

## **STRATEGIC FRAMEWORK**

### ***Politico-socioeconomic pillar***

We hypothesize that managing hypertension in LMICs requires a politico-socioeconomic intervention. Patchy pharmaceutical services, patient education, adherence to medication advice and/or life style change messages at the healthcare access point strategies, oversimplify the issue. Decreasing the burden of hypertension is a national priority that requires multifaceted inter-sectoral national and internationally collaborated top down implementation of well-planned public health and health promotion strategies that efficiently engage targeted and disadvantaged population at risk. In addition, it requires expanding primary care services, executing a model of national insurance coverage, adopting quality based funding that encourages good performance, exploring the national pharmaceutical program for rational use of both formulary-listed and generic medications, eliminating or decreasing user fees, optimal use of tele-health and mobile technology, and innovating remuneration initiatives that ensures health for all and engages all for health.

### ***Measuring the current status***

Conducting situational assessment through accurate precise research is a corner stone for any health promotion planning. Since precise large representative databases are not well established yet in LMICs', policies will have to depend on customized data originating from the HICs' databases. However, this process needs a robust knowledge translation and a defined list of appropriate performance measures.

### ***Public engagement and reporting strategy***

Public involvement in healthcare decision-making is a continuum that ranges from communication and listening to actively engaging and developing partnerships. It enriches public policies, strengthens community actions, results in less resistance and more engagement that result in improving the health program. Town hall meeting methodology may not be a feasible option for public engagement, but the spiritual leaders and organizations may have a large role to play through their weekly services or at their spiritual gatherings and celebrations.

Transparent public reporting of the performance measures, and initiatives' results, enhances accountability and improves the service efficiency and quality and avoid public loss of interest in participation, feeling a loss of independence<sup>[24]</sup>.

The opportunities for utilizing technological data base on/off line databases are provocative if resources allow.

### Opportunistic screening

In our opinion, opportunistic hypertension screening may be the optimal cost effective methods that would utilize the available resources already existing in LMICs. Opportunistic screening would affect policy implementation on choosing physician remuneration methods, optimizing the scope of nurse specialists in community care centers, and pharmacists prior to medication refill to bill for BP check, and finally, on linking the BP measurement results to the national or multinational hypertension database. One large study of elderly population of 50 years or older in 6 LMICs countries, estimate that opportunistic screening with wrist BP machine during routine doctor visits, increases the awareness of hypertension from 25% to 81%<sup>[25]</sup>.

### Population health approach

Hypertension management strategic planning in LMICs, could utilize and customize frameworks of certain internationally recognized health promotion milestones that go beyond healthcare, such as the Ottawa Charter of Health<sup>[25]</sup>; Such goals can be achieved *via* building evidence based public policies of salt reduction, effective food label monitoring, subsidized health services, guaranteed minimum income. It might also be achieved by creating a supportive environment of encouraging physical activities in the work place such as gym time permission during working hours, enforcing a daily period of moderate physical education incorporated into all school levels' curricula, and regulating new town walking trails building codes.

A third approach is through strengthening community actions *via* supporting and funding civil and spiritual organization health initiatives, and sponsoring mass media campaign coverage of successful stories and promising community initiatives.

A fourth approach is by developing personal skills through facilitating life-long education of health care workers, providing hypertension training courses and diplomas for nurses and physicians, collaborating with self-regulatory authorities to broaden the scope of services of specialized nurses.

A fifth tactic is by empowering patients by knowledge acquisition of self-management tools, symptom awareness and recognition, and chronic disease and stress coping skills, efficient utilization of hypertension specialized clinics to improve access, and optimizing the use of mobile technologies and home BP monitoring to enhance patient compliance.

Finally, the reorientation of health services requires strategic shift to allocate resources for well-planned primary care service availability, especially for population at risk and vulnerable groups. Emphasizing healthcare cultural shift towards prevention, public health promotion and improving health literacy level, especially for the marginalized groups with low SEP.

## CONCLUSION

Hypertension management in LMICs is a problem of

great magnitude—requiring collaborative leadership effort going beyond availability of effective medications, and requiring effective patient engagement, visionary proactive leadership, tailored knowledge translation of the HICs initiatives and programs, and most importantly top down implementation of health promotion national socioeconomically-driven programs.

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