

Knowledge, Attitudes and Practices related to Hypertension in Low- and Middle-income Countries: a Systematic Review

Maha Asad¹, Gary Wang², Louise Pilote³

Accepted

November 30, 2021

Published Online

April 12, 2021

Affiliations

¹Global Health Programs, Faculty of Medicine, McGill University

²Faculty of Medicine, McGill University

³McGill University Health Centre, Centre for Outcomes Research and Evaluation

Correspondence

maha.asad@mail.mcgill.ca

Abstract

This study aimed to collect and analyze qualitative data on knowledge, attitude and practice (KAP) towards hypertension (HTN) among adults in low and middle-income countries (LMICs), in order to better inform future research or policy interventions. Studies were included in the review if they examined HTN KAP of adults located in LMICs as defined by the World Bank, using qualitative methods. The databases searched were MEDLINE, CINAHL, Embase, Scopus, Global Health, and LILACS. Data was collected on participants' knowledge of HTN causes, symptoms, and risk factors, sources of HTN information, beliefs and practices regarding checking blood pressure regularly, perceived importance/danger of HTN, and behaviour concerning HTN modifiable risk factors. A total of 16 qualitative studies were included from ten countries. Overall, there were numerous cultural and psycho-social understandings, both correct and incorrect, of HTN. Social support from community and family members were a crucial aspect of HTN KAP, as the most common source of HTN information and a factor in decisions regarding blood pressure checks and lifestyle changes. Urbanicity was perceived to worsen HTN outcomes through heightened social stress, physical inactivity, and other barriers, which also differed according to sex. In general, this review has two important implications. First, community- and gender-based initiatives are needed to address barriers to lifestyle changes related to HTN risk factors. Second, growth and development in LMICs must mitigate these barriers at their root causes of poverty and inequality. Possible limitations include the generalisation of findings due to the heterogeneity of included studies, and the LMIC classification due to wide inequalities in some high income countries, both of which highlight the need for further qualitative research in low-resource settings.

Introduction

Rationale

Hypertension (HTN) is a major public health issue and a leading cause of death and disability across the world. HTN is responsible for an estimated 7.1 million deaths and 64 million disability-adjusted life-years (DALYs) lost annually worldwide (20). However, a greater proportion of the global hypertension burden is on developing countries due to disparities in awareness, treatment, and control (6). While the estimated prevalence in developing countries (~32%) does not differ dramatically from that of developed countries (~29%), these disparities can be attributed to limited resources and lower investment in education and health, in combination with greater population growth and stage in the epidemiological transition (7). Accordingly, there is a difference in the rate at which prevalence is changing; while prevalence decreased by 2.6% in higher-income countries (HICs) from 2000-2010, it increased by 7.7% in lower- and middle-income countries (LMICs) (21). There are also wide

variations of HTN prevalence within LMICs characterised by high levels of inequality.

It is possible that social and cultural factors related to dynamics of inequality and poverty could account for poor HTN outcomes (including low access and adherence to medications and a general lack of awareness and control) in the developing world (19). Under these circumstances, understanding the context and background of HTN through the beliefs and perceptions among lay persons is crucial. Any intervention strategy aiming to improve HTN among adults in LMICs should consider the determinants of HTN found in lifestyle and behavioural choices, taking socio-cultural contexts into account.

In line with the third UN Sustainable Development Goal (SDG) of ensuring healthy lives and promoting well-being for all at all ages, ameliorating the disproportionate burden of

HTN in LMICs would have significant impact on the indicator which looks at the mortality rate attributed to cardiovascular disease, cancer, diabetes, or chronic respiratory disease.⁸ An effective management program which addresses a possible lack of accurate KAP may be able to overcome certain barriers to treatment and public health through education and lifestyle intervention initiatives. It may also pave the way for necessary collaborations with government health authorities, healthcare providers, and community stakeholders.

We thus conducted a systematic review that aims to assess knowledge, attitude and behaviour towards hypertension among adults in low and middle-income countries. Specifically, we aimed to collect and analyze qualitative measures of adults 'knowledge, attitudes, and practices (KAP) concerning HTN and its risk factors, describe relevant trends, and advise how conclusions can be utilised in devising future intervention or education programs.

Methods

Information sources

An initial search of PubMed, Google Scholar, and the McGill Library WorldCat search engine confirmed a lack of breadth in the general literature on the influence of KAP on HTN prevention and management in LMICs. A search strategy was then devised for each database in order to address the specific research question regarding KAP in a systematic review. The final search strategy was peer-reviewed by an associate librarian at McGill University specializing in epidemiology and global health related topics.

The review author searched the following electronic databases in July 2019 for eligible studies: MEDLINE (Ovid, 1950 onwards), CINAHL, Embase, Scopus, Global Health, and

LILACS. Preliminary manual searches were also conducted by reviewing the references listed in studies that seemed most relevant.

Search

The following key search terms were used in all selected databases: “hypertension”, “blood pressure”, “knowledge”, “attitudes”, “practices”, “low income countries”, and “developing countries”. Search syntax was adapted from strategies available from existing systematic reviews in the Cochrane database^{10,11}. The complete draft search strategy for Ovid MEDLINE is shown in Appendix 1.a.

Database searching was done by the lead author (MA), after which the records identified were screened for eligibility by title and abstract by two authors (MA, GW). This was done on Rayyan QCRI, a web application for performing systematic reviews, in a blinded manner. The included articles were then screened by full-text by both authors, noting reasons for exclusion of each article. Throughout the screening process, disagreements were resolved through discussion and consensus (LP). The selection process is outlined visually in a PRISMA flow diagram below (See Figure 1).

Data collection process

The qualitative analysis software NVivo was used to extract text from included studies according to nodes that corresponded to KAP variables. After PDF files of each study were uploaded to the software, reviewers examined each article and assigned text (mainly quotes and results from studies) to the relevant coded node. Each reviewer then exported their nodes and data within them, and the lead author compiled them into one document in order to easily highlight conflicts. Both reviewers communicated on these contradictions until consensus was reached. Then, identical

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Study population of adults (aged over 18) • Study location in an LMIC as defined by the World Bank classification of countries by income level. • Studies that examined hypertension KAP and used qualitative methods in their analyses. 	<ul style="list-style-type: none"> • Studies that examined cohorts in multiple countries if one of such countries belonged to the high- or high-middle income category • Studies that looked at non-communicable disease (NCD) or cardiovascular disease (CVD) KAP too broadly • Studies that exclusively investigated medication adherence/non-adherence relating to HTN • Studies that used exclusively quantitative methods/descriptive statistics in their analyses • Studies carried out more than 20 years ago • Animal studies

Table 1.

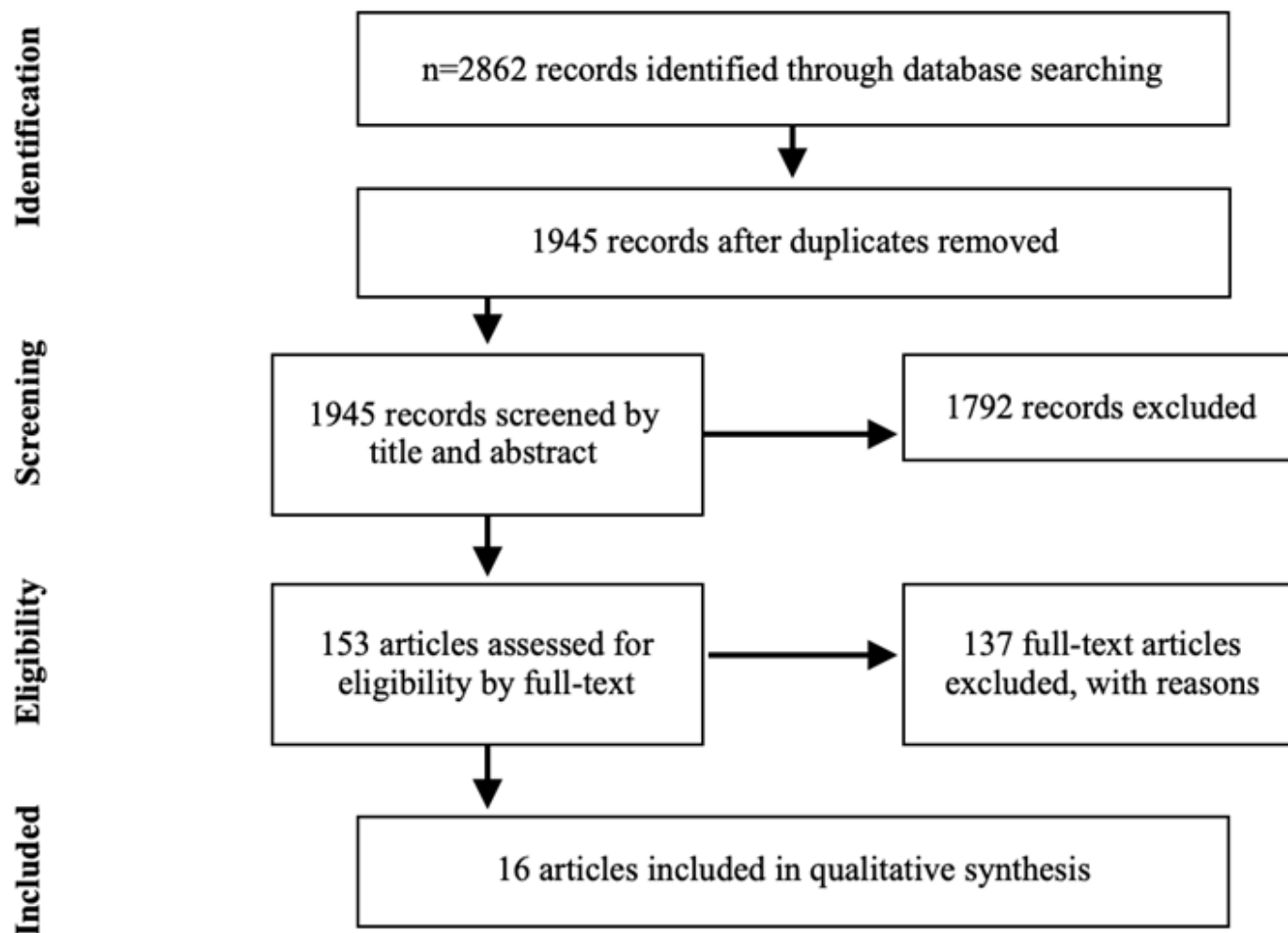


Figure 1. Study flow diagram

or similar data in each node were grouped and condensed by the lead author. The contributing author (GW) regularly reviewed the paper throughout the editing process.

The following data items refer to the “nodes” in NVivo. For the “knowledge” aspect of KAP, data was extracted on 1) participants’ definition of HTN, and their knowledge of HTN causes, symptoms, and risk factors, and 2) participants’ sources of HTN information. For the “attitudes” aspect, data was collected on 1) participants’ beliefs about checking their BP regularly, and 2) how important and/or dangerous they perceive HTN to be. Lastly, data was extracted on “practices” in terms of 1) participants’ conscious behaviour concerning HTN modifiable risk factors (ie. diet, exercise, tobacco/ alcohol consumption, stress), and 2) whether or not they have their BP checked regularly.

Results

A summary table of the 16 included studies can be found in Appendix 1.b, including information on study population and location. Risk of bias within each study was assessed by the principal reviewer following the full-text review to ensure results would not be impacted. Data from included studies were analysed according to the data items, or “nodes”, used in NVivo. The difference in results between urban and rural participants was also summarised in order to highlight important aspects of the relationship between the two.

Knowledge of HTN definition, causes, and consequences

The definition of HTN given by study participants varied in its accuracy. In all studies, participants were able to identify causes of HTN in terms of dietary factors, exercise, and/or stress, however they also held several misconceptions about the specificities as well as other causes (See Table 2). Finally, the consequences mentioned were mainly characterised by explicit symptoms, while very few were able correctly identify complications such as stroke. Overall, there seemed to be multiple understandings (a mix of correct and incorrect)

HTN	Participants' knowledge and ideas
Definition	Identified as non-communicable disease (NCD), which they believed to be incurable [3],[15] Believed it can only be prevented or cured through "strong prayers"; that it is not medically treatable [11],[9],[15] Cannot control whether you get the disease or not [10] "A disease of old people that cannot occur in young people" [11] Symptomatic [5],[6],[16] Can be transmitted through breathing [14]
Causes	Excessive intake of fatty meats, sugar, salt (typically from Maggi bouillon cubes [9]), "fufu" (cassava) [11], oily foods, or teff [1],[4],[5],[11],[13],[16] Shift in diet from homegrown to commercial foods [8] Too much exercise and too little sleep "thicken blood" or cause it to get warmer [2],[13],[14] Lack of exercise reduces the ability of blood to stretch, which hampers blood flow and clogs the blood vessels [13] Stress, worries, and excessive thinking [1],[2],[9], [11],[14],[15],[16] Alcohol, tobacco and drug consumption [1],[2],[11],[14] A spiritual attack or witchcraft, sent by one's enemy or ancestral spirits; used to explain sudden sickness or death [9] Gonorrhoea [1], comorbidities [5],[7] Chemicals from crop production entering through pores of skin and causing high BP [1] Varying temperatures caused by old fridges or too much sleep [1],[13] Urbanicity; pollution and adulteration of food, increased tensions, dietary factors (fat and rising food prices) and less exercise than in villages [5] Divine destiny, "God's will" [2],[4] Heredity [16]
Consequences	Dizziness, headaches, and numbness or pain in the body [1],[8], [9], [13],[14],[15] Weakness and fatigue, blurred vision, and difficulty in breathing [8],[9],[13] Stroke, heart attack, paralysis [11],[14],[16] Irritation at another person, tingling in head, snoring heavily [8],[13] Diabetes [15]

Table 2. Knowledge of HTN definition, causes, and consequences

of HTN with no one overriding belief; there were a variety of significant cultural and psycho-social perceptions in addition to biomedical understandings (2).

Sources of HTN Information

The most common place to get information about HTN across included studies was from lay sources, such as the family, neighbours, and community (2,3). In settings where there is a lack of stigma associated with the disease, communication of information about lifestyle changes, medication adherence, and options for care is encouraged (3,7). Having prior knowledge of the disease was also often linked to having a prior experience of HTN among family community members (7).

The media was the most cited source in one of the included studies (1), and its various forms were mentioned by several others. For example, participants specified radio and television

campaigns/ads about HTN as sources (1,9), as well as drug advertisements by doctors (6). Participants also mentioned the need for government campaigns, as some had previously seen such campaigns for TB and AIDS, and believed that one for HTN would be useful (5).

Health staff such as doctors and health counsellors were another common source of information, particularly for dietary instructions (1). However, many "complained that doctors do not explain enough about high blood pressure" because of barriers such as "limited consulting time" (14,15). Others mentioned the transportation/financial cost of going to a health facility, the inability to read in English/local languages, or having no relative or friend with HTN as hindrances. In particular, the false perception that HTN is "excess blood" is "facilitated partly by how HTN is translated by health professionals to community members into the local languages" (9). Otherwise, participants mentioned

Attitude/Practice	Examples and explanations
Checking BP only necessary if or when symptoms arise	Hospital/clinic visits delayed until symptoms become severe and/or affect daily life [12] Hospital seen to be “only for big problems”; visit local pharmacies or neighbours who have a BP monitoring machine when feeling headache or dizziness [14]. Common to consult with community members first [3] Priority on other daily needs; people “reticent to seek care for asymptomatic conditions” [6] Fear of being burdensome and having to draw from family resources; leads some to avoid their symptoms [6]
Regular monitoring of BP	Some acknowledge that “a medical examination is necessary”, and that one may have hypertension “without showing any signs or symptoms of the disease” [13] Positive experience with community health workers (CHWs) visiting homes and checking BP [12] Those with positive attitudes towards regularly checking BP realise that regular monitoring of BP helps to stay informed and therefore prevent HTN [8] “Sometimes you cannot tell the changes in your body by yourself unless you go to the hospital where the doctors will check your blood pressure and confirm high blood pressure” [1] Proper BP check “the only means of identifying one’s hypertension status as ambiguity prevails over perceived symptoms” [5] Previous experience with HTN in the family: “This ‘raktachap’ [hypertension] is in my family history. That’s why, I should say I am a bit more careful. I go for timely checkup” [14].
Checking BP not necessary or important	Listening to body signs sufficient to tell whether pressure is high; that “there is a way you can feel it is high” [16] Family was important for motivation in this case, when those with HTN did not perceive it as serious themselves [14].
Negative attitude towards checking BP	Inadequate information to check BP; need for guidance from health authorities [8] Stigma: hypertension services sometimes offered in many of the same facilities as HIV care, and as “it is common practice to offer HIV testing to all patients... [it] can attract stigma and associated fears” [6] Locational barriers; inaccessible distance to facilities where BP can be checked is deterring, especially for elderly [8] Too much effort needed plus discontent with health care workers and health care system: “We don’t know where to go and who to ask. We feel like it was worthless to go there... it takes a whole day, just to measure a pressure” [14]

Table 3. Attitudes and practices towards checking blood pressure regularly

that occasional free health screening exercises organised by churches and NGOs were helpful in providing HTN information. (6) A few participants also reported consulting herbal medicine peddlers, justifying the use of plants for medicine from verses of the bible (1).

Finally, some participants were oblivious to the need for correct information on HTN. Claiming that they were the best ones to decide on treatment options, they sought support from family, peers, neighbours or healthcare professionals only if they felt that they needed to (12). While many participants held misconceptions that would require some guidance, it is important to clarify that in fact some lay

perceptions included technical concepts about HTN due to the wide reach of public education on chronic diseases in some areas, especially through mass media (13).

Attitudes and practices toward checking blood pressure regularly

While many participants acknowledged the need to regularly check their blood pressure, there was still a presence of negative attitudes and/or incorrect information, and in some participants, a preference for traditional methods (See Table 3).

Practices regarding HTN modifiable risk factors

Most participants recognised that lifestyle adjustments are

Perceptions	Examples and explanations
<p>Low importance; not dangerous</p>	<p>Asymptomatic nature of HTN plays down its potential long-term seriousness and complications, leading participants to see high BP as something minor [6] Making light of HTN as a way to self-manage the disease itself, in reducing stress [7]. “Well, it is so common for me to be dizzy, so I don’t usually take it seriously, as long as I can still do my jobs” [12] Belief that HTN can go away on its own [2] Religion: “I don’t fear about it. I know God can heal” [15] Lack of experience with the disease related to lack of perceived importance: “Well, since I don’t have it, I don’t think I can’t say much about it” [2]. Not considered serious unless there are symptoms or complications [2],[14] “Well, it is so common for me to be dizzy, so I don’t usually take it seriously, as long as I can still do my jobs.” [12]</p>
<p>High importance; very dangerous</p>	<p>Taken very seriously when it was perceived as an increasingly common problem in the community [8],[10] Strong fear of consequences because of uncertainty surrounding them [5],[15] Belief that HTN is incurable [2] Prevalent fear of sudden deaths and symptoms, such as falling down [8],[7] Comparison to other diseases; belief that HTN is deadlier than HIV [16] Understood to be serious due to loss of resources it implied: less income from inability to work, and costs of treatment and medicine. These both also cause stress which can worsen HTN [8] Implications that go beyond health; some anticipate family quarrels due to a member having HTN, following of their inability to do chores and their need to be taken care of [8] Perception tied to urbanicity; HTN is a common and serious problem in the community because of growing tensions that did not occur in previous rural habitation [5],[14]</p>
<p>Checking BP not necessary or important</p>	<p>Fear that the drugs needed for HTN treatment are “family planning” and cause sexual weakness [11] Anxiety and fear surrounding health checkups; “it is only a sick person that needs a doctor” [11] Denial that one could acquire HTN in their lifetime, even if perceived as a serious disease [12] Gender-specific differences in the perceptions: men concerned with erectile dysfunction/low libido or sexual desire, and the affects on their mobility and ability to work and earn money due to HTN causing a weakness; women were more concerned with family issues, and how relationships were affected [15].</p>

Table 4. Perceived importance/danger of HTN

needed for self-management, which are highlighted in Figure 5. In general, there was an eagerness among participants to adopt healthy lifestyle measures, even if they were unaware of them (11). One aspect of this came from previous negative experiences with medication and doctors, leading to the belief that medicine alone is not sufficient to control HTN, and that one must eat right and self-manage (6). Despite being aware of lifestyle changes, participants also described several barriers they faced that discouraged them from adhering to such modifications (See Table 5).

Urban VS. Rural results

Knowledge of HTN among urban participants was similar to

the rural-dwelling study population, though the definition of HTN given was different across ethnic groups. For instance, in some languages, the term for HTN existed but was not properly used (5,14). The causes of HTN described by urban-dwelling adults resembled those of rural-dwelling adults, but were in some cases more linked to urbanicity. Social aspects such as “unemployment, raising prices, insecure livelihood, disharmony in the community, and other urban related issues” were a prime factor (5). Urban stressors also differed depending on gender; men tended to mention work related issues, while women were more concerned with familial issues (15). Although stress factors were seen by many as unavoidable, it was believed by some urban participants that

Lifestyle Adjustment	Participants' practices and understandings	Barriers and misconceptions
Dietary	Eating less meat [5],[6],[8],[12] and less fat [2],[5],[16] Reducing salt consumption [8],[12],[13],[15] Cutting down on oily foods [5],[8],[13] Eating fruits and vegetables with high water content (cucumber, melon, celery) to lower BP [12] Restricting coffee consumption [12] Reduce food intake at night [13] Eating fewer commercial foods [5]	Financial burden; healthier options such as fruits can be scarce and/or expensive in some areas [11] Tastelessness of food without added salt or "maggi"; cravings for certain foods [11],[14] Cultural practices involving traditional food consumption: "in the case where...they are performing the funeral... there's always drink and food... If you refuse to take, they will say maybe you have a hand in the person's death..." [9] Families ignoring food needs [14]
Exercise	Avoiding hard labor [6] Taking up moderate exercise [6],[8],[13],[16] Yoga, walking, or jogging [5],[15]	Belief that one should be resting if ill from HTN; fear of comorbidities [6],[14] Bad weather, rainy season [6],[14] Old age or laziness [6],[14] Daily chores often mistaken as exercise; "Going up and down in the house, farming, trekking to church...We do not need any more exercise!" [11] Hesitance to exercise publicly: "people will say you are running mad" [10] Recreation centres too expensive [10]
Alcohol	Avoid consuming [8],[13],[15] Consumption affects ability to successfully initiate care [6]	Cultural practices involving alcohol, social drinking [14] Difficulty in quitting [14]
Tobacco	Cessation is necessary for managing and/or preventing HTN [6], [13] Snuff and cigarette consumption common [11]	Difficulty in quitting [14]
Stress	Manage stress [2],[12] Control anger [13],[15] People with HTN "should not be abruptly told anything that could lead to a sudden surge of emotions... this might even lead to an immediate death." [8]	Lack of social support, stigma, being emotionally burdensome, negative relationships [9] Unavoidable stress from "communal conflicts... levies, poverty, unemployment" [11]
Traditional/other	Consuming bitter foods and herbs; pouring water on the heat or eating something sour if BP increases suddenly [6] Avoiding vegetables sprayed with chemical pesticides [8] Drinking water to have frequent urination and decrease body temperature, and similarly taking a bath when temperature outside is high [13],[16] Going to sleep early [13] or sleeping regularly [5],[16]	

Table 5. Practices regarding HTN modifiable risk factors

exercising and dietary changes can help in stress management (16).

Also contrasting rural beliefs, alcohol in one urban case was not believed to cause HTN because “it makes you relaxed” (2). In terms of sources of HTN info, there was more difficulty for rural participants in attaining accurate information. One pointed out how “there are many people at the rural areas still who don’t dare to go to the doctors. Many people can’t go for money. Many people don’t know where to go” (7). Finally, concerning attitudes towards BP checks, there was a perception in one study that educated families (often associated with urban areas) would take the initiative to visit health care facilities, while those from uneducated families (more associated with rural areas) tended not to (8).

DISCUSSION

Main findings

To the authors’ knowledge, this is the first qualitative systematic review on knowledge, attitudes, and practices (KAP) of hypertension (HTN) in low- and middle-income countries (LMICs). There are several interrelated themes that arise from these results which have important implications for any relevant policy development or intervention work.

First, the nuances revealed on urban and rural KAP have an interesting correlation with the hypothesis suggesting a higher prevalence of HTN in urban settings compared to rural settings, attributable to behavioural factors such as unhealthy diet, physical inactivity, and obesity (21). It is likely that urbanisation and globalisation will cause lifestyle changes in many developing countries, and the lower prevalence of hypertension in rural areas will be gradually replaced by a higher prevalence (17). The results correlate with this as various causes of HTN and practices towards modifiable risk factors stemmed from social, economic, or cultural determinants related to urbanicity. Underlying the results was a negative attitude among most participants that urbanisation and globalisation are partly to blame for HTN in their community, through increasingly unhealthy diets (“commercial” foods), pollution, higher costs, psychological and social stress, and physical inactivity.

The social stress aspect of urban risk factors is related to another dominant theme; the importance of having strong social support, for both HTN prevention and treatment. The community and family network proved to be an indispensable source of HTN information and/or advice, which in turn influenced practices regarding adherence to lifestyle changes related to risk factors, as well as getting blood pressure checked. A lack of social support for someone with HTN was a large concern, as this could lead to tensions or conflicts within the family and/or community. Stigma or misconceptions in the community surrounding HTN further

heightened this psychosocial stress — from fear of being labelled as a “sick person” to unwillingness to seek treatment due to a clinic being associated with HIV treatment. A note should also be made about the gendered nature of some of these results; the experiences and attitudes of women and men were often tied to gender roles. For instance, women were more concerned about the effect of HTN on their family and relationships with others, while men focused more on the physical and sexual weakness, the resulting financial burden, and the community stigma that all of this implied.

Thus, this review confirms the importance of gender-specific and community-based HTN interventions that purport to address KAP towards modifiable risk factors. In the WHO’s Global Brief on Hypertension, one of the most important components of any country initiative is the reduction of risk factors in the population (18). However, past interventions have often given unrealistic recommendations for people living in low-income countries, such as to increase physical activity or avoid mental stress (17). As this review demonstrates, such behavioural changes are deeply rooted in socio-cultural and community factors which must be taken into account. Solutions such as public awareness programmes about diet and physical activity should undertake community consultations before implementation, in order to effectively engage and reduce misinformation among the target population.

While these results can be used to inform future policy development and research initiatives, they also bring to mind some more concrete fixes that could improve access to hypertension information and management, especially in rural areas and developing urban areas. For instance, much of the correct information regarding hypertension definitions and beliefs has likely been lost in translation, between local or native languages and dominant or formal languages used in trials or campaigns. In addition, ameliorating the financial and physical barrier to seeking hypertension treatment would make a great difference for rural dwelling adults, for whom the cost or distance of travelling to a clinic was a major deterrent. Many participants had a positive attitude towards having their blood pressure checked but simply found the process to be too difficult or inconvenient. Increasing the accessibility of blood pressure (BP) measuring cuffs in pharmacies or introducing remote home-monitoring devices could greatly increase BP monitoring rates in low-resource communities, which in turn can have positive effects on self-management behaviours and knowledge (24). These are also solutions that should intertwine with urban development and growth to ensure that improved access to clinics and health infrastructure mitigates the relatively higher urban HTN prevalence.

Limitations

While this review provides a rich qualitative insight into HTN

in developing countries, a possible limitation in generalising the findings is the heterogeneity of the included studies in terms of participants' characteristics (ethnicity, age, etc). There is also heterogeneity in the definition of hypertension used in different countries. Another limitation relating to the study selection process could be the LMIC classification, as there are areas within high income and upper-middle income countries (e.g. Brazil) that have such wide inequalities within them that the socio-economic conditions in their lower-income areas are very similar, if not identical, to those in LMICs. This highlights the need for further qualitative research in low-resource settings, at both the national and regional scale.

Conclusions

In order to produce efficient, inclusive, and successful strategies to tackle the growing prevalence of HTN in LMICs, education and awareness-building initiatives targeting behavioural change should be promoted, but through a gendered and community-level lens. It is through this first step of culturally and socially sensitive interventions that a population's knowledge, attitudes, and practices will likely improve and help reduce the prevalence of HTN. As LMICs face an ever-growing double burden of infectious disease and non-communicable diseases, it is becoming crucial to address the complex barriers to behavioural changes that exist at both the institutional and individual levels. More generally, the impact of urbanization and globalization also plays a large role in shaping such future work, which involves "capitalizing on the positive aspects of urbanization by understanding the factors responsible for urban health and preventing the distortions of development outweighing the benefits" (20). Growth and development in LMICs must mitigate these barriers to behavioural changes at their root causes of poverty and inequality.

References

1. Peter Agyei-Baffour, Georgiette Tetteh, Dan Yedu Quansah and Daniel Boateng, "Prevalence and Knowledge of Hypertension among People Living in Rural Communities in Ghana: A Mixed Method Study," *African Health Sciences* 18, no. 4 (2018): 931-41.
2. James Tosin Akinlua, Richard Meakin, Ibrahim Bashir and Nick Freemantle, "Beliefs about Hypertension among Primary Health Care Workers and Clients in Nigeria: A Qualitative Study," *PLoS ONE* 13, no.12 (2018): e0209334.
3. Haeyoon Chang, Nicola L Hawley, Robert Kalyesubula, Trishul Siddharthan, William Checkley, Felix Knauf and Tracy L Rabin, "Challenges to Hypertension and Diabetes Management in Rural Uganda: A Qualitative Study with Patients, Village Health Team Members, and Health Care Professionals," *International Journal for Equity in Health* 18, no.1 (2019): 38.
4. Teklay Aredehey Gebrihet, Kebede Haile Mesgna, Yosef Sibhatu Gebregiorgis, Alemayehu Bayray Kahsay, Negassie Berhe Weldehaweria, and Meresa Gebremedhin Weldu, "Awareness, Treatment, and Control of Hypertension Is Low among Adults in Aksum Town, Northern Ethiopia: A Sequential Quantitative-Qualitative Study," *PLoS ONE* 12, no.5 (2017): e0176904.
5. Yadlapalli S Kusuma, "Perceptions on Hypertension among Migrants in Delhi, India: A Qualitative Study," *BMC Public Health* 9 (2009): 267.
6. Violet Naanyu, Rajesh Vedanthan, Jemima H. Kamano, Jackson K. Rotich, Kennedy K. Lagat, Peninah Kiptoo, Claire Kofler, Kennedy K. Mutai, Gerald S. Bloomfield, Diana Menya et al, "Barriers Influencing Linkage to Hypertension Care in Kenya: Qualitative Analysis from the LARK Hypertension Study," *Journal of General Internal Medicine* 31, no.3 (2016): 304-14.
7. Aliya Naheed, Victoria Haldane, Tazeen H. Jafar, Nantu Chakma, and Helena Legido-Quigley, "Patient Pathways and Perceptions of Hypertension Treatment, Management, and Control in Rural Bangladesh: A Qualitative Study," *Patient Preference and Adherence* 12 (2018): 1437-49.
8. Dinesh Neupane, Craig S. Mclachlan, Rupesh Gautam, Shiva Raj Mishra, Michael Thorlund, Mette Schlüter and Per Kallestrup, "Literacy and Motivation for the Prevention and Control of Hypertension among Female Community Health Volunteers: A Qualitative Study from Nepal," *Global Health Action* 8 (2015): 28254.
9. Gertrude Nsorma Nyaaba, Lina Masana, Ama de-Graft Aikins, Karien Stronks, and Charles Agyemang, "Lay Community Perceptions and Treatment Options for Hypertension in Rural Northern Ghana: A Qualitative Analysis," *BMJ Open* 8, no.11 (2018): e023451.
10. Nelly D. Oelke, Kathy L. Rush, Fastone M. Goma, Jessica Barker, Patricia Marck and Chloe Pedersen, "Understanding Perceptions and Practices for Zambian Adults in Western Province at Risk for Hypertension: An Exploratory Descriptive Study," *Global Journal of Health Science* 8, no.2 (2015): 248-59.
11. Eunice Ogonna Osuala, Abimbola Oyenihum Oluwatosin, Felix Ngozichukwuka Osuala, Sally Nkechinyere Onyeka Ibe, "Perceptions and Thirst for Knowledge Regarding Hypertension among Rural Dwellers in Isunjaba, Imo State, Nigeria: A Qualitative Study," *Health* 8, no.14 (2016): 1603-15.

12. Riana Rahmawati and Beata Bajorek, "Understanding Untreated Hypertension from Patients' Point of View: A Qualitative Study in rural Yogyakarta Province, Indonesia," *Chronic Illness* 14, no.3 (2018): 228–40.
13. Ma J. Rueda-Baclig and Cecilia A Florencio, "Lay Conception of Hypertension and Its Significance to Clients and Professionals in Nutrition and Health," *Journal of Human Nutrition and Dietetics : The Official Journal of the British Dietetic Association* 16, no.6 (2003): 457–66.
14. Sachita Shrestha, Archana Shrestha, Rajendra P Kaju, James P LoGerfo, Biraj Man Karmacharya, Nona Sotoodehnia, and Annette L Fitzpatrick, "Barriers and Facilitators to Treatment among Patients with Newly Diagnosed Hypertension in Nepal," *Heart Asia* 10, no.2 (2018): 11047.
15. Kelly D. Taylor, Ayoade Adedokunb, Olugbenga Awobusuyib, Peju Adeniranc, Elochukwu Onyiad and Gbenga Ogedegbe, "Explanatory Models of Hypertension among Nigerian Patients at a University Teaching Hospital," *Ethnicity and Health* 17, no.6 (2012): 615–29.
16. Tecla M Temu, Ehete Bahiru, Fredrick Bukachi, Gerald S Bloomfield, Peter Muiruri, and Carey Farquhar, "Lay Beliefs about Hypertension among HIV-Infected Adults in Kenya," *Open Heart* 4, no.1 (2017): e000570.
17. Cifkova Renata, George Fodor, and Peter Wohlfahrt, "Changes in Hypertension Prevalence, Awareness, Treatment, and Control in High-, Middle-, and Low-Income Countries: An Update," *Current Hypertension Reports* 18, no.8 (2016): 62. <https://doi.org/10.1007/s11906-016-0669-y>
18. World Health Organization, "A Global Brief on Hypertension," (2013).
19. Mittal, Bharati V. and Ajay K. Singh, "Hypertension in the Developing World: Challenges and Opportunities." *American Journal of Kidney Diseases* 55, no.3 (2010): 590–98.
20. K. Srinath Reddy, Nitish Naik and Dorairaj Prabhakaran, "Hypertension in the Developing World: A Consequence of Progress," *Current Cardiology Reports* 8 (2006): 399–404.
21. Ahmed M. Sarki, Chidozie U Nduka, Saverio Stranges, Ngianga-Bakwin Kandala, Olalekan A Uthman, "Prevalence of Hypertension in Low- And Middle-Income Countries: A Systematic Review and Meta-Analysis," *Medicine (Baltimore)* 94, no.50 (2015): e1959.
22. Mohsen Ibrahim, "Hypertension in Developing Countries: A Major Challenge for the Future," *Current Hypertension Reports* 20, no.38 (2018). <https://doi-org.proxy3.library.mcgill.ca/10.1007/s11906-018-0839-1>
23. Samuel Stroope, "Seclusion, decision-making power, and gender disparities in adult health: Examining hypertension in India", *Social Science Research* 53 (2015): 288-299.
24. Sawitree Visanoyothin, "An integrated program with home blood-pressure monitoring and village health volunteers for treating poorly controlled hypertension at the primary care level in an urban community of Thailand," *Integrated Blood Pressure Control* 11 (2018): 25-35

Appendix 1

1.a. Search strategy

Database: Ovid MEDLINE(R) ALL <1946 to July 10, 2019>

Search Strategy:

1. exp hypertension/ (246147)
2. hypertensi*.tw. (408333)
3. exp blood pressure/ (282765)
4. ((elevat\$ or high\$ or rais\$) adj3 (diastolic or systolic or arterial or blood) adj pressure).tw. (30980)
5. bloodpressure.tw. (42)
6. (knowlege or attitudes or practice*).tw. (877333)
7. Health Knowledge, Attitudes, Practice/ (103941)
8. ((survey* or questionnaire* or interview* or qualitative) adj3 (hypertensi* or "blood pressure" or bloodpressure)).tw. (1631)
9. ((understand* or comprehen*) adj6 (hypertensi* or "blood pressure" or bloodpressure)).tw. (2108)
10. ((perception* or aware* or perspective* or view or views or belief*) adj3 (hypertensi* or "blood pres-sure" or bloodpressure)).tw. (1955)
11. ((behavi* or decision*) adj3 (hypertensi* or "blood pressure" or bloodpressure)).tw. (1501)
12. Developing Countries.sh,kf. (83634)
13. ((developing or "less* developed" or "under developed" or underdeveloped or "middle income" or "low* income" or underserved or "under served" or deprived or poor*) adj (countr* or nation? or pop-ulation? or world)).ti.ab. (91626)
14. (low* adj (gdp or gnp or gross domestic or gross national)).

- ti,ab. (233)
15. (low adj3 middle adj3 countr*).ti,ab. (13289)
16. (lmic or Imics or third world or lami countr*).ti,ab. (6495)
17. transitional countr*.ti,ab. (155)
18. (Afghanistan or Angola or Bangladesh or Benin or Bhutan or Bolivia or Burkina Faso or Burundi or Cabo Verde or Cambodia or Cameroon or Central African Republic or Chad or Comoros or Congo or Cote d'Ivoire or Ivory Coast or Djibouti or Egypt or El Salvador or Eritrea or Ethiopia or Gambia or Georgia or Georgia Republic or Georgian Republic or Ghana or Guinea or Guinea-Bissau or Haiti or Honduras or India or Indonesia or Kenya or Kiribati or Korea or Kosovo or Kyrgyz Republic or Kyrgyzstan or Kirghizia or Kirghiz or Kirgizstan or Lao PDR or Laos or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Micronesia or Moldova or Mongolia

or Morocco or Mozambique or Myanmar or Nepal or Nicaragua or Niger or Nigeria or Pakistan or Papua New Guinea or Philippines or Rwanda or (Sao Tome adj Principe) or Sao Tome or Senegal or Sierra Leone or Solomon Islands or Somalia or South Sudan or Sri Lanka or Sudan or Swaziland or Syrian Arab Republic or Syria or Ta-jikistan or Tanzania or Timor-Leste or East Timor or East Timur or Togo or Tunisia or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or Vietnam or Viet Nam or (West Bank adj Gaza) or West Bank or Yemen or Zambia or Zimbabwe).ti,ab,tw,kf. (529335)

19. 1 or 2 or 3 or 4 or 5 (663813)
20. 6 or 7 or 8 or 9 or 10 or 11 (946341)
21. 12 or 13 or 14 or 15 or 16 or 17 or 18 (632219)
22. 19 and 20 and 21 (1349)

1.b) Characteristics of included studies

Author(s)	Years	Study	Study Purpose	Number of participants	Participant age range
Agyei-Baffour, P., Tetteh, G., Quansah, D. Y., et al	2018	Prevalence and knowledge of hypertension among people living in rural communities in Ghana: a mixed method study	To assess the prevalence, knowledge and perceptions of hypertension in rural communities in Ghana.	28	≥25 years
Akinlua, J., Meakin, R., Bashir, I., et al	2018	Beliefs about hypertension among primary health care workers and clients in Nigeria: a qualitative study	To elicit beliefs about hypertension among Nigerian Primary Health Care clients and workers.	n=40 (22 female, 18 male)	≥20 years
Chang, H., Hawley, N., Kalyesubula, R., et al	2019	Challenges to hypertension and diabetes management in rural Uganda: a qualitative study with patients, village health team members, and health care professionals	To understand the challenges to hypertension and diabetes care in rural Uganda.	n=47 (34 female, 13 male)	≥18 years
Gebrihet, T, Mesgna, K., Gebregiorgis, Y., et al	2017	Awareness, treatment, and control of hypertension is low among adults in Aksum town, northern Ethiopia: A sequential quantitative-qualitative study	To assess the prevalence, associated factors, awareness, treatment and control of hypertension among adults 18 years old or above in Aksum town, Tigray region, North Ethiopia.	n=30 (14 female, 16 male)	≥18 years
Kusuma, Y.	2009	Perceptions on hypertension among migrants in Delhi, India: a qualitative study	To understand explanatory models (EMs) of neo- and settled-migrants regarding hypertension.	n=20 (12 female, 8 male)	38-50 years

Author(s)	Years	Study	Study Purpose	Number of participants	Participant age range
Naanyu, V., Vedanthan, R., Kamano, J., et al	2016	Barriers influencing linkage to hypertension care in Kenya: qualitative analysis from the LARK hypertension study	To evaluate factors influencing linkage to hypertension care in rural western Kenya	n=411 (200 female, 211 male)	27-50 years
Naheed, A., Haldane, V., Jafar, T.H. et al	2018	Patient pathways and perceptions of hypertension treatment, management, and control in rural Bangladesh: A qualitative study	To explore patient pathways to care, as well as knowledge of and adherence to hypertension care.	n=20 (9 female, 11 male)	≥40 years
Neupane, D., Maclachlan, C., Gautam, C., et al	2015	Literacy and motivation for the prevention and control of hypertension among female community health volunteers: a qualitative study from Nepal	To assess literacy and motivation to be involved in a hypertension prevention and control programme in Nepal among FCHVs.	n=69 (69 female)	20-70 years
Nyaaba, G., Masana, L., Aikins, A., et al	2018	Lay community perceptions and treatment options for hypertension in rural northern Ghana: a qualitative analysis	To explore community perceptions regarding hypertension and its treatment in rural northern Ghana and how they differ from medical understanding.	n=96 (47 female, 49 male)	≥18 years
Oelke, N., Rush, K., Goma, F., et al	2015	Understanding Perceptions and Practices for Zambian Adults in Western Province at Risk for Hypertension: An Exploratory Descriptive Study	To better understand risk factors for hypertension in urban and rural communities in Mongu and Limulunga Districts, and explore the intersections between culture and hypertension perceptions and practices for study participants	n=50 (29 female, 16 male)	≥18 years
Osuala, E., Oluwatosin, A. O., Osuala, F. N., et al	2016	Perceptions and thirst for knowledge regarding hypertension among rural dwellers in Isunjaba, Imo State, Nigeria: a qualitative study	To determine the perceptions and attitudes to hypertension issues among rural dwellers between ages 20 and 75 in Isunjaba, Imo state.	n=48 (24 female, 24 male)	20-75 years
Rahmawati, R., Bajorek, B.	2018	Understanding untreated hypertension from patients' point of view: A qualitative study in rural Yogyakarta province, Indonesia	To explore perspectives about hypertension from patients who do not take anti-hypertensive medications	n=30 (27 female, 3 male)	≥45 years old
Rueda-Baclig, M. J., Florencio, C. A.	2003	Lay conception of hypertension and its significance to clients and professionals in nutrition and health	To determine concepts and conceptualization of hypertension (its causation, prevention and consequences) among young adults with high hypertension prevalence in the Philippines.	n=73	20-39 years

Author(s)	Years	Study	Study Purpose	Number of participants	Participant age range
Shrestha, S., Shrestha, A., Koju, R.P., et al	2018	Barriers and facilitators to treatment among patients with newly diagnosed hypertension in Nepal	To explore barriers and facilitators to treatment among patients with newly diagnosed hypertension aged ≥ 18 years in Dhulikhel, Nepal.	n=35 (9 female, 26 male)	≥ 18 years
Taylor, K.D., Adedokun, A., Awobusuyi, A., et al	2012	Explanatory models of hypertension among Nigerian patients at a University Teaching Hospital	To elicit the explanatory models (EM) of hypertension among patients in a hospital-based primary care practice in Nigeria.	n=62 (37 female, 25 male)	≥ 18 years
Temu, T. M., Bahiru, E., Bukachi, F., et al	2017	Lay beliefs about hypertension among HIV-infected adults in Kenya	To explore lay beliefs about hypertension among HIV-infected adults to inform the development of culture sensitive hypertension prevention and control program.	n=53 (31 female, 22 male)	≥ 18 years