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Traditional Herbal Medicine Use Among Hypertensive Patients in Sub-Saharan Africa: A Systematic Review

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Abstract

Background—Hypertension is increasingly common in sub-Saharan Africa, and rates of hypertension control are low. Use of traditional herbal medicines (THM) is common among adults in sub-Saharan Africa and may affect hypertension therapy.

Methods—We searched Ovid MEDLINE, Ovid EMBASE, and Web of Knowledge in June 2013 to find studies about THM use among hypertensive patients living in sub-Saharan Africa. Two independent reviewers evaluated titles and abstracts. Qualifying references were reviewed in full text. Data were extracted using a standardized questionnaire.

Results—Four hundred eighty-one references were retrieved, and 4 articles from 2 countries met criteria for inclusion. The prevalence of THM use was 25-65% (average 38.6%). THM was the most common type of complementary and alternative medicines used by patients (86.7%-96.6%). Among THM users, 47.5% concomitantly used both allopathic medicine and THM. Increased age ($p < 0.001$), male sex (RR 2.58), belief in a supernatural cause of hypertension (RR 2.11), and family history of hypertension (OR 1.78) were positively associated with THM use while belief that hypertension is preventable was negatively associated with THM use (OR 0.57).

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Conclusion—More than a third of adults with hypertension in sub-Saharan Africa use THM. Half of these patients use THM concurrently with allopathic medicine. Healthcare workers in sub-Saharan Africa must discuss THM use with their hypertensive patients. More research is urgently needed to define the impact of THM use on hypertension control and outcomes in sub-Saharan Africa.

Keywords

sub-Saharan Africa; hypertension; blood pressure; traditional herbal medicine; complementary and alternative medicine; traditional healers

Introduction

Although hypertension (HTN) was formerly rare in Africa [1–3], HTN prevalence is now rapidly increasing [4]. In one serial survey of Tanzanian adults 47–57 years old, the overall prevalence of hypertension increased from 25% to 40% between 1987 and 1998 alone [5–7]. According to the World Health Organization, the age-standardized prevalence of HTN in adults >25 years in Africa is now the highest in the world [8].

HTN-related complications are increasingly common in sub-Saharan Africa (SSA) [9,10]. The incidence of stroke in adults aged 30–69 in Tanzania is one of the highest rates in the world (120/100,000 person years) and is 6–10 fold higher than the US, UK and Canada [11]. At our own hospital in Western Tanzania, HTN-related diseases accounted for 15% of all medical admissions, deaths, and hospital days – second only to HIV – and half of these deaths occurred in adults < 65 years old [12]. The early onset of HTN-related complications has been attributed to low rates of diagnosis, treatment and control [13,14]. In one study, the authors summarized this problem as the rule of 1/6ths: among adults with HTN in Africa, only 2/6 are aware of their diagnosis, of these only 1/6 are on treatment, and of these only 1/6 are controlled [15].

Traditional herbal medicine (THM), may have significant impact on HTN treatment and control in sub-Saharan Africa [16]. THM use is high among adults in SSA with a prevalence ranging from 38.5%–90% [17–20]. THM is commonly used around the world for both cardiovascular disease in general [21] and HTN specifically [22–24]. In our experience in Tanzania, adults admitted with complications of HTN frequently report prior THM use.

Therefore, we conducted a systematic review of the literature to collect and describe the currently available data regarding THM use among adults with HTN in SSA. In particular, we aimed to describe the prevalence of THM use, the timing and effects of THM use, reasons reported for THM use and factors associated with THM use.

Methods

Literature Search

In June 2013 we searched Ovid MEDLINE (1946 to present) including in-process and non-indexed citations, Ovid EMBASE (1974 to present), and Web of Knowledge, for studies which investigated the use of THM among hypertensive patients living in SSA. A detailed

search using words, phrases, and controlled vocabulary was created by an information specialist with input from a clinical pharmacologist and two board certified internal medicine physicians. The search strategies were peer reviewed by a second information specialist to ensure high methodological quality. Key words and search terms for each database are provided in Appendix A. The search was not limited to a specific language, date, or publication status. Additional references were found through reviewing the reference lists and related articles of included studies.

Two independent reviewers sorted references based on title and abstract according to predetermined inclusion and exclusion criteria. Differences were resolved through discussion with a third reviewer. References marked for inclusion were obtained, read in full, and marked for inclusion or exclusion.

References were included if they enrolled participants aged 18 years old and above currently living in SSA who were suffering from arterial HTN and described the prevalence of THM use among hypertensive patients. References were excluded if they included pediatric data but did not report data separately for adults, if they included patients outside of SSA and did not report data separately for those living in SSA, or if they included less than 10 patients. References were also excluded if they were pharmacological studies, interventional trials, meta-analyses, reviews, editorial material, or guidelines. See Figure 1 for an explanation of how many references were retrieved and reasons for exclusion.

Data Extraction

A predefined data questionnaire template was used to extract data from the included studies by two reviewers independently. Any disagreements between the first two reviewers were resolved through independent review of a senior member of the research team. The following data points were extracted from each reference and included in the evidence table: sample size, average age \pm SD, age range, gender distribution, prevalence of HTN, prevalence of complementary and alternative (CAM) use, prevalence of THM use, source of THM prescription, types of THM used, factors associated with and reasons stated for THM use, timing of THM use, and effects of THM use. Risk of selection bias was scored on a three point scale with 1 representing a randomly-selected, representative sample of the population, 2 representing a non-random sample of the community, and 3 representing a hospital-based sample. Risk of measurement bias was also scored on a 3 point scale with 1 representing biologically confirmed THM use, 2 representing self-reported THM use, and 3 representing THM use reported by someone other than the patient.

Results

Study Selection

For details of the study selection process, see Figure 1 for a PRISMA diagram. A systematic search of the literature revealed a total of 481 references: 58 from Ovid MEDLINE, 172 from Ovid Embase, and 251 from Web of Knowledge. An additional 4 references were found through hand searching reference lists. After removal of duplicates, 360 references remained. The titles and abstracts were reviewed, and 334 references were excluded. The

remaining 26 were reviewed in full text and an additional 22 were excluded. Data extraction was completed on the remaining 4 references.

Characteristics of Selected Studies

For details of study characteristics, see Table 1. Of the 4 studies included, 1 was conducted in South Africa [16], and 3 were conducted in Nigeria [25–27]. The 3 studies from Nigeria all took place in an urban setting. Two were conducted in an urban hospital clinic [25,26], and 1 was conducted in an urban general population [27]. The 1 study from South Africa was conducted in a rural hospital clinic [16]. The sample size ranged from 100 to 480 participants. All 4 articles dealt exclusively with hypertensive patients [16,25–27]. The 3 references that included gender distribution reported a majority of respondents were female (60-67%)[16,25,27]. The average age of study participants was 55.1-60.7 years.

Prevalence of CAM/THM Use

For details about the prevalence of CAM and THM use, see Table 2. The rate of CAM use (inclusive of THM) was reported by 3 studies and ranged from 29.1-75% [16,25,27], and the average was 47.7%. The rural study from South Africa reported a much higher rate of CAM use (75%) [16] than the 2 studies from Nigeria (29.1-39.1%) [25,27]. THM use in the 4 studies ranged from 25% to 65% with an average of 38.6%. The rural study from South Africa reported higher rate of THM use (65%) [16] than the 3 studies from Nigeria (25%-37.77%) [25–27]. In the three studies that reported both CAM use and THM use, THM use represented the overwhelming majority of CAM use (86.7%-96.6%) [16,25,27].

Timing and Effects of THM Use

Results regarding the timing and effects of THM use are summarized in Table 3. Two studies specifically reported that patients with HTN used THM and allopathic medicines concurrently [25,26], although only one quantified the number of THM users who were also using allopathic medicines (47.5%) [26]. Only one study [25] compared the blood pressures between the patients who reported using allopathic medications alone and those who reported using both allopathic and THM and reported no difference. The other three studies did not report any outcomes in those who were taking THM [16,26,27]. One study reported reasons for stopping THM among a small fraction of the study population (<5%) that had formerly used THM [26]. They found that 1.5% of their total study population stopped using THM due to inefficacy and 3% stopped using THM due to improvement of their disease.

Reasons for THM use

For reasons provided and factors associated with THM use, see Table 4. One study [26] reported why patients used THM. These included 1) perceived failure of allopathic medicines (31.73%), 2) relatively high cost of allopathic medicines (23.08%), 3) social cultural practices and/or herbal knowledge (20.19%), 4) poor accessibility to medical facilities (19.23%), 5) safety concerns about allopathic medicines (9.62%), 6) uncaring attitudes of hospital staff (6.73%). Other reasons reported for THM use included prior phobia to hospitals, curiosity about using THM and pressure from herbal sellers.

Factors Associated with THM Use

Factors which were statistically associated with THM use were reported by 2 studies [26,27]. One found that increased age was associated with THM use ($p<0.001$) [26]. The other found that three factors were positively associated with increased THM use: 1) male sex, RR 2.58 (CI 1.66-3.99, $p<0.0001$), 2) belief in a supernatural cause of HTN, OR 2.11 (CI 1.18-3.78, $p=0.012$), and 3) a family history of HTN, OR 1.78 (CI 1.02-3.10, $p=0.042$) [27]. Belief that HTN is preventable was associated with decreased THM use, OR 0.57 (CI 0.36-0.89, $p=0.014$) [27].

Types and Sources of THM

For details of the types and sources of THM used, see Table 5. The three studies from Nigeria each asked study participants about the names of plants they used [25–27]. The list included “native herbs,” ginger, garlic, bitter leaf (*vernonia amygdalina*), aloe vera, *azadirachta indica*, *allium sativa*, *tamarindus indica*, *hyenia thebachia*, *ocimum basil*, *carica papaya*, *adamsonia digitata*, *gacinia kola*, *zingiber officinalis*, *hymenocardia acida*, *melia azederach*, *mannix cymbopogon*, *piliostigma reticulatum*, *adeola herbal mixture*, *keys herbal mixture*, *herbal viagra*, *cassia alata*, *jatropha curcas*, *ximenis americana*, *moringa oleifera*, *kalms*, and *true man's capsule*. Only one study reported on the specific preparations used [26]. Patients reported using preformulated THM from herb sellers, extracts that needed to be dissolved (in water, lime juice, or corn pap), steam inhalation, single herbs, and mixtures of herbs. Sources of THM were mentioned by 3 studies [16,26,27] and included open markets, friends, traditional healing homes, pharmacies, buses, spiritual pharmacies, traditional healers and faith healers.

Discussion

THM use is very common among adults with HTN in SSA. Among hypertensive adults enrolled in the 4 studies included in this systematic review, more than one third reported using THM at the time of the study [16,25–27]. Rates of THM use varied considerably by country with 65% of adults in rural South Africa reporting THM use compared to 30% of adults from urban Nigeria. In these populations, THM use was the dominant form of CAM, accounting for 86.7-96.6% of all CAM use. The rates of THM use among adults with HTN in SSA were higher than those reported in 2 recent studies from the UK [24] and India [23] that found a prevalence of 28.8% and 14.4% respectively. Several studies explore the types of THM used to treat hypertensive patients [28–30], but very few quantify the amount of THM use. The high prevalence of THM use among adults with HTN in all 4 of these studies highlights the importance of considering the possible effects of THM use on HTN treatment and control in SSA.

Lack of knowledge, traditional beliefs and health systems deficiencies are 3 important factors associated with THM use among adults with HTN in these studies. Perceived failure of allopathic medications was the most common reason reported for THM use according to 1 study [26], and belief that HTN is both unpreventable and has a supernatural cause were factors associated with hypertension in another study [27]. In order to improve knowledge about potential effects of THM, community education campaigns are needed [7,31]. In

addition, healthcare workers should utilize every interaction with hypertensive adults to ask about THM use and to consider the effects of THM on HTN control. Finally, health systems strengthening is needed to reduce the relatively high cost of allopathic medications, increase access to medical facilities and counteract the perception of uncaring attitudes of hospital staff.

Concurrent use of THM and allopathic medications seems to be common among adults with hypertension in SSA. In 1 study, half of HTN patients who were taking THM were also taking allopathic medications [26]. The high prevalence of concurrent THM and allopathic medicine use has been documented in other chronic diseases such as HIV in SSA [32,33]. The potential for therapeutic interactions between allopathic medication and THM is high with concomitant use. THM are known to have an effect on both the cardiovascular system and on blood pressure control [34–37]. Interactions may include altered drug metabolism, exaggerated hypotensive effect, or decreased HTN control. Since adults in SSA rarely volunteer information about THM use to their physicians [38], careful and non-judgmental history taking is essential.

Despite the high prevalence of THM use among African adults with HTN, the authors were surprised to discover that little data exists regarding THM use among adults with HTN in SSA. Although recording THM use is part of the WHO STEPS instrument for NCD risk factor screening [39], it is not systematically reported in studies of HTN in SSA. Even among the 4 studies that were included in this review, data regarding the prevalence, timing and reasons for THM use were not reported in a standardized manner. Physiologic outcomes (e.g. blood pressure measurements) were only reported in one study, and only 2 countries in SSA were represented by these 4 studies. Clearly there is an urgent need for more research regarding THM use among adults with HTN in SSA. Future studies should document the specific types of THM ingested by patients, physiologic effects of specific THM and any interactions with allopathic cardiovascular medications. Prospective cohort studies documenting the timing and impact of THM use on the natural history of HTN would be particularly valuable.

Conclusions

In conclusion, according to this systematic review of the current literature, >1/3 of adults with HTN in SSA use THM. Half of these patients use THMs concurrently with allopathic medicine. Major drivers of THM use are lack of knowledge regarding HTN, traditional cultural beliefs and weakness in the current health systems for HTN primary care in SSA. Health care workers in SSA should screen for THM use among adults with HTN. In addition, both community education and opportunistic patient education are needed to improve knowledge about interactions between THM and allopathic medications. Primary healthcare systems for HTN diagnosis and treatment need to be less expensive, more available and respectful. Finally, more research is urgently needed to define the impact of THM use on HTN control and outcomes so that their beneficial effects can be leveraged and their negative effects avoided.

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Appendix A: Database Search Strategy

Medline (OVID SP)

#1 exp africa south of the sahara/

#2 (africa* adj (central or east or eastern or west or western or south or southern)).mp

#3 (subsahara* or sub-sahara* or “sub sahara*”).mp

#4 (cameroon* or central africa* republic or chad or chadian or congo* or democratic republic of the congo* or equatorial guinea* or gabon*).mp

#5 (burundi* or djibouti* or eritrea* or ethiopia* or kenya* or rwanda* or somalia* or sudan* or tanzania* or uganda*).mp

#6 (angola* or botswana* or lesotho* or malawi* or mozambique* or namibia* or south africa* or swaziland* or zambia* or zimbabwe*).mp

#7 (benin* or “burkina faso*” or “cape verde*” or “cote d’ivoire*” or “ivory coast” or gambia* or ghana* or guinea* or guinea-bissau* or “guinea bissau*” or liberia* or mali or malian or mauritania* or niger* or nigeria* or senegal* or “sierra leone*” or togo*).mp

#8 or/1-7

#9 exp hypertension/ or exp antihypertensive agents

#10 (hypertensi* or antihypertensi*).mp

#11 ((high or increased or elevated) adj blood pressure).mp

#12 or/9-11

#13 medicine, african traditional/ or medicine, traditional/

#14 (african traditional medicine or traditional healing or traditional healer* or african medicine or ethnomedicine* or native medicine or ethnopharmaceutical* or ethnobotanical* or natural remedi*).mp

#15 or/13-14

#16 8 and 12 and 15

Embase (OVID SP)

#1 exp Africa south of the sahara/

#2 (africa* adj (central or east or eastern or west or western or south or southern)).mp

#3 (subsahara* or sub-sahara* or "sub sahara*").mp

#4 (cameroon* or central africa* republic or chad or chadian or congo* or democratic republic of the congo* or equatorial guinea* or gabon*).mp

#5 (burundi* or djibouti* or eritrea* or ethiopia* or kenya* or rwanda* or somalia* or sudan* or tanzania* or uganda*).mp

#6 (angola* or botswana* or lesotho* or malawi* or mozambique* or namibia* or south africa* or swaziland* or zambia* or zimbabwe*).mp

#7 (benin* or "burkina faso*" or "cape verde*" or "cote d'ivoire*" or "ivory coast" or gambia* or ghana* or guinea* or guinea-bissau* or "guinea bissau*" or liberia* or mali or malian or mauritania* or niger* or nigeria* or senegal* or "sierra leone*" or togo*).mp

#8 or/1-7

#9 exp hypertension/ or exp antihypertensive agent

#10 (hypertensi* or antihypertensi*).mp

#11 ((high or increased or elevated) adj blood pressure).mp

#12 or/9-11

#13 african medicine/ or herbal medicine/

#14 traditional healer/ or traditional medicine/

#15 (african traditional medicine or african medicine or native medicine or native remed*).mp

#16 (tradition\$ adj3 (healing or healer* or healed)).mp

#17 (ethnomedicine* or ethnopharmaceutical* or ethnobotanical*).mp

#18 or/13-17

#19 8 and 12 and 18

Web OF KNOWLEDGE (Thomson Reuters)

#1 Topic=(cameroon* OR chad OR chadian OR congo* OR “central africa* republic” OR “democratic republic of the congo*” OR equatorial guinea* OR gabon*) OR Topic=(burundi OR djibouti* OR eritrea* OR ethiopia* OR kenya* OR rwanda* OR somalia* OR sudan* OR tanzania* OR uganda*) Timespan=All years Search language=English

#2 Topic=(angola* OR botswana* OR lesotho* OR malawi* OR mozambique* OR namibia* OR “south africa*” OR swaziland*) OR Topic=(zambia* OR zimbabwe* OR benin* OR “burkina faso*” OR “cape verde*” OR “cote d’ivoire*” OR “ivory coast”) OR Topic=(gambia* OR ghana* OR guinea* OR guinea-bissau* OR “guinea bissau*” OR liberia* OR mali OR malian) Timespan=All years Search language=English

#3 Topic=(mauritania* OR niger* OR nigeria* OR senegal* or “sierra leone*”) Timespan=All years Search language=English

#4 Topic=((africa OR african) NEAR/2 subsahara*) Timespan=All years Search language=English

#5 Topic=((africa OR african) NEAR/2 sub-sahara*) Timespan=All years Search language=English

#6 Topic=((africa OR african) NEAR/2 “sub sahara*”) Timespan=All years Search language=English

#7 Topic=((africa OR african) NEAR/2 (central OR east OR eastern OR west OR western OR south or southern)) Timespan=All years Search language=English

#8 #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1 Timespan=All years Search language=English

#9 Topic=(hypertensi* OR antihypertensi*) Timespan=All years Search language=English

#10 Topic=((“blood pressure”) NEAR/2 (high OR increased OR elevated)) Timespan=All years Search language=English

#11 #10 OR #9 Timespan=All years Search language=English

#12 Topic=(ethnobotanical* OR ethnopharmaceutical* OR ethnomedicine) Timespan=All years Search language=English

#13 Topic=(africa* NEAR/2 medicine) Timespan=All years Search language= English

#14 Topic=(native NEAR/2 (medicine OR remed*)) Timespan=All years Search language=English

#15 Topic=(folk NEAR/2 medicine) Timespan=All years Search language=English

#16 Topic=(traditional NEAR/2 (heal* OR medicine OR remed*)) Timespan=All years
Search language=English

#17 Topic=(natural NEAR/2 remed*) Timespan=All years Search language=English

#18 #17 OR #16 OR #15 OR #14 OR #13 OR #12 Timespan=All years Search
language=English

#19 #18 AND #11 AND #8 Timespan=All years Search language=English

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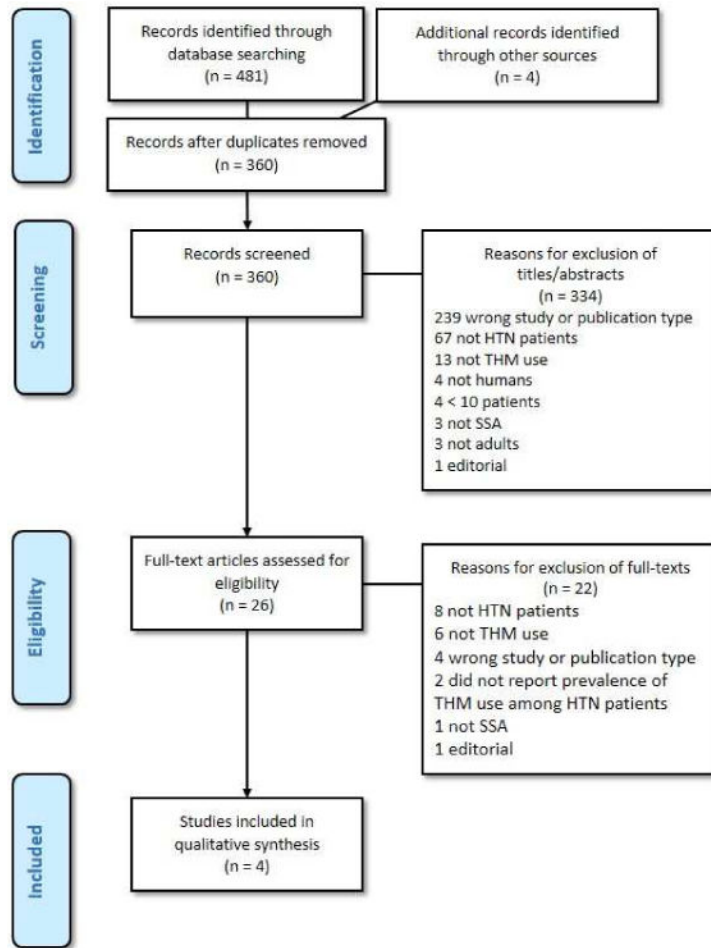


Figure 1. Flow diagram showing the description and selection process of studies included in the systematic review.

Table 1

Characteristics of included studies of THM use among adults with HTN in SSA.

Study	Country	Setting	Sample Frame	Sample Size	Average Age \pm SD (years)	Female Gender (%)	Risk of Selection Bias (1-3)
Amira 2007	Nigeria	Urban	Hospital	225	55.1 \pm 12.4	135/256 (60%)	3
Olisa 2009	Nigeria	Urban	Hospital	480	60.33 \pm 16.33	NR	3
Osamor 2010	Nigeria	Urban	Population	440	60 \pm 12	287/440 (65.23%)	1
Peltzer 2004	South Africa	Rural	Hospital	100	60.7 \pm 9.8	67/100 (67%)	3

Key: SD: Standard deviation. IQR: Interquartile range. NR: Not reported. HTN: hypertension.

Table 2

The prevalence of CAM and THM use among adults with HTN in SSA.

Study	Patients Using CAM	Patients Using THM	THM use as a % of CAM use
Amira 2007	88/225 (39.1%)	85/225 (37.77%)	85/88 (96.6%)
Olisa 2009	NR	120/480 (25%)	NR
Osamor 2010	128/440 (29.1%)	118/440 (26.8%)*	118/128 (92.2%)*
Peltzer 2004	75/100 (75%)	65/100 (65%) [†]	65/75 (86.7%)

Key: CAM: Complementary and alternative medicine. THM: Traditional herbal medicine. HTN: Hypertension. NR: Not reported.

* Percentage is the sum of THM mentioned as being commonly used by all CAM users

[†] Sum of home remedies (39%) and traditional healing herbs (26%). Categories were not mutually exclusive, so actual % may be lower.

Table 3
The timing and general effects of THM use

Study	Timing of THM use	General effects of THM
Amira 2007	Concurrent use of THM and allopathic (not quantified)	No change in BP control between THM+allopathic and allopathic alone.
Olisa 2009	Concurrent use of THM and allopathic 57/120 (47.50%)	Only reported in the 4.5% of patients who <u>stopped</u> using THM.

Key: THM: Traditional herbal medicine. BP: Blood pressure. NR: Not reported.

Table 4
Associated factors and reasons for THM use

Study	Associated with THM Use among HTN Patients	Reasons for THM Use	
Olisa 2009	Higher THM Use: Increased age (p < 0.001)	<ol style="list-style-type: none"> 1 Perceived failure of allopathic medicines (31.73%). 2 Relatively high cost of allopathic medicine (23.08%). 3 Social cultural practices/herbal knowledge (20.19%). 4 Poor accessibility to medical facilities (19.23%). 5 Safety concerns about allopathic medicines (9.62%). 6 Uncaring attitudes of hospital staff (6.73%). 7 Other: prior phobia of hospitals, curiosity about herbal medicines, pressure from herbal sellers. 	
	Lower THM Use: NR		
Osamor 2010	Higher THM Use:		NR
	1 Male Sex: RR 2.58, CI 1.66-3.99, p < 0.0001		
	2 Belief in supernatural cause of HTN: OR 2.11, CI 1.18-3.78, p = 0.012		
3 Family history of HTN: OR 1.78, CI 1.02-3.10, p = 0.042			
	Lower THM Use: Belief that HTN is preventable: OR 0.57, CI 0.36-0.89, p = 0.014.		

Key: CAM: Complementary and alternative medicine. HTN: Hypertension. THM: Traditional herbal medicine. OR: Odds ratio. CI: Confidence interval. NR: Not reported.

Table 5
Plants, preparations used and the sources of THM

Study	Plants	Preparations	Sources
Amira 2007	Native herbs, ginger, garlic, bitter leaf (<i>vernonia amygdalina</i>), aloe vera	NR	NR
Olisa 2009	<i>Azadirachta indica</i> , <i>allium sativa</i> , aloe vera, <i>tamarindus indica</i> , <i>hyenia thebacia</i> , <i>ocimum basil</i> , <i>carica papaya</i> , <i>adamsonia digitata</i> , <i>gacinia kola</i> , <i>zingiber officinalis</i> , <i>hymenocardia acida</i> , <i>melia azederach</i> , <i>mannix</i> , <i>cymbopogon</i> , <i>piliostigma reticulatum</i> , <i>adeola</i> herbal mixture, Keys herbal mixture, herbal viagra, <i>cassia alata</i> , <i>jatropha curcas</i> , <i>ximenis americana</i> , <i>moringa oleifera</i> , <i>kalms</i> , true man's capsule, and garlic	<ol style="list-style-type: none"> 1 Preformulated from herb sellers. 2 Extracts that needed to be dissolved in water, lime juice, or corn pap. 3 Steam inhalation. 4 Single herbs. 5 Mixtures of herbs. 	Open markets, friends, traditional healing homes, pharmacies and buses
Osamor 2010	Herbs, garlic	NR	Traditional healers and spiritual pharmacies
Peltzer 2004	NR	NR	Traditional healers and faith healers

Key: THM: Traditional herbal medicine. HTN: Hypertension. NR: Not reported.