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Cultural Adaptation of a Cardiovascular Health Education Program among Hypertensive Primary Care Patients from Rural Nigeria

Aina Olufemi Odusola and Ayoade Adedokun

Abstract

Culturally adapted behavioral treatments can optimize care. Following standard guidelines we adapted and tested a hypertension education program among primary care patients with hypertension from rural Nigeria. We reviewed literature and collected qualitative information from hypertensive patients to implement the first three of five cultural adaptation stages: *Information gathering, Adaptation design, and Preliminary adaptation testing*. Information obtained was used to adapt a *Cardiovascular Health Education Program* (CHEP) from a similar program *Culturally Appropriate Hypertension Education* (CAHE). CHEP was evaluated among 149 hypertensive patients using pre, – post design, and performance of behavioral goals. Data were analyzed using descriptive statistics and thematic contents. CHEP retained essential features of CAHE and added new culturally relevant information. Local context factors like substitutability of dietary *salt* and exercisability with cultural activities motivated healthy behavior and enhanced cultural fitness. Culturally permissive unhealthy practices were discouraged; intentional weight gain (*big is beautiful*), and non-smoking tobacco use (*sniffing, licking*). Performance of behavioral goals was outstanding; over 60% practiced self-set goals effectively. Standard cultural adaptation of behavioral education program demonstrated potential to limit cardiovascular diseases among hypertensive patients. Guideline-based culturally adapted intervention increased hypertension self-management capabilities among hypertensive primary care patients from rural Nigeria.

Keywords: standardized cultural adaptation, behavioral health education, goal setting assessment, hypertension self-management, rural Nigeria

1. Introduction

Hypertension is a major risk factor of cardiovascular diseases (CVD), and is highly prevalent in sub-Saharan Africa (SSA) [1, 2]. CVD including ischemic heart disease and stroke are the world's biggest killers, having killed 15.2 million people in 2016 alone [3], and being responsible for 17.9 million (31%) of global deaths annually [4]. To limit CVD, World health organization (WHO) advocated preventive

management of hypertension and other CVD risk factors [4]. In Nigeria where the age-standardized prevalence of Hypertension is 19.3%, only 8% of hypertensive patients are aware, 3% controlled and just 5% are covered by treatment [5]. Fortunately though, willingness to adopt recommended lifestyle measures is encouraging among hypertensive patients [6].

In African rural settings deep-rooted cultural orientations can manifest in beliefs and perceptions about health that vary with modern medical perceptions. It is beneficial to re-orientate people in such deeply cultural settings to acquire well informed modern health perspectives. This can be achieved by introducing culturally appropriate behavioral health interventions that have undergone cultural adaptation based on the people's traditional health practices and cultural beliefs.

Cultural adaptation is the systematic process of increasing cultural content and cultural sensitivity of existing behavioral treatments to effectively address distinct sub-cultural group needs. *Cultural sensitivity* has been defined in two dimensions: 1) surface structure elements; and 2) deep structure elements. While *Surface Structure elements* refer to the matching of intervention materials to observable superficial cultural characteristics of a target population e.g. music, food, places, dressing, language etc., *Deep Structure elements* refer to the use of cultural, historical, environmental and social norms and practices to modify targeted health behavior among a target population [7, 8].

An ideal behavioral treatment intervention should be adapted culturally by following standard procedures. Studies have shown that guideline-based cultural adaptation process has potential to increase acceptability, attractiveness and effectiveness of treatment support programs among target populations [9–11]. Furthermore evidence abounds that systematic cultural adaptation of behavioral treatments offer intrinsic self-efficacy benefits for patients [12–14]. Reports further suggests that cultural adaptation of health interventions can enhance service delivery when implemented as a living process with dynamism for continuous feedback, replicability and improvement [11]. Conversely other interventions that are not culturally adapted can unwittingly discourage uptake of recommended lifestyles by patients at risk of CVD [15]. Systematic review evidence from global perspective have also highlighted usefulness of culturally adapted interventions in control of CVD risk factors [16]. Currently however, there is a dearth of regional studies investigating usefulness and exploitability of cultural adaptation of treatment interventions in SSA settings.

To implement standard cultural adaptation, Barrera et al. identified five guideline-based sequential stages involved from a Consensus on Updates of Models for Effective Cultural Adaptation as follows: *Information Gathering (stage one)*, *Preliminary Adaptation Design (stage two)*, *Preliminary Adaptation Testing (stage three)*, *Adaptation Refinement (stage four)*, and *Cultural Adaptation Trial (stage five)* [10]. There is however a need for continuous improvement in the adaptation development process as issues and challenges were recently reported on emerging multistep frameworks design of cultural adaptation process, suggesting need for further research to conclude on effectiveness of interventions adapted based on such designs [17].

The effectiveness of culturally adapted interventions can be evaluated using standard testing procedures. Studies suggest that goal setting and pursuance among patients can be effective in promoting acculturation and adoption of adapted interventions among populations at risk of CVD. Similar evidence abounds that goal setting is useful in evaluating effectiveness of culturally adapted interventions including acquisition of behavioral self-management skills [18–21]. Indeed the setting and pursuing of culturally adapted goals to stimulate healthy behavior have enhanced chronic disease self-management skills [18, 20]. Available evidence

further suggests that the more frequently goals are set and pursued, the easier and faster patients learn and acquire targeted self-management skills [19].

In this study, following standard guidelines and procedures we culturally adapted an existing hypertension education program to produce a similar variant with enhanced cultural content and sensitivity using the first three out of five sequential steps. We proceeded further to evaluate the adapted program for *cultural-fitness* using patients' performance of set behavioral goals, and for *effectiveness* using hypertension treatment outcomes.

2. Methods

2.1 Background to study design

A mixed methods study in two phases: in *phase 1* we conducted qualitative study to adapt a *Cardiovascular Health Education Program* (CHEP) from a similar *Culturally Appropriate Hypertension Education* (CAHE) program; while in *phase 2* we used quantitative and observational designs to evaluate the adapted CHEP for effectiveness and cultural fitness. **Figure 1** shows relationships between various phases of the adaptation process. The cultural adaptation process involved *formative* and *construction arms*. In the *formative arm* we collected information from literature and from qualitative interviews with 40 hypertensive patients to develop the original form and content of CHEP [22, 23]. In the *construction arm* we used information from the *formative arm* to supplement protocol and materials originally developed for CAHE by Beune et al. [24], to increase cultural sensitivity of CHEP for specific needs of hypertensive patients from Nigeria. CAHE was previously developed in the Netherlands to support treatment adherence and BP control among Afro-Surinamese and Ghanaian primary care patients with hypertension [24, 25]. Similarly, CHEP was the main outcome of a cardiovascular disease (CVD) prevention project, *Quality Improvement Cardiovascular Care Kwara* (QUICK-2) in rural Nigeria [26]. The goal of QUICK-2 was to develop and evaluate a patient-centered cardiovascular health education program to increase adherence to prescribed pharmacologic treatment and healthy behavior among hypertensive patients. QUICK-2 was implemented in two consecutive parts: *development of CHEP over*

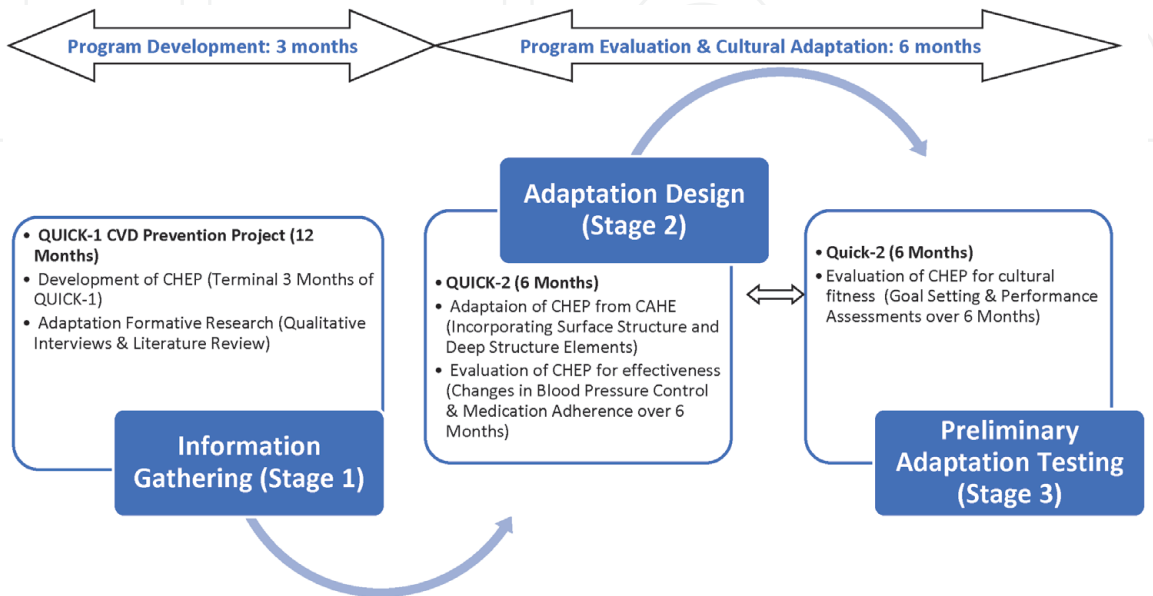


Figure 1.
Cultural adaptation study in relation to QUICK-1 and QUICK-2 studies.

3 months (*part 1*), and *evaluation of CHEP* over the subsequent 6 months (*part 2*). Prior to this, QUICK-2 was preceded by a related QUICK-1 study over 12 months, to assess feasibility of providing quality CVD prevention care to 349 hypertensive patients enrolled in a community-based health insurance program in Kwara state, Nigeria [27]. At the end of QUICK-1, 149 of the 349 participants did not meet hypertension control targets despite accessing standard, quality CVD prevention care of QUICK-1. The 149 uncontrolled patients consequently met criteria for inclusion in QUICK-2. We had hypothesized that ‘consulting room’ health education made available to the patients during ‘usual hypertension care’ in QUICK-1 was inadequate to support adherence and improve treatment outcome. We therefore developed CHEP to improve adherence and outcome among the uncontrolled patients during QUICK-2 [13].

In the current study, our focus is to describe the *processes and stages* involved in cultural adaptation of CHEP from CAHE and the testing of adapted CHEP for cultural fitness, namely *Information Gathering (stage 1)*, *Preliminary Adaptation Design (stage 2)*, and *Preliminary Adaptation Testing (stage 3)*. A CHEP effectiveness control trial would be implemented in future using two final stages: *Adaptation Refinement (stage 4)*, and *Cultural Adaptation Trial (stage 5)*.

2.1.1 Study setting

Our study was implemented at a primary healthcare center, *Ogo Oluwa Hospital* (OOH) in the sleepy agrarian rural town, Bacita in Edu local government area of Kwara state, north central Nigeria. At that time OOH was a provider in the Dutch government funded Kwara State Health Insurance (KSHI) program [28], <http://hifund.org/>. Bacita was inhabited by mainly Nupe and Yoruba ethnic groups in addition to pockets of few other Nigerian tribes. The predominant occupations in the region were artisanship, farming, petty trading and fishing.

In the following section we describe the steps taken in adapting CHEP from CAHE and in evaluating the former, based on designs, measures, procedures and analysis adopted.

2.2 Study phase 1

2.2.1 Information gathering (stage one)

2.2.1.1 Design and participants

In the *formative phase* (July to September 2010) we collected data for development of CHEP by interviewing 40 purposively selected hypertensive patients using a modified version of the *interview guide* previously used for CAHE patients in the Netherlands [12, 24]. The interview guide was however tailored to the Nigerian context to make it culturally relevant for the priority patients of this study. We additionally searched available literature for relevant information on hypertension care and self-management in rural contexts. Using grounded theory we transcribed and analyzed the interviews each lasting about 90 minutes, for thematic contents simultaneously as they were conducted. The CAHE participants are mostly literate African immigrants in the Netherlands while most participants in CHEP are relatively illiterate native Africans from rural Nigeria. Furthermore, to increase cultural content of CHEP relative to CAHE, while CAHE used non-native Dutch nurse practitioners to collect data in English language, CHEP used native nurse and medical practitioners from the study region to collect data in familiar local languages (Yoruba and Nupe).

2.2.1.2 Measures

Beyond what was already known from CAHE, CHEP specifically sought to know the local, cultural and contextual factors the Nigerian hypertensive patients perceive as inhibitors or enablers of prescribed hypertension care and self-management: what hypertension is and how it presents; what situations make hypertension easy or difficult for patients to manage as advised; how patients' finances affect their treatment goals; and how patients' native customs and social environment affect their use of medications, food selection, exercise or weight management. During a follow-up focused group discussion (FGD) after CHEP counseling sessions, participants were further asked: how they view CHEP counseling on pills use, healthy diet, salt reduction/substitution and exercise; what was particularly helpful, or frustrating about CHEP counseling; how much they have been able to meet their hypertension self-management goals; and ways in which the education program can be improved upon in future.

2.2.1.3 Procedures

In addition to the qualitative interviews, at a later stage we conducted FGD with participants to get their views about usefulness, acceptability, sustainability and effectiveness or otherwise of CHEP. As was done in CAHE, the CHEP development interviews began with the interviewer familiarizing with respondents to determine preferred language of communication. Thereafter we introduced participants to the research objectives: to elicit patients' explanatory model of hypertension regarding cause, presentation, course, duration, consequence, treatment, self-management and contextual factors relating to hypertension including social, cultural, religious, and financial factors. Furthermore, while CAHE sought to know the effect migration had on hypertension self-management efforts of its immigrant participants, CHEP explored how peculiar local features of Nigeria's rural, social and cultural environments can be exploited to optimize hypertension self-care.

2.2.1.4 Analysis

We used MAXQDA data management software [29], and Grounded Theory [30] to analyze our data. The analytic process was at first carried out by two researchers independently, thereafter the interview transcripts were exchanged and coding and analytic steps repeated all over by individual researcher. Following this, areas of disagreement were jointly resolved by discussing the data further. In analyzing, we repeatedly examined, compared, verified and reordered the data in line with identified themes and concepts. This produced a matrix of concepts, sub-categories and categories from multi-level coding along thematic lines as follows: a) first we identified clusters of similar concepts in each interview transcript by assigning series of open codes to similar text fragments and emerging themes that reflected same ideas. To produce a code list we inductively coded sections of each transcript that provided information on respondents' ideas about hypertension and hypertension self-management; b) next we reviewed the code list to eliminate duplicates and streamline similar concepts to produce a smaller set of mutually exclusive concepts; and c) we scrutinized the data further and grouped streamlined concepts and related text fragments under four major themes to address our core research question: what social, cultural or native factors affect compliance with prescribed pills, diet and healthy behavior among hypertensive primary care patients from rural Nigeria?

2.2.2 Preliminary adaptation design (stage two)

In the preliminary adaptation stage, we tailored CHEP culturally using information collected in the *Information Gathering Stage*. Our underlying objective was to increase cultural content of CHEP. We made both *surface structure* and *deep structure* changes to the original contents of CHEP and CAHE to achieve a culturally adapted CHEP. *Surface Structure changes* refer to matching of educational intervention materials and messages to observable superficial characteristics of our target population e.g. use of familiar people, places, language, food, locations, and cultural activities preferred by the Nigerian patients, while *Deep Structure changes* involved incorporating social, cultural, environmental and historical components to influence the targeted hypertension self-management behavior among the Nigerian patients [7].

2.2.2.1 Design and participants

Both CHEP and CAHE had notable similarities in forms and contents; each was implemented in three modules over 6 months among hypertensive patients in Europe (CAHE), and Africa (CHEP). But there were differences in their designs. CAHE used non-native nurse practitioners as educators in English language, while CHEP used native medical doctor and nurse to deliver the educational intervention in local languages. Furthermore, while CAHE recruited participants from four primary care clinics in urban Amsterdam, CHEP recruited participants from a single primary care clinic in rural Nigeria. Unlike CHEP, patients in CAHE benefited from modern lifestyle referral support e.g. gyms in Amsterdam city in addition to exposure to a hypertension handbook. In contrast, patients in CHEP had exposure to educational materials that were contextually tailored to Nigerian rural context e.g. audiovisuals and poster teachings on dietary salt replacement with suitable local substitute *Iru*, and use of household chores, farming, fishing, gardening, leisure activities (drumming, gaming, dancing, singing) etc., as forms of exercise. The audiovisuals were scripted and acted by familiar faces including some participants themselves.

2.2.2.2 Measures

Excluding goals setting and few self-report measures, many other measures were assessed in both CAHE and CHEP including patient demographics and physiological measures. Other measures include perceived stress, social support, and illness perception, beliefs about medicines, self efficacy, medication adherence, lifestyle adherence and satisfaction with care. Unlike CHEP however, a measure of 'discrimination' was deemed relevant and included in CAHE whose participants had migrated to Europe and could possibly experience social exclusion.

2.2.2.3 Procedure

A CHEP counseling visit usually began with participants familiarizing with others and the trainers. This is followed by: group interactive counseling on hypertension and hypertension self-management; poster teaching on culturally relevant exercises; a visit to the local market to familiarize with healthy foods; an audiovisual viewing session on pills use, healthy diet and lifestyle; a field practical exercise session; and a goal setting and assessment session. CAHE on the other hand was delivered in one-on-one teaching sessions, featured no audiovisual session, and did not involve teaching visits to local market or grocery store but nevertheless

deployed a specially prepared take-home hypertension handbook to teach her relatively more literate participants about healthy food choices, food preparation methods, pills use and healthy lifestyle. Both CAHE and CHEP counseling trainings were structured into 3 modules and delivered on 3 occasions few weeks apart, over six months in between a baseline and a final assessment visit. In both programs, every participant had physiological, anthropometric and self-report measurements at baseline and final visits. However, CHEP additionally had these measures taken during each of the 3 intervening educational visits because it was observed during pre-baseline information visits that the patients valued such interim measurements if the results are immediately communicated to motivate their self-management efforts.

2.3 Study phase 2

2.3.1 Preliminary adaptation testing (stage three)

2.3.1.1 Design and participants

The *preliminary adaptation testing* took place in the second phase of the study (March to August 2012) during which we used quasi-experimental pretest-posttest design to assess cultural fitness and effectiveness of the newly adapted CHEP. We included, trained and evaluated a cohort of 149 patients over a period of 6 months. Participants were evaluated on performance of set behavioral goals to assess cultural fitness. At a later stage we conducted an FGD with a sub-set of the participants to assess their perceptions about usefulness and acceptability of the adapted intervention.

2.3.1.2 Measures

We measured and recorded participants' socio-demographic parameters (age, gender, ethnicity, marital status, income level, employment status, educational status, alcohol use and tobacco use) and assessed their hypertension treatment outcomes including blood pressure control, body mass index, medication adherence, behavioral adherence as well as social support, satisfaction with care, illness perception, beliefs about medicines, and medication adherence self efficacy. Furthermore we asked participants specific questions on physical activity and exercise, use of salt, alcohol and smoking and graded their responses on a Likert Scale. Finally we asked participants to set and practice preferred culturally adapted behavioral health goals and graded their performances of set goals as a measure of 'cultural fitness.'

2.3.1.3 Procedures

Each of the 149 participants individually had an initial baseline assessment, followed by 3 modules of CHEP training in groups of 12–15 at 6 weeks, 10 weeks and 14 weeks past baseline. They were later disaggregated to have final individual assessments at 6 months past baseline. In essence, each participant had five study visits including a baseline assessment visit, a final assessment visit and three intervening group educational and goals setting assessment visits. Following the baseline visit (1st study visit) each participant was guided to set 3 culturally adapted behavioral goals during the first training session (2nd study visit), and to practice the selected goals at home until he/she revisits for the second training session (3rd study visit). The same goals setting instructions were repeated at the end of second training towards the third and final training session (4th study visit). Participants were additionally guided to practice preferred physical exercises for 20 minutes during the 3rd training session only, and they were encouraged to continue the exercises at home until the final visits

at 6 months (5th study visit). In the section on assessment of set goals, participants’ goals related performances were rated on a Likert scale and compared over 6 months before and after the intervention. Full details of the effectiveness of CHEP evaluation study are available in a related study [13].

2.3.1.4 Analysis

Data were analyzed based on: 1) qualitative self-report from each of the 149 participants on performance of set goals as instructed; and 2) quantitative ‘before-, and after’ comparison of changes in treatment outcomes of participants following intervention.

In assessing performance of set goals, we recorded the number and types of goals set by each participant during a current visit following practice of such goals at home as instructed during previous visit. Using a Likert scale we inquired and got qualitative responses from each participant on the extent to which they practiced selected goals at home. For the CHEP effectiveness study we employed descriptive statistics and regression analysis to evaluate changes in BP control, Body Mass Index, behavioral adherence and medication adherence and got promising improvements as reported in Odusola, et al. [13].

Adaptation Refinement (Stage 4) and Cultural Adaptation Trial (Stage 5).

By design we have reserved the last two stages of the cultural adaptation process, ‘Adaptation Refinement’ and ‘Cultural Adaptation Trial’ for the near future to implement CHEP Efficacy Trial. This is similar to procedures adopted in a previous US study on cultural adaptation of an evidence based treatment, the MLP for Latinas sub-cultural group [11].

2.3.1.5 Ethics

Approval for Ethical conduct of the main study was obtained from the Ethics Committee of University of Ilorin Teaching Hospital on 30th March 2010. The current study is one of the sub-studies of the main study.

3. Results

We collected qualitative information from 40 hypertensive patients (systolic BP \geq 140 mmHg and/or diastolic BP \geq 90 mmHg). Most of them were 50 years or older, two third were Christians, almost all (80%) earn less than 5USD per day while 70% had only primary school education, and most were artisans engaged in farming, fishing, or petty trading (**Table 1**).

Characteristics	N (%)
Age group (years)	
• 30–50	9 (22.5%)
• 50–70	26 (65%)
• 70–90	5 (12.5%)
Gender	
• Male	16 (40%)
• Female	24 (60%)
Educational level	
• None or primary education	28 (70%)

Characteristics	N (%)
• Secondary education	9 (22.5%)
• Tertiary education	3 (7.5%)
Ethnicity	
• Nupe	6 (15%)
• Yoruba	31 (77.5%)
• Others	3 (7.5%)

Table 1.
Socio-demographic characteristics of participants.

Hereunder we describe our results based on the first three out of five guideline-based cultural adaptation stages.

3.1 Information gathering (stage 1)

The results are in two streams: a) *the cultural factors inhibiting uptake and practice of healthy behavior*; and b) *the cultural factors enabling uptake and practice of healthy behavior*.

A. Cultural Inhibitors of Uptake and Practice of Healthy Behavior

Our data showed that a people’s culture, customs and beliefs have capacity to discourage uptake and practice of healthy behavior (**Table 2**).

- 1. Increasing use of dietary salt:** certain cultural practices increase use of salt by the local population. During food preservation practices, salt is used to preserve fish and meat against microbial decomposition. For example, when asked about the cultural practices influencing salt use, a 56 year old hypertensive female [ID37] replied “*we normally preserve our meat from getting rotten by salting and drying them in the sun daily*”. Food preparation practices also encourage increased use of salt. Some people have the habit of preparing meals with salt and salt-containing condiments e.g. maggi (salt *plus* hydrogenated oil *plus* monosodium glutamate). Others are accustomed to salty meals and would habitually add extra table salt to meals already prepared with salt. Some use the salty supernatant obtained from boiled meat to prepare soups believing this enhances its flavor. Furthermore, medicinal use of salt is common in the study region as it is common local practice to manage stomach upsets and abdominal discomforts by drinking salted water (salt solution).
- 2. Increasing body weight and size:** some cultural practices encourage weight gain. A large body size is a desirable appearance to some as societal sign of affluence, comfort or wealth. And so, people may embark on intentional weight gain merely to show off perceived wealth or affluence. Furthermore, it is often perceived that a large body size enhances a woman’s beauty or sexual attractiveness. There is societal perception that the fatter a lady is the more beautiful and fresh she is. On weight gain, a 50 year old female, [ID3] responded: “*people often see being fat as synonymous with affluence, comfort and peace of mind, and they sometimes associate robustness with beauty in women. Moreover, some of us women prefer to get fat believing that by so doing we are more attractive to our husbands and to men generally*”. Our data further shows that people can

sometimes get discouraged when exercising to lose weight For example, an elderly male respondent [ID30] clarified a question on weight reduction saying *“in this region, people often link slimming down to disease particularly if the weight loss is pronounced, suggesting such might be due to disease, and that “slim people are miserly and would rather not spend enough money to feed well and get big”.*

3. Physical inactivity and lack of exercise: excerpts from our data show there is a strong cultural correlation between societal perception and ‘need or needlessness’ to exercise. Many believe exercise is a needless waste of time. Some perceive exercise as dangerous to health especially with advancing age when the body is assumed fragile and weaker. Deliberate attempts to exercise by trekking to destinations are perceived negatively. Such persons are taunted as being miserly and reluctant to fund transport costs to their destinations. On challenges encountered in exercising, an elderly male [ID30] said *“when people see me walking ‘to exercise’ they often slight me and make derogatory comments that I’m greedy and would rather walk long distances than spend money on transportation.*

4. Use of tobacco and other stimulants: curiously, social habits like use of stimulants and tobacco products are sometimes perceived as promoting health. A popular local alcoholic brew ‘Palm wine’ is believed to make vision clearer while others like the ‘Ogogoro’ (local gin), Snuff (Nicotine powder) and Taba (fine-ground tobacco leaves) are variously perceived to relieve stress and bodily tension, and stimulate work. Now better informed, a 65 year old male [ID23] regretted: *“our fore fathers used to say palm wine makes one see very well, but it is now glaring to me that such views were misplaced.* Another participant [ID29] responded: *“in this region we believe chewing kola nuts and using snuff stimulate performance of household chores and work although I personally don’t use them”.*

B. Cultural Facilitators of Uptake and Practice of Healthy Behavior

Our data yielded a rich mix of information on factors encouraging healthy behavior among participants (Table 2). Many felt cultural adaptation of certain local practices made it easier, cheaper and more attractive to practice healthy behavior.

Category	Sub-category		Concepts and Examples
	Factors motivating healthy behavior	Factors inhibiting healthy behavior	
Food related practices: Salt use		Food conservation practices	Salt can preserve food stocks against microbial degradation [n = 3]*
		Food preparation practices	A salt-less diet is repulsive to the African mindset [n = 7]
			Salt and salt products (e.g. maggi) are substantially used in meals preparation [n = 14]
		Medicinal use of salt	Salted water (salt solution) is a sure panacea for abdominal/ stomach discomfort [n = 3]

Category	Sub-category		Concepts and Examples
	Factors motivating healthy behavior	Factors inhibiting healthy behavior	
Food related practices: Salt use	Availability of suitable salt substitute <i>Iru</i>		Following health counseling, I found out that meals prepared with <i>Iru</i> in place of salt are tastier and more delicious [n = 2]
Food related practices: Fruits and vegetables consumption	Endowment of rural environments with health-promoting possibilities and practices: arable land for vegetable and fruit farming and poultry; and streams and rivers for fishing		I now get enough vegetables in my regular diet from vegetable gardening at my backyard [n = 5]
Societal socio-cultural perceptions: weight gain		Increase in body size perceived as wealth, affluence, comfort	The bigger one is the wealthier, affluent and more comfortable he/she is perceived [n = 12]
		Decrease in body size perceived as illness, disease	Deliberate weight loss or slimming down perceived as being caused by serious internal disease [n = 13]
		Increase in body size (bigness) perceived as a woman's beauty or sexual attractiveness	The fatter a woman is, the more beautiful and attractive she is viewed [n = 7]
		Weight gain or Obesity perceived inherited or natural in some families	Heaviness or fatness runs in my family; we normally have big sizes [n = 3]
		Some local delicacies have fattening tendency	Popular local meals are often heavily starch-based, e.g. Pounded yam, Garri-eba [n = 5]
			Red Palm-oil, Groundnut oil readily available in our environment [n = 11]
			Popular local goat-breeding practice makes red meat readily available [n = 2]
Socio-cultural perceptions: weight reduction	Cultural perceptions and orientations: being fat is tantamount to ugliness, sluggishness and physical unfitness		People will say: look at him, 'big for nothing', he will not be able to enjoy breathing, worse still [n = 3].
Socio-cultural perceptions: lack of exercise		Perception of exercise as related to elderly "fragile" health and wellbeing	Popular view: exercising is dangerous with increasing age, and to health the elderly [n = 7]
		Perception of exercise as related to perceived necessity	Popular view: walking long distances just to exercise could only mean one is unserious and greedy to avoid spending travel costs [n = 5]

Category	Sub-category		Concepts and Examples
	Factors motivating healthy behavior	Factors inhibiting healthy behavior	
Socio-cultural perceptions: exercise and physical fitness	Cultural practices and environmental possibilities to achieve physical fitness		Brisk trekking to farm, other destinations; dancing and clapping in church; drumming during festivals; food grains grinding and yam pounding; farming and gardening activities; laundry (washing clothes), sweeping floors;; and where feasible canoe paddling on rivers
Socio-cultural perceptions: social habits		Smoking and non-smoking tobacco and Snuff uses are wrongly perceived beneficial to health	Cigarette smoking and Snuff sniffing relieve tension and aid work [n = 1]
		There's a perception that local alcoholic beverage (Palm wine) and Kola nuts are beneficial to health	Palm wine makes vision clearer [n = 1], chewing kola nuts stimulate task performance and it's a social standard for elders to chew kola nuts [n = 2]
Socio-cultural perceptions: social habits	Faith-based and gender-based considerations that discourages use of alcohol and tobacco		Faith-based and gender-based abhorrence of smoking, alcohol and tobacco by women; society frowns seriously at sight of a woman smoking cigarette

Notes: n refers to the number of respondents who expressed the implied view.

Table 2.
Motivational and inhibitory factors of healthy behavior: Thematic matrix of categories, sub-categories and concepts.

- 1. Limiting use of dietary salt:** following enlightenment through the adapted education program some participants realized that *Iru* (a local food condiment) is a suitable and effective alternative to dietary salt. *Iru*, the locally grown African Locust Bean seed is a relatively cheaper food condiment commonly available. It is devoid of salt or sodium derivatives and participants agreed it makes food tastier and more delicious. Many now use *Iru* in place of salt to prepare their meals although few confessed they nonetheless add little salt despite using *Iru*. A 50 year old female [ID11] said “*I have been enlightened and I have since been using Iru in place of salt to prepare my family meals; truly I found out the meals so prepared are tastier and more delicious.*”
- 2. Increasing consumption of dietary fruits and vegetables:** our data shows that rural African communities are endowed with potential for promoting health using existing socio-cultural and environmental peculiarities such as arable lands, domesticated animals and flourishing streams and rivers. They provide opportunities for vegetable farming, fishing, poultry and animal husbandry. To some participants, earning a living through these *health-related* economic activities motivate hypertension self-management efforts. When asked how often he consumes fruits and vegetables an elderly participant [ID32] responded: “*based on advice from my doctor, I now practice vegetable farming on the*

large expanse of land at my backyard which before now had laid waste, and from this I get sufficient supply of vegetables to meet my family needs”.

3. **Decreasing body size and weight:** some female participants perceive cultural linkages between health and body size, health and wealth, and health and beauty. In the study region, there was a popular cultural perception that “the fatter a woman is the more affluent, comfortable or beautiful she is”. This perception has health implications as it encourages undue weight gain among the women. However, this perception is changing nowadays, and being too fat is now viewed as ugliness, sluggishness or physical unfit. When asked what relationship exists between beauty and large body sizes, a respondent [ID26] replied: *“beauty is a good thing that sometimes goes with bigness but some people are ugly looking when fat”*. These newer perceptions have helped many to adopt healthier behavior.
4. **Increasing physical activity and exercise:** although some participants view exercise as dangerous to health because of advancing age, many others nonetheless understood that exercise is generally good for health and helps to control their hypertension. After the educational counseling many are now aware that some level of physical fitness can be achieved using usual everyday activities in rural communities, and that exercising do not necessarily require formal regimented sessions like street jogging, gyms and swimming pools sessions applicable to cities and urban towns. Our data showed that if given relevant encouragement and training, participants are able and willing to adopt culturally modified versions of local practices to achieve physical fitness: *walking briskly and regularly to farm and other destinations; faith-based and cultural dancing, drumming, clapping or singing; food preparation practices like pounding yam and grains in mortars; farming and gardening activities including shoveling and hoeing; traditional laundry (washing clothes), sweeping floors, and drawing or fetching water from wells; and where feasible canoe paddling on rivers and cycling to move around*. A participant [ID21] responded: *“in my community, women prepare the popular local delicacy pounded yam using mortar, this being a form of exercise since they sweat a lot when they pound”*.
5. **Limiting use of alcohol, tobacco and stimulants:** some participants leverage on existing cultural and religious perceptions to acquire healthy behavior. Following behavioral counseling the few who use tobacco (smoking and non-smoking forms) were able to exploit existing *gender-based, and faith-based cultural perceptions* to discontinue such practices, including faith-based religious abhorrence of smoking and use of alcohol, and gender-based disapproval of female use of tobacco, alcohol, and snuff. It is culturally reprehensible to see a woman smoking cigarette in rural communities.

3.2 Preliminary adaptation design (stage two)

Cultural adaptation of the Education Program was accomplished based on the conceptual framework of formative research using information obtained from qualitative interviews with patients. The other anticipated source of information, literature review, did not yield much useful information on the topic from the study region. Osuna et al. similarly relied substantially on information from a Focus Group Discussion with participants to achieve cultural adaptation design of a

diabetes Intervention program among Latinas in the United States [11]. The adaptation in our study was achieved through cultural modification of existing behavioral health practices among the local population. This involved modifying the ‘*form*’ (surface structure elements) and the ‘*specific content*’ (deep structure elements) into culturally friendly and adoptable methods of exercising within rural contexts. However, because information from our interviews also revealed local practices and beliefs perceived inhibitory to healthy behavior, we highlighted and discarded the inhibitory perceptions in order to achieve a culturally attractive and acceptable final behavioral counseling program. **Table 3** displays a synopsis of key differences and similarities in contents and procedures between the culturally adapted program (CHEP) and the adaptable program (CAHE).

Program Content & Procedure	CAHE	CHEP
Type of program	Hypertension education program	Hypertension education program
Focus of program	Hypertension self-management	Hypertension self-management
Implementation setting	Urban Amsterdam, Netherlands	Rural Kwara, Nigeria
Study population	Hypertensive Primary care African immigrants (mostly literate)	Hypertensive primary care native Africans (mostly illiterate)
Language of communication	English	Native Yoruba and Nupe
Cultural familiarity of education counselors or trainers	Used Dutch nurse Practitioner	Used native African medical and nurse practitioners
Information gathering method	Qualitative interviews with hypertensive participants	FGD and Qualitative interviews with hypertensive participants
Cultural exploratory content	Exploratory from a perspective of European urban/city environment	More deeply exploratory from a perspective of rural African socio-cultural environment
Behavioral health facilities available to support physical fitness and exercise habits	Promoted use of lifestyle referral facilities like gyms, swimming pool, walking out etc.	Promoted use of cultural and environmental possibilities like household chores, farm work, food preparation activities etc.
Adapted component of dietary counseling	Counseled participants to reduce dietary salt consumption	Supported dietary salt reduction counseling with possibility to replace salt with a suitable local substitute <i>Iru</i>
Assessment of cultural fitness	Did not assess participants for cultural fitness	Assessed participants for cultural fitness using culturally tailored behavioral health goals
Effect on hypertension treatment outcome	Significant improvements in diastolic blood pressure and lifestyle adherence	Significant improvements in blood pressure control, medication adherence and lifestyle adherence

Notes: CAHE – Culturally appropriate hypertension education; CHEP – Cardiovascular health education program.

Table 3.
Contents and procedural variances and similarities between culturally adapted CHEP and CAHE.

Furthermore, in **Table 4** we highlight the thematic categories of the relationships existing between traditional local perspectives and cultural practices, and their adaptability following educational counseling drawing from newly available culturally relevant information.

Category	Sub-category	Cultural perspectives and linkages	Cultural adaptation and tailoring
Cultural endowments towards healthy behavior – Diet	Rural African food preservation and preparation practices	Africans are naturally accustomed to high-salt diet	Ability to replace salt with Iru, a suitable local substitute
	Medicinal use of salt	Health-driven ignorant use of salt further diminishes health	Provide enlightenment information about avoidable use of salt
Cultural awareness towards healthy behavior – Weight	Local perceptions about body image and size	Societal perception driven preference for big body sizes	Provide useful information to situate body size within health perspectives
Cultural re-orientation towards healthy behavior – Exercise	Perceived danger of exercise to health	Health-driven concerns about older age-related dangers of exercise	Re-orientate about benefits/risks of age-tailored exercising
Cultural practices and environmental endowments towards healthy behavior – Physical activity	Perceptions that it is difficult, expensive and time wasting to achieve physical fitness	Realizations that physical fitness is also achievable using usual everyday household chores, cultural and occupational activities, leisure and faith-based activities	Re-orientate patients about the possibility and practicability of cheap, user-friendly, attractive and acceptable cultural and environmental activities as exercise
Faith-based and societal perspectives and norms	Societal perceptions of certain behaviors as ‘unfaithful’ and ‘anti-social’ e.g. smoking and use of alcohol	Health-driven exploitation of faith-based abhorrence of certain norms to drive healthy behavior	Provide useful information to exploit faith-based and gender-based socio-cultural practices

Table 4.
Culturally adapted components of existing behavioral practices: Categories, sub-categories, concepts and thematic linkages.

3.3 Preliminary adaptation testing (stage 3)

Preliminary evaluation of the culturally adapted educational intervention was implemented in two arms: 1) cultural fitness assessment based on performance of set behavioral health goals; and 2) assessment of effectiveness based on changes in participants’ hypertension treatment outcomes.

To assess cultural fitness, we examined and recorded serial performance of set goals as reported by participants themselves over six 6 months.

Simultaneously, the effectiveness assessment study took place over same period but this not being the focus of the current study, is reported fully elsewhere [13]. Briefly it involved before-, and after assessments of changes in blood pressure (BP) control, medication adherence, behavioral adherence, and body mass index (BMI). Out of an initial 149 included participants, 140 (94%) completed the study. More participants reported high adherence to prescribed medications and behavioral advice at 6 months compared to baseline: respectively, 101 (72%) at 6 months versus 70 (50%) at baseline, ($p < 0.001$) and 126 (90%) at 6 months versus 106 (76%) at baseline, ($p < 0.001$). Similarly, participants with controlled BP doubled from 34 (24%) at baseline to 65 (46%) at 6 months, ($p = 0.001$). The median SBP and DBP decreased from 129.0 to 122.0 mmHg, ($p = 0.002$) and from 80.0 to 73.5 mmHg, ($p < 0.001$), respectively. However, BMI did not change ($p = 0.444$). The improvement in medication adherence was associated with a decrease in medication concerns ($p = 0.045$) and improvement in medication self-efficacy ($p < 0.001$).

3.3.1 Performance assessment of set goals

As indicated in the methods each participant made 5 visits over 6 months: a baseline assessment visit, three intervening group education visits, and a final assessment visit. Hereunder we report the performance of set goals by participants based on self-reports. Using information from our interview data we structured existing local behavioral health practices of the region into 12 distinct culturally tailored goals (**Box 1**). We guided participants to select, set and practice three preferred goals during the three intervening group visits as well as at home in the weeks that followed their current visit. Their performances were assessed qualitatively during the subsequent visits.

We inquired verbally from participants about how well they practiced selected goals during a subsequent visit and graded their responses on a Likert scale as follows:

1. To reduce amount of salt and salt-containing condiments I currently use in food preparation and/or preservation by half before my next visit
 2. To completely replace salt with *Iru* in all my food preparation and food preservation processes before my next visit
 3. To increase my consumption of healthy foods by eating more fish and at least 3 servings of vegetables and fruits daily before my next visit
 4. To decrease my consumption of unhealthy foods by eating less of red palm oil, groundnut oil, goat meat and other fatty food daily before my next visit
 5. To stop smoking completely if I do, or at least reduce the number of cigarette sticks I smoke daily by half before my next visit
 6. To completely discontinue the use of all socially acceptable non-smoking forms of tobacco (Taba/Snuff), and Kola nuts, or reduce the quantity I use daily by half before my next visit
 7. To completely discontinue consumption of Alcohol and other alcoholic beverages (Spirit, Palm wine, Gin, Ogogoro) perceived as culturally acceptable, or at least reduce the quantities I consume daily by half before my next visit
 8. To exercise more regularly using locally available methods like brisk walking, canoe paddling, cycling or others, to and from my destinations for at least 30 minutes everyday
 9. To exercise more regularly using food preparation processes such as yam/grain pounding in mortars whenever feasible over at least 30 minutes per session before my next visit
 10. To exercise more regularly using usual household chores such as sweeping floors, laundry (washing clothes), pulling/fetching water from wells or others over at least 30 minutes daily before my next visit
 11. To exercise more regularly using usual farming activities such as ground hoeing, shoveling, bush clearing, manual harvesting, gardening etc. over at least 30 minutes daily before my next visit
 12. To exercise more regularly using usual leisurely or faith-related activities such as clapping, dancing, singing, drumming, gaming or others for at least 30 minutes daily before my next visit

Box 1.
Culturally tailored behavioral health goals set by participants

1. For how many days in a week did you perform the selected goal?
Response grading: 0-1 day (poor); 2-3 days (fair); 4-5 days (good); 6-7 days (very good)
2. For how many minutes in a day did you perform the selected goal?
Response grading: 0-10 mins (poor); 11-20 mins (fair); 21-30 mins (good); > 30 mins (very good)
3. How seriously did you perceive any challenges or difficulties encountered in performing the goals you selected and how well did you resolve the challenges?
Response grading: serious challenges, not resolved (poor); moderate challenges, partly resolved (fair); minor challenges, fully resolved (good); encountered no challenges (very good)
4. On a scale of 1 to 4 (1 – poor, 2 – fair, 3 – good, 4 – very good), how would you rate yourself on degree of performance (effectiveness), of set goals?
Response: not performed at all (poor); sometimes performed (fair); often performed (good); always performed (very good).

Following this we graded self-rated performances of participants on a Likert scale (**Table 5**), and found that an overwhelming majority of them performed the selected goals reasonably well. At least 49% and 28% of participants were graded ‘good’ and ‘very good’ respectively on the number of minutes they performed selected goals daily. Furthermore, regarding number of days per week they performed selected goals, about 61% and 11% were graded ‘good’ and ‘very good’ respectively. On their abilities to resolve potential challenges faced, 18% and 56% of participants were graded ‘good’ and ‘very good’ respectively. Finally 30% and 53% of participants were graded ‘good’ and ‘very good’ respectively regarding their perceived effectiveness in performing selected goals.

Performance scale	Participants’ graded performance (Minutes/day)	Participants’ graded performance (Days/week)	Participants’ graded performance (Resolution of challenges)	Participants’ self-rated goals performance (Effectiveness)
	N (%)	N (%)	N (%)	N (%)
Poor	23 (16)	21 (15)	11 (8)	0
Fair	10 (7)	19 (14)	25 (18)	24 (17)
Good	68 (49)	85 (61)	25 (18)	42 (30)
Very good	39 (28)	15 (11)	79 (56)	74 (53)
Total	140 (100)	140 (100)	140 (100)	140 (100)

Table 5.
Assessment of performance of set goals by participants.

3.3.2 Preferential practice of particular behavioral goals

The particular types of culturally adapted goals participants preferred to set and pursue yielded interesting information from our data. Viewed against the background of attractiveness and acceptability, such information can be useful in guiding physicians and care givers on behavioral health practices likely to be accepted and complied

with by hypertensive patients. This type of information can predict areas in need of counseling reinforcement for patients in efforts to improve hypertension self-management skills. Extracts from our data (**Table 6**) reveals that the three most preferred and set goals are dietary salt reduction, exercising and compliance with pills use. Similarly, the three least preferred and set goals are stopping tobacco use, limiting alcohol use and stopping kola nuts consumption. Finally, important considerations that guided participants in selecting particular goals include funding performance of the goals, ease/rigor of performance, and access to practicing the goals.

Types of Goals	Educational Sessions		
	CHEP 1, N (%)	CHEP 2, N (%)	CHEP 3, N (%)
Diet (salt restriction)	124 (89)	97 (69)	66 (47)
Diet (fat restriction)	23 (16)	12 (9)	27 (19)
Diet (vegetables & fruits consumption)	16 (11)	9 (6)	8 (6)
Physical fitness & exercise	121 (86)	100 (71)	93 (66)
Weight reduction	59 (42)	47 (34)	32 (23)
Quit smoking	4 (3)	4 (3)	2 (1)
Quit non-smoked tobacco	5 (4)	2 (1)	0 (0)
Quit Kola nut	14 (10)	4 (3)	7 (5)
Restrict alcohol	13 (9)	10 (7)	7 (5)
Comply with pills use	92 (66)	78 (56)	59 (42)
Comply with clinic appointments	13 (9)	19 (14)	15 (11)

Table 6.
Frequency and types of behavioral goals set during educational sessions.

4. Discussion

We examined the proceedings and results of cultural adaptation of a behavioral treatment program following standard guidelines, among primary care patients with hypertension from rural Nigeria highlighting cultural fitness and effectiveness of the adapted program on their hypertension self-management. Based on theoretical and conceptual framework of formative research described by Resnicow et al. [7], we combined information from exploratory interviews with hypertensive patients with extracts from a review of literature on the topic to adapt a Cardiovascular Health Education Program (CHEP) from an existing Culturally Appropriate Hypertension Education (CAHE) previously deployed among hypertensive African immigrants in the Netherlands [12]. The literature review however did not yield enough relevant information. Our goal was to increase cultural sensitivity and contents of CHEP relative to CAHE and to make the adapted CHEP relevant to specific needs of hypertensive patients from rural Nigeria. Resnicow et al. had proposed combining: a) *surface structure elements* (matching of adaptable behavioral practices and materials to observable superficial characteristics of the target population); with b) *deep structure elements* (incorporation of target population’s customs, culture, beliefs and values into their existing adaptable practices). Drawing inspirations from this, CHEP used materials from both *surface structures* and *deep structures* in its development and adaptation processes. We additionally followed the guidelines described by Barrera et al. in a consensus of cultural adaption processes [10] in adapting CHEP. Finally we evaluated the adapted program and found that CHEP

improved participants' hypertension treatment outcomes and enabled increased performance of culturally tailored behavioral health goals among the participants.

Cultural adaptation is the systematic modification of an existing evidence-based treatment to conform with a distinct group's language, culture, customs and local cultural contexts in a way that it becomes compatible with the group's cultural orientations and values" [9]. The cultural modification process enhances attractiveness and adoptability of a new program among targeted populations. The promising results reported in the previous CHEP evaluation study [13], are plausible in the light of findings from other studies in support of views that standardized cultural adaptation of behavioral interventions can improve treatment outcomes [9, 14, 15, 21, 31]. To the best of our knowledge no previous study conducted in rural African context has shown such potentials from implementing culturally adapted interventions.

Following debates on the most appropriate process for cultural adaptation, researchers arrived at a consensus aggregating various approaches to establish a standard guideline involving five sequential stages: 1) information gathering, stage one; 2) preliminary adaptation design, stage two; 3) preliminary adaptation testing, stage three; 4) adaptation refinement, stage four; and 5) adaptation trial, stage five [10, 17]. In the current study however, by design we opted to adapt CHEP from CAHE using the first three of five guideline-based stages, deferring the last two stages for a future CHEP efficacy trial. A diabetes lifestyle intervention program was similarly adapted for Latinas in the USA using stages one to three only [11].

The local and cultural environments of patients in our study are endowed with materials and possibilities that influenced their hypertension self-management capacities. We found that locally grown Locust Beans '*Iru*' is a healthier condiment suitable in replacing dietary salt. This finding is strikingly comparable to a Peruvian study which reported successful introduction of a similar *salt substitute* with less elemental sodium among a local hypertensive population [32]. Our results also showed that exercising can be attractive and easier when performed using traditional household chores and cultural practices.

Cultural fitness is determined by the extent to which a people accept and use the language, values, beliefs and materials characteristics of newly introduced culturally tailored interventions targeting their self-management skills. We assessed the adapted intervention for cultural fitness by conducting a goals setting and performance exercise among participants and got promising results on performances by most participants. Similar findings have also been reported from other studies [19–21]. Moreover during a follow-up FGD participants spoke excitedly and expressed desires to continue to use the education program even after the study. Interestingly we observed that the three most common behavioral goals practiced by participants were *salt reduction, exercise and weight reduction* while the three least commonly practiced goals were *smoking cessation, alcohol reduction and cessation of kola nuts use*. We believe such observations reflect new perceptions of the health risks which participants now associate with the habits following enlightenment from behavioral counseling. Such information on preferred and disliked behavioral practices can help physicians make informed decisions on areas most in need of attention in planning behavioral health interventions for patients with cardiovascular risk factors.

Limitations encountered in this study include:

1. Participants could have been biased in recalling events and they may have given socially desirable answers on some aspects of our results that are based on self-reports
2. Without prejudice to results obtained, logistics and funding constraints limited our ability to implement all the five guideline-based cultural adaptation stages

5. Conclusion

We followed standard guidelines to culturally adapt an existing behavioral health intervention among hypertensive patients from rural Nigeria. Modeled after a similar intervention from Europe we systematically developed and adapted the new intervention using frameworks of formative research. We got quite promising results on evaluating the adapted intervention for cultural fitness and effectiveness. We submit that guide-line based culturally adapted behavioral treatments have potential to improve hypertension treatment outcomes and limit cardiovascular diseases.

5.1 Implication for practice

The successful control of risk factors among patients at risk of cardiovascular diseases is a major goal of every attending physician. But a major obstacle to this goal is the difficulties faced by patients in adhering to prescribed pills and behavioral advices. Innovations like the current intervention which provides unique information on behavioral practices preferred and disliked by patients can guide physicians on acceptable and adoptable behaviors.

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Conflict of interest

The authors declare no conflict of interest.

Author contributions

AO drafted the manuscript, designed and conducted the study. AA revised versions of the draft. Both authors approved the final draft.

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