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Development of a curriculum to educate religious leaders about blood pressure using community-based participatory research and educational theory in Mwanza, Tanzania

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Abstract

Hypertension is a leading cause of premature mortality in Tanzania, but low trust and awareness of biomedical healthcare and prioritization of spiritual over physical health hinders uptake of care. Religious leaders are highly respected community members and are eager to collaborate with health professionals. Few community health worker training programs utilize evidence-based pedagogical recommendations in combination with theology specific to their students' backgrounds. Our team of health research professionals and religious leaders developed a curriculum to teach local religious leaders to address and screen their communities for hypertension.

We use a Community Based Participatory Research framework and evidence-based educational strategies (Kern's framework for medical education, Bloom's learning domains, and Knowles adult learning principles) to build a curriculum optimized to partner with religious leaders. Previously assessed attitudes toward and knowledge of hypertension in the community determined objectives and content, and religious leaders on the team determined appropriate religious aspects to incorporate. Through an evidence-based process, we hope to maximize efficacy of the intervention.

Recognizing religious leaders as unique learners, we utilize well-tested educational theory and strategies to create a comprehensive curriculum prioritizing student input. The curriculum aligns with adult learning theories, is culturally tailored to meet the needs of the communities involved and equips religious leaders to promote blood pressure management through screening and lifestyle interventions. The curriculum addresses healthcare through a religious lens, fostering trust between healthcare professionals, patients, and religious leaders through interdisciplinary collaboration.

Keywords Hypertension, Community-based participatory research, Religion, Blood pressure, Education, Tanzania

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Background

As in other sub-Saharan African countries, hypertension is a leading cause of hospital admission and premature mortality in Tanzania [1]. The rise of hypertension is a manifestation of the broader growth in non-communicable diseases in sub-Saharan Africa [2]. African health systems were primarily built to address infectious diseases, which have begun to decline. The rise of non-communicable diseases has strained the current primary healthcare system, resulting in poor public health outcomes for many non-communicable diseases in Tanzania [1, 3].

In a study conducted in northwestern Tanzania, 28% of adults over 35 years had hypertension, but only 2% knew they were hypertensive, and less than 1% were on appropriate anti-hypertensive treatment with their blood pressure controlled [1]. Mwanza, a city in northwest Tanzania, is the second most populous city in the country with approximately 1.2 million people [4]. Thirty-eight interviews were conducted in Mwanza, including people with hypertension (receiving treatment ($n=13$), not receiving treatment ($n=11$)) and clinic staff ($n=14$) [5]. Analysis of the interviews found several key reasons for healthcare gaps, including limited health awareness, low trust in biomedical healthcare, and prioritization of spiritual over physical health [5]. Hypertension screening and increased awareness can lead to early initiation of treatment and lifestyle modifications and reduce premature deaths, and even small reductions in blood pressure can lead to appreciable reductions in cardiovascular deaths [6].

Nearly two thirds of the country, including Mwanza, identify as Christian, one third as Muslim, and about five percent as other religions [7]. Religious leaders are highly respected community members in Tanzania with broad reach within their communities. A previous study analyzed thirty-one in-depth interviews with Muslim ($n=14$) and Christian ($n=17$) religious leaders in Tanzania and found that leaders were open and eager to collaborate with health professionals to improve hypertension awareness and management [8]. We partnered with religious leaders to adapt an evidence-based curriculum to equip them to address blood pressure in communities. To our knowledge, no previous curriculums have merged religious and health teachings to reduce community blood pressure in sub-Saharan Africa.

Our goal was to use evidence-based educational theories and strategies to produce a culturally relevant, community-partnered health intervention that teaches learning objectives through a religious lens. This paper will describe the learning theories, adult learning principles, and methodologies that guided the development and integration of community feedback on the training curriculum's goals, objectives, and content.

We reference two sets of religious leaders in this paper: those who helped develop and deliver the curriculum and those who will receive the curriculum. The religious leaders who are part of the research team and helped develop, revise, and teach the curriculum are referred to as "religious leader trainers" (RL trainers) and are from Mwanza. In contrast, the leaders recruited from communities to attend and participate in the curriculum are called "religious leader attendees" (RL attendees) and lead congregations in smaller communities surrounding Mwanza. Informed consent to participate is obtained from all RL attendees involved in the research study.

Methods

Starting in 2021, using a community based participatory research (CBPR) framework, the interdisciplinary team of religious leader trainers and health professionals created the curriculum using the following steps: First, the team develops the goals and learning objectives of the curriculum following Kern's framework for medical education [12] and Blooms Learning Domains [9]. Then the team determines the delivery of the curriculum based on Knowle's adult learning principles and evidence-based teaching strategies [10] to ensure the delivery of the content was specific to the trainee population (RL attendees) (Fig. 1).

Community-based participatory research

CBPR is a guiding principle in both the development and execution of the curriculum. This collaborative research approach equitably involves community members and researchers in all stages of the research process [11]. Partners in these processes recognize that each other's unique strengths, skills, and shared responsibilities can enhance understanding of a given issue. In this case, RL trainers, researchers, and healthcare workers integrated their diverse knowledge and skills to develop a curriculum that aims to foster an understanding of cardiovascular health in Tanzania. As members of the community, the RL trainers that participate in the research creation can contribute their understanding of religious culture and context to the creation of the curriculum, including choosing which parts of the Bible and Qur'an to be utilized in the curriculum, as well as culturally appropriate and preferred methods of instruction.

The team developing the curriculum includes doctors, public health researchers, and RL trainers. Initially, the doctors and public health researchers had no formal training in religion or theology but experience in public health research. RL trainers included nine Muslim and nine Christian religious leaders, with the same number of men and women, chosen based on previous participation in health research followed by snowball recruitment. RL

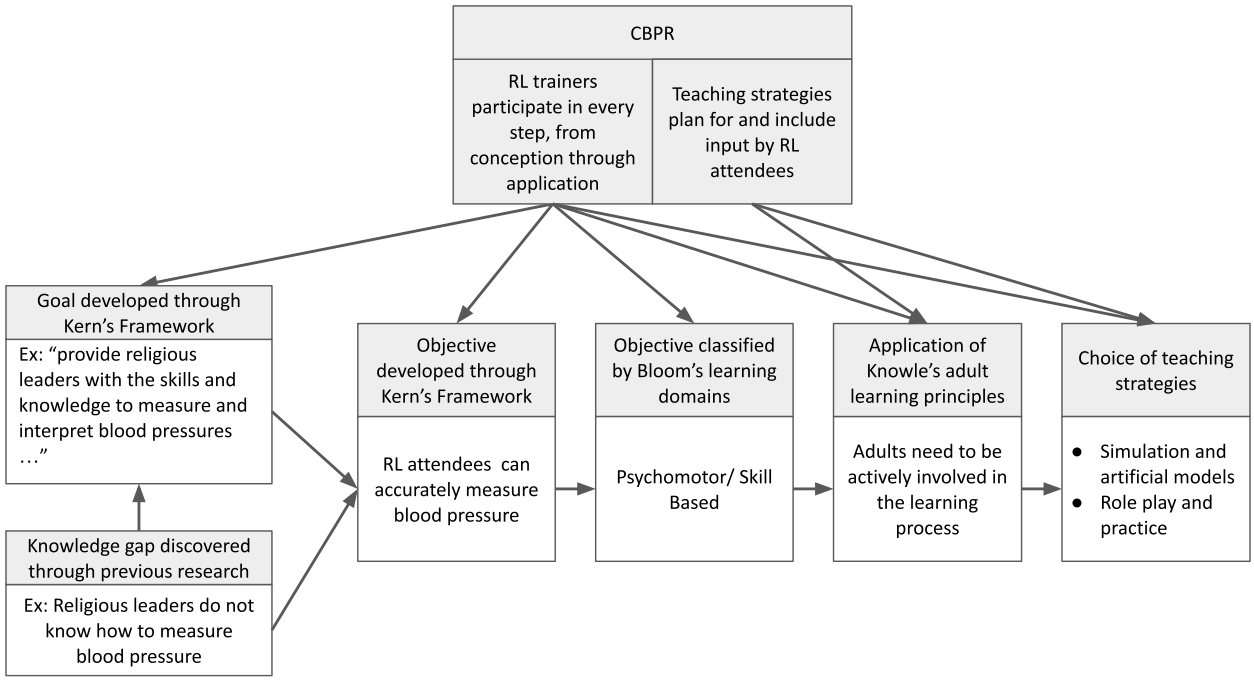


Fig. 1 Diagram of application of CBPR, Kern's learning framework, Bloom's learning domains, and Knowle's adult learning principles used to choose teaching strategies in the curriculum

leaders had little to no training in healthcare or hypertension. The RL trainers and healthcare professionals revised the curriculum through consensus discussions over multiple meetings following the ADAPT-ITT process of revisions as used by many HIV-interventions [12]. The RL trainers participated in practice seminars to improve the delivery of the curriculum and ensure it reflected their experiences. In this way, all team members promoted CBPR principles of co-learning and shared decision-making power amongst its members.

CBPR is also a central in the content development of the curriculum. The activities included in the curriculum use adult learning principles (described below) to integrate key tenets of CBPR, such as knowledge, co-learning, and empowerment, into the curriculum [11]. Throughout the seminar, RL attendees are encouraged to contribute their own experiences and ideas during each seminar to contextualize the information taught in the curriculum and find solutions relevant to their communities.

Establishing goals and objectives using Kern's framework

We first establish the goals and objectives of the training seminar by following Kern's widely used framework for medical curricular development: goals as broad targets and objectives as specific, measurable program outcomes [9]. We create ten specific and discrete learning objectives based on the findings of a study conducted on the knowledge gaps and perceptions about causes, treatment, and complications of hypertension by religious leaders in northwest Tanzania [8].

Classifying learning objectives by Bloom's learning domains

Bloom's learning domains [13] are used to categorize the learning objectives as one or more of Bloom's three learning domains: cognitive (knowledge), affective (attitudes), and psychomotor (skills) domains of learning. These domains guide which specific teaching strategies may be best applied to teach each objective [14]. The three domains are as follows:

> *Knowledge-based* learning objectives aim to cover the foundational information needed by trainees. In this case, knowledge is the medical science and context of hypertension in Tanzanian communities. This includes the epidemiology of hypertension in Tanzania, the drivers of hypertension amongst people in Tanzania, and the management of hypertension, including treatment and culturally appropriate lifestyle modifications to mitigate hypertension in Tanzania. Furthermore, it includes knowledge of religious texts and theology that form the basis of discussion questions surrounding concepts related to hypertension.
>
> *Affective or Attitude-based* learning objectives involve trainees' beliefs and/or opinions, which can

manifest in behavior and determine a person's motivation to learn [13]. This training promotes the attitude that spiritual and physical health, specifically cardiovascular health, can be symbiotic tenets of a community's health. Furthermore, religious leaders have value as messengers of health information and have the potential to influence their communities [8]. *Psychomotor or Skills-based* learning objectives involve the application of knowledge to accomplish a task. In this case, religious leaders need the skills to screen for hypertension, conduct basic counseling around diet and exercise, and refer community members to healthcare centers if necessary. Skills applied in our curriculum are based on the International Society of Hypertension (ISH) global hypertension science guidelines [15].

Application of Knowle's adult learning principles

Knowle's Adult Learning theory, an approach using a series of principles to tailor a curriculum to adults, was applied to make the curriculum meaningful and practical for the target population, RL attendees [10]. These principles focus on the motivations of adult learners and have been broadly and successfully implemented to enhance the learning efficacy and impact of curriculums geared toward adults and professionals [16–18].

Choice of teaching strategies

Bloom's learning domains followed by Knowle's adult learning principles are combined to determine the specific teaching strategies to facilitate teaching each learning objective [23]. The strategies are aligned to the type of learning objective they aim to teach. For example, a learning objective that is psychomotor (e.g. measuring blood pressure) requires strategies that allow physical practice (e.g. practice taking blood pressure of peers). The strategies are suited to students of varying health literacy.

Results

The final curriculum contains a 111-slide PowerPoint presentation, a 14-page take-home flipbook, and a hypertension results card. The seminar days are split into eight sessions with short breaks in between, each focusing on a topic, covering multiple learning objectives (supplement Table 1), and taught by seminar facilitators. Seminar facilitators include RL trainers and health professionals. The creation of the seminar began in 2021 and was used in an intervention starting in 2023.

Curriculum content and structure

All medical information and guidelines follow the ISH global hypertension practice guidelines, which have been explicitly developed for low-resource settings [15]. ISH guidelines define hypertension as a systolic blood pressure equal to or greater than 140 mm of mercury (mmHg) and/or a diastolic equal to or greater than 90 mmHg. A hypertensive emergency is a systolic pressure equal to or greater than 180 and/or a diastolic pressure equal to or greater than 110 mmHg [15].

Goals

Goals are to:

1) create educational sessions and resources that equip religious leaders with spiritual and physical health information related to blood pressure in their communities.
2) provide religious leaders with the skills and knowledge to measure and interpret blood pressures and to teach about lifestyle modifications to address unhealthy norms for diet and exercise.
3) create partnerships between religious leaders and health care workers to organize community blood pressure screenings to address a low perceived risk of hypertension amongst community members and low trust in biomedical care.

Learning objectives

Bases on the goals of the curriculum and knowledge gaps, ten discrete and specific learning objectives (Supplement Table 1) are created:

Learning objectives are as follows and organized as either knowledge (K), skill (S), or attitude (A):

1. Understand the program rationale and research supporting religious leaders' unique role in helping communities prevent hypertension and cardiovascular disease. (K)
2. Define and understand hypertension's prevalence, causes, management, and prevention. (K)
3. Understand and communicate the risks and costs of hypertension (and cardiovascular disease) if left untreated. (K, S)
4. Understand and communicate the role of exercise, diet, and medication in mitigating hypertension and improving blood pressure. (K, S)
5. Communicate with clients and peers about objectives 1–4 in the context of their religious faith. (S, A)
6. Accurately measure blood pressure and interpret results. (S)

7. Understand and implement screening and referral guidelines for hypertension. (K, S)
8. Counsel and refer clients to hospitals and clinics per referral guidelines discussed in objective #7. (S)
9. Confidently communicate about stigmas associated with hypertension and ways to overcome these stigmas. (A)
10. Effectively engage community members in discussions about objectives 1–9. (S, A)

Adult learning principles

Adult learning principles used to guide the creation of the curriculum are:

1. *Adults need to know why they are learning* – The training curriculum emphasizes that hypertension is a leading cause of preventable early morbidity and mortality amongst adults in Tanzania.
2. *Adults are motivated to learn by the need to solve problems* – The training curriculum describes religious leaders as capable and effective leaders who witness poor health in their communities and see the opportunity to help by improving hypertension-related outcomes.
3. *Adults' previous experience must be respected and built upon* – The training curriculum's didactic and practical portions are led by skilled Tanzanian physicians and senior RL trainers who ask the RL attendees to use their life experiences to facilitate learning.
4. *Adults need to be actively involved in the learning process* – The training curriculum includes blood pressure screening and counseling simulations, supervised practice measuring and counseling about blood pressure by Tanzanian healthcare workers, and role play applying these skills in a community setting. RL attendees can practice health communication skills and receive and implement feedback.
5. *Learning approaches should match adults' background and diversity* – All training materials are in Swahili and accommodate a range of health literacy levels, and lifestyle modifications described in the training curriculum are culturally and socioeconomically appropriate and feasible (Fig. 2). Discussion-based learning methods that are consistent with cultural norms are used. Religious texts from the Bible and Qur'an (Fig. 3), chosen by religious leaders in the research group, are part of each discussion and activity to marry public health and theological concepts and emphasize the reciprocity of these fields.

Teaching strategies

Teaching strategies are chosen based on correlation to the corresponding objective with consideration of adult learning principles. Strategies used throughout the seminar include lectures, large group discussions, small group discussions, problem-based learning, inquiry based learning, peer teaching, real-life and supervised clinical experiences, oral reflection, demonstration, simulation and artificial models, and role play (supplement Table 2) (Fig. 4).

Challenges

Timekeeping

RL attendees are given specific times during the seminar to ask questions and discuss during each session. This streamlines the curriculum and prevents running overtime. Leaders are encouraged to write down questions if they think of questions during lecture time. Due to observed challenges learning to use blood pressure cuffs during pilot seminars, increased time was allotted for application and practice.

Materials

The research team made graphics and took photos to demonstrate local application of principles and the proper techniques for measuring blood pressure. This allows the inclusion of local and appropriate foods and activities. The team also created pictures of recommended foods (Fig. 2) and activities that were contextualized to the target populations.

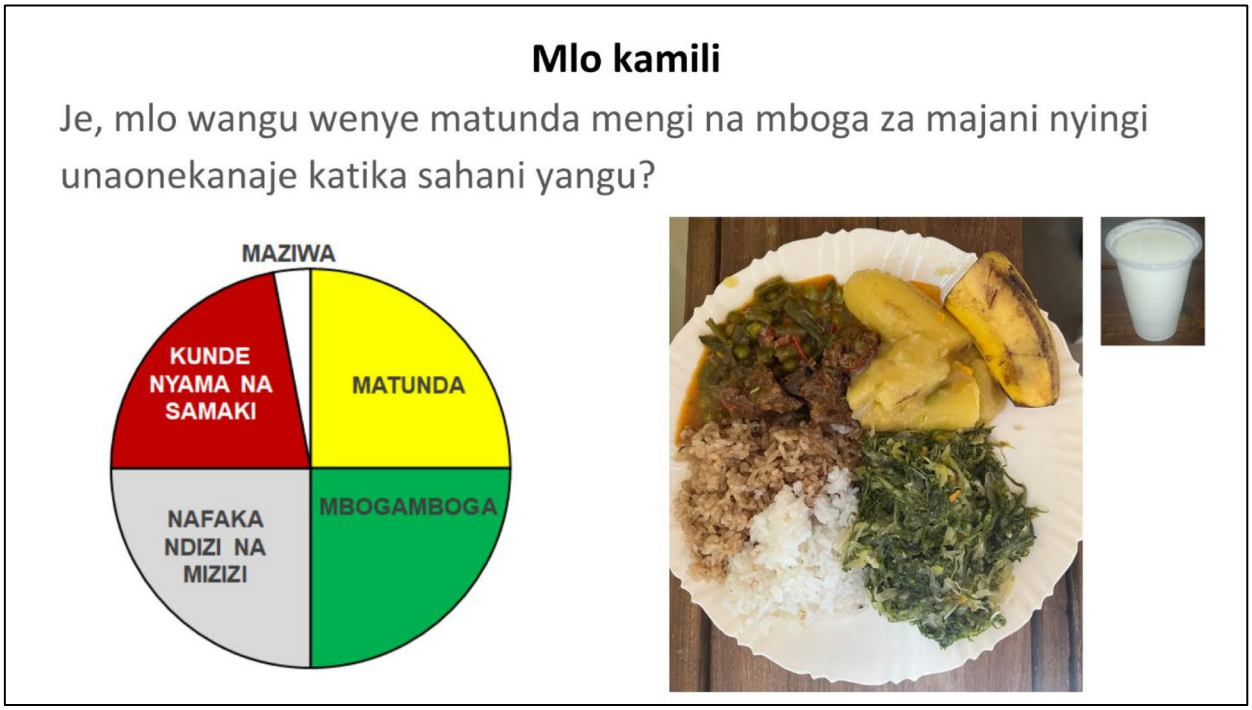
Reimbursement

Participants receive meals during the seminar and compensation for transport costs to and from the seminar location. The meals provided are consistent with the nutritional guidelines provided in the seminar.

Discussion

This manuscript describes how a multidisciplinary team of religious leaders, physicians, and public health practitioners created an evidence-based curriculum to partner with religious leaders to reduce community blood pressure in sub-Saharan Africa. This curriculum is novel because it frames healthcare through a religious lens by utilizing passages from the Qur'an and Bible to teach the health intervention (Fig. 3). The curriculum engages community stakeholders in its creation and dissemination, integrating knowledge across fields to remain consistent with educational best practices and CBPR. Incorporating religion into the curriculum addresses a previously identified barrier to accessing healthcare specifically related to community members' hesitation to access biomedical care with the reasoning that their health status was part

A.



B.

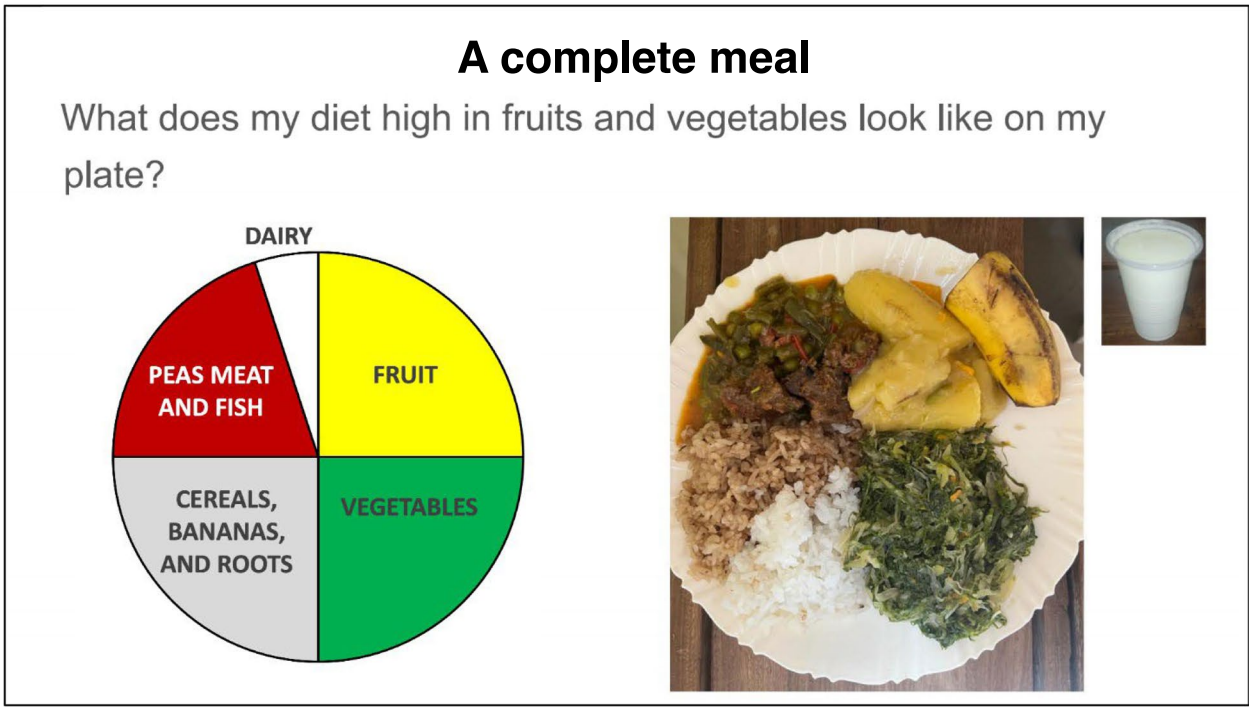


Fig. 2 Suggested meal servings. Suggested servings include fruit, vegetables, peas, meat and fish, dairy, cereals, bananas, and roots. Photo of the meal includes common foods found in the Mwanza region. **A** Original Swahili slide (**B**) English translation of Swahili slide

Fig. 3 Slides utilized during the lecture with passages from the Qur'an and Bible that demonstrate religious views in support of public health practices. **A** Original Swahili slide (**B**) English translation of Swahili slide

of God's plan [8]. As opposed to teaching religion and physical health as mutually exclusive domains, this curriculum frames biomedical care as necessary for spiritual and physical well-being and uses passages from the Bible and Qur'an to demonstrate this (Fig. 3). The curriculum also seeks to build trust between the religious and health-care communities by communicating a common goal and fostering collaboration between health professionals and religious leaders.

A

Utamshaurije?

Ya juu: 139 au ndogo **na** Ya chini: 89 au ndogo	→ *Vizuri*	→ *Muone daktari walau mara moja kwa mwaka*
Ya juu: 140-179 Ya chini: 90-109	→ *Iko juu*	→ *Nenda kwenye zahanati kupata ushauri zaidi ndani ya wiki hii. Pima presha kila wakati*
Ya juu: 180+ **au** Ya chini: 110+	→ *Juu sana (Msaada)*	→ *Ni muhimu kumwona daktari hata kama ni leo au kesho*

Sehemu ya mzingo wa mkono: 31 cm

Presha yangu iko 133 / 93

Tarehe ya leo: 16 / 01 / 2023.

B

How will you advise him?

Top: 139 or lower Bottom: 89 or lower	→ *Good*	→ *Visit doctor once per year*
Top: 140-179 Bottom: 90-109	→ *High*	→ *Go to the local health facility to get more health advice in the coming week. Test your blood pressure regularly.*
Top: 180+ Bottom: 110+	→ *Emergency*	→ *It is important to see the doctor today or tomorrow.*

Arm circumference: 31 cm

My blood pressure is: 133 / 93

Today's Date: 16 / 01 / 2023.

Fig. 4 Slide with practice problem for RL attendees demonstrating problem-based learning and role play teaching strategies. RL attendees are given a hypothetical congregant's blood pressure, then asked to determine which category the congregant would fall into (good, high, emergency). They will then role-play counseling their congregant based on the corresponding assessment. **A** Original Swahili slide (**B**) English translation of slide

We incorporate CBPR practices by partnering with RL trainers as co-researchers throughout the process. CBPR accounts for the social context of the curriculum and the relationships between the community, health professionals, and religious entities [19–21]. CBPR has been effective in other interventions geared toward cardiovascular health, including in partnership with religious leaders in urban and rural settings in the United States

[20, 22]. The RL trainers who helped create the curriculum contributed what can be called "culturally bound knowledge" [23]. While health professionals have access and education to "scientific knowledge," religious leaders bring their knowledge of the community's particular values, desires, and needs to the seminar. Throughout meetings and practice seminars, the leaders gave advice that helped streamline the process, added important insights into community values, and provided a layperson's perspective of medical teaching. For example, the RL trainers requested increasing direct references to the Qur'an and the Bible. They also added slides to the curriculum regarding the financial advantages for community members to treat high blood pressure before it progressed to a more expensive and disabling condition. Through participation in creating the curriculum, the RL trainers could use their knowledge of their community's needs to increase its relevance to the communities who receive it.

Along with CBPR, adult learning theory was central in designing curricular activities. Little is written about educational best practices for health workers aiming to work with religious leaders, and we needed our curriculum to be usable for both Muslim and Christian populations. Religious leaders are unique learners because although they are not medically trained, they understand the most appropriate ways to tailor the medical knowledge to their communities. The seminar needed enough flexibility so that each leader, regardless of their identity (gender, religion, health literacy), could participate and return to their communities equipped with the skills to teach about, measure, and support blood pressure control. We used broadly validated educational strategies to implement stakeholders' feedback and cater to adult learning. Through the creation of this curriculum, we demonstrate that adult learning theory can be applied consistently with CBPR.

The seminar was created to be short enough not to use too much participants' time but long enough to accomplish the course's goals. Adult learning and educational strategies often involve thoughtful discussions and activities. Although they are better for reinforcing concepts, the time required to complete them can vary based on the facilitation required by participants. The curriculum had to balance the depth and breadth of information to encompass all necessary material, remain on schedule, and still cover all learning objectives. Not all aspects of hypertension management were included or emphasized. Instead, input from the community stakeholders, like the RL trainers, who provided continuous feedback on the curriculum, guided which topics would be most impactful and essential for communities.

Limitations of our curriculum include the need for appropriate guidelines, materials, and graphics for the population. Our research team took photos of local dishes and markets to better represent local foods and created step-by-step instructional photos to demonstrate techniques using settings and materials available at the sites. We carefully considered each curriculum component to make the most culturally tailored intervention possible and to avoid the risk of alienating our subjects through unfamiliar and inappropriate design aspects.

In the future, we recommend incorporating community leaders into the building and dissemination of healthcare interventions, as well as using an interdisciplinary approach that makes use of existing education literature. We are currently conducting a clinical trial (clinicaltrials.gov, NCT05416372) to determine if implementing this curriculum can cause a significant reduction in the average blood pressure of a community whose leaders receive the curriculum versus a community whose leaders do not. Other groups may seek to incorporate other evidence-based literature into their interventions in order to give the best possible chance of success to their outcomes and make most efficient use of resources.

Conclusions

We hope this paper is a roadmap for creating an evidence-based curriculum to facilitate unique community-based partnerships. The seminar provides activities and discussions to strengthen the relationship between clinics and religious institutions. It could serve as a foundation for interventions in areas of healthcare beyond hypertension, such as diabetes and family planning. Religious leaders influence healthcare worldwide. Building a solid partnership with religious institutions opens the door to a wealth of cultural knowledge and the ability to reach previously underserved communities. As CBPR continues to become more widely utilized across public health, researchers must use evidence-based practices across all domains of their work. Although it may be easier to create purely lecture-based curriculums, engaging with the community and borrowing knowledge from across fields, such as education research, is vital to maximizing the benefit of interventions.

Abbreviations

RL trainers	Religious leaders who are part of the research team and are included in the authorship of this publication and helped develop, revise, and teach the curriculum.
RL attendees	The leaders recruited from communities to attend and participate in the curriculum are and lead congregations in smaller communities surrounding Mwanza.
CBPR	Community-based participatory research
ISH	International Society of Hypertension
K	Knowledge
S	Skill
A	Attitude
Ex.	Example

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-06836-1.

Supplementary Material 1.

Supplementary Material 2.

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Authors' contributions
EC and MU created the initial content, structure, and form of the curriculum, provided pedagogical expertise, and were major contributors in writing the manuscript. BK, EO, SK, FK, and DM were responsible for revising the curriculum with cultural expectations and community input. AM oversaw incorporation of theological aspects. All authors edited, read, and approved the final manuscript. RP and JD contributed significantly to the writing, editing, and revising of the manuscript, and oversaw all aspects of the project.

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Data availability
Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate
This curriculum will be tested in a trial that has been approved by ethics committees at Weill Cornell Medicine in New York (#21–06023670) and at the National Institute for Medical Research in Dar es Salaam (NIMR/HQ/R8.a/Vol. IX/3807). Those working with us to create the program were community partners and collaborators on program creation. No data was collected specifically from them and informed consent is not relevant.

Competing interests
The authors declare no competing interests.

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