

RESEARCH

Open Access



Feasibility of community-based hypertension screening and referral by village health teams in eastern Uganda: A quasi-experimental study

Andrew Marvin Kanyike^{1,2,3,4*}, Raymond Bernard Kihumuro^{1,3}, Timothy Mwanje Kintu^{3,5}, Lee Seungwon^{4,6}, Ashley Winfred Nakawuki⁷, Kevin Apio³ and Richard Katuramu⁸

Abstract

Background Uganda has a high prevalence of hypertension (HTN) and low diagnosis rates due to healthcare system deficiencies, like scarce diagnostic resources and a shortage of health workers. Task-shifting roles to community health workers (CHWs) could potentially fill gaps in the control of HTN, but this is still underexplored. This study determined the feasibility of leveraging CHWs, called Village Health Teams (VHTs), for HTN screening and referral in Eastern Uganda.

Methods We conducted a quasi-experimental study from June to November 2023 in Bugembe town council, Jinja City, Eastern Uganda. Twelve VHT members were trained and deployed to screen and refer hypertensive patients in their communities. The training covered the basics of hypertension, blood pressure measurement, and referral protocols. VHTs screened adults aged 18 years or older from their homes or workplaces using automatic blood pressure machines. Participants with elevated blood pressure ($\geq 140/90$ mmHg) on two measurements 15 min apart were referred to a local health center for diagnosis and management. Data was collected on participant demographics, blood pressure readings, and screening-referral cascade and analyzed using STATA 15.0. Change in the number of newly diagnosed patients at the facility before and after the intervention was assessed using a paired t-test. A p-value < 0.05 was considered statistically significant.

Results The VHTs screened 5,215 individuals, with a mean age of 34 (SD: 12.3) years. The prevalence of elevated blood pressure (BP) was 22.4% ($n = 1167$). Factors associated with elevated BP were older age, being male, having had previous blood pressure measurements, and alcohol use. Approximately 23.8% ($n = 278/1167$) of participants with elevated BPs accepted referral, 24.8% ($n = 69/278$) reached the facility, and most of these ($n = 65/69$, 94.3%) were confirmed to be hypertensive. The monthly average number of new hypertensive patients at the health centre increased significantly from 4.6 ± 0.9 to 12.7 ± 1.4 four months before and after the intervention ($t = 4.37$, $p = 0.0014$).

*Correspondence:

Andrew Marvin Kanyike
andrewmarvinkanyike@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Conclusion VHTs can reliably screen for HTN with appropriate training. However, strategies are needed to improve the low referral rates post-screening in the community to achieve the desired outcomes of early diagnosis and management of HTN.

Keywords Village health teams, Community health workers, Hypertension, Screening, Referral

Background

Hypertension (HTN) is a significant global public health issue, affecting approximately one billion individuals worldwide [1]. While the global prevalence of HTN stabilized from 1999 to 2019, it continued to rise in low- and middle-income countries (LMICs), with sub-Saharan Africa (SSA) experiencing particularly sharp increases—reaching 48% among women and 34% among men by 2019 [2]. In Uganda, a national survey reported that 26.4% of the population suffers from HTN, yet 76.1% are unaware of their condition [3].

In Uganda, effective control of hypertension is hampered by systemic deficiencies within the primary healthcare system [4–6]. A needs assessment across 53 health facilities revealed that fewer than half were equipped with essential diagnostic tools such as blood pressure (BP) machines, and only a minority had established guidelines for HTN management [7]. In addition, the country faces a critical shortage of healthcare professionals, with a doctor-patient ratio of 1:25,000 and a nurse-patient ratio of 1:11,000 [8]. These figures can't meet the WHO's recommended threshold of 4.45 skilled health workers per 1,000 population needed to achieve universal health coverage [9]. This shortage creates a gap in the human resources needed to screen, diagnose, and manage HTN effectively.

Given these challenges, task shifting specific healthcare roles to community health workers (CHWs)—Public health workers selected by community members who live in their communities—emerges as a viable and cost-effective strategy [10]. The WHO supports task shifting to expand health service coverage, particularly in resource-limited settings like Uganda [10]. This approach has shown positive results in controlling infectious diseases, such as HIV and Tuberculosis (TB) [11, 12]. Furthermore, in Ethiopia, adequately trained CHWs effectively detected and diagnosed HTN, demonstrating comparable proficiency to qualified health professionals [13]. This evidence, coupled with the fact that early diagnosis and control of hypertension is a mainstay in reducing cardiovascular deaths [14, 15] underpin the importance of utilizing CHWs to combat the burden of HTN.

In Uganda, CHWs called Village Health Teams (VHTs), have been engaged in many public health initiatives to enhance community health, such as effectively improving maternal and child health outcomes and helping reduce the burden of malaria and tuberculosis [16, 17]. With the epidemiological shift towards Non Communicable

Diseases (NCDs), VHTs could be crucial in community-based HTN-related initiatives. Although studies done in rural Uganda have demonstrated that VHTs can effectively screen and manage hypertensive patients, their full potential remains largely underexplored [18–20]. The studies have focused on VHT-led community HTN management, including follow-up home visits. However, none have explored the feasibility of post-screening referrals and the potential challenges. While VHTs are uniquely positioned for task shifting roles, their selection based on trust and influence, may limit their capacity to undertake complex tasks like HTN management in Uganda. Therefore, recognizing the core function of instituting VHTs—linking communities to healthcare, in this study, we trained and deployed VHTs to actively screen and refer hypertensive patients in their community to a health center for diagnosis and further management in Eastern Uganda. We determined the feasibility of VHTs in screening and referring hypertensive patients.

Methods and materials

Study design

We employed quantitative techniques in a quasi-experimental study with a pre- and post-intervention evaluation design, without a comparison group, from June 2023 to November 2023. VHTs were trained to actively screen and refer patients with elevated blood pressures (suspected hypertension) in their communities to the health center to confirm the diagnosis and further manage the condition.

Study setting

The study was conducted in Jinja City, Bugembe town council in Eastern Uganda. Jinja is a rapidly urbanizing area in Uganda due to its tourist attractions, mainly the source of the River Nile. Bugembe town council comprises seven villages with an estimated population of 45,600. Four villages were purposively selected based on their proximity to Bugembe Health Center (HC) IV, the referral facility for the participants identified with HTN. Bugembe HC IV has been operating a weekly HTN and Diabetes Mellitus(DM) clinic since 2021, with 261 registered patients before the initiation of this intervention. Health Center IVs in Uganda's health system lie in the health sub-district, with in-patient and outpatient facilities, operating theatres, and general doctors able to provide the first level of comprehensive care.

VHTs are the first point of contact with Uganda's health system, bridging communities with the larger healthcare system by raising awareness or assisting referrals. Their communities select them through a process facilitated by local councils. The selection criteria emphasize that VHTs should be exemplary, trustworthy, and respected within their communities. They should also be able to fluently read and write in their local language, facilitating effective communication and participation in training programs. They undergo training provided by the Ministry of Health to equip them with the necessary skills for delivering primary healthcare services. VHTs are primarily volunteers and receive a monthly allowance of 10,000 Uganda shillings (approximately 3 US dollars) from the government. However, they often receive additional monetary or non-monetary compensation for various projects they participate in alongside non-governmental implementing partners. In this study, they were provided with a modest fixed monthly allowance of Ugx 50,000 (USD 12) during the active screening conducted in the communities. This work was done alongside their other routine duties. Their roles include health education, mobilizing communities for health service utilization, managing common health conditions, and following up on patients [21].

Study population

This study included VHTs of Bugembe town council, Jinja City, Eastern Uganda. Each village in Bugembe has three designated VHT members, and twelve from four selected villages were included in the study. The VHTs were permanent residents of these villages and affiliated with Bugembe HC IV, a public health facility. The study population for screening was adults ≥ 18 years old who were permanent residents in their community and willing to participate. These were found either at home or in trading centers at their places of work [21].

Study procedures and data collection

Baseline A comprehensive training program was developed in consultation with a multidisciplinary team, including an internal medicine physician, two general practitioners, two nurses, a health inspection officer, and two VHT members. We developed materials, including a training booklet, power point slides, and data collection tools (e.g., referral forms). A three-day workshop was conducted to train VHTs by the study team using didactic and practical sessions covering HTN definition, signs, symptoms, risk factors, BP measurement techniques, interpretation of BP values, health lifestyle counseling, and referral criteria delivered by a bilingual team familiar with Lusoga (the local language) and English. On the first day, they learned about the fundamental concepts of HTN. On the second day, they covered the procedures for measur-

ing and interpreting BP values. The third day focused on practical sessions with an automatic BP machine. Each VHT measured the BP of three colleagues and received feedback. Pre- and post-training multiple-choice tests assessed the VHTs' knowledge of trained topics. We also conducted a retrospective analysis of all HTN clinic health records at Bugembe HC IV to determine the previous diagnosis rates of HTN and enrollment into care.

Intervention Each VHT was given an electronic automatic BP machine and deployed into their communities to educate, screen, and refer people with hypertension to the health center. For each screened person, the VHTs recorded the BP readings, their demographics (Age and sex), risk factors (Smoking, alcohol use, and history of hypertension among first degree relatives), and if their BP had been measured before in their lifetime. Every participant with elevated BP ($\geq 140/90$ mmHg) on two different measurements at least 15 minutes apart was considered a suspected case of HTN and referred to the participating health center (Bugembe HC IV). HTN was categorized into stage 1 (systolic BP ≥ 140 -159mmHg or Diastolic BP ≥ 90 -99mmHg) and stage 2 (systolic BP ≥ 160 mmHg or Diastolic BP ≥ 100 mmHg) [22].

Upon referral, the VHTs retained a carbon copy of the referral form and were required to do a follow-up to ensure the referred patients reached the facility. If the identified patient declined to be referred, they would probe and record on the form the reason for their refusal to visit the facility. Qualified health workers double-check BP measurements twice for diagnosis confirmation at the health facility and appropriate enrollment into care, either starting on antihypertensive or lifestyle counseling and monitoring. The health workers completed the referral forms by recording their measured values. The VHT screening activities were supervised weekly by the study coordinator to monitor their screening progress and address any logistical challenges related to the BP machines. Additionally, monthly evaluation meetings were held with the VHTs, principal investigator, co-investigators, and study coordinator. These meetings aimed to identify challenges and share best practices to enhance the outcomes of the intervention.

Endline Trained research assistants (RAs) collected the completed referral forms with BP values recorded by the VHTs and qualified health workers from the health center NCD clinic. The RAs also reviewed the clinic records to extract the number of newly diagnosed hypertension patients enrolled in treatment during the intervention period.

Standard of care Health workers (general practitioners, clinical officers, and nurses) usually detect HTN when

patients come to the health facility seeking medical care or for other reasons. The Ministry of Health in Uganda requires screening for HTN in all patients visiting the hospitals as part of routine care [22].

Study outcomes

The study outcomes included the number of individuals screened and the proportion who had suspected hypertension (elevated blood pressures) and referral cascade (how many were referred, arrived, enrolled, and started on treatment).

Data analysis

The data were entered into Microsoft Excel, cleaned, coded, and imported into STATA version 15 for analysis. The data was described using frequency, percentages, and means with standard deviations and presented as text, tables, and graphs. The prevalence of elevated blood pressure was calculated as a percentage proportion of those with elevated BPs out of the total number screened. The screening and referral cascades were analyzed descriptively to determine the proportions and percentages of those with elevated BPs who were referred, reached the hospital, and enrolled in care. A cumulative frequency curve was plotted to demonstrate the change in the number of newly diagnosed patients at the facility before and after the intervention. An independent t-test was used to evaluate the significance of the changes in HTN diagnosis pre- and post-intervention. A p-value of less than 0.05 was used to determine statistical significance.

Table 1 Sociodemographic characteristics of participants that were screened by VHTs (N = 5215)

Variable	Frequency	Percentage
Age (Mean ± SD)	34.7 ± 12.3	
18–25	1338	25.7
26–39	2282	43.8
40–64	1446	27.7
≥ 65	149	2.9
Sex		
Female	3584	68.7
Male	1631	31.3
Ever Had Blood Pressure Measured		
Yes	2388	45.8
No	2827	54.2
Alcohol Use		
Yes	752	14.4
No	4463	85.6
Cigarette Smoker		
Yes	298	5.7
No	4917	94.3
Known Family History of Hypertension		
Yes	2019	38.7
No	3196	61.3

Results

Characteristics of participants screened by VHTs

Over four months of active screening, 5,215 individuals were screened for hypertension. Their mean age was 34 (SD: 12.3) years, with the range of 26–39 years ($n = 2282$, 43.8%). The majority were females ($n = 3584$, 68.7%), had never had their blood pressure measured before ($n = 2827$, 54.2%), and had no known family history of hypertension ($n = 3196$, 61.3%). About 14% (752) were taking alcohol, and 5.7% (298) were cigarette smokers (Table 1).

Prevalence of elevated BPs and associated factors among participants screened by VHTs

Of the screened community members, 1167 (22.4%) were found to have elevated BPs (suspected hypertension). They had a mean age of 41 (SD: 14.2) years, most in the age range of 40–64 years ($n = 520$, 44.6%). The mean systolic and diastolic BP were 146 (SD: 19.2) mmHg and 95 (SD: 11.6) mmHg respectively. Blood pressures of most participants were categorized under stage 1 HTN ($n = 784$, 67.2%). About 83 (7.1%) were smokers, 223 (19.1%) alcohol users, and 502 (43.0%) had a family history of HTN (Table 2).

With increasing age, there was a progressive increase in the risk of having elevated BPs. Compared to individuals aged 18–25 years old, the adjusted prevalence ratios were 1.71 (95% CI: 1.39–2.10) for 26–39 years, 3.89 (95% CI: 3.15–4.80) for 40–64 years, and peaked at 8.67 (95% CI: 5.95–12.63) for ≥ 65 years. Other factors associated with elevated BPs were being male (aPR: 1.29, 95% CI: 1.10–1.51), using alcohol (aPR: 1.38, 95% CI: 1.14–1.66), and having had prior blood pressure measurements (aPR: 1.58, 95% CI: 1.36–1.84) (Table 2).

Referral and diagnosis of hypertension at the health center

Of the 1167 individuals identified with elevated blood pressures, 278 (23.8%) agreed to be referred to Bugembe HC IV by the VHTs for further assessment and potential enrollment in care. Among those referred, a minority ($n = 69$, 24.8%) made it to Bugembe HC IV. Within this group, most participants ($n = 65$, 94.2%) were found to be hypertensive, and 56.5% ($n = 39/65$) of those were promptly started on antihypertensive treatment, while 26 participants (37.7%) were first initiated on non-pharmacological management (counseled on lifestyle modifications and scheduled for follow-up). Four individuals (5.8%) had normal blood pressure readings upon reassessment at the health facility, as shown in Fig. 1.

Figure 2 shows a cumulative increase in new HTN patients monthly at the health center during the intervention. Compared to the preceding four months, the average number of new HTN patients per month after

Table 2 Social demographic distribution of participants identified with elevated blood pressure and its associated factors ($N = 1167$)

Variable	Elevated Blood Pressure Yes n (%)	Crude PR (95% CI)	Adjusted PR (95% CI)
Overall	1,167 (22.4)		
Mean \pm SD Systolic BP (mmHg)	146.8 \pm 19.2		
Mean \pm SD Diastolic BP (mmHg)	95.3 \pm 11.6		
Age (Mean \pm SD)	41.6 \pm 14.2		
18–25	142 (12.2)	1.00	1.00
26–39	420 (36.0)	1.89 (1.54–2.32)	1.71 (1.39–2.10) *
40–64	520 (44.6)	4.72 (3.85–5.80)	3.89 (3.15–4.80) *
≥ 65	85 (7.2)	11.18 (7.74–16.16)	8.67 (5.95–12.63) *
Sex			
Female	759 (65.0)	1.00	1.00
Male	408 (35.0)	1.24 (1.08–1.42)	1.29 (1.10–1.51) *
Ever Had Blood Pressure Measured			
Yes	678 (58.1)	1.89 (1.66–2.16)	1.58 (1.36–1.84) *
No	489 (41.9)	1.00	1.00
Alcohol Use			
Yes	223 (19.1)	1.57 (1.32–1.86)	1.38 (1.14–1.66) *
No	944 (80.9)	1.00	1.00
Cigarette Smoker			
Yes	83 (7.1)	1.36 (1.05–1.77)	1.16 (0.87–1.53)
No	1,084 (92.9)	1.00	1.00
Family History of Hypertension			
Yes	502 (43.0)	1.25 (1.10–1.43)	1.15 (1.00–1.32)
No	665 (57.0)	1.00	1.00
Blood Pressure Categories			
Stage 1_ Hypertension	784 (67.2)		
Stage 2_ Hypertension	383 (32.8)		

* Statistically significant at $p < 0.05$. Alcohol use: If the participant had ever drunk alcohol and had taken any in the last three months. Cigarette Smoker: If the participant has ever smoked and had smoked in the past three months

starting the intervention increased significantly (4.6 ± 0.9 versus 12.7 ± 1.4 , $t = 4.37$, $p = 0.0014$).

Discussion

This study demonstrates the feasibility of VHTs conducting HTN screening and referrals. The VHTs effectively screened participants, and among those referred with elevated blood pressure who reached the facility, the majority (94.2%) were confirmed to be hypertensive. This aligns with a study from Ethiopia, where trained CHWs detected high BPs as effectively as trained health workers [13]. This success could be attributed to their training, consistent with other studies that have also trained CHWs [13, 18]. In addition, studies conducted in rural areas of Uganda have shown that VHTs can effectively screen and manage hypertensive patients [18–20]. Therefore, with proper training, VHTs can significantly help screen for HTN in Uganda and similar low-resource settings [20, 23]. Scaling up this intervention and integrating it into routine healthcare could further enhance screening coverage and early diagnosis of HTN to improve community health.

This study revealed that 22.4% of those screened had suspected hypertension (elevated blood pressures), similar to the HTN rates (22%) reported in a rural area of Kisoro in Western Uganda [19]. Another study in rural Islands in Uganda found a higher proportion of HTN (28%). The studies indicate a high prevalence of HTN in Ugandan communities that needs urgent attention. The differences in HTN prevalence could be explained by the differences in urbanization and lifestyle adaptations that drive the risks of HTN, as reflected in the 2014 national survey [3]. However, this study did not stratify the sample by age, and the reported prevalence is a crude estimate. Age-adjusted prevalence would provide a more accurate basis for comparison, as HTN prevalence is strongly influenced by age.

In addition, this study revealed that more than half (54.2%) of the participants had never had blood pressure measurements in their lifetime, and 41.9% of those found with suspected hypertension had also never screened and were unaware. Similar studies in Western Uganda (84%) and rural Islands of Uganda (89%) reported higher prevalence of unawareness [13, 19]. These studies were conducted in more rural areas than our study, which could

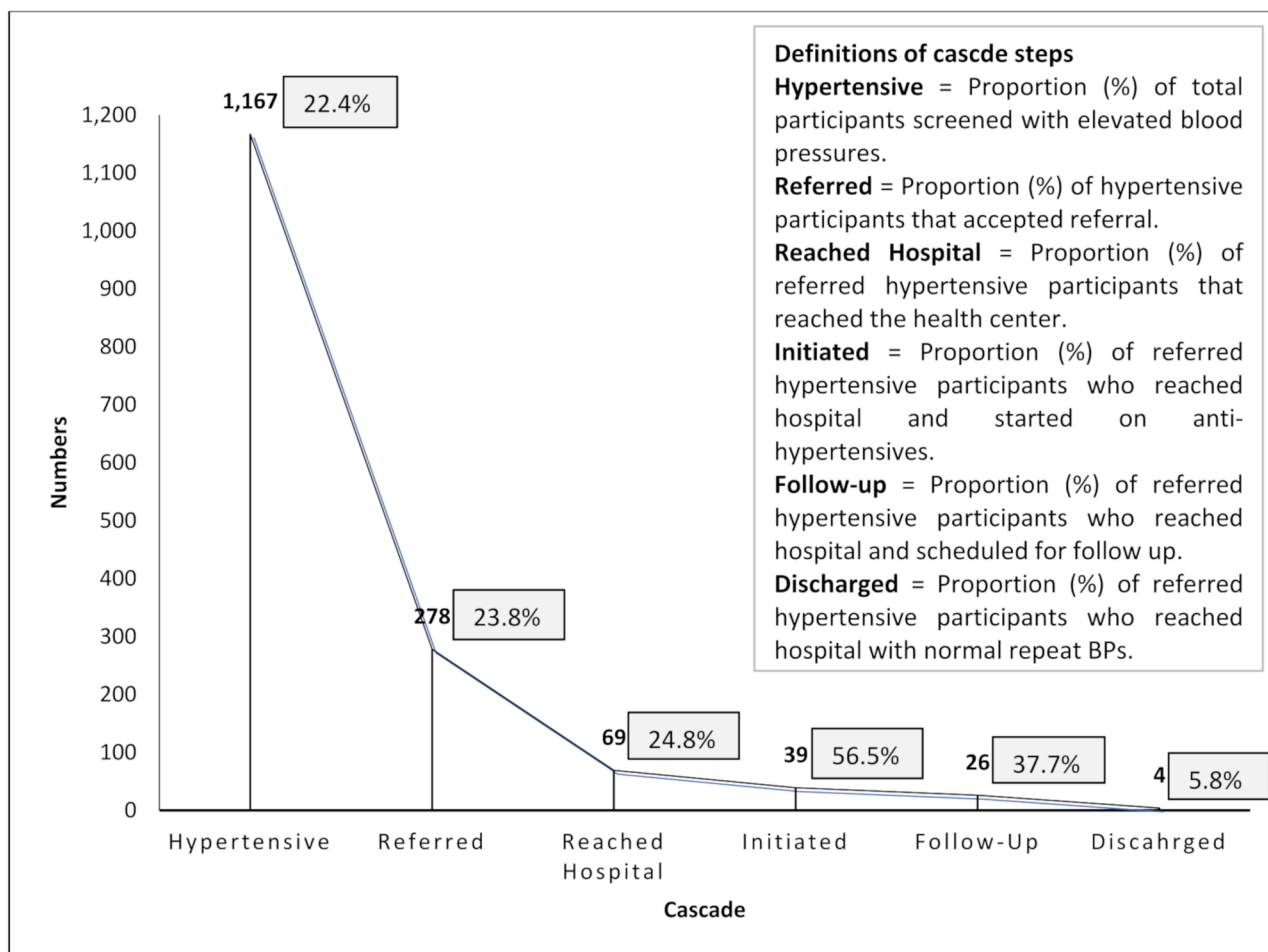


Fig. 1 Cascade of the screening and referral steps by VHTs and diagnosis and enrollment into care at the facility by health workers

explain the differences in unawareness rates. People in rural areas often live far from health facilities and have poor health-seeking behaviors [18]. However, health facilities in rural areas are also not well equipped to screen and manage HTN [7]. Efforts to reduce HTN need reinforcement across individual factors and the entire health system in Uganda. Empowering and motivating CHWs to screen and provide education on HTN could improve awareness, as they have extensive reach to the last mile in their communities [24].

Furthermore, efforts to address HTN should be informed by understanding the demographic and behavioral risk factors associated with the condition. In our study, we found that increasing age, male gender, alcohol use, and a family history of HTN are significant factors linked to elevated blood pressure. A similar study utilizing VHTs for HTN screening reported older age as a factor associated with having high blood pressure [18]. Therefore, tailored community education programs could effectively target older adults and men at higher

risk, providing them with better information on the risks and management of HTN.

Despite successful screening, there were challenges in referring individuals with suspected hypertension for further assessment and treatment. Approximately 23.8% of patients found with suspected hypertension accepted referral. Low referral rates post-hypertension screening is a significant issue, particularly in LMICs. In a large community study conducted in Uganda and Kenya, 92% of participants screened hypertensive and received a clinic appointment, but 42% were subsequently linked to care [25]. In Tanzania, 34% of hypertensive individuals attended a formal healthcare provider within a year of being advised to seek care. The primary reasons for low utilization were the absence of symptoms and the cost of treatment [26]. The low referral rates observed during the active screening process in this study were not systematically evaluated to quantify the underlying reasons. However, a follow-up qualitative study, beyond the scope of this article, was planned to explore these reasons in depth. Findings from that study will be reported in a

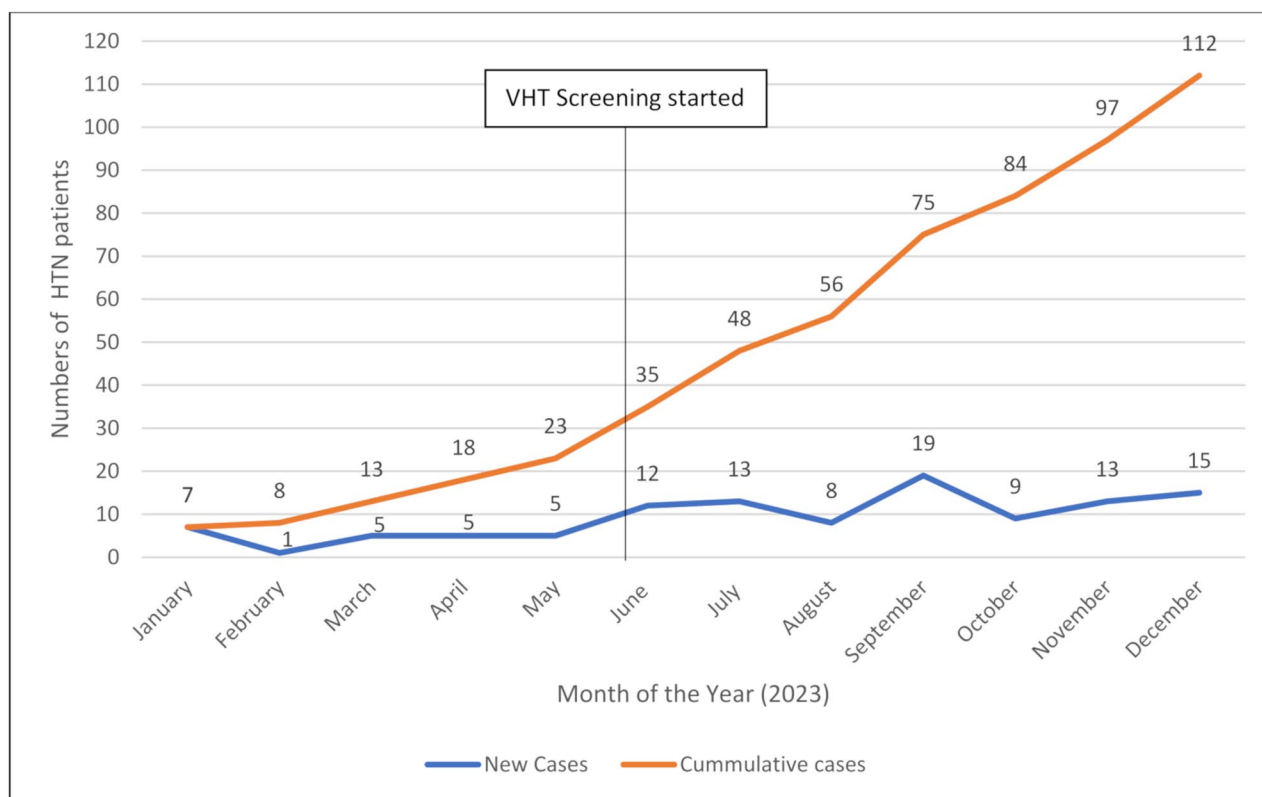


Fig. 2 Line graph showing number of new and cumulative hypertension patients at the health center before and after the VHTs commenced screening

subsequent article and guide the development of strategies to improve this intervention.

Strengths and limitations

This study's strength lies in the comprehensive training of VHTs, which provided reliable blood pressure values for screened participants and their ability to screen a relatively large number of participants. However, the study has some limitations. The absence of a control group limits the ability to attribute observed changes directly to the intervention, as external factors could have influenced the outcomes. The absence of age stratification in the sampling limits the generalizability of the reported elevated BP (suspected hypertension) prevalence, as the findings may not accurately reflect the true prevalence in the broader population. The study was conducted over a relatively short period (four months), which may not capture long-term adherence to VHT-led referral advice. These factors should be considered when interpreting the findings and planning future research. In addition, we only followed up with patients referred to Bugembe Health Center IV. The lack of strategies to include participants who visited private facilities limited the comprehensive evaluation of post-referral assessments. Furthermore, we didn't follow up individuals who declined referral, raising the possibility that some of them eventually sought

care independently, potentially resulting in higher referral rates than reported. The reliability of blood pressure measured by VHTs could have been better assessed if health workers performed repeat measurements on all screened participants in real-time, but logistics didn't allow for this. Future studies in Uganda could build on these findings.

Conclusion

The VHTs can effectively screen for HTN when given appropriate training. Upscaling this intervention and incorporating it into the healthcare system could improve screening coverage and early diagnosis of hypertension. However, significant enhancements are needed to ensure an effective post-screening referral process. Only a small fraction of those with suspected hypertension followed through with referrals to healthcare facilities. Exploring strategies to enhance referral rates post-screening from the community is crucial for the intervention to achieve its desired outcomes of early diagnosis and treatment to prevent the highly morbid and fatal complications of hypertension.

Abbreviations

HTN	Hypertension
CHW	Community Health Worker
VHT	Village Health Team

LMIC	Low-and Middle-Income Country
SSA	Sub-Saharan Africa
BP	Blood Pressure
WHO	World Health Organization
NCD	Non-communicable Disease
HC	Health Center

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s41043-025-01028-5>.

Additional file 1: While writing this study, we followed a checklist for Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Acknowledgements

We would like to thank the village health team members who participated in this research study and Musana Sophie, the Communities for Child Birth international administrator who coordinated the VHTs.

Author contributions

All authors made substantial contributions to the manuscript. AMK, RBK, and TMK conceptualized the study. AMK, RBK, TMK, and RK designed the study protocol. AWN, KA, AMK, and RBK participated in data collection. RBK, and TMK analyzed the data. RK, SL, AMK, RBK, AWN and TMK drafted the original manuscript. All authors reviewed and approved the final manuscript.

Funding

This work was supported with an alumni community action award as part of the Aspire Institute Leader's program founded at Harvard University.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was approved by the Busitema University Faculty of Health Sciences Research Ethics Committee (BUFHS-REC) under number BUFHS-2023-75. Additional permission was obtained from the Jinja City health offices and the administration of Bugembe Health Center IV. All participants were enrolled in the study after informed consent was obtained. They were told that participation was voluntary and that they could withdraw anytime.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Internal Medicine, Mengo Hospital, Kampala, Uganda

²HIV, Infectious Diseases, and Global Health Implementation Research Institute, Washington University in St. Louis, St. Louis, USA

³Way Forward Youth Africa Limited, Kampala, Uganda

⁴Communities for Childbirth International, Jinja, Uganda

⁵Mulago Hospital, Kampala, Uganda

⁶University of Pennsylvania, Philadelphia, PA, USA

⁷Department of Nursing, Faculty of Health Sciences, Busitema University, Mbale, Uganda

⁸Department of Internal Medicine, Faculty of Health Sciences, Busitema University, Mbale, Uganda

Received: 26 May 2024 / Accepted: 25 July 2025

Published online: 01 October 2025

References

1. Zhou B, Bentham J, Di Cesare M, Bixby H, Danaei G, Cowan MJ, et al. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *Lancet*. 2017;389:37–55. [https://doi.org/10.1016/S0140-6736\(16\)31919-5](https://doi.org/10.1016/S0140-6736(16)31919-5).
2. Zhou B, Carrillo-Larco RM, Danaei G, Riley LM, Paciorek CJ, Stevens GA, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 2021;398:957–80. [https://doi.org/10.1016/S0140-6736\(21\)01330-1](https://doi.org/10.1016/S0140-6736(21)01330-1).
3. Ministry of Health Uganda. Non-Communicable Disease Risk Factor Baseline Survey Uganda 2014 REPORT. 2014.
4. Stephens JH, Alizadeh F, Bamwine JB, Baganizi M, Chaw GF, Cohen MY, et al. Managing hypertension in rural Uganda: realities and strategies 10 years of experience at a district hospital chronic disease clinic. *PLoS ONE*. 2020;15:1–18. <https://doi.org/10.1371/journal.pone.0234049>.
5. Ssinabulya I, Nabunnya Y, Kiggundu B, Musoke C, Mungoma M, Kayima J. Hypertension control and care at Mulago hospital ambulatory clinic, Kampala-Uganda. *BMC Res Notes*. 2016;9:487. <https://doi.org/10.1186/s13104-016-2293-y>.
6. Majumdar U, Nanyonga Clarke R, Moran AE, Doupe P, Gadikota-Klumpers DD, Gidio A, et al. Hypertension screening, prevalence, treatment, and control at a large private hospital in Kampala, Uganda: A retrospective analysis. *PLOS Global Public Health*. 2022;2:e0000386. <https://doi.org/10.1371/journal.pgph.0000386>.
7. Rogers HE, Akiteng AR, Mutungi G, Ettinger AS, Schwartz JI. Capacity of Ugandan public sector health facilities to prevent and control non-communicable diseases: an assessment based upon WHO-PEN standards. *BMC Health Serv Res*. 2018;18:606. <https://doi.org/10.1186/s12913-018-3426-x>.
8. UBOS. Uganda national household survey report 2016 / 2017. In: 2018 [Internet]. 2018 [cited 8 Jun 2020] p. 3. Available: <http://www.ubos.org>
9. World Health Organization. Health Workforce Requirements for Universal Health Coverage and Sustainable Development Goals. 2016. Available: <http://www.who.int/about/licensing/>
10. World Health Organisation. Working together for health. 2006.
11. Abdel-All M, Putica B, Praveen D, Abimbola S, Joshi R. Effectiveness of community health worker training programmes for cardiovascular disease management in low-income and middle-income countries: a systematic review. *BMJ Open*. 2017;7:e015529. <https://doi.org/10.1136/bmjopen-2016-015529>.
12. Khetan AK, Purushothaman R, Chami T, Hejjaji V, Madan Mohan SK, Josephson RA, et al. The effectiveness of community health workers for CVD prevention in LMIC. *Global Heart*. 2017;12:233. <https://doi.org/10.1016/j.gheart.2016.07.001>.
13. Teshome DF, Balcha SA, Ayele TA, Atnafu A, Sisay M, Asfaw MG, et al. Trained health extension workers correctly identify high blood pressure in rural districts of Northwest Ethiopia: a diagnostic accuracy study. *BMC Health Serv Res*. 2022;22:375. <https://doi.org/10.1186/s12913-022-07794-w>.
14. Ssinabulya I, Nabunnya Y, Kiggundu B, Musoke C, Mungoma M, Kayima J. Hypertension control and care at Mulago hospital ambulatory clinic, Kampala-Uganda. *BMC Res Notes*. 2016;9:1–7. <https://doi.org/10.1186/s13104-016-2293-y>.
15. Dzudie A, Rayner B, Ojji D, Schutte AE, Twagirumukiza M, Damasceno A, et al. Roadmap to achieve 25% hypertension control in Africa by 2025. *Global Heart*. 2018;13:45. <https://doi.org/10.1016/j.gheart.2017.06.001>.
16. National VHT. Assessment in Uganda Report 2015.
17. Kalyango JN, Rutebemberwa E, Alfven T, Ssali S, Peterson S, Karamagi C. Performance of community health workers under integrated community case management of childhood illnesses in Eastern Uganda. *Malar J*. 2012;11:282. <https://doi.org/10.1186/1475-2875-11-282>.
18. Kwiringira A, Migisha R, Bulage L, Kwesiga B, Kadobera D, Openyitho G et al. Effectiveness of a group-based education and monitoring program delivered by community health workers to improve control of high blood pressure in Island districts of lake victoria, Uganda, February-March 2022. *Q Epidemiol Bull*. 2022;7:1–16. <https://uniph.go.ug/wp-content/uploads/2022/09/Effectiveness-of-a-Group-based-Education-and-Monitoring-Program-Delivered-by-Community-Health-Workers-to-Improve-Control-of-HBP-in-Island-Districts-of-Lake-Victoria-Uganda-February-March-2022.pdf>
19. Stephens JH, Addepalli A, Chaudhuri S, Niyonzima A, Musominali S, Uwamungu JC, et al. Chronic disease in the community (CDCCom) program: hypertension and non-communicable disease care by village health workers

- in rural Uganda. Francis JM. Editor PLOS ONE. 2021;16:e0247464. <https://doi.org/10.1371/journal.pone.0247464>.
20. O'Neil DS, Lam WC, Nyirangirimana P, Burton WB, Baganizi M, Musominali S, et al. Evaluation of care access and hypertension control in a community health worker driven non-communicable disease programme in rural Uganda: the chronic disease in the community project. *Health Policy Plann.* 2016;31:878–83. <https://doi.org/10.1093/heapol/czw006>.
 21. Ministry of Health. Village health team strategy and operational guidelines. 2010.
 22. Ministry of Health Uganda. Uganda Clinical Guidelines. National Guidelines for Management of Common Conditions. 2016.
 23. Musoke D, Atusingwize E, Ikhile D, Nalinya S, Ssemugabo C, Lubega GB, et al. Community health workers' involvement in the prevention and control of non-communicable diseases in Wakiso district, Uganda. *Globalization Health.* 2021;17:7. <https://doi.org/10.1186/s12992-020-00653-5>.
 24. World Health Organization. Task shifting to tackle health worker shortages. Geneva, Switzerland; 2010.
 25. Heller DJ, Balzer LB, Kazi D, Charlebois ED, Kwarisiima D, Mwangwa F et al. K Torpey editor 2020 Hypertension testing and treatment in Uganda and Kenya through the SEARCH study: an implementation fidelity and outcome evaluation. *PLoS ONE* 15 e0222801 <https://doi.org/10.1371/journal.pone.0222801>.
 26. Bovet P, Gervasoni J-P, Mkamba M, Balampama M, Lengeler C, Paccaud F. Low utilization of health care services following screening for hypertension in Dar Es Salaam (Tanzania): a prospective population-based study. *BMC Public Health.* 2008;8:407. <https://doi.org/10.1186/1471-2458-8-407>.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.