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Kenneth Mugambi Langakuo, Dr. Jackline Nyaberi, PhD and Dr Elizabeth Echoka, PhD

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The Interventional Capacity of Community Health Volunteers for Screening and Linkages of Non-Communicable Diseases in Nyeri County, Kenya

[1*]Kenneth Mugambi Langakuo
Post-Graduate Student, School of Public Health, KEMRI Graduate School/Jomo Kenyatta University of Science & Technology

[2]Dr. Jackline Nyaberi, PhD
Lecturer, School of Public Health, Jomo Kenyatta University of Science & Technology

[3]Dr. Elizabeth Echoka, PhD
Chief Principal Research Scientist, Kenya Medical Research Institute

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Abstract

Purpose: Non-communicable diseases (NCDs) are a significant global health challenge, contributing to 50% of worldwide morbidity and 63% of mortality. The burden is particularly substantial in low—and middle-income countries (LMICs), where 80% of NCD-related deaths occur. This study evaluated barriers and challenges to effective screening and linkages of NCDs in Nyeri County.

Methodology: A quasi-experimental non-equivalent pre- and post-test design was conducted from May 2022 to March 2023. The study employed multistage cluster and random sampling to select ten community units, resulting in 150 community health volunteers (CHVs) in the control unit and 150 in the intervention group. Data collection was facilitated through the KOBO app. Quantitative data was analyzed using SPSS version 28.0, and qualitative data was audio-recorded, transcribed, and analyzed via N-Vivo 12 and findings were presented in textual descriptions and thematic analysis that included direct quotes from participants, descriptions of observed behaviors, and interpretations of patterns and themes.

Findings: The study shows that 59.3% of respondents have minimal information, and 92.7 % (n =139) have no clear understanding of NCDs, with a pre-intervention capacity of 48.8%. Independent sample t-test showed a significant difference in capacity from a pre-intervention average of 48.75 (SD±5.7) %, which increased to 68.28 (SD±7.6) %, $p<0.001$.

Unique Contribution to Theory, Practice and Policy: There is a need for a comprehensive, and culturally sensitive training for that will focus on modern healthcare practices, implementing more structured, community-centric approaches involving effective communication, mobilization, and sensitization will enhance the capacity and acceptance of CHVs' roles in combating NCDs. Continuous research and evaluation should ensure practical changes including innovations and use of mobile apps like NCDs app and wheel. An easy-to-use CHV mobile app, continuous capacity building and increased awareness and training will greatly improve on CHVs screening and linkages. Therefore, in this era of technology and use of mobile phones, there is need to develop an app that can be integrated with CHVs mobile phones, Healthcare facility and clients for close NCD monitoring and referral.

Keywords: *Intervention, Community Health Volunteers, Non-Communicable Disease, Screening, Linkages*

INTRODUCTION

This article illustrates the interventional capacity of CHVs in screening and linkages of NCDs in Nyeri County, Kenya. This will focus majorly on interventional approaches that an interventional group initiated. Community health volunteers (CHV) are crucial in extending care and support to the communities, particularly underserved populations in settings attributed to health workforce shortages and resource challenges (Nxumalo et al., 2018). In Sub-Saharan Africa and most low-income nations, the contribution of Community Health Volunteers has resulted in several health indicator gains in children's Health, maternal, reproductive Health, malaria and HIV/AIDS (WHO, 2020). The efforts towards achieving universal health coverage, as well as the Sustainable Development Goals agenda, put much emphasis on the countries investing in their community health workforce to support the delivery of primary healthcare interventions (Angwenyi, 2018).

Integrating Community Health Volunteers (CHVs) into formal healthcare systems has gained significant attention in global health initiatives due to its potential to extend health services to underserved and hard-to-reach populations. Several global health organizations and initiatives underscore the importance of formally integrating CHVs into the healthcare system, aiming to enhance health service delivery's reach and effectiveness. The WHO has been instrumental in promoting the integration of community health workers, including CHVs, into national health systems. It has developed guidelines and provided technical support to governments to facilitate the scaling up of CHW programs, recognizing their critical role in achieving Universal Health Coverage (UHC).

The rationale for integrating CHV Programs into formal healthcare structures was typically anchored on the orientation of CHVs in a community; CHVs are community-owned persons or members who reside in the areas they serve, making them uniquely positioned to extend health services to remote, rural, or underserved urban areas where professional health services are scarce. Integration has ensured better coordination between primary health care and community-based activities. This has led to improved monitoring, early detection, and management of diseases, enhancing Public Health Surveillance and Response, which can significantly improve health outcomes.

In the past, Community Health Volunteers have been part of primary healthcare systems, embedded within communities yet outside of, but aligned to professional health service structures. Therefore, the current global agenda is to integrate Community Health Volunteers programs into formal structures of national health services (Brunei *et al.*, 2022). There is a worldwide consensus on the significance of community-based health workers and on consolidating the contribution of community-led health initiatives (Angwenyi, 2018). However, there is general acknowledgement that the roles and categories of these health care providers are often blurred in terms of engagement, e.g. are they paid? Contracted? Permanent or casual workers? Have they undergone accredited training? In addition, what recruitment mechanisms are used, including whether or not they seek to be residents of the communities they serve (Mdege et al.; S., 2017).

According to Rachis *et al.* (2016), high healthcare costs, lack of adequate infrastructure and health worker shortages all decrease the capability of low and middle-income nations to deliver primary healthcare services to their populations. Sub-Saharan Africa has about 3% of the global health workforce, and an estimated 1.5 million more health workers are needed to provide essential health services in the region (WHO, 2015). Mainly in response to these health worker shortages, the WHO launched the "treat, train, retain" initiative to strengthen and enhance the

global health workforce. This involved the development of more formal cadres of Community Health Workers defined as members who are selected by and answerable to the communities where they work, supported by the health system, and receive less training than formally trained health workers (Mdege et al., 2017).

Generally, CHVs deliver low-cost primary healthcare services to the communities they serve. They are well situated to bridge the gap between communities and the healthcare system and facilitate engagement and overall continuity of care. Community Health Volunteers range from large-scale national programs to smaller community-led initiatives and have improved access and coverage of Health services in rural and remote areas in lower-middle-income countries (Foo et al., 2015). While communicable diseases such as HIV/AIDS and Tuberculosis continue to exert a heavy toll in lower-middle-income Countries, NCDs are also on the rise, with an estimated 639--million hypertensive individuals living in developing countries (Mdege et al., 2017). In Kenya, NCDs increasingly account for a higher proportion of national morbidity and mortality, and numerous individuals are now living with more than one chronic condition. For instance, while individuals living with HIV represent about 7.1% of the Kenyan population, HIV/TB co-infection is also estimated to affect 48% of all new TB patients and hypertension among people living with HIV is estimated at 11.2% and 7.4% for men and women respectively (Foo et al., 2015).

Community health volunteers (CHVs) in Kenya have the potential to improve access to primary healthcare and enhance outcomes, mostly where services are not readily available. This is evidenced by the use of CHVs in HIV programming, which has provided a full continuum of care at three levels: household, community, and facility levels. Thus, by adopting the F3C AMREF model, CHVs were adopted to deliver non-communicable disease services in Nyeri County, which focused on household or community and linkage processes.

At the household and community level, community health volunteers (CHVs) were trained to carry out education, awareness on risk factors, lifestyle modification, and screening for chronic diseases and those who tested positive like raised blood pressure and blood glucose, were referred to the nearest health care facility for further care and treatment and later back to the community treated and well equipped with Knowledge on NCDs hospital and self-care and for further follow-up by CHVs (Kawakatsu et al., 2017).

To ensure that CHVs are effective in screening and linkages of NCDs in the county, there is a need to enhance the existing model by improving and introducing simple, tailor-made NCDs (Hypertension and Diabetes Mellitus) training modules for CHVs. The proposed model focused on skills training and capacity enhancement in terms of a didactic and practical approach that covered NCD causes, Risk factors, signs and symptoms, Investigations or diagnosis, prevention and control, and emergency care for NCD complications leading to the CRISPS model Mugambi, (2024).

Study Justification

Community Health Volunteers (CHVs) play a crucial role in extending healthcare services to underserved populations, yet they face various challenges within existing frameworks that hinder their effectiveness. These challenges include inadequate training, limited support, and a lack of formal recognition within healthcare systems. Insufficient incentives and remuneration in low and middle-class countries like Kenya contribute to high turnover rates among CHVs, disrupting continuity of care and community trust. To address these gaps, interventions such as enhanced training programs, formal recognition, career development, structured incentives, and improved access to resources are proposed. These interventions aim to bolster CHVs' skills,

motivation, and integration into the healthcare workforce, ultimately improving their capacity to deliver essential health services.

Efforts to enhance CHV effectiveness involve developing comprehensive training modules, formal accreditation systems, and structured incentive schemes aligned with local economic conditions. Access to essential tools and resources, including mobile health technologies, is also emphasized to improve CHVs efficiency and effectiveness. By implementing and evaluating these interventions, the literature on CHV effectiveness is enriched, providing evidence-based insights for policymakers to refine CHV programs globally. Ultimately, these initiatives aim to optimize CHVs' performance, recognize their vital role in healthcare systems, and improve health outcomes for underserved communities.

The challenges associated with screening and linking individuals with Non-Communicable Diseases (NCDs) are multifaceted, including limited access to healthcare services, inadequate infrastructure, and a shortage of trained healthcare professionals, particularly in low and middle-income countries like Kenya. To address these challenges, interventions are crucial. Proposed interventions, such as enhancing the existing Community Health Volunteers (CHVs) into formal healthcare systems and implementing tailored NCD training modules and use of digital and latest technologies like mobile apps directly target the needs related to NCDs. By leveraging the community presence and trust of CHVs, screening efforts can reach underserved populations in remote areas.

Moreover, the development of specific training modules like the CRISPS model equips CHVs with the necessary knowledge and skills to identify NCD risk factors, symptoms, and appropriate referral These interventions not only enhance early detection and management of NCDs but also strengthen the linkage between community-based services and formal healthcare facilities, ultimately improving health outcomes for individuals affected by NCDs. This study was based on Socio-Ecological Model and diffusion-innovation theory which emphasizes the multiple levels of influence on health behaviors and outcomes and innovations to address the emerging disease patterns ranging from individual factors to broader societal and environmental influences. In the context of NCD screening and linkage interventions involving CHVs, the SEM could guide the understanding and implementation of strategies targeting different levels of influence from individuals-level influence to interpersonal factors such as social support for health-seeking behaviors, community-level factors such as access to healthcare services, and policy-level factors such as health system strengthening and integration of CHVs into formal healthcare systems.

Previous studies have explored various aspects of NCD screening and linkage, including the effectiveness of different screening methods, barriers to accessing healthcare services for NCDs, and strategies for improving linkage to care for individuals with NCDs. For example, research may have examined the use of community-based screenings conducted by CHVs compared to facility-based screening. Additionally, studies have assessed the effectiveness of different referral systems in ensuring individuals with NCDs receive appropriate follow-up care and management.

METHODOLOGY

The study utilized a quasi-experimental design to assess the interventional capacity of Community Health Volunteers (CHVs) in screening and linking non-communicable diseases (NCDs) in Nyeri County, Kenya. Due to practical constraints, a randomized controlled trial was deemed unfeasible, leading to the adoption of a non-equivalent pretest post-test method. The research spanned from May 2022 to March 2023, involving 300 CHVs divided into

intervention and control groups based on specific inclusion criteria. Multi-stage cluster sampling was employed to select community units, with data collected through pretest and post-test evaluations, along with self-administered questionnaires aided by the KOBO research app. The study was conducted in Nyeri County, Kenya, which presents a diverse healthcare landscape due to a blend of urban and rural populations. NCDs, including cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases, have been on the rise in the county, posing significant health challenges.

Ten community units were randomly selected for intervention and control, with CHVs systematically chosen to represent the entire population. The CHV model adopted from the AMREF facility-community chronic care (F3C) was tailored for NCD screening and linkage services in Nyeri County, emphasizing education, screening, referral, and community reintegration. The interventional model, termed the CRISPS model, focused on building CHV skills and capacity through didactic and practical training components covering NCD causes, risk factors, signs, prevention, and emergency care. CHVs underwent a week-long training led by healthcare professionals fluent in local languages. Practical sessions included blood pressure measurement, height and weight assessment, risk factor identification, and maintaining confidentiality. CHVs in the intervention group underwent pre and post-training assessments, including return demonstrations observed by research assistants to ensure proficiency. Following training, CHVs were deployed to their respective community units, where they conducted screenings and linkages. The research team initiated follow-up processes using various tools like questionnaires, group discussions, and interviews to evaluate CHVs' performance and gather feedback. Remedial training was provided to CHVs who did not meet proficiency standards during the run-in period, emphasizing continuous support and mentorship. Overall, the study aimed to enhance CHVs' capacity in NCD screening and linkage, addressing the rising burden of NCDs in Nyeri County through structured interventions and rigorous evaluation methodologies.

Data Management and Analysis

This study relied on a mobile app data collection app whereby a smartphone running on Android version 9 software and a Kobo Toolbox were used to collect and store data collected from the study participants. This method was ideal, considering that the country was recovering from the COVID-19 menace. The technique enabled real-time data transmission, and analysis was very prompt and efficient. In this study, data management comprises two stages, namely data entry by clerks and data analysis by the researcher with the help of a statistician.

The physical questionnaires were verified and uploaded to the Kobo App. Once all the data was uploaded to the Kobo toolbox, it was then exported to a Statistical Package Software for Social Sciences (SPSS) version 24 for data analysis with inferential statistics like Chi-square test, T-test, Analysis of Variance on gain scores, residual scores, repeated measure and analysis of covariance to establish whether Interventional CHV model was effective in screening and linkages of NCDs in Nyeri County. Descriptive data was presented in the form of figures and tables. Data collected through focused group discussions and Key Informant interviews was audio-recorded, transcribed, translated into English, and coded for content analysis through N-Vivo software version 12 according to themes. The findings augment quantitative results and later conclude whether the Intervention employed in the CHVs model effectively screened and linkages of NCDs in Nyeri County.

RESULTS

Three hundred (300) CHVs were included in the study, ten key informants, and six focused group discussions comprising ten discussants per group. The response rate was 100%.

Demographic Characteristics of Community Health Volunteers

The majority, 61.3% (n =184) of the community health volunteers were female and 72.7% (n =218) were aged 40 years and above. In investigating the level of education, 71.7 % (n =215) had secondary level as their highest level of education, as shown in Table 1.

Table 1: the demographic characteristics of CHVs in Nyeri County

Demographic factors	Frequency	Per cent
Gender		
Female	184	61.3
Male	116	38.7
Age (Mean, SD)	42±3.21	
18 - 25 years	5	1.6
26 - 33 years	17	5.6
34 - 40 years	60	20.1
Above 40 years	218	72.7
Highest level of education		
Secondary level	215	71.7
Certificate/diploma	73	24.3
Master's level	12	4
Occupation		
Casual	115	38.3
Self-employed	145	48.3
Salaried employee	40	13.4

Pre-intervention Assessment of the Capacity of CHVs

A descriptive analysis was done to investigate the pre-interventional capacity of CHVs in NCDS screening and linkage. The assessment used a five-point Likert scale where 1 = Strongly Disagree, 2 = Disagree, 3, Neutral, 4 = Agree, and 5 = Strongly Agree. Most respondents, 59.3 %(n =89), disagreed with the statement that they have the right to information concerning the screening methods used in detecting NCDs.

More than half of the respondents, 52.0% (n =78), agreed with the statement that non-communicable diseases are caused by inadequate intake of fruit and vegetables. Almost half of the respondents, 48% (n =72), were undecided on the statement that dyslipidemia and obesity cause non-communicable diseases. Most of the respondents, 79.3% (n =119), strongly disagreed with the statement that community members with NCDs seek healthcare services promptly. Further, almost all of the respondents, 92.7% (n =139), strongly disagreed with the statement that community members have an increased understanding of NCD screening and linkages.

In addition, CHVs gave views on refresher training that involved all of them and being put under a payroll. They also had other prayers to the existing system that included the provision of first aid kits, uniforms, badges, raincoats, umbrellas, and drugs like painkillers; due to the

lack of these materials and inadequate training, CHVs felt that they didn't have capacity required for screening and linkages of NCDs and therefore the overall capacity of community health volunteers on non-communicable diseases screening and linkages pre-intervention was 48.8% (Inadequate capacity) as shown in Table 2.

Table 2: Pre-intervention Assessment of the Capacity of CHVs

	Level of agreement with the statement					
Statement	**SD n (%)**	**D n (%)**	**U n (%)**	**A n (%)**	**SA n (%)**	**Mean**
Have the right information concerning the screening methods used in detecting NCDs	29(19.3)	89(59.3)	30(20.0)	2(1.3)	0	2.03±0.7
NCDs are caused by inadequate intake of fruit and vegetables.	1(0.7)	18(12.0)	53(35.3)	78(52.0)	0	3.39±0.5
Dyslipidemia and obesity cause non-communicable diseases.	0	13(8.7)	72(48.0)	65(43.3)	0	3.35±0.6
Physical Activity contributes significantly to NCD-related mortality.		5(3.3)	40(26.7)	105(70.0)	0	3.67±0.5
Behavioral risk factors among NCD patients are modifiable	0	4(2.7)	51(34.0)	95(63.3)	0	3.61±0.5
I am aware of my roles in screening and linkages of NCDs	10(6.7)	81(54.0)	29(19.3)	30(20.0)	0	2.53±0.9
NCD is not transmissible	0	20(13.3)	94(62.7)	36(24.0)	0	3.11±0.6
Eating a healthy diet like fruits and vegetables helps to prevent non-communicable diseases	0	31(20.7)	51(34.0)	68(45.3)	0	3.25±0.8
It is easy to take and interpret NCD screening results	27(18.0)	92(61.3)	19(12.7)	12(8.0)	0	2.11±0.8
The Referral link is clear and very efficient	21(14.0)	59(39.3)	63(42.0)	7(4.7)	0	2.37±0.8
Community members with NCDs seek healthcare services in a timely	119(79.3)	30(20.0)	1(0.7)	150	0	1.21±0.4
Community members have an increased understanding of NCD screening and linkages	139(92.7)	11(7.3)	0	0	0	1.07±03

Post-intervention Assessment of the Capacity of CHVs on NCDs Screening and Linkages

A descriptive analysis was done to investigate the post-interventional capacity of CHVs in NCDS screening and linkage. The assessment used a five-point Likert scale where 1 = Strongly Disagree, 2 = Disagree, 3, Neutral, 4 = Agree, and five = Strongly Agree. Twelve questions were included in the analysis.

The findings revealed that none of the respondents strongly disagreed with the statements investigated. Most of the respondents, 60.7% (n =91), agreed they had the correct information concerning the screening methods used to detect non-communicable diseases (NCD). The findings established that post-intervention, the capacity of community health volunteers on non-communicable disease screening and linkages increased to 68.3% (Adequate capacity), as shown in Table 3.

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Table 3: Post-intervention Assessment of the Capacity of CHVs.

Statement	Level of agreement with the statement					
	SD n (%)	D n (%)	U n (%)	An n (%)	SA n(%)	Mean
Have the right information on screening methods used in detecting NCDs	0	0	45(30.0)	91(60.7)	14(9.3)	3.79±0.6
NCDs are caused by inadequate intake of fruit and vegetables.	0		50(33.3)	87(58.0)	13(8.7)	3.75±0.6
Dyslipidemia and obesity cause NCDs.	0	2(1.3)	54(36.0)	78(52.0)	16(10.7)	3.72±0.7
Physical inactivity contributes to NCD-related mortality.	0	1(0.7)	53(35.3)	79(52.7)	17(11.3)	3.75±0.7
Behavioral risk factors among NCD patients are modifiable	0	5(3.3)	46(30.7)	82(54.7)	17(11.3)	3.74±0.7
I am aware of my roles in the screening and linkages of NCDs.	0	4(2.7)	50(33.3)	87(58.0)	9(6.0)	3.67±0.6
NCD is not transmissible	0	5(3.3)	43(28.7)	88(58.7)	14(9.3)	3.74±0.7
Eating a healthy diet like fruits and vegetables helps to prevent NCDs	0	5(3.3)	49(32.7)	85(56.7)	11(7.3)	3.68±0.7
It is easy to take and interpret NCD screening results	0	6(4.0)	54(36.0)	77(51.3)	13(8.7)	3.65±0.7
The Referral link is clear and very efficient	0	4(2.7)	56(37.3)	77(51.2)	13(8.7)	3.66±0.7
Community members with NCDs seek healthcare services in a timely	0	10(6.7)	47(31.3)	81(54.0)	12(8.0)	3.63±0.7
Community members have an increased understanding of NCD screening and linkages	0	10(6.7)	47(31.3)	85(56.7)	8(5.3)	3.61±0.7

Differences in the Pre and Post-Interventional Capacity of CHVs in Screening and Linkage of NCDs in Nyeri County

A paired samples t-test was conducted to investigate whether there were significant differences between the post and pre-intervention capacity of CHVs in screening and linkage of NCDs in Nyeri County. The findings showed that significant differences on many levels were investigated. However, knowledge of the statement that Physical In-activity contributes significantly to non-communicable disease-related mortality ($p = 0.609$) and behavioural risk factors among NCD patients are modifiable ($p = 0.102$), showed no significant differences pre and post-intervention, as shown in Table 4.

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Table 4: Differences in the Pre-And Post-Interventional Capacity of CHVs in Nyeri County Screening and Linkage of NCDs

Capacity of CHVs	Pretest, Mean (SD)	Post-test, Mean (SD)	P-value
I have the correct information concerning the screening methods used in detecting NCDs.	2.03(0.67)	3.79(0.60)	<0.001
NCDs are caused by inadequate intake of fruit and vegetables.	3.39(0.7)	3.75(0.6)	<0.001
Dyslipidemia and obesity cause NCDs.	3.35(0.6)	3.72(0.7)	<0.001
Physical Activity contributes significantly to non-communicable disease-related mortality.	3.67(0.5)	3.75(0.7)	0.609
Behavioural risk factors among NCD patients are modifiable	3.61(0.5)	3.74(0.7)	0.102
I am aware of my roles in screening and linkages of non-communicable diseases.	2.53(0.9)	3.67(0.6)	<0.001
NCD is not transmissible	3.11(0.6)	3.74(0.7)	<0.001
Eating a healthy diet like fruits and vegetables helps to prevent non-communicable diseases	3.25(0.8)	3.68(0.7)	<0.001
It is easy to take and interpret NCD screening results	2.11(0.8)	3.65(0.7)	<0.001
The Referral link is clear and very efficient	2.37(0.8)	3.66(0.7)	<0.001
Community members with NCDs seek healthcare services in a timely	1.21(0.4)	3.63(0.7)	<0.001
Community members have an increased understanding of NCD screening and linkages	1.07(0.3)	3.61(0.7)	<.001

Comparison of Pre and Post-Intervention Findings in Screening and Linkage of NCDs

The paired sample t-test conducted showed that in investigating the community health volunteers' skills and knowledge of non-communicable diseases screening and linkages, there was a significant difference in capacity pre-intervention with an average of 48.75(SD±5.7) %, which increased to 68.28(SD±7.6 (%, $p<0.001$) as shown in Table 5.

Table 5: General Comparison of Findings of Pre and Post-Intervention in Screening and Linkage of NCDs in Nyeri County

Capacity building	Pre-intervention	Post-intervention	t-statistic	P-value
Community health volunteers' skills and knowledge of NCD screening and linkages (Mean, SD)	48.75±5.7	68.28±7.6	-25.31	<0.001
Knowledge assessment (Mean, SD)	79.33±17.7	81.87±16.1	-1.3	0.196

Discussion

Community health volunteers (CHVs) are individuals chosen from within the community who voluntarily provide essential health-related services and information to their communities. They play a crucial role in public Health by bridging the gap between formal healthcare systems and underserved or marginalized populations. Their roles and responsibilities vary widely depending on the community's specific needs and the healthcare system they serve. Still, generally, they fulfil the following functions: Health Education, Monitoring and Reporting, disease Surveillance, Maternal and Child Health, Advocacy and Mobilization.

Nyeri County has an unusual population distribution, with more women than men. The study revealed that out of 184 respondents, 61.35% were females. Additionally, a significant portion of these respondents, 72.7% (218 individuals), were aged 40 years and above. Moreover, 71.7% (215 individuals) of the respondents had completed their education up to the secondary level, indicating the educational attainment within the surveyed population. This is not different from studies on CHV in India and Uganda, Rachis et al., (2016), where the majority of the study

population was women. The study revealed initial gaps in knowledge among respondents regarding the screening methods and causes of non-communicable diseases (NCDs).

A significant portion lacked accurate information on detection methods, attributing NCDs to inadequate fruit and vegetable intake while showing uncertainty about dyslipidemia, obesity, and the causes of NCDs. In Uganda and DR Congo, the use of CHVs in HIV programs was not successful due to disparities in cultural and knowledge gaps in terms of nutrient values attributable to some fruits and other vegetables in one community to the other Patel, M., & Steyn, K. (2016). This study has highlighted that community members with NCDs often do not seek timely healthcare services, and there is a lack of increased understanding regarding NCDs, particularly related to screening and linkages among community members. This has also been alluded to in several global studies showing a similar pattern of poor health-seeking services among NCD patients, Namatovu, L., & Walley, J. (2018).

The pre-intervention assessment of Community Health Volunteers (CHVs) demonstrated an overall capacity of 48.8% in terms of knowledge about NCDs, screening modalities and interpretation of the results and process of referrals and linkages, which significantly increased to 68.3% after the introduction and implementation of Crisps intervention model, Mugambi,(2024). The post-intervention analysis indicated that a structured learning approach and mentorship significantly improved the CHVs' understanding of NCDs, particularly in screening and linkages.

The McNemar test for knowledge assessment demonstrated significant differences between pre and post-intervention across all variables assessed. Overall, the comparison showed a substantial increase in capacity from 48.75% to 68.28% post-intervention, indicating the effectiveness of the Intervention in enhancing CHVs' model in screening and linkages for NCDs. Comparing the results of this study and others across the globe, especially educational Intervention, it is noted that educational Intervention improves the mitigation modalities for diseases like diabetes and hypertension by increasing and raising awareness of the disease process and self-care approaches, therefore reducing the disease burden. Patel, M., & Steyn, K. (2016).

Therefore, this study's findings align with the general trend observed in interventions aimed at enhancing the knowledge of CHVs regarding NCDs.These interventions involved a structured learning trend that significantly improved the understanding of NCDs among volunteers. In summary, this study shows that an enhanced volunteer model encompassing well-structured learning and mentorship positively impacted the capacity of CHVs regarding NCD screening and linkages.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The in-depth analysis of Community Health Volunteers (CHVs) and their capacity in screening and linking Non-Communicable Diseases (NCDs) in Nyeri County revealed multifaceted findings. The study unveiled a significant disparity in capacity regarding low knowledge and understanding of NCDs among CHVs, pointing to the crucial need for a simple community-based intervention model and training.

The Intervention involving structured learning methods and mentorship demonstrated a notable increase in CHVs' capacity and understanding of NCDs, specifically in screening and linkages. However, challenges such as inadequate resources, traditional beliefs, and communication breakdowns were identified as barriers hampering their efficiency in NCD-related tasks.

Recommendations

1. Continued and Improved Training: There is a necessity for ongoing, comprehensive, and culturally sensitive training for CHVs to bridge the knowledge gap regarding NCDs. Such training should encompass modern healthcare practices, handling workload challenges, and better communication strategies tailored to diverse needs.
2. Community Engagement and Sensitization: Implementing more structured, community-centric approaches involving effective communication, mobilization, and sensitization can enhance the capacity and acceptance of CHVs' roles in combating NCDs. Addressing traditional beliefs and engaging with local structures and committees is vital to aligning the community with modern healthcare practices.
3. Research Continuation and Policy Implementation: Continuous research and evaluation should drive policy implementations, ensuring that insights gathered are translated into practical changes. This might include reforms in CHV training modules, healthcare resource distribution, and community engagement programs to improve NCD screening and linkage.

Unique Contribution to Theory, Policy & Practice:

This study has greatly contributed to the theory, policy and practice through the following:

- Theory: The development of an easy-to-use CHV mobile app aligns with theoretical frameworks such as the Diffusion of Innovations theory. This theory suggests that innovations, such as mobile health technology, spread through a population over time, impacting adoption rates and ultimately influencing health outcomes. By integrating mobile technology into CHVs' workflow, the study contributes to theoretical understanding by demonstrating how innovative solutions can facilitate the dissemination of healthcare services and improve health outcomes, particularly in underserved communities.
- Policy: The study advocates for the integration of a CHV mobile app into existing healthcare systems, highlighting the importance of policy support for technology-driven interventions in public health. Policy implications include the need for government support in funding and regulating the development and implementation of such apps. This contribution to policy discourse emphasizes the role of technology in enhancing the effectiveness and reach of CHVs' services in NCD screening and linkage efforts.
- Practice: The study's emphasis on continuous capacity building for CHVs and increased awareness and training reflects a practical approach to improving NCD screening and linkage practices on the ground by providing CHVs with ongoing training and support, as well as equipping them with user-friendly mobile tools. This contribution to practice underscores the importance of investing in human resources and technological infrastructure to strengthen community-based healthcare delivery, ultimately leading to improved health outcomes for individuals with NCDs.

In summary, the proposed integration of a CHV mobile app, coupled with continuous capacity building and increased awareness and training, represents a novel approach to addressing NCD screening and linkage challenges. This approach contributes to theoretical understanding, informs policy development, and guides practical interventions aimed at improving healthcare delivery and outcomes in the context of NCDs.

Strength of the Study

This study overly focused on the CHVs who are community-owned resource persons, are privy to the community units they serve and are part of the NCD cycle. The involvement of an intervention and the subsequent follow-up and return demonstration in the community enabled a process of engagement among the CHVs, which brought about a sense of ownership and belonging. However, the study had a few limitations that included recall biases among the elderly CHVs, and some of the CHVs in the NCD program experienced some forms of discomfort due to the NCD disease process they are undergoing.

Ethical Considerations

Confidentiality was maintained across all sections and processes for this study. Study permission was obtained from the School of Postgraduate at Jomo-Kenyatta University of Agriculture and Technology (JKUAT) Ref Number JKU/2/11/HSH411-0183/2018, clearance and research ethical approval was obtained from the Ethical Review Board of Kenya Medical Research Institute-Scientific Ref Number KEMRI-SERU/CPHR/025-07-2021/4400)).

A research permit was obtained from the National Commission for Science Technology and Innovation Ref number NACOSTI/P/22/20516). Subsequently, study permission from Nyeri County Ministry of Health Ref CGN/HEALTH/HRM/5/VOL11, Nyeri County Commissioner Ref NYC/ADM/1/57/VOL VIII/94, Ministry of Education Nyeri County Ref Number CDE/NYI/GEN/23/VOL IV/86 and later permission from community units' in-charges. Before consenting to the study, participants were explained in a language they could understand, including the purpose, benefits, and risks associated with participating in the research and the aspect of absolute voluntarism.

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