**Research Article**

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

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## Abstract

**Background Information:** Globally, Non-Communicable Diseases (NCDs) account for 63% of mortalities. Approximately, 80% of these NCD-related deaths occur in LMICs and they contribute to at least 50% of hospital admissions. NCDs affect individuals, households, communities, and health care systems leading to increased expenditures at all levels. In Kenya, the National and County governments prioritized Communicable diseases more than NCDs. Consequently, NCDs continued to affect the skewed, ill-equipped health systems resulting in an upsurge in disease morbidity and mortality. This led to the introduction and use of CHVs at the grassroots levels to mitigate this upsurge and morbidity related to NCDs.

**Objective:** This study evaluated the interventional capacity of Community Health Volunteers in the screening and linkages of Non-Communicable Diseases in Nyeri County, Kenya.

**Methodology:** A quasi-experimental study utilizing a non-equivalent pre-and post-test was carried out from May 2022 to March 2023 with 370 study participants. Multistage cluster sampling was used at the primary and secondary levels to select 10 community units, each unit is comprised of 10 households and each household is served by three CHVs, therefore 150 CHVs were randomly selected to form a control unit and 150 formed interventional group. Data collection was made through a questionnaire uploaded to a KOBO app. Six (6) homogenous FGDs comprised of 10 members and 10 KII were conducted across study sites. Quantitative data was analyzed using SPSS version 28.0 and qualitative data was audio-recorded, transcribed, and analyzed via N-Vivo 12.

**Results:** 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.

**Conclusion:** A well-designed community interventional model plays a pivotal role in grassroots healthcare delivery but requires optimization for NCD management through leveraging CHV capacity-building programs that will enhance screening and linkages of NCDs.

## INTRODUCTION

Community health volunteers (CHV) play a crucial role in extending care and support to the communities, particularly underserved populations in settings that are attributed to health workforce shortages and resource challenges [1]. 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 [2]. The efforts towards the achievement of universal health coverage as well as the Sustainable Development goals agenda put much emphasis on the countries to invest in their community health workforce to support the delivery of primary healthcare interventions [3].

This call to action has witnessed African governments make commitments to addressing human resources for health challenges supported by global initiatives such as the One Million Community workforce campaign. 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. There is a global consensus on the significance of community-based health workers and on consolidating the contribution of community-led health initiatives [3]. 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 [4].

According to Rachlis et al. [5], 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 just to be able to provide basic health services in the region [6]. Largely 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 [4].

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 [7].

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 [4]. 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 [7]. 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 adopting the F3C AMREF model [8], CHVs were adopted for use in delivering non-communicable disease services in Nyeri County where it focused on household or community and the 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 [9]. 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 use by 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 acronym "CRISPS model", Mugambi [10].

## Study Design

This was a quasi-experimental study design that utilized a non-equivalent pre-test post-test method to evaluate the Interventional capacity of Community Health Volunteers in Screening and Linkages of NCDs in Nyeri County. It was carried out between May 2022 to March 2023.

150 Community health volunteers were selected randomly to join the interventional group and another 150 Community Health volunteers were randomly selected to join the control group.

A Multi-stage cluster sampling method was used to select community units as the primary sampling unit and later the CHVs were selected as secondary sampling units from the primary sampling unit. , data was collected through pretest and post-test evaluation among the CHV aged 18 years and older. The initial pretest was carried out before the intervention was rolled out and after the training, a post-test evaluation was done later after a month of the field follow-up for skills acquisition and return demonstration to the interventional group, data further collected using self-administered questionnaires and the majority through the help of research assistant in research app KOBO tool Both pretest, post-test and data collection modalities employed similar methodologies to ensuring consistency in data collection procedures.

## Study Setting

The study was conducted in community units within Nyeri County, Kenya, which is characterized by varying NCD prevalence and associated comorbidities and mortalities. 10 community units were selected randomly and allocated to both intervention and control sites. These included Gatitu, Kamoko, Kinunga, Nyeri town, and Unjiru health centres formed Interventional groups and Gichira, Kiganjo, Mweiga, Ihururu, and Wamagana for control groups. Homogenous CHVs in these community units were selected systematically in an alphabetical ascending order to produce a sample that represented the whole population.

## Study Participants

Community Health Volunteers in the intervention group were recruited from the selected community units Participants underwent random assignment to the intervention group, and their informed consent was meticulously obtained, prioritizing ethical considerations throughout the study. The control group

was comprised of Community Health volunteers who had similar attributes to the CHVs in the Interventional group and were randomly selected from Community units. These participants enrolled on a pretest, later interventional group was extensively trained on NCDs, and later a post-test was carried out among the intervention group.

## Selection Criteria

The study participants were selected from a pool of CHVs aged 18 years and above who reside and are volunteers under the Community health strategy in Nyeri County who were able to consent to the study, However, CHVs who did not consent to the study were excluded.

## Current CHV Model

This CHV model currently in use was adopted from the AMREF [8], facility-community chronic care (F3C) which is an HIV programming model but adapted for use in delivering non-communicable diseases (NCDs) screening and linkages services. The model's continuum of care comprises three levels: household and Community, facility level, and linkages. At the household and community level, CHVs are trained to carry out education, awareness on risk factors, lifestyle modification, and screening for chronic diseases, and those who test positive for raised blood pressure and blood glucose are referred to the nearest health care facility for further care and treatment. At the linkage level, clients for chronic disease care identified at the community level were promptly paired with health centres that manage NCDs and act as referral units for CHVs. Once the clients receive care, they are empowered with knowledge of the disease and self-management and later linked back to the community through support groups and treatment mentors (Figure 1).

This model was introduced in Nyeri County and was purely adopted for the prevention and promotion of healthy living, especially in children under five years and TB patients. Subsequently, during the outbreak of COVID-19, CHVs were deployed to carry out public health education and follow-up to ensure adherence to WHO protocols in the community units.
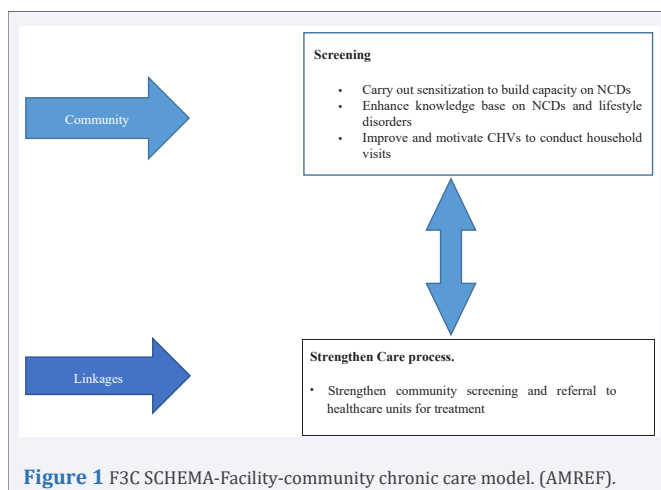


**Figure 1** F3C SCHEMA-Facility-community chronic care model. (AMREF).

## The Interventional Model

In Nyeri County, the use and reliability of CHV were remarkably noted in the control of COVID-19. The success of COVID-19 control and prevention was attributable to the use of CHVs especially in the way they carried out health education and promotion of healthy living. Later due to the rising number of NCDs in the county, CHVs' scope of work was drastically shifted to screening and linkages of NCDs in their respective community units. Despite the use of CHVs, the number of NCDs and their related complications continued to rise in the county. This led to several questions regarding CHV capacity towards NCDs (Hypertension, diabetes, and Cancers) screening and linkages and especially the use and results in interpretation with a high level of precision of screening tools, knowledge, and preparedness in addressing NCD emergencies like elevated blood pressure, deranged blood sugars? In addition, what is the community members' perception of the capacity of CHVs in the screening of NCDs? Thus, these discussions and questions led to the coining of a simple, clear, and easy-to-understand model that is anchored on a locally available community item /food called Potato. Potatoes are locally available household foods that are very familiar and acceptable in every household, mostly this foodstuff can be used to create potato crisps that if salted are very crunchy, sweet and it's a fast food snack for every reveller and locals, therefore this name was adopted and used to describe a model that focuses on NCDs causes risk Investigations, signs, symptoms, predisposing and control factors and therefore an acronym Crisps that results to CRISPS Model.

This Crisps model was adopted considering that it resonates well with the locals whose commonest staple food is potatoes in almost every meal and it will be easier for the CHVs to recall and attach their health education, screening and linkages through this intervention. This model introduced an intervention that focused on CHV skills and capacity building through didactic and practical training components that cover NCD causes, risk factors, signs and symptoms, investigations or diagnosis, prevention, and control, and emergency care for NCD complications as described by the acronym "CRISPS" (Figure 2).

## Model Rollout

Community Health Volunteers were informed of the study and recruited as per study protocol. CHVs were either in two groups: an interventional unit group that was exposed to a pre and post-test exam and afterwards an intervention model (CRISPS model) and a control unit group that was only enrolled to a pretest and no capacity building in terms of skills training but continued with routine NCDs screening and linkages in the respective community units. The intervention group underwent training for one week, which included both practical and didactic components. Training teams were comprised of health professionals (Nurses, Clinical officers, medical officers and public health officers) who were fluent in both the official English, and Kiswahili languages, and predominantly spoken local languages at each community unit.

**Figure 2** Linkage and Referral Process, (CHV handbook, MoH 2013).
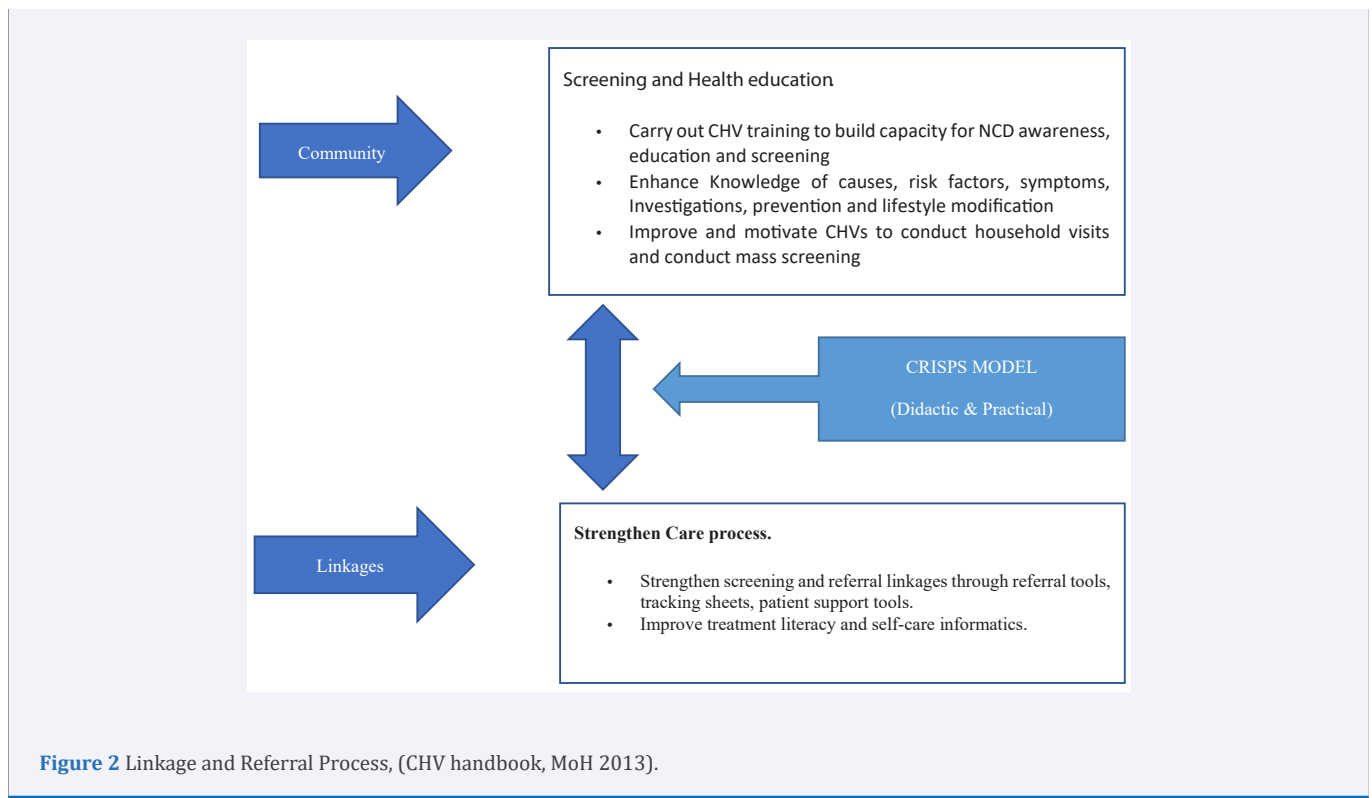
Didactic training covered NCDs definitions, causes, signs and symptoms, risk and predisposing factors, investigation and screening methods to use, Didactic elements were assessed using a pre-training knowledge test before the introduction of intervention and later the element was assessed with a post-training knowledge test before deploying CHVs to the field for screening and linkages. Practical training covered knowledge on various components of blood pressure machines, establishing correct cuff size, and how to take and interpret blood pressure at different sites, which includes the arm and leg, and taken 5 minutes apart with an automated Omron blood pressure machine.

Further practical topics covered the measurement of height with a tape measure mounted on a stand and taking weight using a digital scale, calculation of BMI with a target population, completion of risk factor and linkages forms, and process of maintaining confidentiality during screening and linkage process. Practical assessments were completed by obtaining anthropometric measurements on an individual basis by the trainers as part of the post-training assessment. Only CHVs who passed both the knowledge test with a minimum score of 60% on content knowledge for NCD pre-tests and the usage of tools, interpretation, and recording of screening results were deployed to their respective community units and those not meeting the scores joined the next group of CHVs for remedial training.

The CHVs deployed to the field carried out return demonstrations under the observation of research assistants during a 1–2-week run-in period. The research coordinator randomly selected a Community unit and the corresponding CHVs accompanied the researcher for the day's screening, and linkages activity, directly observed the process, and ensured adherence to the study guidelines and protocols. All CHVs were observed in this manner before the end of the run-in period to help identify any performance issues before they participated in the study and those CHVS who did not do so well in this run-in period were paired with other CHVs who performed so well in the run-in period for support and mentorship. After the run-in period, the CHVs were officially deployed to their respective community units and the research team started the follow-up process with study tools like questionnaires, group discussions, and interview guides.

**Data management and analysis**

This study relied majorly on a mobile app data collection app whereby a smartphone running on Android version 9 software and a Kobo Toolbox was used to collect data as well as store data collected from the study participants. This method was ideal considering that the country was recovering from the COVID-19 menace, the method enabled real-time data transmission, and analysis was very prompt and efficient. In this study, data management was comprised of 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, and the findings presented to augment quantitative results and later draw a conclusion on whether the Intervention employed to the CHVs model was effective in screening and linkages of NCDs in Nyeri County.

## RESULTS

Three hundred (300) CHVs were included in the study (150 per arm), 10 key informants and 6 focused group discussions comprised of 10 discussants per group that consisted of community health workers and community health volunteers respectively. 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.

### Pre-intervention assessment of the capacity of CHVs

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

**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 |

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 timely. 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.

### Post-intervention assessment of the capacity of CHVs on NCDs screening and linkages

Descriptive analysis was done to investigate the post-interventional capacity of CHVs in the screening and linkage of NCDS. The assessment was done using a five-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3, Neutral, 4=Agree and five=Strongly Agree. 12 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 that they had the right information concerning the screening methods used in detecting 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.

### 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 there were significant differences on many levels that were investigated although 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.

### General comparison of findings of pre and post-intervention in screening and linkage of NCDs in Nyeri County

The paired sample t-test conducted showed that in

**Table 2**: Pre-intervention assessment of the capacity of CHVs

| Statement | Level of agreement with the 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 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 |

**Table 3:** Post-intervention assessment of the capacity of CHVs on NCDs screening and linkages

| STATEMENT | Level of agreement with the statement | | | | | |
|---|---|---|---|---|---|---|
| | SD n (%) | D | U | An n (%) | SA n(%) | Mean |
| | | n (%) | n (%) | | | |
| Have the right information concerning the 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 significantly 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 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 |

**Table 4:** Differences in the pre and post-interventional capacity of CHVs in screening and linkage of NCDs in Nyeri County.

| Capacity of CHVs | Pre-test, Mean (SD) | Post-test, Mean (SD) | P-value |
|---|---|---|---|
| I have the right 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 non-communicable diseases. | 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 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 |

**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 |

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.

## DISCUSSION

Community health volunteers (CHVs) are individuals chosen from within the community who provide essential health-related services and information to their communities voluntarily. 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 specific needs of the community and the healthcare system they serve, but generally, they fulfill the following functions among others; 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 done regarding CHV in India and Uganda, Rachis et al [5], where the majority of the study population was made up of 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 [1], 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 [11]. 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 studies across the globe that have shown a similar pattern of poor health-seeking services among NCD patients [12].

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 [10]. The post-intervention analysis indicated that a structured learning approach and mentorship significantly improved the CHVs' understanding of NCDs, particularly in screening and linkages [13].

The McNemar test for knowledge assessment demonstrated significant differences between pre and post-intervention across all variables assessed [14]. 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 [15]. Comparing the results of this study and others across the globe and especially on educational intervention, it is noted that educational intervention improves the mitigation modalities for diseases like diabetes and hypertension by increasing and raising awareness on disease process and self-care approaches therefore reducing disease burden [1].

Therefore, this study's findings align with the general trend observed in interventions aimed at enhancing the knowledge of CHVs regarding NCDs [16].These interventions involved a structured learning trend that significantly improved the understanding of NCDs among volunteers [17]. In summary, this study shows that there is a positive impact of an enhanced volunteer model that encompassed well-structured learning and mentorship that ultimately improved the capacity of CHVs regarding NCD screening and linkages [18].

## 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 [19]. 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 [20]. The intervention involving structured learning methods and mentorship demonstrated a notable increase in CHVs' capacity and understanding of NCDs, specifically in screening and linkages [21]. However, challenges such as inadequate resources, traditional beliefs, and communication breakdowns were identified as barriers hampering their efficiency in NCD-related tasks [22-24].

## RECOMMENDATIONS

**1. Continued and Improved Training:** There is a clear 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 community 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.

## STRENGTH OF THE STUDY

This study overly focused on the CHVs who are community-owned resource persons; 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 and this brought about a sense of ownership and belonging.

However, the study had several limitations that included some recall biases among the elderly CHVs, Some of the CHVs in the NCDs 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 the purpose, benefits, and risks associated with participating in the study as well as the aspect of absolute voluntarism.

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