



ORIGINAL ARTICLE

Performance of Community Health Volunteers in the Delivery of Healthcare Services During the Covid-19 Pandemic in Nakuru, Kenya: A Cross-Sectional Analysis

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ABSTRACT

In many parts of the world, including Kenya, there is a critical shortage of trained healthcare workers. In response to this, the World Health Organization (WHO) has advocated for the utilization of volunteer community members to provide essential health services within their communities. While Community Health Volunteers (CHVs) in Kenya have demonstrated positive contributions to community health, there is a dearth of data on their performance during pandemics such as COVID-19.

We assessed the performance of CHWs during the COVID-19 pandemic in Nakuru County.

This was a cross-sectional descriptive study with mixed methods approach. Purposive sampling was utilized to select the study sites and random sampling to sample 260 CHV participants. A standardized data collection schedule was used to collect data on key community health indicators from the District Health Information System 2 (DHIS2) in each sub-county which was used to compare CHVs' performance before and during COVID-19. A structured questionnaire was filled out by CHVs to address the study objectives. Data was subjected to an Analysis of variance (ANOVA) test to determine differences in the periods at $\alpha=0.05$.

The CHVs' routine community services significantly improved during COVID-19. There were significant differences in Maternal and Neonatal Health (MNH) services groups as determined by the Analysis of variance test ($F(2, 33) = 26.341, p < .001$), child services groups as determined by Analysis of variance test ($F(2, 33) = 15.042, p < .001$), CHVs' care of persons with known chronic conditions services groups as determined by Analysis of variance test ($F(2, 33) = 39.799, p < .001$) and significant difference in CHVs' care of geriatrics services groups as determined by Analysis of variance test ($F(2, 33) = 24.778, p < .001$).

Pre- and Post-pandemic policies should promote CHV service utilization and consider training, proper reporting of their indicators and continuous monitoring and evaluation (M&E). New service provision methodologies such as the application of technology should be integrated into the CHVs services.

Key words – Trained health workers, Community Health Workers, Community health strengthening, Community Health Volunteers, Disease Emergencies



INTRODUCTION

Primary Health Care (PHC) constitutes a pivotal component of any country's health system, encompassing both community health services and services delivered at lower-level health facilities. It serves as the initial point of contact for individuals, families, and communities within the national health system, bringing health services as close as possible to people's residences and workplaces (Gofin & Gofin, 2005). The PHC team, including Community Health Workers (CHWs), is instrumental in delivering a range of services. These encompass the promotion of good health and basic sanitation practices, provision of maternal, newborn, and child health services, as well as health education focused on the prevention and control of infectious diseases, among other essential functions (Hartzler et al., 2018).

Community health programs have demonstrated a positive impact on enhancing the health status of both communities and individuals across the globe. In the United States, compelling evidence indicates that the involvement of Community Health Workers (CHWs) in managing hypertension, mitigating cardiovascular risk factors, controlling diabetes, and conducting cancer screenings has significantly contributed to the reduction of disease burden, particularly among low-income populations (Perry et al., 2014). Brazil boasts one of the largest and most effective community health programs globally (Pinto et al., 2012). This initiative has played a pivotal role in the country's achievements, including a nearly 75 percent reduction in under-five mortalities, a 50 percent decrease in maternal mortality, and the attainment of nearly universal immunization coverage (Grossman-Kahn et al., 2017).

Significant health achievements have been realized in Africa since the *Alma Atta* Declaration on Primary Health Care (PHC), including the eradication of smallpox, the elimination of leprosy, and a notable reduction in measles incidences (Rifkin, 2018). Substantial strides have also been taken toward the eradication of poliomyelitis and guinea-worm disease (Gauld et al., 2012). Despite Africa contributing up to 25 percent of the global health burden (Crisp, 2011), the majority of African countries face critical health workforce shortages, meeting the criteria set by the World Health Organization (WHO) (Campbell, 2013). In response to the scarcity of trained health professionals and the considerable burden of infectious and non-communicable diseases (NCDs), many African nations leverage Community Health Workers (CHWs) as a strategic approach to fortify

their health systems (WHO, 2008).

The first Community Health Strategy in Kenya, formulated in 2006, delineated comprehensive guidelines governing the administration of community health services at level 1 for the entire populace (Njiraini & Hussein, 2022). The pivotal role played by Community Health Volunteers in enhancing health outcomes in Kenya is underscored by an experimental study in Kitui County. The implementation of the community strategy resulted in a noteworthy 10.1 percent increase in infant vaccination coverage (IVC) (Nzioki et al., 2017). Nevertheless, the community health workforce grapples with myriad challenges as elucidated in the Kenya Community Health Strategy 2020-25. These challenges encompass an inadequate community health workforce, impeding efficient service delivery, dearth of capacity-building fora, and inadequate supervision and mentorship programs, thereby circumscribing the scope of service (Ministry of Health [MoH], 2020).

Disease emergencies have the potential to exacerbate existing vulnerabilities within community health systems, thereby compromising previously attained advancements through both direct and indirect ramifications. A study conducted in Kenya sought to scrutinize the indirect repercussions of the Covid-19 pandemic in the country, shedding light on supply chain disruptions that impeded access to fundamental medical commodities crucial for sustaining service delivery. Notably, programs addressing Tuberculosis (TB), Malaria, and oncology encountered shortages in commodities necessitating importation from China, India, and the USA (Barasa et al., 2021). Despite the designation of healthcare providers as essential workers, CHVs experienced setbacks due to the informal nature of their roles. While empirical literature on the impact of COVID-19 on community health services remains limited, existing evidence indicates that CHVs were anticipated to engage in public health measure sensitization, COVID-19 transmission control, case identification and surveillance, contact tracing, and facilitating referrals. This was in addition to their ongoing provision of routine health services. Whether the CHVs were able to effectively execute their normal duties as well the extra assignments occasioned by the pandemic is yet to be well profiled. Against this backdrop, we evaluated the performance of CHVs in Nakuru County concerning routine health services amid the COVID-19 pandemic.

METHODOLOGY

Study Location

This study was conducted in Nakuru County, encompassing Nakuru East (urban), Naivasha (peri-urban), and Nakuru North (rural) sub-counties. The choice of these sub-counties was based on their confirmed high incidence of reported COVID-19 cases during the pandemic regime. Nakuru County's significance in this study stems from its diverse landscapes and population densities, offering a representative cross-section of Kenya's demographic and geographic variations.

Study Design

This study utilized a cross-sectional descriptive design, guided by Setia's (2016) framework. The approach involved sampling a representative subset of the CHV target population at a specific point in time, enabling the generalization of results to populations with homogeneous demographics. No variables were altered during the analysis process.

Study Population

The study population included 2923 active Community Health Volunteers (CHVs) in Nakuru County during the data collection period. Inclusion criteria for participant selection were as follows: CHVs with a minimum of 1 year of service before March 2020 (prior to the first reported Covid-19 case in Kenya), those registered at the sub-county and having undergone basic module training, and those actively involved in providing routine community health services alongside their Covid-19 response duties. Exclusion criteria encompassed newly recruited CHVs, those specifically recruited for the Covid-19 response program, CHVs displaying Covid-19 symptoms during the data collection screening, and those who opted out of community service at the onset of the Covid-19 infections in Kenya. A total of 760 CHVs were recruited into the study.

Sampling

Purposive sampling technique was employed for the selection of sub-counties in the study. This method, guided by Palinkas et al. (2013), facilitates the targeted identification of information-rich cases related to the phenomenon of interest. Nakuru East, Nakuru North, and Naivasha sub-counties were specifically chosen due to their elevated COVID-19 disease burden and strategic geographical representation, encompassing urban (Nakuru East), peri-urban (Naivasha), and rural (Nakuru North) settings. The selection of 3 out of 11 sub-counties adhered to the recommendation by Mugenda & Mugenda (2003), ensuring a representation of 10-30 percent of the

entire study population. Quantitative data collection involved the application of simple random sampling to select Community Health Volunteers (CHVs) as study participants. This method ensured an unbiased and representative sample, with numbers randomly allocated, and every 3rd respondent chosen to facilitate the robust assessment of the performance of CHVs in Nakuru County during the study period.

Data Collection Tools and Procedure

Secondary data on the performance of Community Health Volunteers (CHVs) were extracted from the District Health Information System (DHIS) using a data collection schedule. A semi-structured questionnaire, comprising both open and closed-ended questions, was employed to collect quantitative data directly from the CHVs. The questionnaire was designed with sections addressing information related to all three objectives of the study. The tools were made available in both English and Kiswahili languages, ensuring accessibility and understanding for the study participants.

Data Analysis

The descriptive analysis aimed to comprehensively profile the characteristics of Community Health Volunteers (CHVs) involved in the study. This involved summarizing and presenting key demographic information, providing a detailed overview of the composition of the CHV cohort. This statistical examination sought to identify any discernible patterns or associations between specific socio-demographic factors and the effectiveness of CHVs in delivering healthcare services in the context of the Covid-19 pandemic. The findings resulting from these analyses were meticulously presented through tables, figures, and charts. Data were analyzed using SPSS version 27 at 95% confidence interval (CI).

Ethical Considerations

Ethical approval was secured from the Kabarak University Institutional Scientific and Ethics Review Committee (KABU01/KUREC/001/05/04/23). A data collection permit was obtained from the National Commission of Science Technology and Innovation (NACOSTI/P/23/25444). Permissions were sought from the Department of Health Services, Nakuru County, for data collection from DHIS and CHV participants. Informed consent was obtained from each participant, ensuring voluntary participation and the right to withdraw from the study at any point. All data were deidentified and handled securely by the lead researcher.

RESULTS

The Performance of CHVs Before and During COVID-19 Pandemic

The CHVs performance in the delivery of community health services before and during the COVID-19 pandemics was evaluated. Majority, 140(53.4%) rated their performance before Covid-19 as good, 64(24.4%) rated average, 46(17.6%) rated very

good, 10(3.8%) rated poor and 2(0.8%) rated very poor. Majority, 102(38.9%) rated their performance during Covid-19 as good, 68(26.0%) rated very good, 60(22.9%) rated average, 24(9.2%) rated poor while 8(3.1%) rated very poor. The CHVs performance ratings before and during Covid - 19 are summarized in Figure 1 below.

Figure 1: CHVs Performance Ratings (Before & During Covid-19)

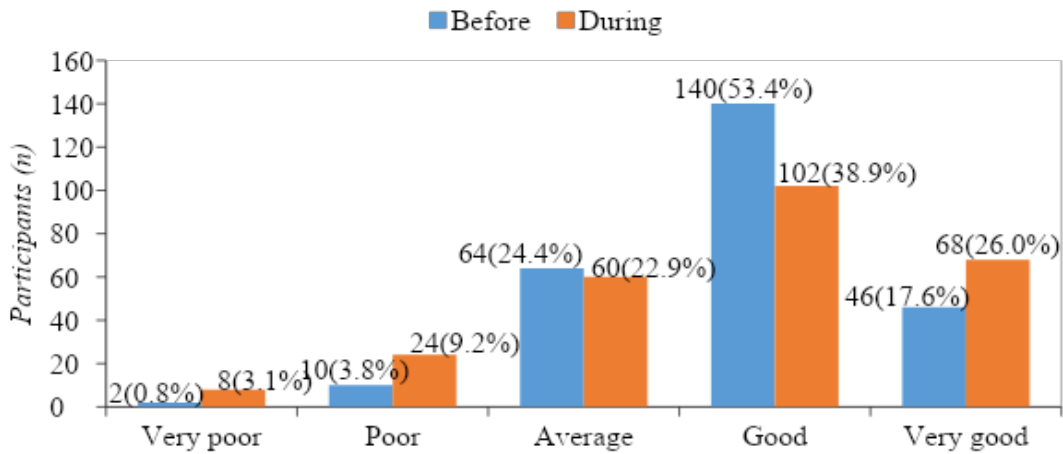


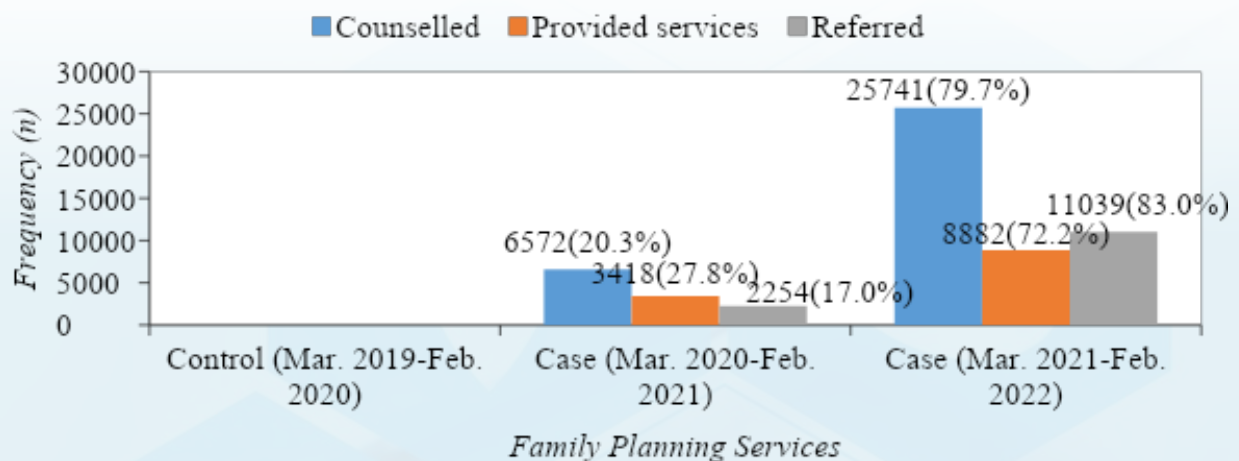
Figure 1: CHVs performance ratings (Before & During Covid - 19)

The Pattern of Family Planning Services

A total of 57,906 women were provided with family planning services by Community Health Volunteers (CHVs) during the specified study period from March 2019 to February 2022. Among these, 32,313 received counselling, 12,300 were administered family planning services, and 13,293 were referred for family planning during the COVID-19 period. Notably, the majority of counselling interventions, constituting 25,741 (79.7%), occurred between March 2021 and February 2022, with 6,572 (20.3%) occurring in the preceding COVID-19 period from March 2020 to February 2021. Data for the year

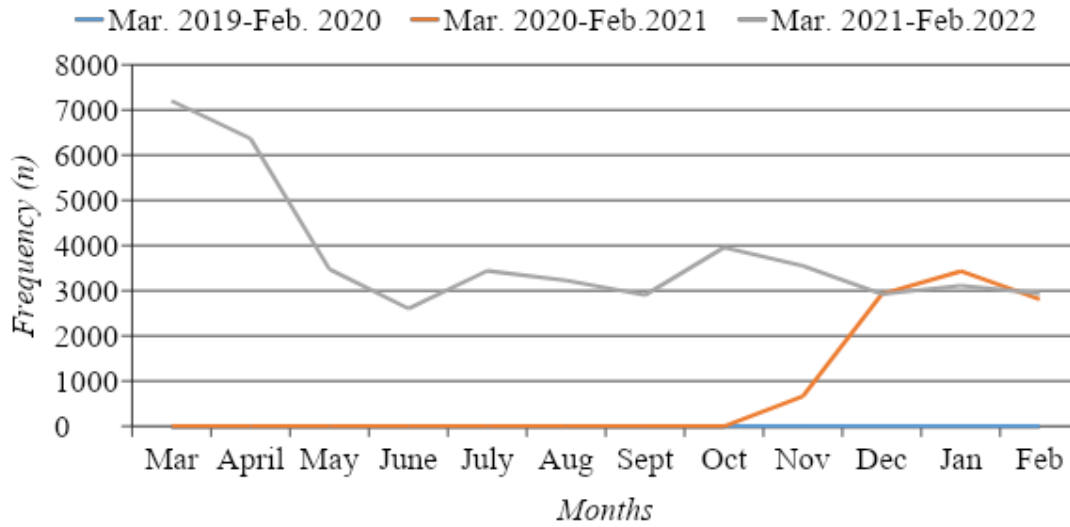
2019-2020 before the onset of COVID-19 were not reported. Regarding the provision of family planning services, a majority of 8,882 (72.2%) were rendered during the March 2021 to February 2022 period, compared to 3,418 (27.8%) in the COVID-19 period from March 2020 to February 2021. Similarly, among the women referred to health facilities for family planning services, the majority, 11,039 (83.0%), were referred during the March 2021 to February 2022 period, as opposed to 2,254 (17.0%) in the COVID-19 period from March 2020 to February 2021 (Figure 2 and 3).

Figure 2: Distribution of Family Planning Services During the Pandemic



Family Planning Services

Figure 3:
Family Planning Services Offered by CHVs

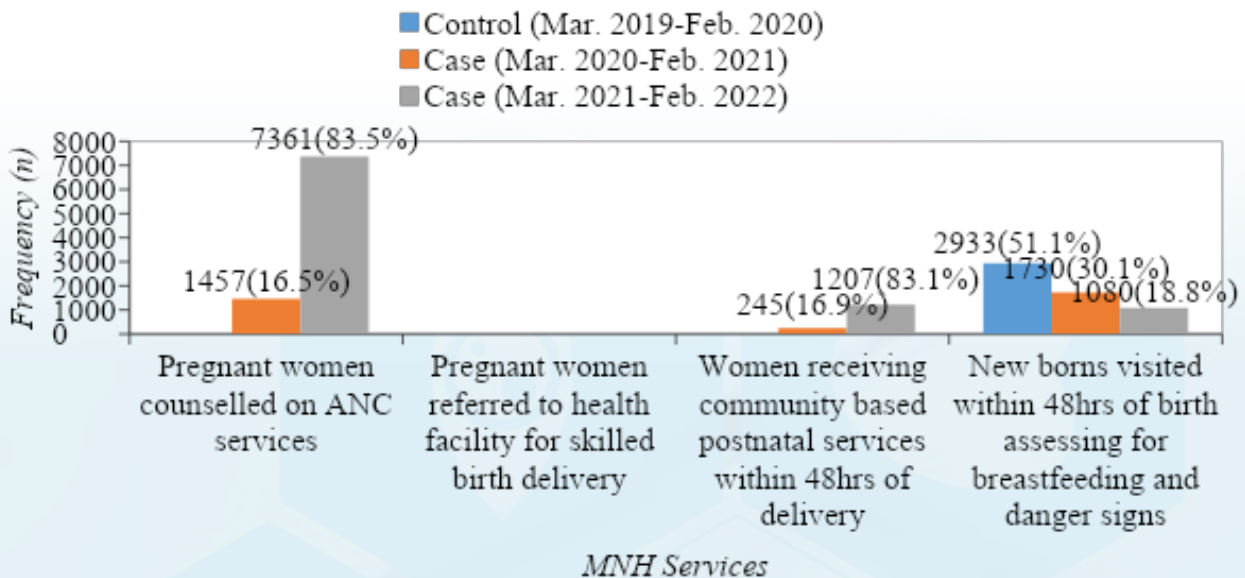


Distribution of Maternal Neonatal Health (MNH) Services

During the study period from March 2019 to February 2022, Community Health Volunteers (CHVs) provided Maternal and Newborn Health (MNH) services to 16,031 patients. The majority of these services, specifically 9,648, were delivered between March 2021 and February 2022, followed by 3,432 in the period from March 2020 to February 2021, and 2,933 between March 2019 and February 2020. Within this cohort, 8,818 pregnant women received counselling on Antenatal Care (ANC) services, 1,452 women availed community-based postnatal services within 48 hours of delivery, and 5,743 newborns were visited within 48 hours of birth to assess breastfeeding and detect danger signs.

Among the pregnant women counselled on ANC services, the majority (83.5%) received counselling during the March 2021 to February 2022 period, with the remaining 16.5% counselled during the March 2020 to February 2021 COVID-19 period. For women receiving postnatal services within 48 hours of delivery, the majority (83.1%) were served between March 2021 and February 2022, while 16.9% received services during the March 2020 to February 2021 COVID-19 period. Among newborns visited within 48 hours of birth to assess breastfeeding and danger signs, the majority (51.1%) were attended to between March 2021 and February 2022, followed by 30.1% from March 2020 to February 2021, and 18.8% during the March 2021 to February 2022 COVID-19 period (Figure 4).

Figure 4:
Distribution of MNH Services

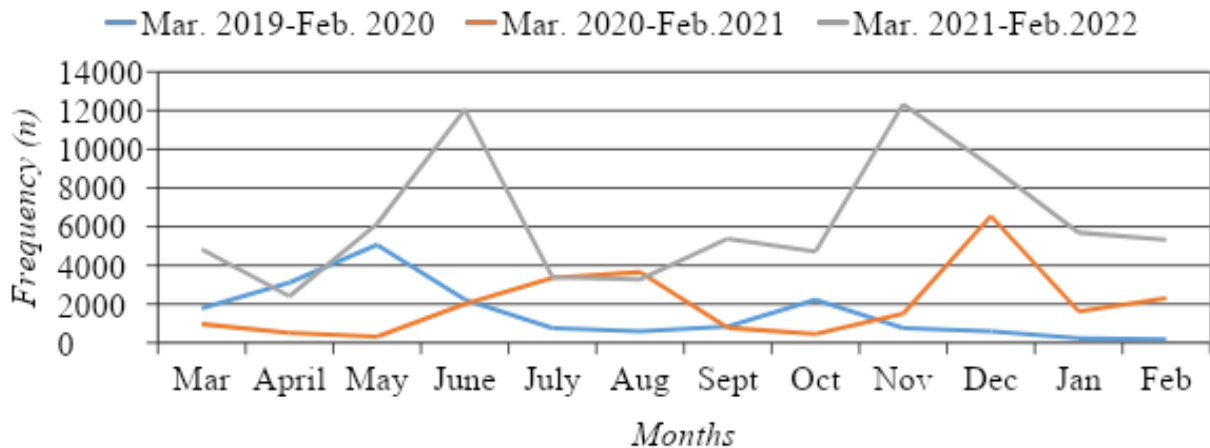


Evaluation of Well Child Services During the Pandemic

During the study period from March 2019 to February 2022, Community Health Volunteers (CHVs) provided Well Child Services totalling 117,008, with the majority (74,644) delivered between March 2021 and February 2022, followed by 24,028 between March 2020 and February 2021, and 18,336 between March 2019 and February 2020. This encompassed various interventions, including the identification of 669 malnourished children aged 6-59 months, referral of 17,257 children aged 6-59 months for Vitamin A supplementation (VAS), deworming of 92,388 children aged 12-59 months, referral of 5,119 children aged 0-11 months for immunization, and referral of 1,575 immunization

defaulters. The majority of malnourished children (80.6%) were identified between March 2021 and February 2022, compared to 19.4% during the March 2020 to February 2021 COVID-19 period. Similarly, referrals for VAS, deworming, and immunization were predominantly concentrated in the March 2021 to February 2022 period. Statistical analysis using Analysis of Variance (ANOVA) demonstrated a significant difference in Well Child Services groups ($F(2, 33) = 15.042, p < .001$). A Tukey post hoc test revealed that CHVs' services significantly improved from March 2021 to February 2022 ($6220.33 + 3262.06, p < .001$) compared to March 2020 to February 2021 ($2001.50 + 1801.68, p < .001$) and March 2019 to February 2021 ($1528.00 + 1444.52, p < .001$) groups.

Figure 5:
Distribution of Well Child Services

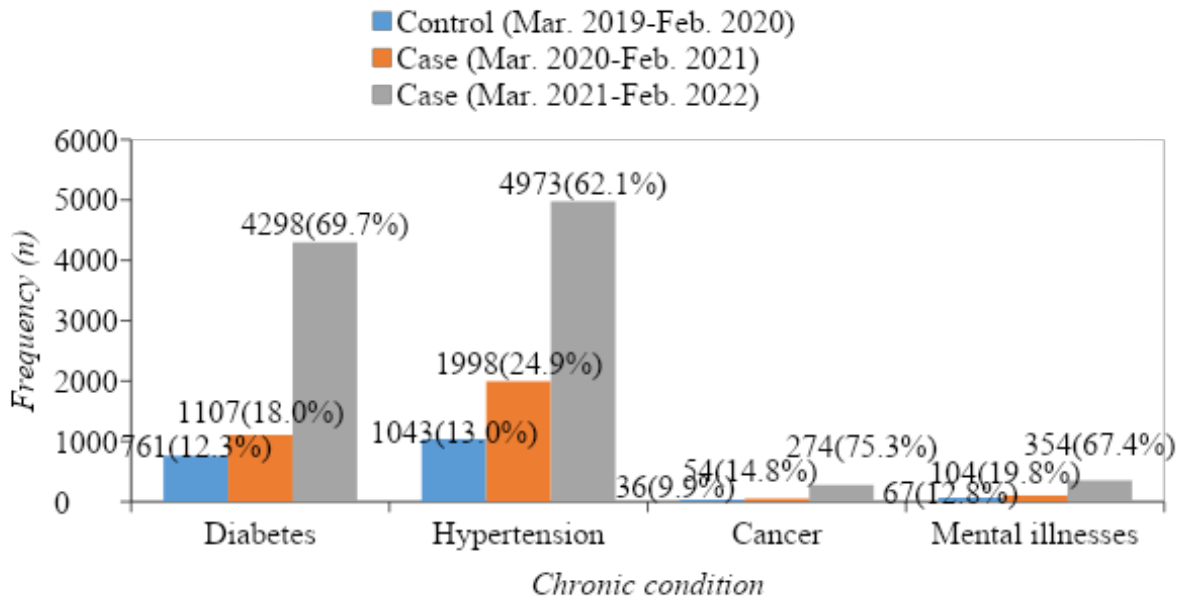


Care of Persons with Known Chronic Conditions

During the study period from March 2019 to February 2022, Community Health Volunteers (CHVs) provided services for the care of persons with known chronic conditions, totaling 15,069. The majority of these services (9,899) were offered between March 2021 and February 2022, followed by 3,263 between March 2020 and February 2021, and 1,907 between March 2019 and February 2020. The chronic conditions addressed included diabetes (6,166 cases), hypertension (8,014 cases), cancer (364 cases), and mental illnesses (525 cases). Among individuals with diabetes, the majority (69.7%)

received services from March 2021 to February 2022, followed by 18.0% from March 2020 to February 2021, and 12.3% from March 2019 to February 2020. Similarly, for hypertension, 62.1% received services from March 2021 to February 2022, 24.9% from March 2020 to February 2021, and 13.0% from March 2019 to February 2020. The majority of cancer patients (75.3%) received services from March 2021 to February 2022, while mental health services were predominantly provided in the same period (67.4%).

Figure 6:
Distribution of Care of Persons with Known Chronic Conditions

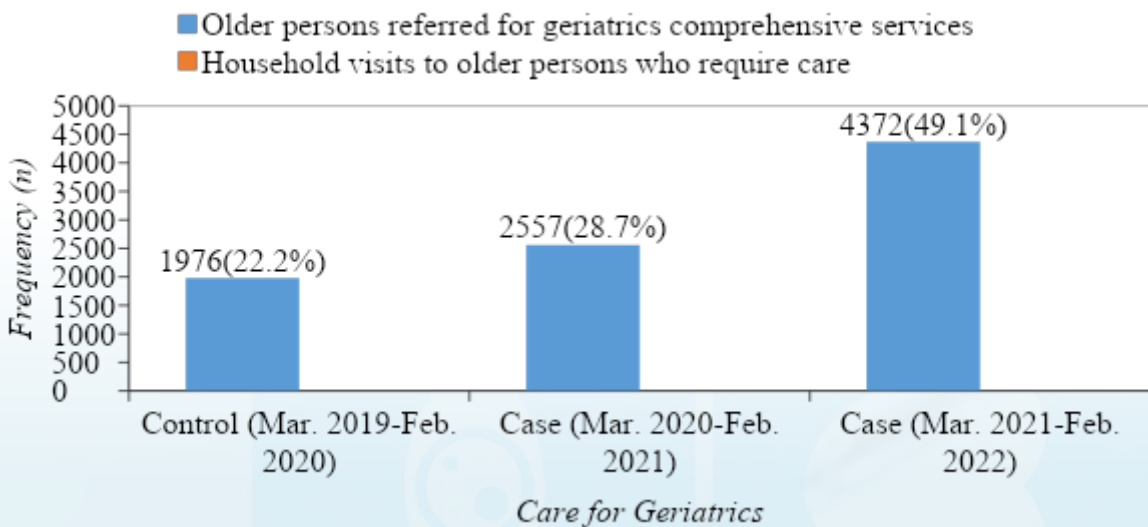


Geriatric Care Services by CHVs During the Pandemic

Community Health Volunteers (CHVs) provided comprehensive geriatric care services during the study period from March 2019 to February 2022, with a total of 8,905 older persons referred for such services. The majority of these services, comprising 4,372, were offered between March 2021 and February 2022, followed by 2,557 services between March 2020 and February 2021, and 1,976 services

between March 2019 and February 2020 (Figure 9). Statistical analysis using Analysis of Variance (ANOVA) demonstrated a significant difference in CHVs’ care of geriatrics services groups ($F(2, 33) = 24.778, p < .001$). A Tukey post hoc test further revealed that CHVs’ services significantly improved in March 2021 to February 2022 ($364.33 + 66.64, p < .001$) compared to March 2020 to February 2021 ($213.08 + 96.15, p < .001$) and March 2019 to February 2021 ($164.67 + 45.55, p < .001$) groups.

Figure 7:
Distribution of Care of Geriatrics



Performance of CHVs in the Delivery of Community Health Services Before and During the COVID – 19 Pandemic

The table below illustrates changes in the number of services provided by Community Health Volunteers (CHVs) and the corresponding reasons for these fluctuations. Of the total cases, 4.5% remained consistent, 62.7% saw an increase, while 29.8% experienced a decrease. The predominant reason for the surge in cases (84.9%) was the fear of patients contracting COVID-19 at healthcare facilities, coupled with logistical challenges such as the absence of staff (7.0%), lack of medicines (6.4%), closed

health facilities (8.1%), and inaccessible locations (8.7%). Additionally, 26.7% faced obstacles due to a lack of transportation means, while 40.7% attributed the rise to the community's trust in CHVs' services. Conversely, the decline in cases (74.4%) was primarily driven by community members' apprehension about contracting COVID-19 from CHVs, with other contributing factors being individuals opting for traditional healers (26.9%) and choosing to treat ailments at home (44.9%). A smaller percentage (6.4%) cited a lack of trust in CHVs as a reason for the decline.

Table 1:

Self-Assessed Performance of CHVs in the Delivery of Community Health Services Before and During the COVID – 19 Pandemic

Services		n	%
Change in number of services provided	Same	12	4.5
	Increased	172	62.7
	Decreased	78	29.8
Reason for increase in cases	Fear of patients getting COVID – 19 infection from the hospital	146	84.9
	No staff at health facilities	12	7.0
	No medicine at health facilities	11	6.4
	Health facilities were closed	14	8.1
	Health facility was too far	15	8.7
	Lack of transport means to health facility	46	26.7
	Community trust the services of CHVs	70	40.7
	Other		
Reason for decrease in cases	Community members were afraid to get infected with COVID – 19 from CHV	58	74.4
	People choosing to consult traditional healers	21	26.9
	People choosing to treat at home	35	44.9
	Community did not trust CHVs	5	6.4
	Other	3	3.9

DISCUSSION

The analysis of Maternal and Newborn Health (MNH) services rendered by Community Health Volunteers (CHVs) from March 2019 to February 2022 reveals a substantial and commendable surge in service provision, particularly within the COVID-19 period, notably between March 2021 and February 2022. This pronounced increase can be attributed to heightened awareness and prioritization of maternal and newborn health amid the ongoing pandemic. The prevalence of counselling, family planning services, and referrals during this timeframe suggests a proactive response to the unique challenges posed by the pandemic.

Significantly, the study underscores the statistical significance of the improvements observed in MNH services through the application of the Analysis of Variance (ANOVA) test. This statistical validation accentuates the effectiveness of CHVs in dynamically adapting and enhancing their services, indicative of a resilient community health response during times of adversity. Furthermore, the temporal distribution of services exhibits a concentrated effort in the more recent period, implying an evolving and dynamic approach to healthcare provision by CHVs. The observed increase in services may be attributed to the implementation of targeted interventions, strengthened community engagement strategies, or the flexible adaptation of service delivery methodologies by CHVs. This adaptability is a testament to the versatility and responsiveness of CHVs to the ever-changing healthcare landscape.

Delving into the specifics of the services provided, such as counselling, family planning, and postnatal care, the study underscores the holistic nature of MNH services delivered by CHVs. This holistic approach not only addresses the immediate needs of mothers and newborns but also signifies a comprehensive and integrated strategy to ensure the well-being of the entire maternal and newborn health spectrum.

The analysis of Well Child Services depicts a noticeable upward trajectory in services provided by Community Health Volunteers (CHVs) during the study period, aligning with analogous trends observed in Maternal and Newborn Health services (Perry et al., 2014). This surge, particularly evident from March 2021 to February 2022, underscores an intensified commitment to child health amid the ongoing COVID-19 pandemic (Plotkin et al., 2022). The comprehensive distribution of services across distinct age groups indicates a holistic approach, catering to the diverse healthcare needs of children from infancy through late childhood (Plotkin et al., 2022). Insights into the surge in cases reveal socio-economic and health system challenges faced by the community, with a major contributing factor being the fear of COVID-19 infection at healthcare

facilities. This apprehension has prompted a discernible shift towards community-based services facilitated by CHVs, showcasing their adaptability and responsiveness to the unique circumstances imposed by the pandemic (Chengo et al., 2022). This aligns with trends observed in Maternal and Newborn Health services, emphasizing a consistent pattern across healthcare domains (Chengo et al., 2022).

Statistical analysis reinforces the substantial improvements in Well Child Services, affirming the efficacy of CHVs in dynamically meeting the evolving healthcare demands of the community. The Application of Variance (ANOVA) test, coupled with the Tukey post hoc analysis, not only underscores these improvements but also accentuates temporal nuances, providing a nuanced comprehension of the continually shifting healthcare landscape. Comparative insights gleaned from various studies in the field further solidify the pivotal role played by CHVs in community health. The congruence in trends across diverse health service categories, such as Maternal and Newborn Health, Well Child Services, and the Care of Persons with Known Chronic Conditions, underscores the universal adaptability and effectiveness of CHVs (Lassi et al., 2016; Adam et al., 2014; Gilmore & McAuliffe, 2013). This consistent pattern across different healthcare domains fortifies the argument for sustained support and recognition of CHVs as indispensable frontline healthcare providers.

The surge in services for individuals with known chronic conditions, notably between March 2021 and February 2022, mirrors overarching trends observed in Maternal and Newborn Health (MNH) and Well Child Services, as evidenced in studies by Croke et al. (2022). The heightened prevalence of chronic conditions like diabetes and hypertension underscores the indispensable nature of continuous care, persisting even amidst the complex backdrop of the ongoing pandemic (Brennan et al., 2023; Dehghani et al., 2023).

The rationale behind the escalation in cases provides valuable insights into community challenges, prominently featuring the apprehension of COVID-19 infection at traditional healthcare facilities. This apprehension propels a notable shift towards community-centric services, illustrating the dynamic responsiveness of Community Health Volunteers (CHVs) to community health needs. The multifaceted reasons, encompassing trust in CHV services and limitations within conventional healthcare systems, underscore the adaptable nature of CHVs in addressing diverse community health challenges across multiple studies (Ndu et al., 2022; Bakibinga et al., 2020).

Statistical analyses consistently underscore the observed improvements in the care of individuals with chronic conditions. The significant differences identified reinforce the effectiveness of CHVs, reiterating the need for sustained and augmented support for those managing chronic health issues amidst crisis situations. The addition of more comparative studies, such as the work by Ogutu et al. (2021), further enriches the discussion, highlighting the universality of trends and the role of CHVs in fostering resilient community health systems.

The analysis of geriatric care data offers a distinctive perspective, spotlighting the healthcare necessities of the older population. The notable upswing in services, particularly in recent periods, indicates an augmented focus on geriatric care, likely spurred by an increased awareness of the distinctive healthcare requirements of older individuals. The reasons behind the surge in geriatric cases resonate with broader themes observed in other healthcare categories, prominently featuring the fear of COVID-19 infection as a significant factor. This aligns with a consistent theme across various health service domains, highlighting the universal impact of the pandemic on healthcare-seeking behaviors. Once again, the adaptability of Community Health Volunteers (CHVs) in addressing community needs becomes apparent, as reflected in the nuanced reasons provided, demonstrating a profound understanding of the challenges faced by the older demographic.

Further analysis substantiates the observed enhancements in geriatric care, affirming the effectiveness of CHVs in meeting the distinct healthcare needs of older community members. This statistical validation not only reinforces the efficacy of CHVs in addressing the unique health challenges of the geriatric population but also contributes to the growing body of evidence supporting the pivotal role of CHVs in comprehensive community health care. In essence, the heightened focus on geriatric care, evidenced by the surge in services and the nuanced understanding of the challenges faced by older individuals, underscores the adaptability and effectiveness of CHVs in catering to diverse healthcare needs across different demographic groups. This discussion contributes to the evolving discourse on the role of CHVs in providing targeted and responsive healthcare, particularly for vulnerable populations like the geriatric community.

CONCLUSION(S)

Based on the findings above, we conclude as follows:

- i. This study reveals a dynamic and adaptable performance by CHVs in Nakuru County during the Covid-19 pandemic, showcasing their capacity to navigate and respond effectively to evolving healthcare challenges within the community.
- ii. The study underscores the critical role played by CHVs in the delivery of healthcare services during the pandemic, augmenting the importance of their contributions in maintaining and enhancing community health, even in the face of unprecedented challenges posed by the Covid-19 crisis.

RECOMMENDATIONS

We recommend as follows:

- i. The CHV training programs should be enhanced to facilitate effective response to evolving healthcare challenges in different contexts.
- ii. Establish and reinforce recognition and support mechanisms to empower CHVs in maintaining community health during unprecedented challenges like the Covid-19 pandemic.

Competing interests

The authors declare no competing interest.

Authors' contributions

All authors made substantial contributions to the conception and design of the study, acquisition and interpretation of data, drafting the article and revising it critically for important intellectual content, and final approval of the version to be submitted.

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