Journal of Cancer Education (2022) 37:466–473
https://doi.org/10.1007/s13187-020-01839-6

Focused Training of Community Health Volunteers on Cervical Cancer in Rural Kisumu

Edwin Onyango Ochomo[1] · Samson Ndege[1,2] · Peter Itsura[1,3]

Published online: 27 July 2020

Abstract

The cancer disease burden is higher in the low- and middle-income countries like Kenya where uptake of screening services is low. Community health volunteers (CHVs) have been shown to be effective in improving uptake of health services and could also be used in cervical cancer screening. However, they still have inadequate knowledge hindering effective public education. The aim of this study is to determine the effect of focused training of the CHVs on their knowledge on cervical cancer and screening uptake among women of reproductive age. This was a quasi-experimental study in rural sub-counties of Nyando and Nyakach. Nyando was the intervention arm with 186 CHVs and Nyakach the control with 239 CHVs. Participants' knowledge on cervical cancer was assessed using a self-administered questionnaire. CHVs in the intervention arm were trained about cervical cancer and screening. Knowledge was re-assessed following a 6-month public education period. The focused training improved the CHVs' knowledge on cervical cancer to 60.9% compared to 13.4% in the control arm ($p = 0.004$) at the end-line. The knowledge was dependent on the level of education ($\chi^2 = 34.41$, $p = 0.045$), religion ($\chi^2 = 25.85$, $p = 0.007$), and occupation ($\chi^2 = 95.04$, $p < 0.0001$). Screening uptake was significantly associated with knowledge of risk factors ($p = 0.019$) and sign and symptoms ($p = 0.017$). Screening uptake improved in the intervention arm while declined in the control arm. The training significantly improved the CHVs' knowledge on cervical cancer and uptake of screening services in the intervention area, Kisumu County, Kenya, and should be continuous.

Keywords Community strategy · Community health volunteers · Cervical cancer · Screening

Background

There has been a steady increase in both the number of cases and deaths from cervical cancer globally, making it the fourth most common cancer in women. There were 569,847 cases and 311,365 deaths as of 2018, up from 530,000 cases and 270,000 deaths in 2012 [1]. In Eastern Africa, 119,284 new cases of cervical cancer were diagnosed in 2018 with 81,687 deaths, making it the leading cause of cancer-related mortality with an incidence rate of 40.1/100,000 and mortality of 30.0/100,000 [1]. In Kenya, current estimates indicate that every year, 5250 women are diagnosed with cervical cancer and 3286 die from the disease annually [2]. Cervical cancer ranks as the second most prevalent cancer among women in Kenya and the most prevalent cancer among women of ages between 15 and 44 years [2]. Data from hospital-based registries in Kenya indicated that cancer of the cervix accounts for 70–80% of all cancers of the genital tract [3]. The disease burden is significantly higher in the low- and middle-income countries with lower uptake of preventive services.

In high-income countries, programs are in place which enables women to get screened, making most pre-cancerous lesions identifiable at stages when cure is feasible. Early treatment prevents up to 80% of cervical cancers in these countries [4]. In the developing countries, however, it was estimated that 95% of women had never been screened for cervical cancer mainly due to lack of awareness among the population [5]. This underscores the need for public education which is undertaken by the community health volunteers (CHVs) who

✉ Edwin Onyango Ochomo
edochomo@gmail.com

Samson Ndege
ndegekip@yahoo.com; sndege@mu.ac.ke

Peter Itsura
peteritsura@gmail.com

[1] AMPATH Cervical Cancer Program, P.O. Box 4606, Eldoret, Kenya

[2] School of Public Health, Moi University, P.O. Box 4606, Eldoret, Kenya

[3] School of Medicine, Moi University, P.O. Box 4606, Eldoret, Kenya

have been proven to be effective in passing health information [6]; however, their ability to create demand for the screening services depends largely on their ability to pass the right information to the community members.

Enlightened women, who have access to information about their health and are able to make informed decisions, have been shown to be more likely to seek cervical cancer screening [7, 8]; moreover, a high level of knowledge about cervical cancer was found to be a key predictor of screening intent [9]. To enhance cervical cancer screening and early detection, it is important that the women access the most critical information on cervical cancer and where the screening services can be accessed from Wongwatcharanukul et al. [10].

Objectives of the Study

General Objective

The aim of this study is to determine the effect of focused training of the CHVs on their knowledge on cervical cancer and screening uptake among women of reproductive age in rural Kisumu County.

Specific Objectives

1. To assess the effect of the focused training on the knowledge of CHVs on cervical cancer in rural Kisumu County.
2. To assess the effect of the educational intervention on the uptake of cervical cancer screening services among women of reproductive age in rural Kisumu County.

Methods

Study Setting

The study was carried out in the rural areas of Kisumu County, that is, Nyando and Nyakach sub-counties. Nyando sub-county covers an area of 413.20 km^2 with a population of 161,501 while Nyakach sub-county covers an area of 357.30 km^2 with a population of 150,319 according to the 2019 National Census. The two sub-counties are found in Kisumu County which has one of the highest HIV prevalence in the country which is a comorbidity with cervical cancer. They are located adjacent to each other with comparable socio-economic characteristics, functional community units, but with low uptake of cervical cancer screening rates.

The two sub-counties have 19 and 18 government health facilities, respectively. Each of the health facilities has community units which link them to the community. Each community unit has 10 community health volunteers serving it, giving a total of 580 CHVs for the 58 community units in the two sub-counties. The volunteers are trained on general health issues including cancers without any special emphasis on cervical cancer and the importance of screening and early diagnosis.

Study Design

This was a quasi-experimental study where Nyando sub-county was the intervention arm while Nyakach sub-county was the control arm. Baseline knowledge of the CHVs in the two sub-counties was assessed in October to November 2018. The CHVs in Nyando sub-county were trained by a trained research assistant on the risk factors, signs and symptoms, and the availability of the cervical cancer screening services in the local health facilities using the training guide adopted from the NCD facilitator's guide. The research assistant was a community health specialist with specific training on cervical cancer. After that, being the primary source of health information to the community under the community strategy approach, they were allowed to sensitize the community for 6 months before the uptake of cervical cancer screening was reevaluated. However, the CHVs in Nyakach sub-county were not trained but continued their sensitization normally. This is referred to under "The Intervention" section. After six months, in March and April 2019 their knowledge was re-assessed. During the 6 months, screening data from the health facilities was collected on a monthly basis.

Target Population

The study targeted all the community health volunteers in both Nyando and Nyakach sub-counties. According to Kenya Health Information System (KHIS) 2017, the two sub-counties had a total of 58 community units with each having 10 CHVs. The target population was therefore all the 580 CHVs. This comprised of 310 from Nyando and 270 from Nyakach.

Sampling Procedure

A saturated sample of all the CHVs was included in the study provided they consented to participate in the study.

The Intervention

All the CHVs in both the sub-counties were offered equal chance to be included in the study. In Nyando sub-county, the CHVs were invited for the sensitization which started with a pre-test to document their baseline knowledge. After that, the research assistant took the CHVs through the risk factors, signs and symptoms, and locally available screening options in a session which lasted about 3 h in each of the participating

facilities. The CHVs then carried out public education at the household level for 6 months, between November 2018 and May 2019 to create awareness on cervical cancer. The control arm did not have sensitization; therefore, the research assistants stationed at the health facilities issued the questionnaires to the CHVs as they reported for duty over the week. The CHVs were allowed to continue with their public education and household visits without any additional information to address cervical cancer and screening.

Data Management and Analysis

Filled questionnaires were handed over to the principal investigator for safe keeping on a daily basis. At the beginning of each month, the research assistants collected monthly screening data from each of the participating facilities. The knowledge level on cervical cancer was determined by calculating the percentage score in all the sections; then, the change in knowledge was assessed based on the percentage score at the pre- and post-intervention surveys. Screening trends were presented using line graphs for comparison. The change in knowledge was then subjected to chi-square test. The factors influencing knowledge and screening for cervical cancer were assessed using regression. All statistical modeling were done using logistic regression (both bivariate and multivariate analysis) with a 5% significance level.

Ethical Approval and Authority to Participate

The study was approved by the Moi Teaching and Referral Institutional Research and Ethics Committee (IREC) (FAN:IREC 3059) and before recruitment into the study, the participants' written informed consent was obtained. The authority of the Kisumu County Health Management was also obtained. Lastly, no identifiable participant information was collected and access to data was limited to the study team only.

Results

Demographic Characteristics

A total of 425 out of the 580 eligible community health volunteers in the two sub-counties participated in the study giving a 73.3% response rate. This comprised of 239/270 (88.5%) from Nyakach and only 186/310 (60.0%) from Nyando. The low response rate in Nyando was due to unavailability of some of the CHVs to attend the sensitization meetings and those who did not consent were also excluded from the study.

In Nyakach sub-county (the control arm), majority of the CHVs 187 (78.2%) were female with mainly primary school level of education at 138 (57.7%) and an average at 110 (46.0%) practicing small-scale farming as their major occupation. In Nyando sub-county (the intervention arm), majority of the CHVs were female at 153 (82.3%) of which 111 (59.7%) had secondary level of education, and 135 (72.6%) practiced small-scale farming as their major occupation (Table 1).

Community Health Volunteers' Knowledge on Cervical Cancer

In the control arm, the baseline survey showed that 97.1% (232/239) had ever heard about cervical cancer; however, they had below average knowledge level. This remained unchanged in the end-line survey. The average knowledge score on risk

Table 1 Demographic characteristics of the study participants

	Control (Nyakach)		Intervention (Nyando)	
Variable	Baseline *N* (%)	End-line *N* (%)	Baseline *N* (%)	End-line *N* (%)
Sample size	239	239	186	186
Gender				
Male	52 (21.8)	52 (21.8)	33 (17.7)	33 (17.7)
Female	187 (78.2)	187 (78.2)	153 (82.3)	153 (82.3)
Age				
20–29	0 (0.0)	0 (0.0)	7 (3.8)	7 (3.8)
30–39	64 (26.8)	64 (26.8)	47 (25.3)	47 (25.3)
40–49	102 (42.7)	102 (42.7)	81 (43.3)	81 (43.3)
50–59	58 (24.3)	58 (24.3)	44 (23.7)	44 (23.7)
Above 60	15 (6.3)	15 (6.3)	7 (3.8)	7 (3.8)
Level of education				
Primary	138 (57.7)	138 (57.7)	58 (31.2)	58 (31.2)
Secondary	77 (32.2)	77 (32.2)	111 (59.7)	112 (59.7)
Post-secondary	24 (10.0)	24 (10.0)	17 (9.1)	17 (9.1)
No education	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Religion				
Christian	237 (99.2)	237 (99.2)	184 (98.9)	184 (98.9)
Muslim	1 (0.4)	1 (0.4)	0 (0.0)	0 (0.0)
Others	1 (0.4)	1 (0.4)	1 (0.5)	1 (0.5)
No religion	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.5)
Marital status				
Single	2 (0.8)	2 (0.8)	3 (1.6)	3 (1.6)
Married	201 (84.1)	201 (84.1)	157 (84.4)	157 (84.0)
Separated	36 (15.1)	36 (15.1)	26 (14.0)	26 (14.0)
Occupation				
Small-scale farming	110 (46.0)	110 (46.0)	135 (72.6)	135 (72.6)
Commercial farming	2 (0.8)	2 (0.8)	6 (3.2)	6 (3.2)
Business/other	99 (41.4)	99 (41.4)	27 (14.5)	27 (14.5)
Salaried employee	0 (0.0)	0 (0.0)	7 (3.8)	7 (3.8)
Manual/casual labor	28 (11.7)	28 (11.7)	11 (5.9)	11 (5.9)

Data are in figures (proportion). Proportion is in percentages

Table 2 Comparison of the pre- and post-training knowledge on cervical cancer among community health volunteers in rural Kisumu County

		Control arm (Nyakach sub-county)			Intervention arm (Nyando sub-county)		
	Variable	Baseline interview *N* (%)	End-line interview *N* (%)	Test of proportion (p value = 0.05)	Baseline interview *N* (%)	End-line interview *N* (%)	Test of proportion (p value = 0.05)
	Sample size	239*	239		186*	186	
	Heard of cervical cancer	232 (97.1)	232 (96.1)	0.8037	182 (97.8)	186 (100.0)	*0.0438*
Risk factors	Many children	16 (6.9)	16 (6.7)	0.9821	24 (13.0)	137 (73.7)	*< 0.0001*
	Many sexual partners	62 (26.7)	62 (25.8)	0.9093	78 (42.4)	141 (75.8)	*< 0.0001*
	Early onset of sexual activity	16 (6.9)	17 (7.1)	0.982	39 (21.2)	127 (68.3)	*< 0.0001*
	HPV infection	25 (10.8)	25 (10.4)	0.9634	53 (28.8)	122 (65.6)	*< 0.0001*
	Smoking	47 (20.3)	47 (19.6)	0.9323	28 (15.2)	107 (57.5)	*< 0.0001*
	Immune suppression	47 (20.3)	47 (19.6)	0.9323	20 (10.9)	119 (64.0)	*< 0.0001*
	Do not know	40 (17.2)	40 (16.7)	0.9525	9 (16.1)	0 (0.0)	*0.00009*
	Risk factor score (%)	15.3	14.7	0.9323	21.7	67.2	*< 0.0001*
	Above average	0 (0.0)	0 (0.0)		10 (5.4)	126 (67.7)	*< 0.0001*
Signs and symptoms	Abnormal vaginal bleeding	18 (7.5)	18 (7.5)	1	96 (51.6)	155 (83.3)	*< 0.0001*
	Abnormal vaginal discharge	38 (15.9)	38 (15.8)	0.9905	51 (27.4)	142 (76.3)	*< 0.0001*
	Abdominal pains	12 (5.0)	13 (5.4)	0.9641	55 (29.6)	139 (74.3)	*< 0.0001*
	Pain during sex	50 (20.9)	50 (20.8)	0.9902	31 (16.7)	110 (59.1)	*< 0.0001*
	Do not know	124 (51.9)	124 (51.7)	0.9749	18 (31.0)	2 (1.1)	*< 0.0001*
	Symptoms score (%)	12.3	12.8	0.9945	31.3	73.0	*< 0.0001*
	Above average	0 (0.0)	0 (0.0)		25 (13.4)	138 (74.2)	*< 0.0001*
Screening methods used	VIA	16 (14.2)	16 (15.7)	0.9749	17 (36.2)	144 (77.4)	*< 0.0001*
	VILI	15 (13.3)	15 (12.3)	0.9759	12 (26.7)	128 (68.8)	*< 0.0001*
	Pap-smear	48 (42.5)	49 (42.0)	0.9099	26 (42.6)	7 (3.8)	*< 0.0001*
	HPV testing	34 (30.1)	34 (29.9)	0.9899	68 (79.1)	18 (9.7)	*< 0.0001*
Cost	Free	66 (58.4)	66 (58.2)	0.9641	97 (83.6)	179 (96.2)	*< 0.0001*
	Less than KSH. 100	17 (15.0)	18 (15.1)	0.9899	5 (4.3)	0 (0.0)	*0.0046*
	More than KSH. 100	30 (26.5)	30 (26.4)	0.9945	14 (12.1)	4 (2.2)	*0.0005*
Turnaround time	Less than 30 min	31 (27.4)	31 (27.0)	0.9979	59 (50.7)	169 (90.9)	*< 0.0001*
	30–60 min	36 (31.9)	36 (31.8)	0.9856	43 (37.1)	10 (5.4)	*< 0.0001*
	More than 60 min	46 (40.7)	47 (40.6)	0.9978	14 (12.1)	4 (2.2)	*0.0005*
Retesting interval	Semi-annually	47 (41.6)	47 (41.4)	0.9901	39 (33.6)	12 (6.5)	*< 0.0001*
	Annually	55 (48.7)	56 (47.7)	0.9912	57 (49.1)	10(5.4)	*< 0.0001*
	After 5 years	11 (9.7)	11 (9.5)	0.9945	20 (17.2)	161(86.6)	*< 0.0001*
	Screening score (%)	12.3	12.7	0.8791	16.6	42.5	*< 0.0001*
Aggregate score (%)		13.3	13.4	0.9564	23.2	60.9	*< 0.0001*

Data are in numbers (percentage). Scores are based on the total number of correct answers given out of the maximum 15, converted to percentage then graded as either above or below average. Threshold for average knowledge was 50% score

Italics indicates scientifically significant change ($p \leq 0.05$)

factors at baseline reduced from 15.3 to 14.7% ($p = 0.9323$) in the end-line survey; however, that on signs and symptoms and on availability of screening services improved from 12.3 to 12.8% ($p = 0.9945$) and 12.3 to 12.7% ($p = 0.8791$), respectively. The overall score had a statistically insignificant improvement from 13.3% at the baseline survey to 13.4% in the end-line survey ($p = 0.9564$). In the intervention arm, knowledge significantly improved with the knowledge on risk factors improving from 21.7 to 67.2% ($p < 0.0001$), the knowledge on signs and symptoms improved from 31.3 to 73.0% ($p < 0.0001$) while the knowledge on availability of screening services improved from 16.6 to 42.5% ($p < 0.0001$), this translated to an overall improvement in the general knowledge about cervical cancer from 23.2 to 60.9% ($p < 0.0001$) (Table 2).

Table 3 Comparison of the study arms pre- and post-intervention knowledge scores

	Pre-intervention phase			Post-intervention phase		
	Control arm	Intervention arm	*p* value	Control arm	Intervention arm	*p* value
Knowledge of risk factors						
Mean	1	1		1	4	
%age above mean	15%	22%		15%	67%	
Median (IQR)	1 (1–1)	1 (1–1)	0.064	1 (0–1)	4 (3–6)	*< 0.001*
Knowledge of symptoms of cervical cancer						
Mean	0	1		1	3	
%age above mean	12%	31%		13%	74%	
Median (IQR)	0 (0–1)	1 (1–1)	*< 0.001*	1 (0–1)	3 (2–4)	*0.001*
Knowledge of screening services						
Mean	0	1		1	2	
%age above mean	12%	17%		12%	40%	
Median [IQR]	0 (0–1)	1 (0–1)	*0.008*	1 (0–1)	2 (1–2)	*0.005*
Aggregate knowledge score						
Mean	2	3		2	9	
%age above mean	13%	22%		13%	61%	
Median (IQR)	2 (1–3)	3 (2–3)	*< 0.001*	2 (0–2)	9 (7–11)	*0.004*

The Italics indicates scientifically significant change ($p \leq 0.05$)

Further analysis between the two arms showed a significantly higher score in the intervention arm than in the control arm following the training across all the indicators assessed as shown in Table 3.

Demographic Factors Associated with Knowledge of Cervical Cancer

In the control arm, gender ($\chi^2 = 13.56$, $p = 0.028$) and occupation ($\chi^2 = 73.76$, $p < 0.0001$) were found to significantly influence the knowledge of the CHVs on cervical cancer. However, in the intervention arm, level of education ($p = 0.0045$), religion ($p = 0.007$), and occupation ($p < 0.001$) were found to significantly influence the knowledge on cervical cancer (Table 4).

Association of Knowledge of Cervical Cancer and Uptake of Screening Services

In the control area pre-intervention phase, uptake of cervical cancer screening services was associated with knowledge of risk factors (OR = 5.01, 95% CI 1.46, 17.18) and knowledge of symptoms (OR = 4.84, 95% CI 1.34, 17.45). The same factors also associated in the intervention period knowledge of risk factors (OR = 4.98, 95% CI 1.54, 16.35) and knowledge of symptoms (OR = 4.84, 95% CI 1.34, 17.45).

In the intervention area, we also adjusted in priori for knowledge of risk factors, knowledge of symptoms, and knowledge of screening services. Uptake of cervical cancer screening services at baseline was associated with knowledge

Table 4 Demographic factors associated with knowledge of cervical cancer among community health volunteers in rural Kisumu County

Characteristics	Control arm (Nyakach sub-county) χ^2 (*p* value)	Intervention arm (Nyando sub-county) χ^2 (*p* value)
Age	14.67 (0.478)	40.80 (0.609)
Gender	*13.56 (0.028)*	15.98 (0.142)
Level of education	14.97 (0.101)	*34.41 (0.045)*
Religion	4.98 (0.834)	*25.85 (0.007)*
Marital status	13.47 (0.125)	20.97 (0.522)
Occupation	*73.76 (< 0.0001)*	*95.04 (< 0.0001)*
Duration worked as a CHV	10.78 (0.845)	46.44 (0.372)

Statistical significance determined by chi-square analysis

Values in italics are statistically significant at $p \leq 0.05$

Table 5 Association of knowledge of cervical cancer to uptake of screening services

Characteristics	Control arm (Nyakach sub-county)				Intervention arm (Nyando sub-county)			
	Pre-intervention phase Adjusted OR (IQR)	*p* value	Post-intervention phase Adjusted OR (IQR)	*p* value	Pre-intervention phase Adjusted OR (IQR)	*p* value	Post-intervention phase Adjusted OR (IQR)	*p* value
Knowledge of risk factors	5.01 (1.46, 17.18)	*0.010*	4.98 (1.54, 16.35)	*0.019*	0.62 (0.39, 0.96)	*0.034*	1.00 (0.75, 1.34)	0.980
Knowledge of symptoms	4.84 (1.34, 17.45)	*0.016*	4.89 (1.47, 17.35)	*0.017*	2.31 (1.25, 4.25)	*0.007*	1.08 (0.68, 1.72)	0.748
Knowledge of screening services	1		1		2.15 (1.12,4.11)	*0.021*	0.78 (0.44, 1.37)	0.386

The Italics indicates scientifically significant change ($p \leq 0.05$)

of risk factors (OR = 0.62, 95% CI 0.39, 0.96), knowledge of symptoms (OR = 2.31, 95% CI 1.25, 4.25), and knowledge on the availability of screening services (OR = 2.15, 95% CI 1.12, 4.11). At the end-line, knowledge on risk factors, signs and symptoms, and availability of cervical cancer screening services was higher but none of the factors was associated with uptake of the screening services as shown on Table 5.

Cervical Cancer Screening Trends in Rural Kisumu County

Prior to the study, the Ministry of Health Kenya had partnered with one implementing partner to carry out cervical cancer screening outreaches in the county. This led to an increased number of screening done, averaging 85 per month. At the end of the outreach program, the number of screening done per month reduced gradually and normalized at about 25 per month in January 2019 onwards in the control region in the control arm. However, with the intervention which involved public education by the trained CHVs at the household level and referral of the WRA to the local health facilities for screening services, the screening rates steadily increased over the 6-month period of follow-up as illustrated in Fig. 1.

Discussion

Majority of the CHVs had heard about cervical cancer at the baseline survey at 97.1% in the control arm and 97.8% in the intervention arm. However, both arms had below average knowledge on the risk factors, signs and symptoms and screening availability in the local health facilities. The average knowledge scores improved from 13.3 to 13.4% ($p = 0.9564$) in the control arm while that of the intervention arm significantly improved from 23.2 to 60.9% ($p < 0.0001$).

In the intervention arm, knowledge significantly improved in all the areas of focus, that is, risk factors, signs and symptoms, and screening services. The greatest improvement was noted on the knowledge of risk factors which improved from 21.7 to 67.2% ($p < 0.0001$); this was followed by signs and

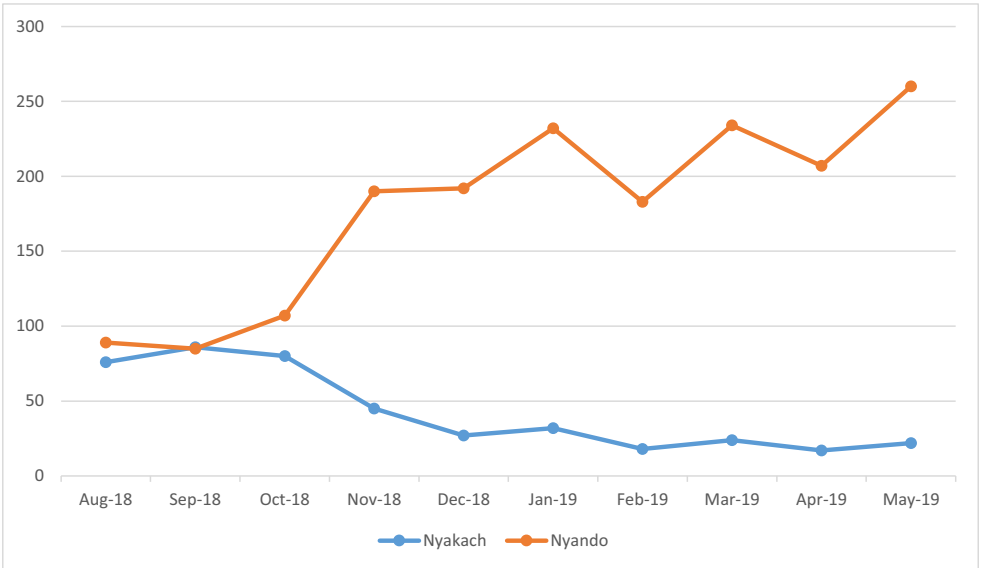

Fig. 1 Cervical cancer screening rates in rural Kisumu County between August 2018 and May 2019

symptoms which improved from 31.3 to 73.0% ($p < 0.0001$), and then knowledge on screening which improved from 16.5 to 39.8% ($p < 0.0001$).

In the control arm, the knowledge was significantly influenced by gender ($p = 0.028$) and occupation ($p < 0.0001$) while in the intervention arm, level of education ($p = 0.045$), religious beliefs ($p = 0.007$), and occupation ($p < 0.0001$) were significantly associated with knowledge on cervical cancer and screening.

These findings are similar to those of other previous studies which found low knowledge on risk factors, symptoms, and treatment and prevention of cervical cancer [11]; similarly, Ochomo et al. [12] established that the knowledge of CHVs on cervical cancer was low and needed to be bridged. Furthermore, Uysal Toraman and Yildirim [13] noted critical knowledge deficit among Turkish women which needed to be addressed. As was also established by Gichangi et al. [14] the current study found that the knowledge on the availability of screening services was low with particular misinformation on the methods used, time taken, and the screening frequency. However, since all other medical services in public health facilities in Kisumu County, Kenya, are free under the Universal Health Coverage program, majority of the participants knew that the screening wherever available is free of charge. This low knowledge is a reflection of the inadequacy of the initial 10-day training to the CHVs during recruitment which require follow-up training to improve [15]. During the initial training, several health topics are covered ranging from communicable diseases, non-communicable diseases, oral health, maternal health, and child health among others.

The screening trends in the intervention arm showed consistent increase compared to the control arm which slowed down then stagnated. This can be attributed to the positive impact of the public education by the trained CHVs. With improved knowledge, better public education was possible and adequate attention was given to cervical cancer screening. This is in agreement with the conclusion of another study that educational intervention has the potential to greatly improve uptake of cervical cancer [16]. The study started at the end of an outreach program, thus explaining the elevated numbers recorded the first 3 months of the study which could be due to the residual effects of the outreach program.

Screening uptake was significantly associated with knowledge of risk factors ($p = 0.019$) and sign and symptoms (0.017). This is best explained by the fact that women having such knowledge make informed choices since they know whether or not they have had the exposure like family history, many sexual partners, and high parity. Further, knowing how the disease will manifest, bleeding, pain, and bad odor, among other unpleasant experiences that the women would not want to go through, drives them to seek early diagnosis and treatment before such manifestation.

Conclusion

Despite being the community gatekeepers and the first point of contact between the community and the formal health sector, the CHVs had below average level of knowledge on cervical cancer at the baseline. This has a bearing on their ability to carry out public education effectively. The sensitization bridged the knowledge gap with a significant improvement in the knowledge of the CHVs. Improved knowledge enabled the CHVs do better public education and increase the demand for cervical cancer screening.

Recommendation

1. There is need for a more targeted training on cervical cancer for the CHVs after recruitment to enhance their knowledge on cervical cancer for effective public education.
2. The current training module for CHVs on non-communicable diseases needs to be revised to include signs and symptoms and current changes in screening methods.
3. There is need for follow-up studies to determine the knowledge and screening rates beyond the 6-month intervention period.

Acknowledgments We acknowledge the Health Department of the County Government of Kisumu for allowing us to carry out this study within their jurisdiction, the community health volunteers in Nyakach and Nyando sub-counties, the data collection team, Sostine Akinyi and Dinozof Achoki, the AMPATH Cervical Cancer Program Manager Kapten Muthoka, and my advisor Dr. Anisa Mburu.

Availability of Data and Materials The data from which the study conclusions are drawn can be requested from the authors.

Author Contributions OEO designed and carried out the data collection in the field and participated in the drafting of the manuscript. PI and SN made substantial contributions to the design and interpretation of the data. PI and SN were also involved in revising the manuscript critically for important intellectual content. They also gave the final approval of the version to be published and have agreed to be accountable for all aspects of this work. All authors read and approved the final manuscript.

Funding Information The study was funded by the National Institutes of Health under the U54 Cervical Cancer Prevention Mentoring Core Research Grant (grant no. 233).

Abbreviations *CDC,* Centre for Disease Control and Prevention; *CHV,* Community health volunteer; *KHIS,* Kenya Health Information System; *HPV,* Human papillomavirus; *IREC,* Institutional Research and Ethics Committee; *VIA,* Visual inspection using acetic acid; *VILI,* Visual inspection using Lugol's iodine; *WHO,* World Health Organization; *WRA,* Women of reproductive age

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