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Towards a cervical cancer-free future: women's healthcare decision making and cervical cancer screening uptake in sub-Saharan Africa

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ABSTRACT

Objective We investigated the association between women's healthcare decision making and cervical cancer screening uptake in sub-Saharan Africa.

Design Secondary data from the Demographic and Health Surveys of six countries in sub-Saharan Africa were used. We employed multilevel binary logistic regression modelling.

Setting Sub-Saharan Africa.

Participants Women aged 15–49 years in Benin (n=5282), Côte d'Ivoire (n=1925), Cameroon (n=7558), Kenya (n=6696), Namibia (n=1990) and Zimbabwe (n=5006).

Primary outcome measures Cervical cancer screening uptake.

Results The overall prevalence of cervical cancer screening across the six sub-Saharan African countries was 13.4%. Compared with women whose healthcare decisions were made solely by husbands/partners/someone else, the likelihood of cervical cancer screening uptake was significantly higher among women who took healthcare decisions in consultation with their husbands/partners (aOR=1.38; 95% CI 1.19 to 1.59), but highest among those who made healthcare decisions alone (aOR=1.66; 95% CI 1.44 to 1.91). Women aged between 40 and 45 years (aOR=5.18; 95% CI 3.15 to 8.52), those with higher education (aOR=2.13; 95% CI 1.57 to 2.88), those who had ever heard of cervical cancer (aOR=32.74; 95% CI 20.02 to 53.55), read newspaper or magazine at least once a week (aOR=2.11; 95% CI 1.83 to 2.44), listened to the radio at least once a week (aOR=1.35; 95% CI1.18 to 1.52) and those in households with richest wealth index (aOR=1.55; 95% CI 1.20 to 2.00) had significantly higher odds of screening for cervical cancer compared to their counterparts.

Conclusion Women who are able to make autonomous healthcare decisions and those who practice shared decision making are more likely to uptake cervical cancer screening. Therefore, policy interventions should focus on empowering women to be able to take autonomous healthcare decisions or shared decision making while targeting subpopulations (ie, multiparous and rural-dwelling women, as well as those in other religious affiliations aside from Christianity) that are less likely to uptake cervical cancer screening. Also, the radio and print media could be leveraged in raising awareness about cervical cancer screening to accelerate cervical cancer screening uptake in sub-Saharan Africa.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The use of nationally representative data enhances the generalisability of the findings.
⇒ The use of multilevel binary logistic regression enhanced the accuracy of the findings.
⇒ Causal inference cannot be established between women's decision-making autonomy and cervical cancer screening uptake due to the cross-sectional nature of the Demographic and Health Surveys datasets.
⇒ This study analyses self-report data that are subject to recall and social desirability biases.
⇒ Residual confounders such as cultural norms could not be accounted for due to the use of secondary datasets that did not have variables on these factors.

INTRODUCTION

Cervical cancer is ranked as the fourth most common cancer after breast cancer (2.1 million cases), colorectal cancer (0.8 million) and lung cancer (0.7 million), and it is the leading cause of cancer deaths in women worldwide.[1 2] In 2020, the GLOBOCAN estimated 604 127 new cases of cervical cancer and 341 831 deaths worldwide, with about 90% of deaths occurring in low-and middle-income -income countries. Sub-Saharan Africa (SSA) recorded the highest incidence and mortality.[2–4] The risk factors for cervical cancer have been indicated as infection with high-risk human papillomavirus (HPV), smoking, increased number of childbirths and HIV infection with infection with high-risk HPV accounting for about 99% of all cervical cancer cases.[4–6]

Cervical cancer could be prevented and/or cured through highly effective primary HPV vaccination and secondary prevention measures of screening combined with treatment.[2–6] High-performing screening test allows for the early detection and prompt treatment of precancer lesions and is regarded as a significant measure of safeguarding women who have not been vaccinated against the 'oncogenic subtypes', which existing vaccines are not effective for.[2–7] Early screening with prompt treatment is indicated to be an economical way to prevent cervical cancer.[7] The WHO has recommended cervical cancer screening to begin at the age of 30 years for all sexually active women and beginning at an earlier age for all sexually active and HIV positive women.[7] There are currently in existence a number of screening methods including cytology or Papanicolaou (Pap) smear testing, *visual inspection using acetic acid* or *Lugol's iodine* and HPV test.[8] The most common in low-and middle-income countries is Pap smear. However, HPV detection has proven its superiority to cervical cytology in primary screening for prevention of cervical cancer,[9 10] and more and more countries are now changing towards molecular HPV testing. WHO has recommended that women aged 30–49 years be screened with validated tests that detect HPV in cervical or vaginal samples.[11] These tests are more sensitive than visual inspection with acetic acid (VIA) or Pap smears, allow for longer screening intervals[11] and can be done with self-collected vaginal samples.[12 13]

Cervical cancer screening programmes and their uptake are limited in low-income and middle-income countries, particularly in SSA.[14–16] The prevalence of screening for cervical cancer in the lifetime of women in low-and middle-income countries is indicated to be 43.6%, with countries from the sub-Saharan African region recording the lowest prevalence (country-level median, 16.9%; range 0.9%–50.8%) compared with the prevalence of more than 60% reported in high income nations.[2–14]

In SSA, several factors including increasing age, higher education, higher household wealth index and being employed have been documented to be associated with increased uptake of screening for cervical cancer.[16–21] It has also been documented that staying in rural areas, low level of awareness of services, cost of accessing services and the distance to health facility reduces the uptake of cervical cancer screening.[16–19] Studies have identified factors including being informed about services and/or suggested by a health personnel, knowing somebody to have screened and receiving support from partners to be associated with increase uptake of cervical cancer screening.[20 22] A recent study in Eswatini has also revealed that women prefer to seek cervical cancer screening in health facilities and from nurses who are not from their locality due to the fear of judgement and gossips in cervical cancer screening facilities.[23]

Beyond these issues, the independence of women's decision making associated with gender roles have been highlighted to influence screening for cervical cancer.[24] In sub-Saharan African countries, gender norms are indicated to influence the access and utilisation of reproductive health services among women, particularly among women living in rural areas.[25 26] Cultural practices and gender norms influence the movement of women and their household decision making, including the decision to use healthcare services.[27 28] Women's healthcare decision making may influence the uptake of cervical cancer screening. For instance, a study has found women with an autonomy of household decision-making power to be more likely to use maternal healthcare services.[21] Another study has also found women's own healthcare decision-making with the support from their partners and others to significantly predict the utilisation of reproductive healthcare services.[29]

Previous studies have largely focused on examining the effects of individual-level and health facility-level factors on the uptake of cervical cance screening, with limited studies focusing on the relationship between women's decision-making autonomy and cervical cancer screening.[8] This study sought to examine the influence of women healthcare decision making on the uptake of cervical cancer screening in SSA. This comprehensive analysis across several sub-Saharan African countries could help clarify the role of women's healthcare decision making in cervical cancer screening uptake in the region.

Connell's Theory of Gender and Power guided our investigation on the association between women's healthcare decision-making capacity and cervical cancer screening uptake. The Theory of Gender and Power postulates that men and women's power dynamics are displayed in three key structures: sexual division of labour, sexual division of power and affective attachments and social norms.[21 30] These structures explain the gendered relationships that exist between men and women and explain how power and role dynamics shift from males to females. In this gendered relationships, males are considered as more dominant and females subordinate.[30] Hence, a woman's decision go for cervical cancer screening could be influenced by her and her partner's equality, cultural expectations and conventions on who makes healthcare decisions. The decision is also influenced by whether or not there is male dominance in the home. Although the three structures differ, they overlap and hence cannot be considered separately.[30] These patterns are also influenced by social mechanisms at the societal and institutional levels, which include individual sociodemographic factors.[31]

METHODS

Data source and study design

We analysed cross-sectional data from the Demographic and Health Surveys (DHS) of six countries in SSA. Only these six countries had data on cervical cancer screening between 2011 and 2020. The DHS is a nationally representative and comparative survey conducted periodically in over 85 low-income and middle-income countries to collect data on health and social indicators such as cervical cancer screening and women's healthcare

Table 1 Description of sample

Country	Survey year	Weighted N	Weighted %
Benin	2018	5282	18.6
Cote d'Ivoire	2011–12	1925	6.8
Cameroon	2018	7558	26.5
Kenya	2014	6696	23.5
Namibia	2013	1990	7.0
Zimbabwe	2015	5006	17.6
All countries		28 457	100.00

decision-making capacity.[32] The main purpose of the DHS Program is to improve the collection, analysis and distribution of demographic, health and nutrition data, as well as to make these data more usable for planning, policymaking and programme management. The study population in the DHS consisted of men, women and children. During the data collection, only the respondents who were either permanent residents of selected households or visitors who stayed the night before the survey were included. Respondents who were living in nomadic and institutional populations such as hotels, barracks and prisons were excluded from the survey. The survey was conducted using a descriptive cross-sectional design. Structured questionnaires were used to obtain data from the respondents using validated and pretested structured questions. A two-stage cluster sampling technique was used to conduct the survey. To begin, a stratified sample of enumeration areas (EAs) was selected using probability proportional to size, in which a sample of a predetermined number of EAs is selected independently in each stratum using probability proportional to the EA's size measure. In the designated EAs, a listing technique was used to ensure that all dwellings/households were listed. Second, equal probability systematic sampling was used to select households in the designated EAs. The data collection took place at the residence of the respondents. In this study, a total of 28 457 women of reproductive age were included in the final analysis (table 1). We relied on the 'Strengthening the Reporting of Observational Studies in Epidemiology' statement in writing the manuscript.[33] The dataset is freely accessible via this link: https://dhsprogram.com/data/available-datasets.cfm.

Variables

Outcome variable

Cervical cancer screening was the outcome variable in the study. To derive this variable, the respondents were asked the question 'Have you ever been tested or examined for cervical cancer?'. The response options were 0=no, 1=yes and 8=don't know. For this study, those that responded 'don't know' were dropped as the interest was on those who provided definite responses. The utilisation and coding were informed by literature.[18]

Key explanatory variable

The main explanatory variable was healthcare decision making. This variable was assessed using the question 'Who usually makes decisions about healthcare for yourself: you, your (husband/partner), you and your (husband/partner) jointly, or someone else?'. The response categories were 1=respondent alone; 2=respondent and the husband/partner; 3=husband/partner alone; 4=someone else; and 5=others. We recoded these responses into 0=husband/partner/someone else/ other; 1=respondent alone; and 2=respondent and husband/partner. Our recoding was informed by a previous study that used the DHS datasets.[34]

Covariates

We included 12 variables as covariates in this study. These variables were grouped into individual-level variables (women's age, marital status, educational level, current working status, religion, parity, heard of cervical cancer, frequency of watching television, frequency of listening to radio and frequency of reading newspapers/magazines) and contextual-level variables (wealth index and place of residence). We maintained and used the existing coding for women's age, educational level, current working status, heard of cervical cancer, wealth index and place of residence as found in the DHS datasets. Marital status was recoded into 'married' and 'cohabiting'. Religious affiliation was recoded into 'Christianity', 'Islamic', 'African Traditional', 'no religion' and 'others'. Parity was recoded into 'zero births', 'one birth', 'two births', 'three births' and 'four or more births'. The frequencies of listening to radio, watching television and reading newspaper/magazine were recoded into 'not at all', 'less than once a week' and 'at least one a week'. All the covariates were selected based on their significant association from literature,[16–18 35] as well as their availability in the DHS datasets.

Conceptual framework

The Health Care Services Utilisation Model by Anderson and Newman[35] guided the selection of the explanatory variable and the covariates. The model focuses on the conditions that either promote or hinder the utilisation of healthcare services.[36] The main constructs of the model are predisposing factors, enabling factors and need for care factors.

The predisposing factors refer to the demographic, social structure and health belief characteristics.[35 36] In this study, the predisposing factors were healthcare decision making, maternal age, marital status, educational level, current working status, religion, exposure to media and parity. Enabling factors are the resources or means that are available to an individual to seek healthcare services.[36] In this study, the enabling factors included place of residence and wealth index.

Need for care factors refer to an individual's perception of his or her own general health and functional condition, as well as how familiar they are with the signs and symptoms of ill health, agony and concerns about their

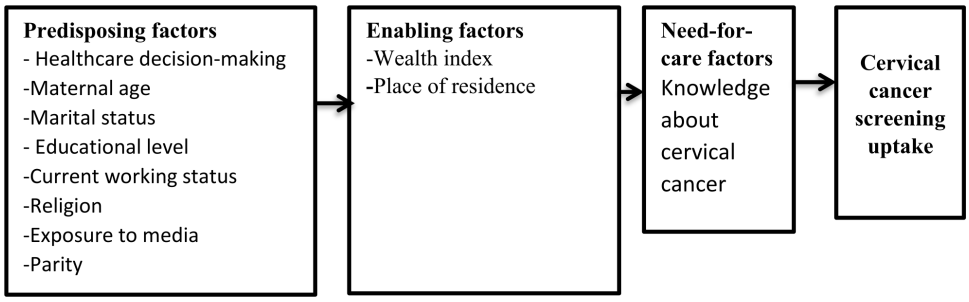

Figure 1 Conceptual framework (the Health Care Services Utilisation Model by Anderson and Newman[35]).

health.[29] The need for care factors are influenced by the predisposing and enabling factors. In this study, the need for care factor was knowledge about cervical cancer (figure 1).

Patient and public involvement statement

Study participants or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Statistical analyses

We performed the analysis using Stata software V.16.0 (Stata Corporation). In each country's dataset, we first selected the variables of interest. As recommended by the MEASURE DHS, we weighted each of the countries dataset employing the command 'gen wt=v005/1000000' and subsequently adjusted for the strata using the Stata command 'svyset v021 [pw=wt], strata(stratum)'. Afterwards, the dataset from the six countries were appended as one dataset. Later, we cleaned the dataset by recoding and dropping missing observations from all the variables of interest. A sample size of 28 457 was arrived at after dropping the missing observations. Furthermore, percentages were used to present the results of the prevalence of cervical cancer screening uptake (table 2) and healthcare decision making (figure 2) . We performed a χ^2 test of independence to determine the association between the outcome variable and the key explanatory variable and covariates (table 3). Cross-tabulations were also used to show the distribution of cervical cancer screening across the key explanatory variable and the covariates (table 3). We used a multilevel binary logistic regression to examine the association between healthcare decision making and cervical cancer screening uptake. Four different models were built to determine this association. The first model (model O) was fitted to include only cervical cancer screening uptake attributed to the clustering of the primary sampling units (PSUs). Model I was fitted to include the key explanatory variable and the individual-level variables. Model II contained only the contextual-level variables, while the last model (model III) was fitted to include the key explanatory variable and all the covariates. The results of the regression analyses were presented using adjusted ORs with their respective 95% confidence interval (CI). The level of significance was set at $p<0.05$ in the χ^2 test and regression analysis. We used the Stata command 'melogit' in building all four models. Model fitness was checked using Akaike's information criterion.

Table 2 Prevalence of cervical cancer screening

Country	Survey year	Percentage (%)	95% CI
Benin	2018	0.5	0.03 to 0.07
Cote d'Ivoire	2011–12	3.5	2.7 to 4.4
Cameroon	2018	4.2	3.7 to 4.7
Kenya	2014	21.6	20.6 to 22.6
Namibia	2013	51.6	49.4 to 53.8
Zimbabwe	2015	18.8	17.7 to 19.9
All countries		13.4	13.0 to 13.8

Ethical consideration

Ethical approval was not sought for this study due to the public availability of the DHS dataset. We obtained permission to use the dataset for publication from the MEASURE DHS on registration. The ethical guidelines regarding the analysis of secondary datasets for publication were followed. Detailed information about the data and ethical standards can be found at http://goo.gl/ny8T6X.

RESULTS

Prevalence of cervical cancer screening

The overall prevalence of cervical cancer screening across the six countries was 13.4%. Namibia had the highest prevalence of cervical cancer screening (51.6%), whereas Benin reported the lowest prevalence (0.5%) of cervical cancer screening (table 2).

Women's healthcare decision making

In figure 2, the proportions of women's healthcare decision making across the selected countries in SSA was shown. The results indicate that overall, 40% of women made decisions concerning their healthcare in consultation with their husbands or partners, while 33.7% reported that their healthcare decisions were made solely by their husbands/partners/someone else/others. Only 24.3% of the women in this study autonomously made their healthcare decisions. At the intercountry level, the results showed that Cote d'Ivoire (55.6%) had the highest proportion of women reporting that their healthcare

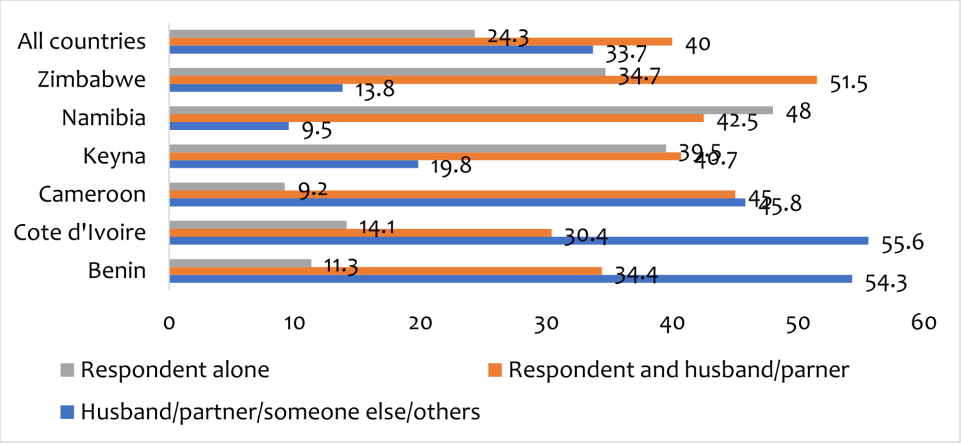

Figure 2 Level of women's healthcare decision making.

decision making was done solely by their husbands partners/someone else/others. Namibia on the other hand reported the lowest proportion of women who reported that their healthcare decision making was done solely by their husbands/ partners/someone else/others (9.5%). At the same time, Namibia reported the highest proportion of women who took healthcare decisions alone (48%).

Bivariate analysis of healthcare decision making and cervical cancer screening uptake

Table 3 shows the results of the bivariate analysis on the healthcare decision making and the cervical cancer screening uptake, as well as across the covariates. The results showed that healthcare decision making had significant association with cervical cancer screening uptake at 95% CI. Women who made healthcare decisions alone reported the highest prevalence of cervical cancer screening (22.2%), while those whose husbands/partner/someone else/ others took the decisions reported the lowest prevalence of cervical cancer screening uptake. In terms of the covariates, the findings indicate that all of the covariates (ie, age, marital status, educational level, current working status, religion, parity, heard of cervical cancer, exposure to the media (frequency of watching television, listening to radio, reading of newspapers/magazines), wealth index and place of residence) were significantly associated with the prevalence of cervical cancer screening uptake.

Association between healthcare decision making and cervical cancer screening

Fixed effects results

Table 4 presents the findings from the multilevel logistic regression. The final model (model III) is the complete model and shows the association between healthcare decision making and cervical cancer screening uptake in SSA. The results indicate that compared with women's healthcare decision making made solely by husbands/partners/someone else/others, the likelihood of cervical cancer screening uptake was significantly higher among women who took healthcare decisions in consultation with their husbands or partners (aOR=1.38; 95% CI 1.19 to 1.59), but highest among those who made healthcare decisions alone (aOR=1.66; 95% CI 1.44 to 1.91).

For the covariates, the results show that the likelihood of cervical cancer screening uptake significantly increased with age with those aged between 40 and 45 years being most likely to get screened (aOR 5.18; 95% CI 3.15 to 8.52) as compared with those aged between 15 and 19 years. Compared with women with no formal education, those with primary (aOR=1.47; 95% CI 1.14 to 1.90), secondary (aOR=1.51; 95% CI 1.18 to 1.95) or higher education (aOR=2.13; 95% CI 1.57 to 2.88) had higher odds of undergoing cervical cancer screening. Also, awareness of cervical cancer (aOR=32.74; 95% CI 20.02 to 53.55), reading newspaper or magazine at least once a week (aOR=2.11; 95% CI 1.83 to 2.44), listening to the radio at least once a week (aOR=1.35; 95% CI 1.18 to 1.52) and belonging to the richest wealth index (aOR=1.55; 95% CI 1.20 to 2.00) were associated significantly higher odds of screening for cervical cancer. Cohabiting women (aOR=0.79; 95% CI 0.69 to 0.91), those with four or more parities (aOR=0.70; 95% CI 0.55 to 0.89) and rural-dwelling women (aOR=0.81; 95% CI 0.69 to 0.95) reported significantly lower odds of cervical cancer screening uptake. Compared with women who were Christians, women of all other religious categories reported lower odds of screening for cervical cancer.

Random effects results

Model III was considered the model of best fit for predicting the association between women's healthcare decision making and cervical cancer screening. This model explained 7% of the observed variations (ICC=0.07). The percentage of variance explained at the empty model was 0.13, which decreased to 0.08 in model I but increased to 0.12 in model II (Table 4).

DISCUSSION

In line with the Global Strategy to Accelerate the Elimination of cervical cancer, otherwise known as the 90-70-90

Table 3 Bivariate analysis of healthcare decision making and cervical cancer screening

Variable	Weighted N	Weighted %	Cervical cancer screening	
			Yes (%)	P value
Women's healthcare decision making				<0.001
Respondent alone	6900	24.2	22.2	
Respondent and husband/partner	11 952	42.0	14.9	
Husband/someone/others	9605	33.8	5.3	
Women's age (years)				<0.001
15–19	1400	4.9	3.1	
20–24	4367	15.3	6.4	
25–29	6484	22.8	11.0	
30–34	5784	20.3	15.2	
35–39	4630	16.3	16.4	
40–44	3288	11.6	20.0	
45–49	2504	8.8	19.7	
Marital status				<0.001
Married	23 243	81.7	14.1	
Cohabiting	5214	18.3	10.5	
Educational level				<0.001
No education	6889	24.2	1.7	
Primary	9052	31.8	11.6	
Secondary	10 452	36.7	18.0	
Higher	2064	7.3	37.5	
Current working status				<0.001
No	8918	31.3	12.0	
Yes	19 539	68.7	14.1	
Religion				<0.001
Christianity	21 295	74.8	16.5	
Islamic	5080	17.9	2.0	
African Traditional	780	2.7	0.6	
No religion	924	3.3	5.7	
Others	378	1.3	41.3	
Parity				<0.001
0	1700	6.0	12.5	
1	4401	15.5	12.7	
2	5542	19.5	17.1	
3	5193	18.2	17.3	
4 or more	11 621	40.8	10.4	
Heard of cervical cancer				<0.001
No	9028	31.7	0.3	
Yes	19 429	68.3	19.6	
Frequency of watching television				<0.001
Not at all	14 212	49.9	8.1	
Less than once a week	3786	13.3	12.8	
At least once a week	10 459	36.8	21.0	
Frequency of listening to radio				<0.001
Not at all	10 909	38.3	6.8	

Continued

Table 3 Continued

Variable	Weighted N	Weighted %	Cervical cancer screening	
			Yes (%)	P value
Less than once a week	5259	18.5	12.6	
At least once a week	12 289	43.2	19.7	
Frequency of reading newspaper or magazine				<0.001
Not at all	20 257	71.2	7.6	
Less than once a week	4656	16.4	21.8	
At least once a week	3544	12.4	35.7	
Wealth index				<0.001
Poorest	4659	16.4	4.5	
Poorer	5296	18.6	8.0	
Middle	5297	18.6	9.8	
Richer	6198	21.8	14.6	
Richest	7006	24.6	25.2	
Place of residence				<0.001
Urban	13 042	45.8	18.5	
Rural	15 415	54.2	9.1	

strategy,[7] this study examined the influence of women's health decision making on the uptake of cervical cancer screening in SSA. Overall, the prevalence of cervical cancer screening within the subregion was low (13.4%), which is lower compared with the pooled prevalence reported in a study conducted using five countries in SSA (19.0%)[36] and a single study conducted in Kenya (18.2%).[37] This low prevalence has significant implications on Africa's capacity to achieve the Sustainable Development Goals, especially SDG 3 (targets 3.4, 3.7 and 3.8), as well as the '70' component of the 90-70-90 strategy, which envisions that, by 2030, 70% of women should be screened by high-performance screening tests by age 35 years and another one at age 45 years.[7] Intercountry comparison showed that Namibia had the highest prevalence of cervical cancer screening, while Benin reported the lowest prevalence. This finding is consistent with the results from a multicountry study involving SSA countries that reported the highest and lowest prevalence of cervical cancer screening in Namibia (45.9%) and Benin (0.7%), respectively.[36] The observed high prevalence of cervical cancer screening in Namibia could be linked to the response by the Namibian government such as the introduction of VIA and cryotherapy to 'Screen and Treat' women, as well as the implementation of a national awareness and screening campaign in the country.[38] Notwithstanding, the findings call for regional and national level strategies to increase awareness about the preventive and curative nature of cervical. When that is done, women within the sub region would be encouraged to take up cervical cancer screening.

Our study revealed that women's healthcare decision making significantly influenced the uptake of cervical cancer screening. The results indicate that women who take decisions concerning their healthcare on their own have the highest likelihood of undertaking cervical cancer screening as compared with those whose healthcare decision making was done by their husband/partner or someone else. It is therefore not surprising that Namibia, which reported the highest proportion of autonomous healthcare decision making in this study, also reported the highest prevalence of cervical cancer screening. This finding is in agreement with Connell's Theory of Gender and Power, which explains that hegemonic masculinity practised at the household level serves as a barrier to health seeking among women.[27 39] Our finding also aligns with those of Viens, Clouston and Messina that found that women who made decisions on their own tend to more likely undergo a cervical cancer screening.[31] A plausible explanation for this finding could be that women whose healthcare decisions are determined by their husbands or partners often face high level of objections to get screened, primarily because they lack understanding about cervical cancer and the relevance of screening as a primary preventive measure.[40] Also, in Africa, sociocultural practices and gender norms are critical in determining women's decision and access to particularly reproductive health services.[41 42] Consistent with other studies[43 44] that have found a significant association between shared decision making and the likelihood of cervical cancer screening, our study showed that women who made healthcare decisions in consultation with their husbands or partners had higher odds of undertaking cervical cancer screening, although this likelihood is a bit lower when compared with women who autonomously make healthcare decisions.

Consistent with studies conducted in Ethiopia[45] and South Africa,[46] our study found significant association

Table 4 Fixed and random effect analyses of the association between healthcare decision making and cervical cancer screening

Variable	Model O	Model I AOR (95% CI)	Model II AOR (95% CI)	Model III AOR (95% CI)
Fixed effect model				
Women's healthcare decision making				
Husband or partner/someone/ others		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Respondent alone		1.66** (1.44 to 1.90)		1.66** (1.44 to 1.91)
Respondent and husband/ partner		1.38*** (1.19 to 1.59)		1.38*** (1.19 to 1.59)
Women's age (years)				
15–19		1 (1.00 to 1.00)		1 (1.00 to 1.00)
20–24		1.39 (0.89 to 2.18)		1.32 (0.84 to 2.07)
25–29		2.25*** (1.45 to 3.50)		2.08** (1.33 to 3.26)
30–34		3.20*** (2.03 to 5.05)		2.89*** (1.82 to 4.60)
35–39		4.06*** (2.58 to 6.40)		3.66*** (2.30 to 5.80)
40–44		5.28*** (3.31 to 8.45)		4.73*** (2.94 to 7.59)
45–49		5.82*** (3.57 to 9.50)		5.18*** (3.15 to 8.52)
Educational level				
No education		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Primary		1.51** (1.17 to 1.95)		1.47** (1.14 to 1.90)
Secondary		1.65*** (1.28 to 2.12)		1.51** (1.18 to 1.95)
Higher		2.45*** (1.81 to 3.30)		2.13*** (1.57 to 2.88)
Marital status				
Married		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Cohabiting		0.79*** (0.69 to 0.91)		0.79***(0.69 to 0.91)
Religion				
Christianity		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Islamic		0.40*** (0.31 to 0.53)		0.38*** (0.29 to 0.51)
African Traditional		0.21*** (0.09 to 0.53)		0.21***(0.09 to 0.53)
No religion		0.59** (0.40 to 0.86)		0.61** (0.42 to 0.88)
Others		2.21*** (1.66 to 2.96)		2.11*** (1.57 to 2.82)
Current working status				
No		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Yes		1.06 (0.95 to 1.19)		1.05 (0.94 to 1.18)
Parity				
0		1 (1.00 to 1.00)		1 (1.00 to 1.00)
1		0.94 (0.74 to 1.19)		0.95 (0.75 to 1.21)
2		0.98 (0.78 to 1.25)		1.02 (0.80 to 1.29)
3		0.91 (0.72 to 1.16)		0.96 (0.76 to 1.22)
4 or more		0.64*** (0.50 to 0.82)		0.70** (0.55 to 0.89)
Heard of cervical cancer				
No		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Yes		32.05*** (19.60 to 52.41)		32.74*** (20.02 to 53.55)
Frequency of reading newspaper or magazine				
Not at all		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Less than once a week		1.56*** (1.37 to 1.79)		1.55***(1.35 to 1.77)

Continued

Table 4 Continued

Variable	Model O	Model I AOR (95% CI)	Model II AOR (95% CI)	Model III AOR (95% CI)
At least once a week		2.19*** (1.89 to 2.53)		2.11***(1.83 to 2.44)
Frequency of listening to radio				
Not at all		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Less than once a week		1.12 (0.96 to 1.31)		1.12 (0.95 to 1.31)
At least once a week		1.32*** 1.16 to 1.50)		1.35*** (1.18 to 1.52)
Frequency of watching television				
Not at all		1 (1.00 to 1.00)		1 (1.00 to 1.00)
Less than once a week		1.05 (0.90 to 1.23)		0.94 (0.80 to 1.10)
At least once a week		1.27***(1.13 to 1.43)		1.00 (0.87 to 1.15)
Wealth index				
Poorest			1 (1.00 to 1.00)	1 (1.00 to 1.00)
Poorer			1.82***(1.45 to 2.28)	1.18 (0.95 to 1.46)
Middle			2.22***(1.77 to 2.80)	1.11 (0.89 to 1.38)
Richer			3.51***(2.77 to 4.45)	1.30* (1.03 to 1.63)
Richest			6.94***(5.39 to 8.94)	1.55***(1.20 to 2.00)
Place of residence				
Urban			1 (1.00 to 1.00)	1 (1.00 to 1.00)
Rural			0.93 (0.78 to 1.10)	0.81** (0.69 to 0.95)
Random effect model				
PSU variance (95% CI)	0.50 (0.41 to 0.60)	0.28 (0.22 to 0.36)	0.44 (0.35 to 0.55)	0.26 (0.20 to 0.34)
ICC	0.13	0.08	0.12	0.07
Wald χ^2	Reference	1317.39***	389.45***	1339.88***
Model fitness				
Log-likelihood	−11 169.99	−8800.55	−10 594.44	−8768.79
AIC	22 344	17 661.1	21 202.89	17 607.57
N	28 457	28 457	28 457	28 457
Number of clusters	1480	1480	1480	1480

Exponentiated coefficients; 95% CIs in brackets.
*P<0.05, **p<0.01, ***p<0.001.
1, reference category; AIC, Akaike's information criterion; AOR, adjusted OR; ICC, intraclass correlation; PSU, primary sampling unit.

between increasing age and the up-taking cervical cancer screening. From our findings, it is indicative that aged between 40 and 45 years were five times more likely to get screened as compared with those aged between 15 and 19 years. This aligns with a study in Cameroon that found women aged 45 years to be eight times as likely to be screened for cervical cancer compared with women of younger age.[18] Plausibly, this age disparity in cervical cancer screening can be explained by the global screening recommendation that posits that the screening by high-performance should begin by age 35 years and another one at age 45 years.[7] Another possible justification for the steadily increase in age and screening practice could be due to the fact that lesions that develop to cervical cancer take years.[47] As such, the older a woman gets, the more likely they are at risk to develop cervical cancer. Hence, their decision to take up cervical cancer screening as they age.

Besides the age differences in screening for cervical cancer, our study revealed that women with formal education had greater odds of getting screened as compared with their counterparts who had no formal education. The finding is similar with studies conducted in Cameroon[18] and five SSA countries.[36] Formal education is likely to expose women to cervical cancer and raise their awareness and knowledge about the relevance of taking up screening as a preventive measure. Related to this was our findings that having heard of cervical cancer is associated with higher likelihood of screening. This is consistent with previous studies,[18 48] that have postulated that women's awareness of the disease significantly influenced their decision to get screened. We argue that women

who are aware of cervical cancer would be knowledgeable about its adverse effect on their physical and social health. They would also be knowledgeable about the fact that it is only through early screening that cervical cancer can be detected and treated. This implies that investing in national awareness and campaign programmes could significantly lead to better health-seeking behaviour.

We also found that exposure to the media significantly influenced women's uptake of cervical cancer screening. Importantly, women who read newspapers or magazine at least once a week, or listened to the radio at least once a week were two times and 1.35 times more likely to undertake cervical cancer screening, respectively. The result aligns with a related study conducted among SSA women.[36] This implies that the radio and print media can be used as mediums for awareness creation campaigns about cervical cancer and the available preventive/treatment measures to accelerate cervical cancer screening uptake in SSA. Furthermore, belonging to the richest wealth index was associated with significantly higher odds of screening for cervical cancer as compared with women in the poorest wealth index. This finding is similar to evidence from Cameroon[18] and SSA.[36] The result highlights the imperativeness of improving the socioeconomic and livelihood status of women in SSA to engineer the necessary efforts to increase cervical cancer screening uptake.

The present study also shows that rural-dwelling women had the least likelihood of taking cervical cancer screening. This is corroborated by Kangmennaang *et al*,[37] who reported that women who lived in rural residents were less likely to seek cervical cancer screening as compared with those in the urban areas. Screening services such as HPV testing and Pap smear are often located in urban areas, thereby placing rural-dwelling women at a significant disadvantage with regards to cervical cancer screening.[18] Moreover, previous studies have shown that rural areas often lack sufficient transportation networks that deter many women from seeking cervical cancer screening.[36 49] It is also possible that women in rural areas lack access to sufficient information about the benefits, modalities and point of access to cervical cancer screening.[22] Hence, women in rural settings often lack knowledge about the disease and would usually not see the value of getting screened even when they are free from signs and symptoms.

Concerning the influence of parity, our findings that multiparous women have the least odds of cervical cancer screening uptake is incongruent with a related study in Nepal that found no association between parity and cervical cancer screening uptake.[50] However, although the findings are in accordance with a study in Jamaica that found a strong association between parity and the uptake of cervical cancer screening, the direction of association differs.[51] Ncube *et al*[51] reported that multiparous women were more likely to be screened for cervical cancer. Probably, multiparous women perceive that they have had sufficient experience with child birth, which did not result in cervical cancer. Hence, they are not encouraged to get screened. This observation is a threat to the realisation of the SDG targets 3.4, 3.7 and 3.8. The findings underscore the need for health and birthing facilities to broaden educational messages provided to mothers. These messages should capture and emphasise cervical cancer screening for all women, especially multiparous women.

Our study found a strong association between religion and the uptake of cervical cancer screening, mirroring a related study from Kenya,[52] that reported lower likelihood of cervical cancer screening uptake among Muslims as compared with those who professed Christianity. A qualitative study found that Muslim women often resisted cervical cancer screening on the basis that it was incompatible with cultural and religious values.[53] Another study also pointed out that Muslim women often perceived cervical cancer as a function of the will of God and therefore should not be interrupted.[54] These aforementioned reasons could be the possible reasons for the lower likelihood of cervical cancer uptake among Muslim women in comparison with those who profess Christianity. Our findings underscore the importance of targeting Muslim women with more cervical cancer screening interventions.

Practical implications

The findings from this study give credence to the need for much interventions and strategies within the sub-Saharan African region that aim at enhancing women's autonomy in decision making. This could be achieved by investing heavily in girl child and women's education as well as improving the economic livelihoods of women. Also, the results from the present study underscore the importance of developing the cognition of husbands and partners about cervical cancer and the need for supporting the decision to screen by their wives. This will help to limit the likelihood of resistance on the part of husbands or partners. Our findings also highlight the essential role of designing and implementing culturally and religious sensitive interventions that promote cervical cancer screening uptake across the different religious affiliations of women in SSA. The support of governments and departments of health is urgently needed in ensuring the availability of screening services in rural settlements, communities and regions.

Strengths and limitations

Our study has some strengths that are noteworthy. The dataset used for this study was large and nationally representative and therefore makes our findings generalisable to the women population in the countries included in this study. However, a significant limitation of our study is the use of secondary data that used cross-sectional design. Hence, causality could not be established between women's healthcare decision making and cervical cancer screening. Hence, the findings are limited to associations. There is also the possibility of reverse causality in terms of the association between women's healthcare decision

making and cervical cancer screening. We acknowledge that there is the possibility of social desirability and recall bias that could have affected the results.

CONCLUSION

We conclude that the prevalence of cervical cancer screening is low in SSA. Women who make healthcare decisions alone and those who practise shared decision making with their husbands/partners are more likely to uptake cervical cancer screening. Therefore, policy interventions should focus on empowering women to be able to take autonomous healthcare decisions or shared decision making while targeting subpopulations (ie, multiparous and rural-dwelling women, as well as those in other religious affiliations aside from Christianity) that are less likely to uptake cervical cancer screening. Also, the radio and print media could be leveraged in raising awareness about cervical cancer screening to accelerate cervical cancer screening uptake in SSA.

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