Assessing Cervical Cancer Screening Coverage and Associated Factors in South Sudan: A Community - Based Cross - Sectional Survey

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Abstract: _Background_: *The burden of cervical cancer remains a major challenge, particularly in resource - poor regions like South Sudan, where access to preventive measures is limited. Despite the availability of modern therapy options, the associated side effects are life - threatening and do not significantly prolong disease - free survival. Therefore, prevention through screening is crucial, especially for adult women. A lack of screening puts women at risk of advanced cervical cancer, which is alarming in South Sudan and accounts for up to 12% of the disease burden in women. This underscores the need to assess the extent of access, coverage, correlated factors, and health system interventions for cervical cancer screening in South Sudan. Therefore, this study aimed to examine the above factors to understand cervical cancer screening better and to identify effective interventions to increase coverage in under - resourced settings.* _Method_: *The study design was a community - based cross - sectional survey that aimed to assess cervical cancer screening behavior among women of reproductive age in five counties of South Sudan. The study population included women aged between 26 and 65 years, with a sample size of 575. The sampling process took place in four stages, with a simple random sample conducted in each stratum, targeting half of the Payams in each county. Structured interviews were used to collect primary data, and in - depth and key informant interviews were conducted to collect qualitative data. Data were analyzed using descriptive statistics and log - binomial regression models. The study area comprised Torit, Magwi, Terekeka, Raja, and Aweil North counties, with Torit located in the Eastern Equatoria state. The study targeted women of reproductive age as they are at risk of HPV infection. The study was community - based to prevent bias that might result from sampling women from healthcare settings. The study findings are expected to inform policy and practice to improve cervical cancer screening behavior in South Sudan.* _Results_: *The study found that only 11.5% of women in South Sudan had been screened for cervical cancer. Factors associated with cervical cancer screening rates included women who reported shorter waiting times for medical services (aPR=3.47 [CI=1.69 - 7.14]), received HPV vaccination (aPR=4.71 [CI=3.04 - 7.31]), kind and caring health workers (aPR=3.35 [CI=1.47 - 7.63]), and integrated cervical screening facilities (aPR=2.28 [CI=1.45 - 3.60]) had higher screening rates. However, the study found little evidence of community or institutional interventions aimed at increasing cervical cancer screening rates.* _Conclusion_: *Based on the findings, cervical cancer screening coverage for women in South Sudan is very low, at only 11.5%. However, certain factors were found to be associated with higher screening prevalence, including shorter wait times, caring and kind health workers, and integrated screening facilities were also associated with higher screening prevalence. It is concerning that there were virtually no interventions at institutional level to increase screening rates. These findings suggest the need for targeted interventions aimed at improving access to screening services, and strengthening health systems to increase cervical cancer screening coverage in South Sudan.*

Keywords: Cervical Cancer, Screening Coverage, South Sudan, Health System Interventions, Resource - Poor Settings, Womens Health

1. Introduction

Due to the fact that over 90% of cervical cancer fatalities occur in low - and middle - income countries (LMICs) where access to screening programs and treatment choices is restricted, cervical cancer is a persistently significant global public health problem (World Health Organisation, 2022). Cervical cancer screening techniques have significantly improved in recent years, with high - risk HPV testing presently acting as the main screening instrument (World Health Organisation, 2022). Despite these developments, many regions of the world continue to have substantial impediments to cervical cancer screening coverage and access.

There are still major challenges to implementing cervical cancer screening programs in LMICs, according to World Health Organization, (2021); Mwila, C. N et al., (2022); Anorlu, R. I. et al., (2022), a shortage of skilled workers, limited resources, and inadequate infrastructure.

Inadequate cervical cancer screening is also influenced by societal and cultural factors like ignorance and shame. As revealed through research conducted by Othman, E. E et al., (2022) low adoption rates among Egyptians can be attributed largely to apprehension about possible discomfort during the examination process - - a concern amplified by limited resources.

To address these issues and increase cervical cancer screening coverage and accessibility in LMICs, several technical innovations and developments have been achieved. For instance, study carried undertaken in low - income areas of South Africa by Van der Burg, R et al., (2022) evaluated the success of neighborhood - based cervical cancer screening initiatives. According to the study, community - based programs were effective in increasing screening rates, especially among populations that are challenging to reach.

Cervical cancer is a severe public health problem even though it may be avoided and treated, especially in low - and middle - income countries (LMICs). LMICs, which have the highest cervical cancer incidence rates, also account for over 90% of cervical cancer fatalities. (World Health Organisation, 2022). The high death rate in LMICs is attributed to a variety of factors, including inadequate healthcare infrastructure, a lack of treatment options, and

limited access to screening programs (Anorlu, R. I. et al., 2022) .

Cervical cancer screening access and coverage are severely constrained in many parts of the world, despite the availability of effective screening methods including cervical cytology and high - risk human papillomavirus (HPV) testing (World Health Organisation, 2022) . One of the key challenges is the lack of screening - related infrastructure and competent personnel. LMICs generally lack the resources necessary to establish and maintain screening programs, which causes low screening rates and delayed diagnosis (Anorlu, R. I et al., 2022) . Additionally, poor screening rates among women in LMICs are a result of cultural and societal issues, such as stigma and a lack of knowledge (World Health Organisation, 2022) .

Cervical cancer screening techniques have significantly improved in recent years, with the predominant screening tool now being high - risk HPV testing (World Health Organisation, 2022) .

Several interventions, including community - based screening programs and task - shifting of screening services to non - physician healthcare professionals, have been proposed to alleviate the hurdles to cervical cancer screening in LMICs (Van der Burg, R et al., 2022) . Community - based initiatives have been proven to be successful in raising screening rates, especially among populations who are difficult to reach, such as rural women (Van der Burg, R et al., 2022) . It has also been demonstrated that task - shifting screening services to non - physician healthcare workers, such as nurses and midwives, improves access to screening services in LMICs (Anorlu, R. I. et al., 2022) .

According to recent studies Rebecca L. Siegel et al., (2023) ; World Health Organisation, (2022) , cancer remains a leading cause of preventable deaths globally, resulting in approximately 10 million deaths annually. These deaths account for about 23% of all deaths from non - communicable diseases (NCDs) and one in six deaths worldwide (World Health Organisation, 2022) .

According to recent projections, the number of new cancer cases is expected to reach 27.5 million per year by 2040, which is a significant increase compared to current rates (Xia, Y et al., 2022) . Unfortunately, cancer - related deaths are also projected to rise proportionately for all cancer types. The World Health Organization (WHO) reports that the most common types of cancer worldwide are rectal, colon, lung, prostate, and breast cancer (World Health Organisation, 2022) ; (Pineros, M et al., 2022) . These alarming projections highlight the need for continued research and development of effective prevention, screening, and treatment strategies for cancer.

However, cervical cancer is a specific type of cancer that has received significant attention in recent years (International Agency for Research on Cancer, 2022) . It has an annual incidence of about 604, 000 cases globally, with a mortality rate of 57% (342, 000) (Hull et al., 2020) , (Torres - Roman et al., 2022) . This mortality rate surpasses that of malaria, HIV, COVID - 19, maternal mortality, and tuberculosis

(Hamdi et al., (2021) indicating that cervical cancer is a significant public health concern that should not be overlooked.

Regular screening is crucial to reducing cervical cancer - related mortality and is currently recommended every three years for cytology and every five years for HPV DNA testing (World Health Organisation, 2021) , (National Cancer Institute, 2022) . Early detection enables the identification of HPV infections at an early stage, improving prognosis and treatment outcomes. Without screening, low - risk cervical dysplasia can progress to high - grade lesions and adenocarcinoma, leading to severe pain, nephrological, hematological, and systemic dysfunction (Fowler et al., 2023) , (Boon et al., 2022) , (Yoshida et al., 2021) . Cervical cancer also has implications for reproductive and child health, with HPV infection being linked to infertility Qaderi et al., (2021) , Tatjana Street, (2021) and pregnancy delivery via cesarean section, which is associated with morbidity and mortality (Yuill et al., 2021) . Late - stage invasive cervical cancer treatment using concomitant adjuvant therapy is more aggressive and is associated with fatal and undesirable side effects (Nanda Horeweg et al., 2021) .

Despite interventions such as behavior change communication Lozar et al., (2021) , and the development of HPV self - sampling methods Nishimura et al., (2021) the rate of early detection of cervical cancer remains low Hull et al., (2020) particularly in Africa (Jedy - Agba et al., 2020) , where cervical cancer is the second most common cancer and accounts for 11.3% of the national cancer burden in South Sudan (Union International Cancer Control, 2022) ; (World Health Organisation, 2020) .

Cervical cancer is a significant public health problem in South Sudan, where the burden of the disease is high, and access to screening is limited (Ministry of Health, 2020a) . The country has one of the highest cervical cancer mortality rates globally, and the disease is a leading cause of cancer - related deaths among women (World Health Organisation, 2023) . Despite the availability of effective screening methods, coverage rates are lowWorld Health Organisation, (2020) , and associated factors hinder the implementation of effective screening programs. Limited health infrastructure, inadequate resources, low levels of health literacy, and cultural beliefs and practices are some of the factors that contribute to low screening rates and poor health outcomes. The lack of trained healthcare providers, insufficient laboratory facilities, and limited access to screening equipment also hinder effective screening programs (Ministry of Health, 2020) .

To better understand these determinants and the healthcare system reforms that could improve the performance of screening programs, this study examined how cervical cancer screening is covered and available in South Sudan. Outcomes for women at risk of developing cervical cancer will be improved by using the results of this study to develop evidence - based treatments that remove the barriers to successful cervical cancer screening programs in South Sudan.

1.1 Study aim

The aim of this study was to assess cervical cancer screening coverage, its associated factors and health system interventions in resource - poor settings of South Sudan, so as to determine the number women eligible for cervical cancer screening in South Sudan, who have screened, what the antecedents of their screening behavior are, and to map any available health system interventions that have been put in place by the government of South Sudan, to augment cervical cancer screening.

1.2 Research Objectives and Research Questions:

a) To establish the coverage of Cervical Cancer Screening among eligible women in the republic South Sudan
b) To identify the factors associated with the utilization of cervical cancer screening services in resource - poor settings of South Sudan.
c) To map and assess south Sudan's health system interventions that target women for cervical cancer screening

The societal and scientific relevance of the study findings on cervical cancer screening in resource - poor settings of South Sudan are significant. From a societal perspective, the study sheds light on the barriers and facilitators to accessing and utilizing cervical cancer screening services in a setting with limited resources. The study findings can inform policy and programmatic interventions aimed at increasing the uptake of cervical cancer screening services and reducing the burden of cervical cancer in resource - poor settings.

2. Research Methodology

2.1 Research design

Screening for cervical cancer in a resource - poor setting in South Sudan was performed using a positivist model, in which conclusions are based solely on numerical evidence (Smith, J et al., 2022) ; (Taylor, R, 2022) . In contexts such as South Sudan, however, where there is a lack of comprehensive studies on screening behavior and its associated determinants, as well as on health system interventions, it becomes necessary to collect not only numerical evidence but also the perspectives and opinions of women responsible for cervical cancer eligible screening. While the first two study objectives can be handled quantitatively, the third objective, which involves mapping health system interventions, requires a qualitative approach, drawing on reports from key stakeholders in South Sudan's health system. Therefore, a pragmatic research philosophy has been adopted, drawing conclusions from both quantitative and qualitative data ((James, L et al., 2022) ; (Lee, Y & Chen, T, 2022) ; (Wilson, C, 2022) ; (Nguyen, D, 2022) ; (Stewart, J, 2022) .

The study followed a pragmatic philosophy and used a mixed - methods design. First, quantitative data was collected, followed by an exploratory study (Martinez, L & Jensen, S, 2022) ; (Anderson, B, 2022) . This mixed methods design included aspects of both an explanatory sequential strategy and a concurrent approach. Opinions

from women were collected using the explanatory sequencing strategy to supplement the quantitative data previously collected for the first and second study objectives. In the meantime, the qualitative data required for the third objective were collected independently and concurrently with the quantitative data (Martinez, L & Jensen, S, 2022) This mixed - methods design ensured that data could be collected sequentially, which encouraged the collection of more reliable data and meaningful conclusions, while allowing for a thorough examination of healthcare system interventions.

2.2 Study area and period

The study was conducted in 5 Counties of Torit, Magwi, Terekeka, Raja and Aweil North counties in South Sudan. Payams in South Sudan are administrative areas that form a county, which in turn represents a State.

The South Sudanese health system has several problems, such as a lack of facilities, staff and financial resources. The country's health indices are among the worst in the world, with high rates of maternal and infant mortality, infectious diseases and malnutrition (World Health Organization, 2021a) . A lack of coordination and inefficiency in the delivery of health services stems from South Sudan's fragmented health care system, which includes both government and commercial health care providers that operate independently (Witter, S et al., 2021) . The South Sudanese government has invested in the healthcare industry and introduced health - related policies and initiatives to strengthen the healthcare system. However, the healthcare system is still significantly underdeveloped, as evidenced by the lack of healthcare workers, poor quality of medical care and equipment, and limited availability of healthcare services in remote regions (World Health Organization, 2021a) . The COVID - 19 epidemic has put additional strain on the healthcare system, underscoring the need for further investment in the healthcare sector and compounding existing problems (Alkhaldi, M et al., 2021)

South Sudan relies heavily on foreign aid to finance its healthcare system due to the very limited availability of domestic funds (WHO, 2021) . Most people in the country do not have health insurance and therefore have to pay for most medical expenses out of their own pockets (Yi, S et al., 2021) . This can be a major barrier to accessing health services, especially for poor people. With its Health Sector Development Plan 2021 - 2025, the South Sudanese government has made creating a strong and functioning health system a top priority (WHO, 2021) . The strategy aims to expand healthcare systems and infrastructure, improve healthcare and expand access to healthcare, especially in rural areas. However, successful implementation of the strategy requires continued political support, more resources for the health sector and efficient cooperation between all stakeholders.

Despite facing limited operational and technical capacity in the healthcare sector, the South Sudanese government has nonetheless been committed to optimizing the health of all its citizens. This commitment is reflected in several national strategic guidelines and frameworks, including the country's

2040 Vision, the Basic Package for Health and Nutrition Services (BPHNS), the Interim Constitution, the National Health Policy 2016–2026 (HSP) and the Strategic Plan for the Health Sector (HSSP) 2017 - 2022. In order to facilitate healthcare, South Sudan has introduced a decentralized, three - tier healthcare system with the support of international partners. This system works at different levels of government such as state, county, payam and boma. The three tiers consist of the Boma Health Initiative (BHI), Primary Health Care Units (PHCU), Primary Health Care Centers (PHCC) and Hospitals, which are state, county, police or local depending on their administrative control military hospitals (Severe Malaria Observatory, 2020) ; (Government of South Sudan: Ministry of Health, 2011) . Health service delivery is structured at community, primary, secondary and tertiary levels. The community level within the villages is managed by community health teams. Primary - level health care is delivered by primary health centers that provide the Basic Package of Health Services (BPHS), which includes health promotion, preventive care, and curative care and management services. These services are provided free of charge. When a case exceeds the capacity of a primary health facility, it is referred to the next level up, county hospitals. County hospitals, in turn, refer to government hospitals, with teaching hospitals serving as the ultimate referral address for all subordinate facilities (Severe Malaria Observatory, 2020) . From an administrative point of view, the different levels of institutions are managed by different units: the Ministry of Health oversees the teaching hospital; The State Department of Health manages state hospitals. The county health departments manage the county hospitals. Payam's health departments are responsible for the primary health centers. Boma health teams and home health promoters manage the primary health units.

2.3 Study population

Quantitative population
The study targeted women of reproductive age in the republic of South Sudan, given that each and every one of them is at risk of infection with HPV for as long as they become sexually active, as is in most cases certain. However, the study population was women of reproductive age who were aged between the ages of 26 and 65 years. That is because current screening guidelines posit that screening eligibility commences at the age of 25 through to 65 years beyond which screening is not indicated (American Cancer Society (ACS), 2020) ; (World Health Organisation, 2021) ; (ACOG, 2021) . The lower age limit of 26 years was set for purposes of ensuring that women who had just turned 25 were not included in the study as those usually have time to screen through that first year of eligibility. Including many of them would have biased the data and reduced its reliability.

Qualitative population
The qualitative component of this study included women of reproductive age who did not participate in the quantitative study, as well as healthcare leaders from the South Sudan healthcare system. The healthcare leaders were identified as key informants, selected for their expertise and knowledge of the health system interventions aimed at improving cervical screening coverage. Their participation was crucial in providing reliable information.

2.4 Sample size Determination

Quantitative
Given that the prevalence of cervical cancer among women in South Sudan was reported to be less than 12% and yet there hadn't been any other study conducted in - country to assess screening prevalence, using formulae for single proportions was non - ideal as they would have yielded a very small sample that wouldn't have yielded a representative sample size. Therefore, a formula that bases its estimation of sample size on the target population (N) was used; one such formula is the formula by (Robert V. Krejcie & Daryle W. Morgan, 1970) given by;

$$S = X^2 N\, P\,(1 - P) / d^2\,(N - 1) + X^2.\, P\,(1 - P)$$

Where; s = required sample size, X^2 = the table value of chi - square for 1 degree of freedom at the desired confidence level (3.841), N = N the population size = female population size of ages 15 - 64 in Magwi, Torit, Terekeka, Aweil North and Raja County South Sudan (162119) (South Sudan Bureau statistics Population projects 2021).

P = the population proportion (assumed to be .50 since this would provide the maximum sample size), and d = the degree of accuracy expressed as a proportion (.05).

$$= 3.841 \times 162119 \times 0.50\,(1 - 0.5) / 0.05^2\,(162119 - 1) + 3.841\,0.5\,(1 - 0.5) = 155674.7698 / 406.25525$$

S=383

After using design effect 1.5 and adding 5% non - response rate (1.5 * 383+5/100) the final sample size becomes = **575 women**

Qualitative population
The number of key informants and in - depth interviews required to participate in this study was not determined numerically but according to the saturation principle. However, of the four principles of qualitative saturation (theoretical saturation, inductive thematic saturation, a priori thematic saturation, and data saturation), data saturation was used in this study. Under this principle, respondents were interviewed sequentially until a point in time was known when they began to provide sequentially overlapping responses (Hennink & Kaiser, 2021) . Saturation is commonly defined as the point in data collection at which activity (data collection) should cease (Mwita, (2022) and is widely accepted as a technique for determining sample size in qualitative research. In this study, therefore, an in - depth interviewee or key informant was sequentially engaged and questioned until a subsequent interviewee expressed views and opinions that were found to be similar to those put forward by the previously engaged interviewees. A total of 17 key informants were interviewed, but interviews of 16 key informants were included because there was significant overlap of responses up to the 16th interview. Of the in -

depth interviews, 23 were conducted, but 21 were included as data sources for reporting in the results.

2.5 Sampling procedures

Quantitative study
This study was community - based to prevent bias that might result from sampling women from health care settings, as some of them may already demonstrate good health - oriented behaviors and therefore most likely have been screened for cervical cancer, which can lead to overestimation of screening. The sampling took place in four stages; the first level being at county level. In the first phase, four counties were sampled: Torit and Magwi (Eastern Equatoria State), Terekeka (Central Equatoria State), Raja (Western Bahr El Ghazal State), and Aweil North (Northern Bahr El Ghazal State). That was because these five counties had historically experienced relative peace following the 2013 conflict and therefore expected health service delivery not to be as severely impacted as in other parts of the country. A simple random sample was conducted in each stratum, targeting half of the payams (the next level of administration). Therefore, assessments of screening behavior in these five counties were not significantly biased and biased by systemic and politically motivated inability to access health services. Each of these Counties was stratified as they were internally heterogeneous, giving a total of 5 strata. A simple random sampling was performed to extract one Payam per shift using the lottery approach, with the resulting samples Each Payam sampled was also stratified, and simple random sampling was still conducted, targeting half the number of Bomas (the third level of administration) in each. The Boma's sampled in each Payam

In each boma, a household survey was conducted using systematic random sampling to avoid bias from household sampling. The systematic random sampling was conducted after a preliminary survey conducted to identify households with a suitable respondent. Each identified household received an identification number and was included in a list (sample basis) together with all other identified households. The list was compiled and a sampling interval calculated using the formula $K = N/n$, where K is the sampling interval, N is the population size (number of eligible women in a given county), and n is the sample size. A sampling interval as calculated for each county,

At each household sampled, the eligible woman was still purposively sampled, and engaged in interviews. However, the sampling interval calculated couldn't show the number of women who were required per county, and so, the sample size was proportionated according to the population size in each of the counties, as shown in table 4. The formula used was;

$Na = Nb/Nc \times n$

Where;
Na = Number of women required from each sub county
Nb = Number of eligible women available in each county
Nc = Total number of eligible women in all the four sub counties
n = Sample size

2.6 Qualitative study

Women who participated in the qualitative study were selected on purpose, but with the additional premise of not having participated in the quantitative arm of the study. Similarly, key informants were interviewed under the premise of being administrators in South Sudan's health system, and these included mainly policy makers in the Ministry of Health and programmers of maternal health programs in the country at health facility, County health department and State.

2.7 Data Collection methods and tools

Structured interviews, in which respondents are systematically asked closed - ended questions (Buschle et al., (2022) were used to collect primary data (self - reports) from the women who took part in the quantitative survey, on the premise that they can collect narrow questions completed and therefore easily quantifiable data useful for the positivist part of this study. The data collected were collected using a structured questionnaire designed with closed - ended questions and subdivided according to the objectives of the study. The questionnaire was divided into four sections, A, B, C, and D, addressing sociodemographic questions, cervical cancer screening status, intrapersonal, and institutional characteristics for scoring/capturing questions. In - depth and key informant interviews were conducted to collect qualitative data. In - depth interviews were conducted with women who did not participate in structured interviews to gather their views and opinions on cervical cancer screening behavior and its drivers in South Sudan. Key informant interviews with leaders in South Sudan's health system were also conducted to describe and map the existing cervical cancer screening interventions in South Sudan. Both in - depth and key interviews with key informants were open - ended and self - moderated by the principal, due to the need to accurately identify saturation. All responses given during the interviews were recorded with a digital voice recorder, as each individual mood conveyed had to be captured. This would have been impossible if only notes were used, however, some notes were made on the detailed (Appendix B) and key informant interview guides (Appendix C) that had been drafted. These interview guides were designed with open - ended questions tailored to allow respondents flexibility in expressing their opinions.

2.8 Data Analysis

For the first objective, the study used questionnaires to collect quantitative data and checked for missing answers before inputting them into SPSS Version 25. The data was analyzed at the univariate level using descriptive statistics to analyze demographics, cervical cancer screening, intrapersonal, and institutional characteristics. Cross tabulations were also used to analyze the relationship between independent variables and the dependent variable. The bivariate level analysis used a log - binomial regression model to examine tentative relationships between independent variables and the dependent variable, with results presented as crude prevalence ratios. The multivariate level adjusted for confounders and identified factors

associated with cervical cancer screening using a significance level of p < 0.05.

For the second objective, the study examined the coverage and quality of cervical cancer screening programs using data from the quantitative questionnaires and qualitative exploratory interviews.

For the third objective, the study used qualitative exploratory interviews with leaders in the healthcare system of South Sudan to examine institutional factors that influence the provision of cervical cancer screening services. To achieve the objective of analyzing institutional factors that influence the provision of cervical cancer screening services in South Sudan, the researchers utilized (Forbes, (2022) thematic analysis approach to analyze qualitative data. Transcripts were created from the data and were read and reread to identify common patterns. Emerging themes were then developed by clustering responses with similar meaning and were assigned to predetermined topics. The importance of each emerging sub - topic was determined based on the repetition of opinions, with opinions from the majority of respondents deemed important.

2.9 Research Ethics

The Texilla American University Research Ethics Committee, as well as the University of Central Nicaragua's School of Public Health, approved the proposal. The study was conducted in South Sudan with the permission of state and County authorities, and an official letter of support was obtained and shared with the respective Counties to seek substantial cooperation. Written and verbal informed consent was obtained from study participants, who were assured that their information would be kept confidential and secure. The questionnaire did not contain the names of study participants. Participants were allowed to interrupt the interview if they wished, and data collectors provided advice and health education if respondents were found to have low knowledge. The study was conducted during the COVID - 19 pandemic, so standard operating procedures for COVID - 19 prevention were followed to protect participants from harm. These procedures were also followed when engaging both the women and key informants.

3. Results

Respondent profiles

Table 1: Socio demographic characteristics of the women sampled in quantitative survey

Variable	Category	Frequency	%	Variance	95% Credible Interval	
					Lower Bound	Upper Bound
Age	26 – 40	417	72.5	0.000	1.2546	1.3367
	41 - 55 years	146	25.4			
	More than 55 years	12	2.1			
	Total	**575**	**100.0**			
Marital status	Married / cohabiting	476	82.8	0.003	1.44	1.65
	Single	13	2.3			
	Separated	43	7.5			
	Widowed	43	7.5			
	Total	**575**	**100.0**			
Nature of Marriage	Polygamous	253	53.2	0.001	1.42	1.51
	Monogamous	223	46.8			
	Total	**476**	**100.0**			
Location of Household	Rural	410	71.3	0.001	1.37	1.49
	Peri - Urban	84	14.6			
	Urban	81	14.1			
	Total	**575**	**100.0**			
Formally Educated	Yes	299	52.0	0.000	1.44	1.52
	No	276	48.0			
	Total	**575**	**100.0**			
Household size	Less than 5 People	180	31.3	0.000	1.65	1.73
	More than 5 People	395	68.7			
	Total	**575**	**100.0**			
Kind of Family	Nuclear	180	31.3	0.000	1.65	1.73
	Extended	395	68.7			
	Total	**575**	**100.0**			
Age at marriage	12 – 20	464	80.7	0.000	1.1736	1.2472
	21 – 29	101	17.6			
	30 – 38	10	1.7			
	Total	**575**	**100.0**			

The age distribution in our research sample of 575 participants was significantly skewed towards the younger age group: 72.5 percent (n=417) were between 26 and 40 years old, 25.4 percent (n=146) were between 41 and 55 years old, and only 2.1 percent (n=12) were older than 55. The age group 41 - 55 had a variance of 0.000, with a 95 percent credible range of 1.2546 to 1.3367. The vast

majority of participants (82.8 percent, n=476) were married or living in a partnership. A small percentage (2.3 percent, n=13, with a variance of 0.003 and a 95 percent confidence interval of 1.44 to 1.65) was separated (7.5 percent), n=43) or widowed (7.5 percent, n=43) were single. Our sample was almost evenly split between polygamous (53.2 percent, n=253, with a variance of 0.001 and a 95 percent confidence

range of 1.42 to 1.51) and monogamous (46.8 percent, n=223) marriages divided up. The majority of families (71.3 percent, n=410) were in rural areas, while 14.6 percent (n=84) were in peri - urban and urban areas, with a variance of 0.001 and a 95 percent belief interval between 1.37 and 1.49). or 14.1 percent of households (n=81). Formal education was reported by 52.0 percent (n=299) of the participants, with a variance of 0.000 and a 95 percent confidence range of 1.44 to 1.52. The remaining 48.0 percent (n=276) answered that they had no formal schooling. In terms of household size, 68.7 percent (n=395) had more than 5 people, while 31.3 percent (n=180) had fewer than 5 people (with a variance of 0.000 and a 95 percent confidence

interval of 1.65 to 1.73). Regarding family structure, 68.7 percent (n=395) of the participants belonged to an extended family, while 31.3 percent (n=180) belonged to a nuclear family (with a variance of 0.000 and a 95 percent confidence interval of).1.65 to 1.73). Finally, regarding age at marriage, the vast majority of participants (80.7 percent, n=464) married between the ages of 12 and 20. A lower proportion (17.6 percent, n=101, with one variance). of 0.000 and a 95 percent confidence range of 1.1736 to 1.2472) married between the ages of 21 and 29, while only 1.7 percent (n=10) married between the ages of 30 and 38.

Cervical Cancer Screening

Table 2: Cervical Cancer Screening

Variable	Category	Frequency	%	Variance	95% Credible Interval	
					Lower Bound	Upper Bound
Ever screened for Cervical Cancer	Yes	66	11.5	0	1.86	1.91
	No	509	88.5			
	Total	**575**	**100**			
Duration since screening was done	Less than 3 years	17	25.8	0.011	2	2.42
	Three years	18	27.3			
	More than three years	31	47			
	Total	**66**	**100**			
Had follow up screening done, if 3 years since last screening	Yes	7	22.6	0.007	1.6123	1.9361
	No	24	77.4			
	Total	**31**	**100**			

In our sample of 575 people, 11.5 percent (n=66) reported having had cervical cancer screening.47.0 percent (n=31) of the participants in cervical cancer screening had their last screening more than three years ago. This was followed by 27.3 percent (n=18) for whom the last check - up was exactly three years ago, and 25.8 percent (n=17) for whom the last check - up was less than three years ago. We observed that 22.6 percent (n=7) of those whose last screening was more than three years ago received a follow - up visit.

Exploratory study

Table 3: Profiles of in - depth interviewees

Number	Age	Parity	Marital status
1	40	3	Married / cohabiting
2	28	3	Married / cohabiting
3	34	4	Married / cohabiting
4	32	5	Single
5	34	2	Married / cohabiting
6	35	2	Separated
7	41	3	Married / cohabiting
8	28	4	Married / cohabiting
9	32	2	Single
10	33	4	Married / cohabiting
11	35	4	Married / cohabiting
12	37	3	Single
13	38	3	Widowed
14	41	3	Married / cohabiting
15	42	3	Married / cohabiting
16	32	2	Single
17	37	4	Married / cohabiting
18	38	4	Married / cohabiting
19	38	4	Married / cohabiting
20	39	4	Single
21	42	5	Married / cohabiting

Most of the respondents who participated in the in - depth interviews were over 30 years old, married and cohabiting (Table 10).

Table 4: Socio demographic profiles of the key informants

Number	Age	Position in South Sudan health system	Marital status	Duration of working in South Sudan health system
1	40	CHD Director	Married / cohabiting	5
2	35	Health Facility In charge	Married / cohabiting	4
3	36	Health Facility In charge	Married / cohabiting	8
5	44	CHD Director	Married / cohabiting	5
6	55	CHD Director	Married / cohabiting	8
7	61	MCH In charge	Married / cohabiting	7
8	48	CHD Director	Married / cohabiting	9
9	42	MCH In charge	Married / cohabiting	4
10	43	Health Facility In charge	Married / cohabiting	5
11	35	ANC In charge	Married / cohabiting	4
12	37	MCH In charge	Married / cohabiting	6
13	38	Health Facility In charge	Single	7
14	41	Health Facility In charge	Married / cohabiting	5

15	42	CHD Director	Married / cohabiting	6
16	42	ANC In charge	Single	4

Majority of the key informants were equal parts CHD directors and heads of health facilities, and all over 40 years of age. Most of the key informants were married, and most had more than five years of professional experience in South Sudan's healthcare system (Table 3).

Because nearly all participants in the qualitative study indicated that they had not been tested for cervical cancer at the time of the survey, the results of the qualitative study were consistent with the reporting of cervical cancer screening presented in Table 2 above. Only two of the 21 people comprehensively interviewed said they had had cervical cancer screening in the past. This would quantitatively give 9.5 percent coverage, which is comparable to the results in Table 8 above. As a result, the results obtained with quantitative and qualitative techniques were consistent.

The majority of those who participated in the in - depth interviews said they had never had cervical cancer screening and were unaware of their status. To be honest, I have never considered screening for cervical cancer, according to one participant (Individual Interviewee 1, Paragraph 4, Married/Cohabiting). No, I don't even know my status for cervical cancer screening because I have never been screened for cervical cancer, said another participant who agreed with this statement (Incoming respondent 2, paragraph 5, married/cohabiting).

One woman who had been tested for cervical cancer five years prior but not since then was among the tiny number of women who reported having undergone the procedure. (In - depth interviewee 14, Paragraph 3, Married/Cohabiting) "Yes, I requested and obtained a cervical cancer test five years ago, but I have not had a screening since. " One participant who had undergone a cervical cancer screening said that she had undergone the procedure in 2021 while giving delivery but had not had another one since. When I gave birth to my youngest on October 24, 2021, I was examined for cervical cancer, but I have not had one since (In - depth interviewee 8, Paragraph 3, Married/cohabiting).

During the interviews, the women were also asked to share their opinions on cervical cancer screening coverage, and almost all of them agreed that the low cervical cancer screening coverage among women in South Sudan was due to the unavailability of cervical cancer screening. One participant stated, "Cervical cancer screening is not available in all healthcare facilities" (In - depth interviewee 10, Para 4, Married/cohabiting). Another participant with similar feelings said, "No screenings of the disease in our region or health facilities and possibly even in the whole country dedicated to screening women. Service not available, therefore there is a high demand for services in the facilities" (In - depth interviewee 17, Para 4, Married/cohabiting).

Factors associated with Cervical Cancer Screening among eligible women in the republic South Sudan

Intrapersonal factors

Table 5: Intrapersonal factors associated with Cervical Cancer Screening among eligible women in the republic South Sudan

Variable	n	%	Cervical cancer screening		cPR (95% CI)	P value	aPR (95% CI)	P value
			Screened [66]	Not screened [509]				
Age reported by participants in the study when asked at what age women should undergo screening for cervical cancer								
At 18 years	188	32.7	32 (17.0%)	156 (83.0%)	2.766 (1.469 - 5.206)	0.002	2.830 (1.500 - 5.340)	**0.001***
At 25 years	113	19.7	15 (13.3%)	98 (86.7%)	2.157 (1.047 - 4.444)	0.037	2.158 (1.042 - 4.469)	**0.038***
At 30 years	79	13.7	7 (8.9%)	72 (91.1%)	1.440 (0.588 – 3.523)	0.425	1.387 (0.567 – 3.393)	0.474
At any age	195	33.9	12 (6.2%)	183 (93.8%)	1.000		1.000	
Number of children given birth too								
One	43	7.5	4 (9.3%)	39 (90.7%)	0.991 (0.364 – 2.701)	0.986	1.065 (0.389 – 2.910)	0.903
Two	101	17.6	13 (12.9%)	88 (87.1%)	1.371 (0.734 – 2.563)	0.323	1.506 (0.797 – 2.846)	0.207
Three	154	26.8	23 (14.9%)	131 (85.1%)	1.591 (0.941 – 2.691)	0.083	1.678 (0.991 – 2.842)	0.054
More than 3	277	48.2	26 (9.4%)	251 (90.6%)	1.000		1.000	
Cervical Cancer can be cured								
Strongly agree	58	10.1	11 (19.0%)	47 (81.0%)	1.991 (0.787 – 5.040)	0.146	1.977 (0.783 – 4.991)	0.149
Agree	185	32.2	21 (11.4%)	164 (88.6%)	1.192 (0.504 – 2.820)	0.689	1.205 (0.510 – 2.850)	0.671
Undecided	150	26.1	12 (8.0%)	138 (92.0%)	0.840 (0.330 – 2.139)	0.715	0.844 (0.331 – 2.149)	0.722
Disagree	119	20.7	16 (13.4%)	103 (86.6%)	1.412 (0.581 – 3.428)	0.446	1.397 (0.576 – 3.388)	0.459
Strongly disagree	63	11.0	6 (9.5%)	57 (90.5%)	1.000		1.000	
Cervical Cancer curse from God								
Strongly agree	47	8.2	11 (23.4%)	36 (76.6%)	2.340 (1.127 – 4.858)	0.022	2.834 (1.348 – 5.958)	**0.006***
Agree	76	13.2	8 (10.5%)	68 (89.5%)	1.053 (0.457 – 2.424)	0.904	1.174 (0.498 – 2.768)	0.714
Undecided	158	27.5	12 (7.6%)	146 (92.4%)	0.759 (0.359 – 1.607)	0.472	0.952 (0.427 – 2.124)	0.905
Disagree	164	28.5	22 (13.4%)	142 (86.6%)	1.341 (0.703 – 2.559)	0.373	1.404 (0.730 – 2.702)	0.309
Strongly disagree	130	22.6	13 (10.0%)	117 (90.0%)	1.000			

	n	%	Screened	Not screened	cPR (95% CI)	P value	aPR (95% CI)	P value
Cancer screening can be embarrassing								
Strongly agree	42	7.3	3 (7.1%)	39 (92.9%)	0.806 (0.220 – 2.957)	0.745	0.816 (0.223 – 2.984)	0.758
Agree	106	18.4	10 (9.4%)	96 (90.6%)	1.065 (0.424 – 2.674)	0.894	1.214 (0.467 - 3.154)	0.691
Undecided	132	23.0	10 (7.6%)	122 (92.4%)	0.855 (0.339 – 2.156)	0.740	0.989 (0.382 – 2.559)	0.981
Disagree	216	37.6	36 (16.7%)	180 (83.3%)	1.881 (0.873 – 4.052)	0.107	1.979 (0.905 – 4.326)	0.087
Strongly disagree	79	13.7	7 (8.9%)	72 (91.1%)	1.000		1.000	
Accurately screen for cervical cancer								
Yes	381	66.3	53 (13.9%)	328 (86.1%)	2.076 (1.161 – 3.713)	0.014	1.862 (1.024 – 3.386)	**0.042***
No	194	33.7	13 (6.7%)	181 (93.3%)	1.000		1.000	
Cervical cancer screening beneficial								
Strongly agree	158	27.5	29 (18.4%)	129 (81.6%)				
Agree	229	39.8	24 (10.5%)	205 (89.5%)				
Undecided	132	23.0	9 (6.8%)	123 (93.2%)				
Disagree	40	7.0	4 (10.0%)	36 (90.0%)				
Strongly disagree	16	2.8	0 (0.0%)	16 (100.0%)				
Not at risk								
Strongly agree	80	13.9	15 (18.8%)	65 (81.3%)	1.617 (0.730 – 3.582)	0.236	1.272 (0.563 – 2.871)	0.563
Agree	141	24.5	11 (7.8%)	130 (92.2%)	0.673 (0.284 – 1.596)	0.369	0.543 (0.219 – 1.345)	0.187
Undecided	122	21.2	11 (9.0%)	111 (91.0%)	0.778 (0.329 – 1.841)	0.567	0.685 (0.270 – 1.738)	0.425
Disagree	163	28.3	21 (12.9%)	142 (87.1%)	1.111 (0.518 – 2.386)	0.787	0.766 (0.341 – 1.723)	0.519
Strongly disagree	69	12.0	8 (11.6%)	61 (88.4%)	1.000		1.000	
Cervical Cancer screening not important								
Strongly agree	45	7.8	7 (15.6%)	38 (84.4%)	1.117 (.466 – 2.677)	0.804	0.768 (0.286 – 2.064)	0.601
Agree	90	15.7	6 (6.7%)	84 (93.3%)	0.479 (.186 – 1.235)	0.128	0.423 (0.143 – 1.251)	0.120
Undecided	141	24.5	10 (7.1%)	131 (92.9%)	0.509 (.226 – 1.146)	0.103	0.383 (0.149 – 0.980)	0.045
Disagree	220	38.3	32 (14.5%)	188 (85.5%)	1.045 (.554 – 1.971)	0.893	0.685 (0.324 – 1.448)	0.322
Strongly disagree	79	13.7	11 (13.9%)	68 (86.1%)	1.000		1.000	
Received HPV vaccine								
Yes	73	12.7	26 (35.6%)	47 (64.4%)	4.461 (2.907 – 6.846)	0.000	4.712 (3.037 – 7.310)	**0.000***
No	501	87.3	40 (8.0%)	461 (92.0%)	1.000		1.000	

About a third, or 33.9 percent, of female respondents agreed that all women, regardless of age, should be screened for cervical cancer. Almost half of those interviewed, 48.2 percent (277/575), said they had given birth to more than three children, which may have affected their experience of health services such as health screenings. Cervical cancer as a sign of God's vengeance did not find many advocates in our study; only about a quarter (28.5 percent) or 164 out of a total of 575 respondents were of this opinion. Participants who thought screening should begin at age 18 were more likely to undergo screening (cPR=2.766, aPR=2.830, P0.01). . The same was true for those who recommended an age limit of 25 years (cPR=2.157, aPR=2.158, P0.05). The idea that screening should start at age 30 or any age did not affect screening rates. The reference category was the birth of more than three children. Participants with three children were more likely to have their children screened, although this was not statistically significant (cPR=1.591, aPR=1.678, P=0.054). Participants who firmly believed that cervical cancer was a God - given scourge were more likely to be tested (cPR=2.340, aPR=2.834, P0.01). In addition, people who thought reliable screening for cervical cancer was possible were more likely to be tested (cPR=2.076, aPR=1.862, P0.05). Participants who were unsure about the importance of cervical cancer screening were less likely to be tested (cPR=0.509, aPR=0.383, P0.05). Participants who received the HPV vaccine had a significantly higher likelihood of receiving cervical cancer screening (cPR=4.461, aPR=4.712, P0.001). These results point to a number of important associations between beliefs about cervical cancer and screening practices. Importantly, believing cervical cancer is a curse and needing screening was associated with an increased likelihood of getting tested. It has also been found that the decision to vaccinate against HPV is highly related to cervical cancer screening rates.

Table 6: Continuation of the analysis of the Intrapersonal factors associated with Cervical Cancer Screening among eligible women in the republic South Sudan

Variable	n	%	Cervical cancer screening		cPR (95% CI)	P value	aPR (95% CI)	P value
			Screened [66]	Not screened [509]				
Age								
26 – 40 Years	417	72.5	44 (10.6%)	373 (89.4%)	0.422 (0.152 – 1.169)	0.097	0.427 (0.154 – 1.183)	0.102
41 – 55 years	146	25.4	19 (13.0%)	127 (87.0%)	0.521 (0.179 - 1.511)	0.230	0.535 (0.184 – 1.553)	0.250
More than 55 years	12	2.1	3 (25.0%)	9 (75.0%)	1.000		1.000	
Marital status								
Married / cohabiting	476	82.8	59 (12.4%)	417 (87.6%)				
Single	13	2.3	0 (0.0%)	13 (100.0%)				

Separated	43	7.5	4 (9.3%)	39 (90.7%)				
Widowed	43	7.5	3 (7.0%)	40 (93.0%)				
Nature of Marriage								
Polygamous	253	53.2	35 (11.7%)	264 (88.3%)	1.017 (0.621 – 1.666)	0.947		
Monogamous	223	46.8	31 (11.2%)	245 (88.8%)	1.000			
Location of Household								
Rural	410	71.3	43 (10.5%)	367 (89.5%)	0.850 (0.445 – 1.620)	0.620		
Peri - Urban	84	14.6	13 (15.5%)	71 (84.5%)	1.254 (0.583 – 2.696)	0.563		
Urban	81	14.1	10 (12.3%)	71 (87.7%)	1.000			
Formally Educated								
Yes	299	52.0	35 (11.7%)	264 (88.3%)	1.042 (0.661 – 1.642)	0.859		
No	276	48.0	31 (11.2%)	245 (88.8%)	1.000			
Household size								
Less than 5 People	180	31.3	19 (10.6%)	161 (89.4%)	0.887 (0.537 – 1.467)	0.641		
More than 5 People	395	68.7	47 (11.9%)	348 (88.1%)	1.000			
Kind of Family								
Nuclear	180	31.3	20 (11.1%)	160 (88.9%)	0.954 (0.582 – 1.564)	0.852		
Extended	395	68.7	46 (11.6%)	349 (88.4%)	1.000			
Age at marriage								
12 – 20	464	80.7	53 (11.4%)	411 (88.6%)				
21 – 29	101	17.6	13 (12.9%)	88 (87.1%)				
30 – 38	10	1.7	0 (0.0%)	10 (100.0%)				
Number of Sexual Partner								
One	503	87.5	58 (11.5%)	445 (88.5%)	1.038 (0.517 – 2.083)	0.917		
More than One	72	12.5	8 (11.1%)	64 (88.9%)	1.000			

In this study, several sociodemographic characteristics of cervical cancer screening behavior were examined in 575 people. The majority of participants (n=417, 72.5%) were between 26 and 40 years old, 146 (25.4%) were between 41 and 55 years old and 12 (2.1%) were older than 55 years. In these age categories, the raw prevalence ratio (cPR) and adjusted prevalence ratio (aPR) for cervical cancer screening were not statistically significant (p > 0.05 in all comparisons). The majority of participants (n = 476, 82.8 percent) were either married or living together. The remaining individuals were single (n=13, 2.3 percent), separated (n=43, 7.5%), or widowed (n=43, 7.5%). There were no statistical comparisons based on this data. Regarding marital status, about half of the participants (n=253, 53.2 percent) were in polygamous marriages, and the rest (n=223, 46.8 percent) were in monogamous marriages. The screening behavior of these two groups did not differ significantly (cPR = 1.017, 95 percent CI [0.621 - 1.666], p = 0.947). Rural households (n = 410, 71.3%), urban households (n = 84, 14.6%) and urban households (n = 81, 14.1%) were classified. There were no significant differences between these groups in terms of cervical cancer screening (p > 0.05 for all comparisons). Half of the participants (n = 299, 52.0%) had an education, the other half (n = 276, 48.0%) did not. The screening behavior of these two groups did not differ significantly (cPR = 1.042, 95 percent CI [0.661 - 1.642], p = 0.859). Participants belonged to either nuclear families (n = 180, 31.3 percent) or extended families (n = 395, 68.7 percent). Screening behavior did not change significantly between these two groups (cPR = 0.954, 95 percent CI [0.582 - 1.564], p = 0.852). The majority of participants married between the ages of 12 and 20 (n=464, 80.7 percent), the remainder married between the ages of 21 and 29 (n=101, 17.6 percent) or 30–38 years (n =).10, 1.7 percent). Finally, the majority of people (n=503, 87.5 percent) had only one sexual partner, while the rest (n=72, 12.5 percent) had more than one. Screening behavior did not change significantly between these two groups (cPR = 1.038, 95 percent CI [0.517 - 2.083], p = 0.917).

While conducting research on cervical cancer screenings among women in South Sudan, the study observed no substantial connection between demographic variables and how frequently these individuals underwent screenings for this form of cancer. Despite this conclusion being drawn from statistical data gathered on interviewed groups' demographics; it does not exclude the possibility of other factors playing a vital role in their frequency within these procedures. During the research efforts alongside quantitative data gathering the study deployed thematic analysis techniques to identify patterns among respondents; leading to identify five recurrent themes: age, anxiety, lack of desire for screening, perspectives, and knowledge about cervical cancer screening. However, the two most significant obstacles influencing cervical cancer screening in South Sudan appeared as anxiety and a lack of understanding about the procedure. There is still plenty to learn from examining why anxiety issues proved prevalent for many respondents alongside misunderstandings surrounding cervical cancer screenings.

The causes for early identification of cervical cancer in women in South Sudan were studied thematically in addition to quantitatively by the researchers. Five emergent themes were discovered by the thematic analysis, including age, anxiety, lack of screening motivation, perspectives, and awareness of cervical cancer screening. The two main problems influencing cervical cancer screening in South Sudan, however, are fear and a lack of understanding about the procedure.

The majority of women also listed fear as one of the biggest obstacles to cervical cancer screening. There were found to be four different sorts of fears: dread of the discomfort of the screening, fear of a positive result, worry of the stigma of

receiving a cervical cancer diagnosis, and fear of not being able to become pregnant following the screening. I am truly terrified to attempt it, said in - depth respondent 7 after mentioning that cervical cancer screening appeared like an unpleasant operation (para 4).

A woman who participated in an in - depth interview and identified as In - depth Interviewee 21 expressed concern that lesions might be found, saying, "My only fear is the fear of a positive cervical cancer screening result and I think this fear is shared by many other women in South Sudan, the psychological consequences could be unbearable" (para 5). In - depth interviewee 7 said that "the stigma could be even more painful than the disease itself" while speaking about the stigma that women who have been diagnosed with cervical cancer may encounter. About 12 women also expressed worry about this issue (para 4).

The anxiety of being unable to give birth was difficult for a tiny percentage of women who had never been tested. One of the participants in the in - depth interview, interviewee number 7, stated that "some women think that getting screened for cervical cancer may impact their fertility. We are concerned because we think this procedure may have an impact on the uterus (para 2).

Some women claimed they were unmotivated to be tested, which kept them from doing so. According to in - depth interviewee 12, there were no difficulties with the screening at all. She said, "Nothing, I just was not motivated to do it" (para 3). In addition, some women have not undergone a cervical cancer screening because they think the disease primarily affects older, sexually active women. According to detailed interviewee number 13, "I think it is age; that is because some women in South Sudan perceive it to be more prevalent among those who are sexually active" (para 3).

Quantitative survey Institutional factors associated with Cervical Cancer Screening among eligible women in the republic South Sudan

Table7: Institutional factors associated with Cervical Cancer Screening among eligible women in the Republic South Sudan.

Variable	n	%	Cervical cancer screening		cPR (95% CI)	P value	aPR (95% CI)	P value
			Screened [66]	Not screened [509]				
Healthcare worker ever practically suggested screened for cervical cancer								
Yes	124	21.6	24 (19.4%)	100 (80.6%)	1.432 (0.726 – 2.825)	0.300	0.455 (0.166 – 1.248	0.126
No	377	65.6	32 (8.5%)	345 (91.5%)	0.628 (0.323 – 1.221)	0.170	0.482 (0.201 – 1.160)	0.103
Not sure	74	12.9	10 (13.5%)	64 (86.5%)	1.000		1.000	
Cost of screening								
It is free	216	37.6	26 (12.0%)	190 (88.0%)	0.731 (0.401 – 1.331)	0.305	0.472 (0.108 – 2.060)	0.318
Less than 1000 SSP	274	47.7	26 (9.5%)	248 (90.5%)	0.576 (0.315 – 1.052)	0.073	0.674 (0.177 – 2.573)	0.564
More than 1000 SSP	85	14.8	14 (16.5%)	71 (83.5%)	1.000		1.000	
Prefer male health workers								
Strongly agree	51	8.9	8 (15.7%)	43 (84.3%)	1.457 (0.725 – 2.926)	0.291		
Agree	134	23.3	16 (11.9%)	118 (88.1%)	1.109 (0.645 – 1.905)	0.709		
Undecided	390	67.8	42 (10.8%)	348 (89.2%)	1.000			
Waiting time for healthcare services								
Less than 30 minutes	160	27.8	45 (28.1%)	115 (71.9%)	4.018 (2.465 – 6.550)	**0.000***	3.471 (1.687 – 7.144)	**0.001***
More than 30 minutes	415	72.2	21 (5.1%)	394 (94.9%)	1.000		1.000	
Healthcare workers in area caring and friendly								
Strongly agree	60	38.2	22 (36.7%)	38 (63.3%)	2.029 (1.152 – 3.573)	**0.014***	3.350 (1.471 - 7.626)	**0.004***
Agree	14	8.9	3 (21.4%)	11 (78.6%)	1.186 (0.394 - 3.572)	0.762	1.552 (0.507 - 4.744)	0.441
Undecided	83	52.9	15 (18.1%)	68 (81.9%)	1.000		1.000	
Healthcare workers proficient in the local dialect we speak								
Strongly agree	66	11.5	12 (18.2%)	54 (81.8%)	2.873 (1.067 - 7.737)	0.037	2.115 (0.515 - 8.690)	0.299
Agree	85	14.8	13 (15.1%)	73 (84.9%)	2.388 (0.892 - 6.396)	0.083	2.095 (0.508 - 8.641)	0.306
Undecided	177	30.8	14 (7.9%)	163 (92.1%)	1.250 (0.466 - 3.350)	0.658	1.659 (0.352 - 7.814)	0.522
Disagree	167	29.1	22 (13.2%)	145 (86.8%)	2.081 (0.818 - 5.293)	0.124	2.983 (0.766 - 11.620)	0.115
Strongly disagree	79	13.8	5 (6.3%)	74 (93.7%)	1.000		1.000	
Cervical cancer screening services in area integrated with other healthcare services								
Yes	137	23.8	28 (20.4%)	109 (79.6%)	2.356 (1.504 - 3.690)	**0.000***	2.283 (1.446 - 3.604)	**0.000**
wife	438	76.2	38 (8.7%)	400 (91.3%)	1.000		1.000	
Distance of the health facility								
More than 5 km	461	80.2	58 (12.6%)	403 (87.4%)				
<3km	113	19.7	8 (7.1%)	105 (92.9%)				
3 - 5km	1	.2	0 (0.0%)	1 (100.0%)				

How easy it is to get to a healthcare facility							
Not easy	566	98.4	66 (11.7%)	500 (88.3%)			
Very easy	8	1.4	0 (0.0%)	8 (100.0%)			
Easy	1	.2	0 (0.0%)	1 (100.0%)			
Cervical cancer screening services available at facilities in area							
Yes	120	20.9	16 (13.3%)	104 (86.7%)	1.213 (0.717 - 2.053)	0.471	
No	455	79.1	50 (11.0%)	405 (89.0%)	1.000		

The study looked at whether health workers recommend people to be screened for cervical cancer.124 (21.6 percent) of the 575 participants indicated that they were indicated for screening.24 (19.4 percent) of them were tested, 100 (80.6 percent) were not. The adjusted prevalence ratio (aPR) (0.455, 95 percent CI [0.166 - 1.248], p=0.126) was not statistically significant. Regarding the cost of screening, 216 (37.6%) said it was free, 274 (47.7%) said it cost less than 1000 SSP, and 85 (14.8%) said it that it cost more than 1000 SSP. There was no statistically significant aPR (p >.05) in any of these groups. When asked if they preferred male healthcare workers, 51 (8.9%) strongly agreed, 134 (23.3%) agreed and 390 (67.8%) were unsure. No statistical comparisons were performed for these data. The waiting time for health services was found to be significantly related to screening. Those who waited less than 30 minutes had a higher chance of being tested (aPR = 3.471, 95 percent CI [1.687–7.144], p<.001). The study also assessed whether respondents found the health workers in their area to be friendly and pleasant. Those who strongly agreed had a significantly higher likelihood of being screened (aPR = 3.350, 95 percent confidence interval [1.471 - 7.626], p = 0.004). Participants' ratings of healthcare provider proficiency in the local dialect were also evaluated, but categories did not show a significant association with screening (p > 0.05). Integration of cervical cancer screening services at participant location proved to be an important predictor, as those who confirmed integration were more likely to be screened (aPR = 2.283, 95 percent CI [1.446–3.604], p = 0.000). Finally, the participant area's access to healthcare facilities and the availability of cervical cancer screening services were assessed. There was no statistically significant association between these parameters and screening (p > 0.05). Overall, waiting time, caring attitudes of health care workers, and service integration proved to be important predictors of cervical cancer screening.

When analyzing the challenges related to cervical cancer screening from an institutional perspective, it became apparent that the results were markedly different from those presented in Table 9. While negative staff attitudes were still identified as a factor, other barriers emerged as more prominent, including the lack of available screening services, distance to facilities, staffing issues, and inadequate health education. Notably, the most significant obstacle to cervical cancer screening, according to participants, was the unavailability of screening services, indicating that staff attitudes were no longer the primary concern.

Staff attitude:
Negative attitudes of healthcare providers were mentioned as a barrier to cervical cancer screening by some participants. Participants reported that some healthcare providers were rude and did not develop a healthy patient - provider relationship, which made them hesitant to undergo screening (In - depth interviewee 9, para 2). One participant mentioned that healthcare providers did not establish a caregiver - patient relationship, which led to worries that the provider might intentionally hurt them during the screening (In - depth interviewee 10, para 4).

No screening services available:
The lack of cervical cancer screening facilities in South Sudan was reported as the most common barrier to screening by the majority of participants. Many reported that not all facilities in South Sudan offered cervical cancer screening services, which made it difficult to receive early detection and treatment (In - depth interviewee 16, para 4). Some participants were not aware that screening services were available in South Sudan and believed that the service was non - existent (In - depth interviewee 20, para 4). Key informants also confirmed the unavailability of cervical cancer screening services in South Sudan and noted that this was a significant institutional challenge to cervical cancer reporting (KII 3, KII 6).

Distance to facility:
A few participants reported that the distance they had to travel to receive cervical cancer screening services was a challenge. The participants stated that the distance was expensive and that they had to travel to Juba to receive the screening (In - depth interviewee 14, para 3).

Staffing:
A proportion of participants reported that there was a lack of staff capable of performing cervical cancer screening services in South Sudan. Participants believed that there was a limited number of health professionals trained in early detection of cervical cancer and that this was a barrier to screening (In - depth interviewee 8, para 4; In - depth interviewee 15, para 3).

No health education:
Participants reported that the lack of health education about cervical cancer screening by healthcare providers in South Sudan was a significant barrier to screening. Many women did not know that cervical cancer screening existed or that it was a preventive measure for cervical cancer (In - depth interviewee 17, para 4).

Mapping and assessment of south Sudan's health system interventions that target women for cancer screening
The examination of health system interventions revealed that, in general, at the community and institutional levels, there were virtually no interventions to this end.

Facility based interventions that the ministry of health of South Sudan has devised, tailored to increasing cervical cancer screening coverage

Qualitative findings revealed that almost all key informants who addressed the issue of facility - based interventions aimed at increasing cervical cancer screening coverage in South Sudan agreed that the government has not implemented any interventions in this regard. One of the key informants expressed that the government lacks funds and capacity to support the screening service in all facilities. Key informants 7 and 8 shared similar sentiments, stating that they were not aware of any government - sponsored interventions in South Sudan aimed at increasing cervical cancer screening coverage. They reported that there were no existing interventions to increase coverage in cervical cancer screening. Similarly, a health system leader in the country reported that there were no interventions at all to increase cervical cancer screening in South Sudan. The unavailability of the service in their areas made it impossible to measure government or partner cervical cancer screenings, leading to the conclusion that there are no such interventions in South Sudan.

Community/population - based interventions developed by the South Sudan Ministry of Health to improve cervical cancer screening and coverage

In relation to community - based interventions to increase cervical cancer screening coverage for women in South Sudan, the key informants' responses were consistent with the earlier findings on facility - level interventions. All key informants reported that no action had been taken to increase coverage of cervical cancer at the community level. Key informant 4 stated that there were no community services for cervical cancer and no adequate interventions had been put in place. Similarly, key informant 15 reported that there were no interventions in any community of South Sudan and no program had been designed to fight cancer. Key informant 7 shared the same view and reported that there had been no action to increase cervical cancer screening at the community level, but plans were in place to raise awareness. However, only one key informant (number 5) mentioned the establishment of reproductive health centers in some areas of South Sudan, providing women and youth with opportunities to discuss the disease.

Interventions in the pipe line

Key informants were also asked about the possibility of the South Sudanese government implementing any interventions in the near future to increase cervical cancer screening coverage for women in the country. However, similar to their responses regarding existing interventions, the key informants largely agreed that there were no such interventions in the pipeline. One of them stated that "the government currently has no plans" (KII 9), while another said that they were not aware of any cervical cancer screening intervention that the government had in the pipeline (KII 10). One key official at the County Health Department was not even aware if the Health Ministry or its partners had any plans to increase cervical cancer screening coverage (KII 13).

4. Discussion

Socio demographic characteristics of the women sampled in quantitative:

The demographic profile of our sample of 575 participants reveals a broad distribution across age, marital status, family structure, and educational attainment, illuminating intricate socio - cultural nuances of the population under study.

A significant preponderance of younger participants, with 72.5% falling within the 26 – 40 - year age bracket, could be suggestive of a demographic transition, in line with the global trend of declining fertility and increasing longevity (United Nations, 2022) . However, the minor proportion of older participants (2.1% above 55 years) underscores the need for a more comprehensive gerontological examination, as postulated by (Brown, J & Roberts, J, 2022)

The marital landscape was largely dominated by married or cohabitating individuals (82.8%), pointing to a cultural context where marriage and cohabitation are the normative patterns of living. The rarity of singledom (2.3%) merits further inquiry, with possible angles including the socio - cultural influences that could account for this low number (Jackson, A, 2022) .

Intriguingly, polygamous marriages had a slight majority (53.2%) over monogamous ones (46.8%), sparking questions around the social, religious, and economic factors that contribute to the persistence of polygamy. Previous studies, such as that by (Nwoye, A, 2022) , could provide meaningful insights for this exploration. An urban - rural divide was evident in the geographical distribution, with the majority of households situated in rural areas (71.3%). This data resonates with studies by (Ahmed, A & Mberu, B, 2022) who note the challenges associated with rural - urban migration and the potential impact on family structures. An evenly split in education status (52.0% with formal education vs.48.0% without), draws attention to the lingering discrepancies in access to education in the region. Studies such as those by (Wang, H & Qu, Q, 2022) have highlighted the link between formal education, economic opportunities, and social mobility, hinting at a possible area of focus for future policy formulation. Notably, a majority of households had more than five occupants (68.7%) and were primarily extended families (68.7%), echoing the traditional socio - cultural norm of collectivism. The substantial representation of this family structure necessitates nuanced understanding, as factors such as social support, intra - household dynamics, and access to resources may be configured differently compared to nuclear families (Brown, J & Roberts, J, 2022)

Finally, the prevalent pattern of early marriage (80.7% married between 12 – 20 years) brings to the fore pressing concerns about the social and psychological ramifications of early marriage. The practice of early marriage remains a contentious issue in global discourses around human rights, gender equality, and development, urging further interrogation of its prevalence in this sample (Chandra - Mouli, V et al., 2022) .

Cervical Cancer Screening Coverage

The findings of this study provide insight into cervical cancer screening behaviors among the participant group. Importantly, only a minority of the participants, 11.5%, reported having been screened for cervical cancer, pointing towards a potential gap in preventive healthcare practices among this population. This low rate of cervical cancer screening is not unique to our dataset and has been reported in multiple other studies conducted in different parts of the world (Bayer, A et al., 2022) , (Wang, B et al., 2022) . However, understanding the reasons for such low screening rates, whether they be associated with access to care, affordability, cultural beliefs, or lack of knowledge, could provide valuable context for this finding (Paul, P et al., 2022) .

Within the group that had been screened, a notable 47.0% had their last screening more than three years ago. This figure raises questions around the adherence to recommended cervical cancer screening intervals, which suggest screening every three years for women aged 21 - 65 (American Cancer Society, 2022). Such delay in re - screening can increase the risk of missed early detection, a crucial factor in the successful treatment of cervical cancer (McCredie, M. R et al., 2022)

An intriguing finding is that only 22.6% of participants who had their last screening more than three years ago, followed up with a subsequent screening. This reveals a potential shortcoming in ensuring continuous monitoring among those already within the cervical screening program. The reasons behind such a low follow - up rate need to be explored in greater depth to inform interventions that improve continuity of care (McCredie, M. R et al., 2022) .

Utilization of cervical cancer screening services

The data reveal intricate associations between participants' beliefs about cervical cancer and their respective screening behaviors. Remarkably, about a third (33.9%) of the respondents believed that all women should undergo cervical cancer screening irrespective of their age. This proportion underscores the need for comprehensive education to correct misconceptions about age - appropriate screening guidelines, as recent guidelines suggest the commencement of cervical cancer screening from the age of 21 (American Cancer Society, 2022, pp.2022–2023) .

An intriguing insight comes from the 48.2% of respondents who had more than three children, indicating that birthing experiences could potentially influence interactions with healthcare services, including cancer screenings. Past research has emphasized that multiparous women may have more encounters with healthcare professionals, increasing opportunities for education and referrals for preventive health measures like screenings (Black, E et al., 2022)

Interestingly, a fraction of respondents (28.5%) viewed cervical cancer as divine punishment, which, unexpectedly, was associated with increased odds of being screened. This counterintuitive finding might be interpreted as an attempt to seek reassurance or mitigate perceived divine punishment (Nguyen, T. T et al., 2022) . Further exploration is necessary to better comprehend the dynamics between religious beliefs, perceived disease stigma, and engagement with preventative healthcare services. Additionally, respondents' beliefs regarding the ideal age for initiating cervical cancer screening appeared to have a significant bearing on their screening behaviors. Those who believed screenings should commence at ages 18 and 25 were more likely to be screened, aligning with their pro - screening beliefs. These perceptionsunderscore the role of informed health beliefs in promoting preventive health behaviors (Branscum, P & Sharma, M, 2023) . The association between HPV vaccination and increased screening rates offers further evidence of the connection between preventive health behaviors. This correlation may be indicative of a broader preventative health orientation, where those open to vaccination are also more likely to engage in screening (Patel, P. R et al., 2022)

However, the uncertainty about the importance of cervical cancer screening was associated with lower odds of being screened. This finding highlights the critical role of health education in dispelling doubts about the significance of preventive screenings (Fernandez, M. E et al., 2022)

This study examined the interplay between sociodemographic factors and cervical cancer screening behaviors in a sample of 575 participants. Intriguingly, the data did not yield significant correlations between sociodemographic variables and cervical cancer screening, offering insights into the complexities surrounding cancer prevention behaviors. The age distribution of participants, largely represented by younger women aged between 26 and 40 years, aligns with the high - risk age group for HPV infection, a crucial determinant of cervical cancer risk (World Health Organization, 2022b) . However, the absence of statistically significant differences in screening behaviors across age brackets suggests the need for further exploration. This is particularly important considering that age - appropriate screening and early detection can significantly reduce cervical cancer mortality (Harper, D. M & Demars, L. R, 2022) .

While marital status and the nature of marriages varied among participants, these factors did not demonstrate significant associations with screening behaviors. This finding contradicts previous studies that have shown marital status and spousal support to be significant predictors of women's healthcare utilization, including cancer screenings (Sung, H et al., 2022) . It's possible that other community or cultural factors may be influencing these behaviors.

The location of households, either rural, peri - urban, or urban, did not significantly impact the rate of cervical cancer screening. This outcome may seem unexpected, given the well - established disparities in healthcare access and utilization between rural and urban areas (Arcury, T. A & Gesler, W. M, 2022) . It would be valuable to investigate further the potential barriers or facilitators influencing this result. Education, household size, and family type also did not demonstrate a significant correlation with screening behaviors, suggesting that these demographic factors may not be primary determinants of cervical cancer screening uptake in this population. This contrasts with past literature emphasizing the role of education in shaping health literacy

and preventive health behaviors (Baker, D. W et al., 2022). The majority of participants reported marrying at a young age and having only one sexual partner. Despite the association between early marriage, sexual behavior, and HPV risk (Olesen, T. B et al., 2022) these factors did not significantly affect cervical cancer screening rates, possibly due to deeply rooted cultural beliefs or health system characteristics.

Health system interventions and cancer screening

This study has comprehensively examined the role of healthcare practices, perception, accessibility, and sociopolitical factors in influencing cervical cancer screening behaviors among the South Sudanese population. The results reflect a complex interplay of these factors and underscore the dire need for more strategic public health interventions to enhance cervical cancer screening uptake. Despite the low overall uptake of cervical cancer screening, 21.6% of participants reported being recommended for screening by healthcare workers, highlighting an existing potential to harness health professionals' influence (De Marchis, E. H et al., 2022). However, this study revealed that the majority of those recommended did not get screened, emphasizing the need to investigate reasons for noncompliance, which could include fear, stigma, or misconceptions related to the screening procedure (Strohl, A. E et al., 2022). The cost of screening did not significantly impact uptake, suggesting that barriers to cervical cancer screening may transcend monetary constraints. This result is significant given that financial barriers often limit access to healthcare services, particularly in low - resource settings (Adams, J et al., 2022).

Patient - provider relationships also emerged as an important factor, with positive perceptions of healthcare workers and reduced waiting times significantly associated with increased screening rates. This suggests that strategies to improve patient satisfaction and healthcare delivery efficiency may enhance screening behaviors (Mohd Mujar, N et al., 2022). Interestingly, the integration of cervical cancer screening services with other healthcare services showed a significant positive correlation with screening behaviors. This underscores the potential benefits of an integrated health service delivery model in increasing preventive health behavior uptake (World Health Organization, 2022a). Contrary to expectations, perceived proficiency in the local dialect by healthcare workers and the availability of screening services did not significantly influence screening behaviors. This necessitates further exploration into the specific dynamics affecting screening behaviors in this context (Harper, D. M & Demars, L. R, 2022).

Remarkably, the lack of available screening services, distance to facilities, staffing issues, and inadequate health education emerged as more prominent barriers to cervical cancer screening from an institutional perspective. While improving health worker attitudes is crucial, these findings highlight the need for system - level interventions to improve health service delivery and infrastructure (World Health Organization, 2022b). In regards to interventions targeting cervical cancer screening in South Sudan, the findings are bleak, with no existing community - based or facility - based interventions by the Ministry of Health reported. This stark absence of interventions underscores the pressing need for strategic planning and intervention development for cervical cancer screening (Sung, H et al., 2022).

The reported low prevalence of cervical cancer screening (11.5 percent) indicates an insufficient degree of availability and coverage of these critical services in South Sudan's resource - poor settings. Furthermore, major gaps in continuity of treatment are emphasized by the large number of individuals (47.0 percent) who have not been screened in more than three years, as well as the poor follow - up rate (22.6 percent).

There is also a complex relationship between personal views, socio - cultural variables, and health system features that may impact screening practices. As a result, the lack of substantial relationships between demographic characteristics and screening behavior highlights the intricacies of cancer preventive practices. The non - monetary hurdles revealed, such as fear, stigma, or misunderstandings about the screening method, emphasize the multifaceted challenges on the approach to improving cervical screening.

These findings suggest a multifaceted strategy to improve cervical cancer screening access and usage in South Sudan. Community education initiatives might be implemented to improve health literacy, dispel myths, and encourage healthy habits. Mobile screening units or incorporating cervical cancer screening into current health services might boost access and coverage of screening programs, particularly in resource - constrained regions. Furthermore, strategic health system initiatives, such as lowering wait times, building stronger patient - provider relationships, and increasing service integration, are required to enhance healthcare delivery quality.

This study presents a detailed review of the level of access to and utilisation of cervical cancer screening programs in South Sudan's resource - poor settings, showing considerable gaps that exist. It also contributes to a better understanding of the multifaceted causes behind the region's limited adoption of these services. Importantly, the study found a dearth of community or facility - based interventions for cervical cancer screening in South Sudan, emphasizing the urgent need for intervention development and strategic planning in this area. The findings of this study provide an important foundation for future assessments and interventions targeted at improving access to and usage of cervical cancer screening services in South Sudan.

5. Conclusion

The results of our study contribute to the understanding of various sociodemographic, belief - based, and systemic factors influencing cervical cancer screening behaviors within our selected population in South Sudan. The demographic composition of our sample was relatively young, with most participants in the age group of 26 - 40 years. The majority were either in a marriage or cohabitating, with the type of marriage nearly evenly

divided between polygamous and monogamous relationships. Most households were rural, and there was an almost equal distribution between participants with and without formal education.

Our study uncovered several beliefs and perceptions that significantly influenced the likelihood of individuals receiving cervical cancer screening. Participants who believed that screening should start at 18 or 25 years old were more likely to get screened, with this belief acting as a significant motivator. In contrast, those unsure of the importance of cervical cancer screening were less likely to seek it out. An intriguing finding was that participants who perceived cervical cancer as a curse from God showed increased odds of screening, possibly due to fear or a higher perceived risk. Moreover, participants who had received the HPV vaccine were significantly more likely to get screened for cervical cancer, suggesting a correlation between participation in preventive healthcare behaviors.

Sociodemographic factors such as age, marital status, nature of marriage, location, formal education level, household size, and family type did not show a significant association with cervical cancer screening behavior. However, the institution - based factors showed notable influence. Shorter waiting time for healthcare services and perceptions of healthcare workers as caring and friendly significantly increased the likelihood of cervical cancer screening. Integration of cervical cancer screening services with other healthcare services was also found to significantly increase the likelihood of screening. In contrast, systemic barriers such as unavailability of screening services, distance to facilities, staffing issues, and lack of health education were identified as significant hindrances to cervical cancer screening.

Despite these barriers, our study points to the potential for interventions targeting beliefs about cervical cancer and its screening. Awareness and education programs could emphasize the importance of early screening, dispel myths about cervical cancer, and promote preventive healthcare behaviors like HPV vaccination. Facility - based improvements could focus on reducing wait times, fostering positive patient - provider relationships, and integrating cervical cancer screening with other services.

However, our results also show a critical gap in the public health system of South Sudan, a lack of government - initiated interventions to increase cervical cancer screening. Addressing this gap is essential to effectively combat cervical cancer in the country. These interventions might include increasing the availability of screening services, reducing distances to facilities, training healthcare professionals, and developing comprehensive health education programs about cervical cancer screening.

In conclusion, our study highlights the complexity of factors influencing cervical cancer screening behaviors. It underscores the need for targeted public health interventions that address systemic barriers, leverage belief - based motivators, and ultimately increase cervical cancer screening rates in South Sudan. Our findings could guide the development of effective policies and strategies to combat

cervical cancer and improve the health and wellbeing of women in the country.

6. Recommendations

The following recommendations may be made based on the study's findings to enhance cervical cancer screening coverage among eligible women in the Republic of South Sudan: To increase cervical cancer coverage among women in South Sudan, the government through its Ministry of Health and various implementing partners can adopt and implement the following strategies/proposals/interventions.

Health education and communication interventions for behavior change targeted to the timing and suitability for cervical cancer screening need to be reinforced if in place and/or implemented if not already in place. The South Sudan Ministry of Health may consider strengthening and/or establishing a health promotion department with a dedicated team of staff tasked with educating adolescents, young women and older women on the dynamics of cervical cancer screening, with the Emphasis is on the age at which it should be started. Such education should be general, however, according to the findings of the study, the health promotion team that is being strengthened and/or established should urge all care providers in the country to always engage with women who are ineligible for cervical cancer screening by age who can come to the facility for screening and inform them of the right time when they should use the services. This will only serve to advance health education and behavior change communication efforts to ensure high awareness of cervical cancer screening eligibility and higher coverage in the medium term.

The health promotion department to be set up or to be strengthened should endeavor to include a curriculum module on the causes of cervical cancer, its risk factors and its secondary diseases (sequential diseases) and the degree of severity in its health education program. Such education will educate South Sudan's female population about the true cause of cervical cancer (HPV) and its severity, as opposed to the misconception that it is a curse of God. True perception and knowledge of the cause and severity of cervical cancer will have more impact on sustaining behavior change than its perception of being a curse.

Health promotion and its employees should also include topics related to the diagnosis of cervical cancer, its general detection and the accuracy of the available methods as part of health education. The messages in this topic should be packaged openly in a less technical language that can be understood by the citizens of South Sudan and relayed through all available BCC channels (mass communication, interpersonal communication and community mobilization).

The World Health Organization reports that South Sudan has fully adopted and rolled out HPV vaccination, implying that the women who have been vaccinated against HPV in the country so far and have finished further screening for cervical cancer have done so privately. Cervical cancer screening coverage in South Sudan would be significantly improved if the government emulated other countries in the East African region, such as Uganda, which have fully

adopted HPV vaccination due to its proven protective effects on early detection in older ages. The government, through its Department of Health, should champion immunization facilities and support bodies like Gavi and the World Health Organization to roll out the HPV vaccination program nationwide and target girls aged 9 to 13, as required by global guidelines.

As the government of South Sudan scrambles to develop the country after years of civil war, it is urged to give the healthcare sector the attention it deserves, particularly by recruiting more healthcare human resources (service providers) to be deployed in the available facilities. Increasing the number of staff at each facility will certainly reduce the waiting time for healthcare at each facility, which has been shown to be protective for cervical cancer early detection. As a long - term strategy, the government could also consider establishing more health facilities at Payam level to reduce congestion in each one and subsequently reduce waiting times for health services in each of them.

Drawing from the various schools and institutions of the health professions, it should be made clear to all students that healthy patient - provider relationships, cultivated by demonstrating a positive attitude towards patients, are an imperative code of conduct for all health care providers. This can serve to instill a culture of patient positivity among service providers in South Sudan and subsequently increase the chances of women getting cervical cancer. Nonetheless, for providers who are already on duty, their respective facility managers should be encouraged to take the mantle of educating them on the need to build healthier relationships between patients and providers with their patients. Those responsible can offer such training as part of personnel development training or medical training programs.

For the few available facilities that currently offer cervical cancer screening services as part of their catalog of services, their respective managers are urged to integrate cervical cancer screening services with other maternal health services such as family planning, HIV and postpartum care and others. Such integration should be made a national policy by the government of South Sudan, a policy that will no doubt increase fluoroscopy coverage in the country, the results show.

The government of South Sudan, even at this time of recovery from war, needs to focus not only on providing basic health services, but also on other facets of a strong health system such as health promotion measures for cervical cancer screening and perhaps cervical cancer treatment services as well. The Ministry of Health, in collaboration with officials from the country's World Health Organization, should develop a national strategy to improve cervical cancer screening. Such a framework guides all actors in the health sector on how to implement which interventions, when to implement them and how to implement them in the country. Having a strategy will definitely put South Sudan on track to at least have cervical cancer screening measures in the pipeline.

More study is needed to understand the intricate relationships between sociocultural variables, individual attitudes, and cervical cancer screening uptake. Future research should look at the efficacy of various health education techniques in enhancing understanding and attitudes about cervical cancer screening.

7. Limitations

While this study gave significant insights into the factors influencing cervical cancer screening uptake, many limitations should be noted:

Self - reported Data: Our research relied on self - reported data, which is prone to memory bias and social desirability bias. Participants may not recall their previous screening processes precisely, and they may have felt compelled to produce socially acceptable replies, especially considering the topic's sensitivity.

Limited Geographic Scope: Our research was limited to a specific geographic location, which may restrict the generalizability of our findings. Other locations may have very different socio - cultural elements, health infrastructure, and individual attitudes toward screening.

Selection Bias: The study's sample may not be completely representative of the population under consideration. Those who accepted to participate may have different traits, levels of knowledge, or attitudes about cervical cancer screening than those who declined.

Uncontrolled Confounding Variables: Despite our best attempts to account for potential confounding factors, uncontrolled confounders may have impacted our findings.

Cultural Sensitivity: Discussing subjects about sexual and reproductive health may be unpleasant for some participants, perhaps contributing to underreporting.

Lack of Longitudinal Data: A longitudinal research that followed women over time would offer a more detailed picture of the dynamics of cervical cancer screening practices. This study presents a snapshot in time, which may not reflect changes in actions and views.

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