A Comprehensive Assessment of Interventions in Women Cervical Cancer Screening in South Sudan

ABSTRACT

Introduction: The substantial impact of cervical cancer, particularly in low-resource environments like South Sudan, underscores the urgent need for preventive solutions, as access remains sparse. Contemporary treatment options while accessible, bring about severe side effects without greatly extending disease-free survival, emphasizing the importance of preventive screening, especially for adult women. The glaring absence of screening leads to women potentially suffering from progressed cervical cancer, a grim reality in South Sudan that contributes to around 12% of the female disease burden. Consequently, it is vital to examine the reach, associated elements, and health system initiatives aimed at cervical cancer screening in this region. This study intended to conduct an in-depth analysis of South Sudan's health system with a focus on understanding and evaluating the current interventions in place for cervical cancer screening among women.

Methods: The research was based on a community-oriented cross-sectional survey aimed at evaluating cervical cancer screening habits among women of childbearing age in five South Sudanese counties. The participants were women aged 26-65 years, with 575 samples in total. A four-stage random sampling procedure was followed in each stratum, focusing on half the Payams per county. Structured interviews were utilized for primary data collection, supplemented by key informant discussions for qualitative data. Descriptive statistics and log-binomial regression models were used for data analysis. The study was conducted in Torit, Magwi, Terekeka, Raja, and Aweil North, targeting women of reproductive age due to their HPV infection risk.

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 the institutional level to increase screening rates. These findings suggest the need for targeted interventions to improve access to screening services and strengthen health systems to increase cervical cancer screening coverage in South Sudan.

Keywords: Cervical Cancer, Cervical Cancer Screening, South Sudan, Low- and medium-Income Countries, Health Systems.

1. INTRODUCTION

Cervical cancer persists as a significant global health concern due to a high proportion of fatalities, over 90%, occurring in low and middle-income countries (LMICs) where the provision of adequate screening programs and effective treatment options is typically insufficient [1] Enhanced cervical cancer screening methods, primarily high-risk HPV testing, have made substantial strides in recent years [1]. Nevertheless, many global regions continue to grapple with substantial barriers to broad coverage and accessibility of cervical cancer screening.

Notably, implementation of robust cervical cancer screening programs in LMICs is frequently hampered by a lack of skilled professionals, scarce resources, and inadequate infrastructure [2,3]; [4] Socio-cultural factors like ignorance and stigma further exacerbate inadequate cervical cancer screening [5]. To mitigate these challenges and enhance the reach and coverage of cervical cancer screening in LMICs, various technological advancements and initiatives have been undertaken. For instance, neighborhood-based cervical cancer screening initiatives in South Africa's low-income regions have reportedly improved screening rates significantly [6]

Cancer continues to be a leading cause of preventable death worldwide, causing around 10 million deaths annually [7,1]. Cervical cancer, in particular, is a significant health concern with a global incidence of around 604,000 cases annually and a mortality rate of 57% (342,000) [8] Torres-Roman et al., 2022). Regular screening, such as cytology every three years or HPV DNA testing every five years, is vital to reducing cervical cancer mortality rates [2,9]. Despite advancements like behavior change communication and the development of HPV self-sampling methods, the rate of early detection remains particularly low in Africa, where cervical cancer is the second most common cancer, accounting for 11.3% of the national cancer burden in South Sudan [10]; [1]

Cervical cancer poses a significant public health challenge in South Sudan due to the high disease burden and limited access to screening services [11] Despite available effective screening methods, the coverage rates are low, and multiple factors inhibit the establishment of efficient screening programs. These include limited health infrastructure, insufficient resources, low health literacy, and prevailing cultural beliefs and practices [12] [11]

To address these issues, this study aims to map and evaluate South Sudan's health system interventions that target women for cervical cancer screening. This research will explore the extent and effectiveness of the coverage and accessibility of cervical cancer screening in South Sudan, and it will assess the health system interventions that seek to promote it. Understanding these determinants will guide recommendations for system reforms that could enhance the performance of screening programs in the region. By applying the study's findings to devise evidence-based strategies, we aim to dismantle the barriers to successful cervical cancer screening programs, ultimately improving the prognosis for women at risk of developing cervical cancer in South Sudan.

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS/METHODOLOGY

Research Design

A mixed-methods research design was employed, aligning with a pragmatic research philosophy. This approach allowed the combination of quantitative and qualitative data to deliver comprehensive insights. The research integrated both an explanatory sequential strategy and a concurrent approach.

Study Area and Period

The investigation was conducted in five counties of South Sudan, specifically Torit, Magwi, Terekeka, Raja, and Aweil North.

Study Population and Sample Size

The research focused on women of reproductive age in South Sudan, with a particular emphasis on those between the ages of 26 and 65 years, as defined by current screening guidelines (American Cancer Society (ACS), 2020); (World Health Organization, 2021); (ACOG, 2021).

For the qualitative aspect of the study, women of reproductive age who did not participate in the quantitative research and health system leaders from South Sudan were included. The number of key informants and in-depth interviews required for the study was decreased according to the principle of data saturation. A total of 17 key informants were interviewed, but responses from 16 were included due to significant overlap.

The required sample size for the quantitative portion of the research was calculated using a formula proposed by Robert V. Krejcie & Daryle W. Morgan, 1970. After adjusting for the design effect and non-response rate, the final sample size comprised 575 women.

Sampling Procedure

The study was community-based, helping to prevent bias that might occur from sampling women only from healthcare settings. The selection of participants for the qualitative study was purposive, focusing on women who did not participate in the quantitative section, and key informants from South Sudan's healthcare system.

Data Collection

Data collection was carried out via structured interviews, where respondents were asked a series of closed-ended questions. These interviews enabled the collection of narrow and quantifiable data for the quantitative part of the study.

Data Analysis

For the quantitative analysis, the data were analyzed using SPSS Version 25. Descriptive statistics were employed to analyze demographics, cervical cancer screening, intrapersonal, and institutional characteristics. The multivariate level was adjusted for confounders and identified factors associated with cervical cancer screening using a significance level of $p < 0.05$.

For the qualitative analysis, the researchers utilized a thematic analysis approach to examine institutional factors that influence cervical cancer screening services provision in South Sudan. Emerging themes were developed by clustering responses with similar meanings and were assigned to predetermined topics.

3. RESULTS AND DISCUSSION

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). 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 (Table 1).

Variable	Category	Frequency	%	Variance	95% Credible Interval	
					Lower Bound	Upper Bound
Age						
	26 – 40	417	72.5			
	41 - 55 years	146	25.4	0.000	1.2546	1.3367
	More than 55 years	12	2.1			
	Total	**575**	**100.0**			
Marital status						
	Married / cohabiting	476	82.8			
	Single	13	2.3	0.003	1.44	1.65
	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			
	Peri-Urban	84	14.6	0.001	1.37	1.49
	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			
	21 – 29	101	17.6	0.000	1.1736	1.2472
	30 – 38	10	1.7			
	Total	**575**	**100.0**			

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

Cancer Screening

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 (Table 2).

Variable	Category	Frequency	%	Variance	95% Credible Interval	
					Lower Bound	Upper Bound
Ever screened for Cervical Cancer						
	Yes	66	11.5	0.000	1.86	1.91
	No	509	88.5			
	Total	**575**	**100.0**			
Duration since screening was done						

	Less than 3 years	17	25.8			
	Three years	18	27.3	0.011	2.00	2.42
	More than three years	31	47.0			
	Total	**66**	**100.0**			
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**	**100.0**			

Table 2: Cervical Cancer Screening

The 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).

Number	Age	Position in South Sudan health system	Marital status	Duration of working in the 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

Table 3: Socio-demographic profiles of the key informants

The study looked at whether health workers recommended 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, and 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 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). ParParticipantstings 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 locations 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 times, caring attitudes of healhealthcarekers, and service integration proved to be important predictors of cervical cancer screening (Table 4).

Variable	n	%	Cervical cancer screening		cPR (95% CI)	P value	Apr (95% CI)	P value
			Screened [66]	Not screened [509]				
Healthcare workers 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 the area are 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 the 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 the 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			

Table 4: Institutional factors associated with Cervical Cancer Screening among eligible women in the Republic South Sudan.

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 4. 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 the 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

Regarding 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 in 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 pipeline

Key informants were also asked about the possibility of the South Sudanese government implementing any interventions shortly 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 of the Health Ministry or its partners had any plans to increase cervical cancer screening coverage (KII 13).

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[13]. However, the minor proportion of older participants (2.1% above 55 years) underscores the need for a more comprehensive gerontological examination, as postulated by [14].

The marital landscape was largely dominated by married or cohabitating individuals (82.8%), pointing to a cultural context where marriage and cohabitation were the normative patterns of living. The rarity of singledom (2.3%) merits further inquiry, with possible angles including the sociocultural influences that could account for this low number of [15]

Intriguingly, polygamous marriages had a slight majority (53.2%) over monogamous ones (46.8%), sparking questions about 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 [16] 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 [17] 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[14]. 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 [18].

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 [19], [20]. 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 [21].

Within the group that had been screened, a notable 47.0% had their last screening more than three years ago. This figure raises questions about adherence to recommended cervical cancer screening intervals, which suggest screening every three years for women aged 21-65 [22]. Such a delay in re-screening can increase the risk of missed early detection, a crucial factor in the successful treatment of cervical cancer [23].

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 [23].

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 [24]. 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[25]. 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[26].
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[27]. 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 [28]. 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 [29].

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 [30]. 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[31].
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 the continuity of treatment are emphasized by a 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).

4. CONCLUSION

The study 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.

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Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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