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Original Research

Cervical Cancer Screening among Somali Women: A Cross-Sectional Study Using the Health Belief Model

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Abstract

Background: Cervical cancer remains one of the most common cancers and a leading cause of cancer-related mortality among women in developing countries. Screening can detect cervical cancer at an early stage, and early diagnosis significantly improves the chances of successful treatment; however, uptake remains low in Somalia. We examined the perceptions and beliefs of Somali women regarding cervical cancer screening. This study contributes to the existing literature by identifying key determinants of cervical cancer screening uptake in Somalia. **Method**: This descriptive cross-sectional study was conducted in Mogadishu and involved a sample of 238 women. Participants' demographic data, perceptions, and beliefs regarding cervical cancer screening were evaluated using a demographic questionnaire, the Health Belief Model Scale for cervical cancer, and the Pap smear test results. Data were analyzed using SPSS (version 21). **Results**: The mean age of the study participants was 28.94 $\pm$ 8.35 years (18–59). Only 14.3% of the women had undergone cervical cancer screening, and 5.5% had received vaccination against human papillomavirus (HPV) at the time of the study. Most women demonstrated insufficient knowledge of cervical cancer, screening methods, and HPV vaccination. Perceived susceptibility was significantly associated with women who had undergone a Pap smear test within the past 5 years ($p < 0.05$). Perceived seriousness and barriers were significantly associated with a personal history of cervical cancer. Additionally, perceived seriousness and benefits were significantly associated with having a relative diagnosed with cervical cancer. Perceived susceptibility was significantly associated with having undergone a Pap smear test within the last 5 years ($p < 0.05$). Additionally, a history of cervical cancer was significantly associated with the uptake of the Pap smear test (odds ratio [OR]: 5.38; 95% confidence interval [CI]: 2.266–12.806). **Conclusions**: Women's knowledge, health beliefs, and a history of cervical cancer were significant predictors of cervical cancer screening participation. A multifaceted and holistic approach-addressing healthcare system, individual, community, and structural levels—is required to increase cervical cancer screening uptake in Somalia. Considering the high prevalence of cervical cancer in Somalia, this study recommends implementing targeted strategies to increase cervical cancer screening and HPV vaccination among women.

Keywords: health belief model; cervical cancer; cervical cancer screening; Somalian women

1. Introduction

Cervical cancer is a major public health problem owing to its high mortality and morbidity [1]. According to the World Health Organization (WHO), cervical cancer is the fourth most common cancer in women worldwide, with approximately 660,000 new cases and 350,000 deaths predicted by 2022 [1]. The incidence and mortality rates of cervical cancer are the highest in low- and middle-income countries [1]. Sub-Saharan Africa has the highest incidence of cervical cancer worldwide. This situation is exacerbated by the region's high HIV prevalence, early sexuality, high rates of unprotected sex, sexually transmitted infections, and inadequate sexual and reproductive health education for young women [2]. The lack of access to national human papillomavirus (HPV) vaccination, cervical screening, treatment services, and social and economic factors also contribute to these inequalities [1]. Somalia is an African country with the greatest need for improvement in health indicators. In Somalia, the incidence of cervical cancer was 13.2 in 100,000 women (2020); the number of cervical cancer deaths in 2019 was 880 [3].

Screening tests can usually detect cervical cancer in its early stages, and early diagnosis increases the chances of being cured [4]. Cervical cancer screening significantly reduces mortality and morbidity in previous studies [4–6]. HPV vaccination and cervical cancer screening can be used together to prevent cervical cancer [7]. The cervical cancer screening program includes Pap smear and HPV DNA tests [8]. Although some communities have undergone cervical screening programs, participation is limited [9,10]. The screening rates for Somali women are also very low compared with those reported in other countries [5,6,11]. Al-

though cervical cancer is one of the most common cancers in Somalia, there are no community-based screening or vaccination programs in the country [12].

Interviews with health workers in Somalia revealed that screening is carried out in hospitals for a fee that many Somali women cannot afford. Although this is the most important reason why Somali women are not screened, there are some social and individual reasons. When the reasons for cervical cancer screening among Somali immigrant women were analyzed, the most common reasons included a lack of familiarity with the tests and concepts used in cancer screening, limited knowledge about cancer screening, language barriers, fear of testing, shame, lack of trust in the health system, religious attitudes and fatalism [5,6,11,13]. However, the reasons for the lack of screening among women living in Somalia differ. Specifically, several irregularities in the Somali healthcare system prevent women from having access to screening. These reasons include technical problems such as electricity in health services, high cost of health services, and mistrust of the healthcare system [14]. Furthermore, the ongoing war has seriously damaged the structure of the country's health system, making it difficult for people living in the country to access healthcare services [14]. Low screening rates among women are also suggested by the lack of cervical cancer screening programs and widespread vaccination programs in the country. Research on the risk factors for cervical cancer among women and the emotional, cognitive, and environmental aspects of screening that affect Somali women is needed.

The 'Health Belief Model' (HBM) is used to examine why some individuals practice health protection and promotion behaviors, whereas others participate in disease prevention and screening program at a limited level [15]. HBM is a framework for motivating people to engage in positive health-related behaviors that avoid negative health outcomes, with negative health outcomes being the primary motivator [15]. This model has five components: perceived seriousness, susceptibility, benefit/motivation, health motivation, and perceived barriers [16–19]. To predict future actions, the HBM focuses on a person's health-related behaviors. HBM has been tested and applied to research on women in many cultures [16–19].

The Director-General of the WHO called for global action to implement a triple-response strategy to reduce cervical cancer by 2018, known as the 90-70-90 target. The first is to vaccinate 90% of all girls by the age of 15 years; the second is to screen 70% of women twice between the ages of 35 and 45 years; and the third is to treat at least 90% of all precancerous and cancerous lesions detected by screening [20]. It is important for each country to define its own strategies to achieve these goals. The level of knowledge and screening behaviors of Somali women regarding cervical cancer screening and the level of knowledge and reasons for not receiving the HPV vaccine were generally assessed in Somali immigrant women [5,6,11,13]. Little is known about why Somali women are not yet screened for cervical cancer [14]. Limited research has been conducted on women's health beliefs about cervical cancer in Somalia. This study aimed to describe the perceptions and beliefs concerning cervical cancer and screening among women attending the gynecology and obstetrics clinic in Mogadishu district, Somalia, and to determine the associations between their beliefs and the use of Pap smears. This study aims to fill these gaps in the existing knowledge. It is also expected to contribute to action plans to reduce the incidence of cervical cancer in the African Region, which are included in global health targets and guide the development of national and international health policies [21].

2. Methods

2.1 Study Design and Participants

This cross-sectional study was conducted at the Somalia Mogadishu Recep Tayyip Erdoğan Training and Research Hospital Gynecology and Obstetrics Clinic from 1 April to June 30, 2024. The population of the study consisted of 1652 patients who were registered at the Gynecology and Obstetrics Clinic between the days of the study. The required sample size was calculated as 232 women (calculated at http://www.raosoft.com/samplesize.html). The student who answered the questionnaire allowed the level of knowledge to be estimated with a confidence level of 90%. The study sample consisted of 238 women selected by the convenience sampling method from among the individuals who visited the Gynecology and Obstetrics Clinic and agreed to participate in the study. The study included eligible participants who fulfilled the following criteria: women aged 18–65 years, married or divorced, and had cognitive competence. Individuals who did not want to participate in the study and single women were excluded for cultural reasons. This study was approved by the Somalia Mogadishu Recep Tayyip Erdogan Research and Training Hospital Scientific Research Ethics Committee (document date and number: 30.03.2024/MSTH/17690). Informed consent was obtained from the participants who agreed to participate in the study and were identified and informed about the study. The principles of the Declaration of Helsinki were strictly followed to protect the rights of participants.

2.2 Data Collection

The questionnaires were collected by a Somalian researcher (FHT). This researcher is also an academician in Somalia Mogadishu Recep Tayyip Erdoğan, Faculty of Health Sciences in Mogadishu. The researcher is a Turkish and Somali speaker. The questionnaires were prepared in Turkish and translated into Somali. The Turkish questionnaire was translated by two Somali academicians who are experts in Somali. The questions were then back-translated into Turkish by two independent academicians from Soma-

lia according to Beaton-recommended guidelines [22]. All academics were experts in their respective fields of expertise.

Before the main study, the authors piloted the questionnaire with 10 women to test its applicability and clarity and to identify any difficulties. Women who visited the hospital where the study was conducted were selected for the pilot study. The data for this study were collected by the Somali author (FHT) through face-to-face interviews with women who visited the Somalia Mogadishu Recep Tayyip Erdogan Research and Training Hospital Gynecology and Obstetrics Clinic. Women who agreed to participate in the study were interviewed in a quiet room at the clinic. The researcher read each question and answered the questionnaire aloud to the participants. Participants were asked to choose the correct answer. Each answer given by the participant was marked by the researcher, who took ~20–30 min to complete the questionnaire. Women who participated in the pilot study were excluded from the main study. The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) criteria for reporting the item checklist of qualitative studies were used as guides for reporting methods and findings [23].

2.3 Measurements

Data were collected using an interview form prepared by the researchers. The interview form comprised three sections. The first part included questions regarding the sociodemographic characteristics of the participants. Sociodemographic characteristics such as age, marital status, educational status, employment status, family type, income status, and place of residence. The second part included questions to describe the participants' cervical cancer history and screening status, as well as their perception of cervical cancer and screening. Cervical cancer history and screening status were evaluated using four questions: *'Have you had cervical cancer?'*, *'Has anyone close to you had cervical cancer?'*, *'Have you had a Pap smear test in the last five years?'*, and *'Have you been vaccinated against HPV?'*. The perception of cervical cancer and screening in women was evaluated using seven questions: *'Do you know about cervical cancer?'*, '*Can cervical cancer be the cause of abnormal bleeding (other than menstrual bleeding)?'*, *'Is it a sign of cancer if there is unusual and persistent vaginal discharge?'*, *'Could it be a sign of cervical cancer if your periods are heavier than normal and last longer than usual?'*, *'Could intermittent bleeding after menopause be a sign of cervical cancer?'*, *'Do you know why a Pap smear test is carried out?'*, and *'Do you know that the HPV vaccine is a protection against cervical cancer?'*. The third part assessed health beliefs related to cervical cancer screening using the HBM Scale for cervical cancer and Pap smear test. The HBM Scale for cervical cancer and the Pap smear test, developed by Victoria Champion for use in breast cancer screening (1985) [24], was adapted to the Turkish language for use in cervical cancer and screening by Güvenc *et al.* [18] in 2010, and validity and reliability studies were carried out. We used the Turkish version of the HBM (with the permission of the authors) translated by a Somalian researcher (FHT). The scale consists of 35 items and has five subscales. These subscales include perceptions of benefits for Pap smears (8 items), perceptions of barriers to Pap smears (14 items), perceptions of the importance and seriousness of cervical cancer (7 items), perceptions of susceptibility to cervical cancer (3 items) and perceptions of health motivation for patients with cervical cancer (3 items). The subscales of the scale were scored separately, and the total score was not calculated. The number of points used for scoring was equal to the number of dimensions used. The highest and lowest scores that can be achieved for the subscales are 8–40 points for the perceived benefits of undergoing cervical cancer screening, 14–70 points for the perceived barriers to cervical smear testing, 7–35 points for the perceived seriousness of cervical cancer, 3–15 points for the perceived susceptibility to cervical cancer, and 3–15 points for the perceived health motivation for cervical cancer. Higher scores indicate increased health motivation, susceptibility, and seriousness. Perception of barriers, one of the subscales, was negatively associated with cervical cancer screening behavior. All subscales showed positive responses related to screening behavior, except for barriers, which were negatively associated. In the original test, the Cronbach's alpha coefficients for the five subscales were between 0.62 and 0.86 [18]. In this study, Cronbach's alpha coefficient of 0.80 was observed for the five subscales.

2.4 Statistical Analyses

The data were summarized as means, standard deviations, medians, frequencies, and percentages using the Statistical Package for the Social Sciences (SPSS) version 21.0 (SPSS Corp., Armonk, NY, USA). Skewness and kurtosis values were used to assess the normal distribution of the data. The Mann-Whitney U test, Kruskal-Wallis analysis, Independent samples *t*-tests and analysis of variance (ANOVA) were used to examine the relationships between sociodemographic and obstetric characteristics, women's perceptions of cervical cancer and the HPV vaccine, and health beliefs. Binary logistic regression analysis was performed to assess the factors affecting cervical cancer screening. Statistical significance was evaluated using a two-tailed test, and $p < 0.05$ was considered significant.

3. Results

Overall, 238 women participated in this study. The mean and standard deviation of the age of the study participants were 28.94 $\pm$ 8.35 (18–59) years. The majority (62.2%) of the study participants were between 21 and 30 years of age. Most participants (61.8%) were married. With respect to the educational status of the study participants,

Table 1. Socio-demographic characteristics of participants (n = 238).

Variables	n (%)
Mean age ± *SD* (min–max), years	28.94 ± 8.35 (18–59)
Age, years (%)	
<20	22 (9.2)
21–30	148 (62.2)
31–40	38 (16)
>40	30 (12.6)
Marital status	
Married	147 (61.8)
Divorced/widow	91 (38.2)
Level of education	
Secondary school graduate and below	105 (44.1)
High school graduate and above	133 (55.9)
Employment status	
Yes	102 (42.9)
No	136 (57.1)
Family type	
Nuclear family	68 (28.6)
Extended family	139 (58.4)
Single family	31 (13)
Income status	
Poor	89 (37.4)
Fair	134 (56.3)
Good	15 (6.3)
Place of residence	
City	209 (87.8)
District/village	29 (12.2)

55.9% of the study participants had completed high school or above. Most of the participants (58.4%) lived in large families, 56.3% perceived their income level as fair, 87.8% lived in cities (Table 1).

Table 2 shows the cervical cancer history and screening status of the participants. The majority of women reported that they had never been diagnosed with cervical cancer (83.6%), had no relatives diagnosed with cervical cancer (64.7%), had not undergone a Pap smear test in the last five years (85.7%) and had not been vaccinated against HPV (94.5%) (Table 2).

Perceptions of cervical cancer and screening are shown in Table 3. In this study, over half of the women in the study had heard of cervical cancer (53.4%). Most women answered "no" or "don't know" to the questions about the symptoms of cervical cancer, Pap smear testing, and HPV vaccination (Table 3).

The mean scores on the Health Belief Model subscales of the women who participated in the study were evaluated. Although not included in the table the mean score of perceived seriousness was 6.68 ± 3.37, susceptibility was 20.01 ± 6.58, benefits of undergoing cervical cancer screening was 26.78 ± 8.1, health motivation was 10.18 ± 3.66 and, barriers were 38.97 ± 11.66.

Table 2. Participants' cervical cancer history and screening status (n = 238).

Questions	n (%)
Have you had cervical cancer?	
Yes	39 (16.4)
No	199 (83.6)
Has anyone close to you had cervical cancer?	
Yes	84 (35.3)
No	154 (64.7)
Have you had a Pap smear test in the last five years?	
Yes	34 (14.3)
No	204 (85.7)
Have you been vaccinated against HPV?	
Yes	13 (5.5)
No	225 (94.5)

HPV, human papillomavirus.

The relationships between the sociodemographic characteristics of the participants and HBM scale scores are presented in Table 4. Women aged 31 years and over were found to have a significantly higher perceived benefit in relation to cervical cancer than women aged 30 years and under. Women aged 31–40 also showed significantly higher perceived health motivation compared to those aged 21–30. The difference between the groups was statistically significant ($p < 0.05$). The mean perceived barrier subscale scores were higher for single women than for married women. The difference between the groups was statistically significant ($p < 0.05$). The mean perceived susceptibility subscale score of women with high school education and above was higher than that of women with secondary school education and/or women with less education.

When employment status and cervical cancer health beliefs were compared, the mean scores of the perceived health motivation sub-dimension of working women were higher than those of non-working women ($p < 0.05$). The mean scores for the 'benefits of undergoing cervical cancer screening' and 'health motivation' subscales were significantly higher for women in nuclear families than for women in big families and single women. Those with high-income status scored higher than those with medium-income status on the perceived seriousness subscale, and those with high- and low-income status scored higher than those with medium-income status on the perceived benefits of the cervical screening subscale, and the difference between them was significant. No significant differences were found in the other sociodemographic variables ($p > 0.05$) (Table 4).

The relationships between other variables and the HBM scale scores for the participants were compared and are shown in Table 5. The mean scores of women with cervical cancer on the perceived susceptibility and perceived barrier subscales were significantly higher than those of women without cervical cancer. Women who had a relative with cervical cancer scored higher on the subscales of per-

Table 3. Perception concerning cervical cancer and screening practices (n = 238).

Questions	n (%)
Have you ever heard of cervical cancer?	
Yes	127 (53.4)
No	111 (46.6)
Can cervical cancer be the cause of abnormal bleeding (other than menstrual bleeding)?	
Yes	52 (21.8)
No	103 (43.3)
Don't know	83 (34.9)
Is it a sign of cancer if there is unusual and persistent vaginal discharge?	
Yes	39 (16.4)
No	123 (51.7)
Don't know	76 (31.9)
Could it be a sign of cervical cancer if your periods are heavier than normal and last longer than usual?	
Yes	57 (23.9)
No	99 (41.6)
Don't know	82 (34.5)
Could intermittent bleeding after menopause be a sign of cervical cancer?	
Yes	59 (24.8)
No	76 (31.9)
Don't know	103 (43.3)
Do you know why a Pap smear test is carried out?	
Yes	88 (37)
No	150 (63)
Do you know that the HPV vaccine is a protection against cervical cancer?	
Yes	67 (28.2)
No	171 (71.8)

ceived seriousness and benefits of undergoing cervical cancer screening than did women who did not have a relative with cancer (Table 5). Women who underwent a smear test in the last five years had a significantly higher mean score on the perceived susceptibility subscale than those who did not. There was no significant difference between the mean scores of patients who had information on cervical cancer and those who did not (Table 5).

A comparison between having undergone a cervical smear test and having a history of cancer is presented in Table 6. The rate of uptake of Pap smear tests was higher among those with a history of cervical cancer in their family and themselves and the difference between them was significant. Table 7 presents the analysis of the effects of variables on Pap smear test uptake via binary logistic regression analysis. A history of cervical cancer was significantly associated with the uptake of the Pap smear test (odds ratio [OR]: 5.387; 95% confidence interval [CI]: 2.266–12.806).

4. Discussion

This study examined the relationship between the perceptions and beliefs regarding cervical cancer screening among Somali women. We discovered that Somalia women's sociodemographic characteristics, uptake of the Pap smear test, and history of cancer were effective in influencing their cervical cancer screening behaviours and their level of perception about cervical cancer. Furthermore, those who had a history of cancer in themselves or their family had more screening behaviours.

Among the women who participated in this study, 16.4% and 35.3% reported a history of cervical cancer themselves and their relatives, respectively. The incidence of cervical cancer in Somalia is 13.2/100,000 [12] and this rate is high compared to developed countries [1]. In this study, information on women's history of cervical cancer was obtained through self-reports. Sometimes, HPV positivity in women is perceived as cancer positivity [25]. Owing to the moderate specificity of the HPV test for the detection of cervical precancer [26], most HPV+ women will end up with an HPV+/triage-negative result requiring repeat screening within 12/18 months. Thus, infection with an oncogenic type of HPV can be detected, but positivity does not necessarily mean that the infection will cause cervical precancer or cancer, or that the woman will require treatment. Most HPV infections resolve naturally [27]. Women participating in this study may also have recognised HPV-positive results as cancer. In this context, nurses and physicians need to provide detailed information about HPV in Somali women. In this study, we found that the majority of women did not have Pap smear test and HPV vaccination. Similarly to this study, Salad *et al*. [28] concluded that almost all Somali immigrant women did not have information

Table 4. Relationships between sociodemographic characteristics and HBM scale scores for participants (n = 238).

Variables	Perceived susceptibility	Perceived seriousness	Perceived benefits	Perceived health motivation	Perceived barriers
Age, years (%)					
<20 (22) [a]	6.68 ± 3.75	18.04 ± 6.27	23.00 ± 8.25	10.27 ± 4.01	37.63 ± 13.06
21–30 (148) [b]	6.92 ± 3.54	20.09 ± 6.98	26.10 ± 8.76	9.77 ± 3.72	39.10 ± 12.51
31–40 (38) [c]	6.18 ± 2.50	19.81 ± 4.46	29.78 ± 6.13	11.68 ± 3.20	39.28 ± 8.41
>40 (30) [d]	5.93 ± 3.38	21.3 ± 6.91	29.16 ± 4.33	10.23 ± 3.33	38.93 ± 10.15
	H = 2.243	H = 3.546	H = 12.098	H = 8.601	H = 0.381
	$p = 0.523$	$p = 0.315$	$p = 0.007$	$p = 0.035$	$p = 0.944$
			c,d>a,b	c>b	
Marital status					
Married (147)	6.47 ± 3.19	19.82 ± 6.13	26.91 ± 8.32	9.97 ± 3.55	37.46 ± 11.17
Single (91)	7.75 ± 3.51	20.17 ± 6.67	25.00 ± 7.52	9.97 ± 3.99	43.29 ± 12.19
	Z = –0.731	Z = –0.608	Z = –0.605	Z = –1.272	Z = –2.717
	$p = 0.465$	$p = 0.543$	$p = 0.545$	$p = 0.203$	$p = 0.007$
Level of education					
Secondary school graduate and above (105)	5.99 ± 2.89	20.21 ± 7.2	26.60 ± 8.15	3.66 ± 0.35	37.87 ± 12.07
High school graduate and above (133)	7.18 ± 3.65	19.84 ± 6.06	26.93 ± 8.08	3.62 ± 0.31	39.84 ± 11.31
	Z = –2.222	Z = –0.348	Z = –1.142	Z = –2.296	Z = –1.209
	$p = 0.026$	$p = 0.728$	$p = 0.887$	$p = 0.022$	$p = 0.227$
Employment status					
Yes (102)	6.82 ± 3.43	20.49 ± 6.25	27.00 ± 7.75	10.73 ± 3.62	39.24 ± 10.98
No (136)	6.53 ± 3.35	19.65 ± 6.81	10.73 ± 3.62	9.77 ± 3.66	38.77 ± 12.19
	Z = 0.664	Z = –1.079	Z = –0.103	Z = –2.114	Z = –0.434
	$p = 0.506$	$p = 0.281$	$p = 0.918$	$p = 0.035$	$p = 0.664$
Family type					
Nuclear family [a] (68)	7.05 ± 3.41	21.6 ± 6.81	29.45 ± 7.76	11.77 ± 2.98	41.13 ± 12.28
Family size [b] (139)	6.31 ± 3.23	19.28 ± 6.53	26.29 ± 7.75	9.69 ± 3.69	38.4 ± 11.8
Single family [c] (31)	7.32 ± 3.86	19.77 ± 5.82	23.16 ± 8.77	8.87 ± 3.87	36.83 ± 8.97
	H = 3.535	H = 5.753	H = 16.808	H = 20.078	H = 3.517
	$p = 0.171$	$p = 0.056$	$p < 0.001$	$p < 0.001$	$p = 0.172$
			a>b	a>b	
			a>c	a>c	

Table 4. Continued.

Variables	Perceived susceptibility	Perceived seriousness	Perceived benefits	Perceived health motivation	Perceived barriers
Income status					
Poor [a] (89)	5.86 ± 3.24	22.00 ± 7.54	30.46 ± 6.24	10.20 ± 3.76	41.46 ± 8.89
Medium [b] (134)	6.91 ± 3.52	18.90 ± 6.74	24.80 ± 8.59	10.05 ± 3.73	38.58 ± 12.47
Good [c] (15)	6.41 ± 3.17	21.34 ± 5.87	29.06 ± 6.77	10.38 ± 3.59	39.15 ± 10.83
	H = 0.721	H = 7.619	H = 13.436	H = 0.305	H = 0.288
	$p = 0.396$	$p = 0.006$	$p < 0.001$	$p = 0.581$	$p = 0.591$
		c>b	c>b		
		$p = 0.018$	a>b		
Place of residence					
City (209)	6.52 ± 3.25	20.07 ± 6.80	27.15 ± 8.04	10.33 ± 3.70	39.23 ± 11.91
District/village (29)	7.65 ± 4.13	19.55 ± 4.77	24.17 ± 8.20	9.13 ± 3.24	37.13 ± 9.66
	Z = –1.202	Z = –0.846	Z = –1.877	Z = –1.895	Z = –0.905
	$p = 0.229$	$p = 0.398$	$p = 0.061$	$p = 0.058$	$p = 0.366$

Z = the Mann-Whitney U test, H = the Kruskal-Wallis H test, F = ANOVA (analysis of variance), t = the Student's t-test, $p < 0.001$. a, b, c, d: Superscript letters indicate statistically significant differences between groups based on post hoc pairwise comparisons ($p < 0.05$), following Kruskal-Wallis H tests. HBM, Health Belief Model.

Table 5. Relationships between variables and HBM scale scores for participants.

Variables	Perceived susceptibility	Perceived seriousness	Perceived benefits	Perceived health motivation	Perceived barriers
Have you had cervical cancer?					
Yes (39)	7.40 ± 3.48	22.71 ± 5.21	27.38 ± 7.21	10.94 ± 2.71	43.84 ± 8.98
No (199)	6.52 ± 3.35	19.48 ± 6.70	26.60 ± 8.27	10.03 ± 3.81	38.02 ± 11.91
	Z = –1.599	Z = –3.012	Z = –0. 208	Z = –1.006	Z = –3.153
	$p = 0.110$	$p = 0.003$	$p = 0.836$	$p = 0.315$	$p = 0.002$
Has anyone close to you had cervical cancer?					
No (154)	6.52 ± 3.35	19.33 ± 6.22	25.94 ± 8.00	9.98 ± 3.80	39.11 ± 11.42
Yes (84)	6.91 ± 3.44	21.25 ± 7.06	28.33 ± 8.10	10.54 ± 3.39	38.72 ± 12.17
	Z = –1.004	Z = –2.168	Z = –2.544	Z = –0.870	Z = –0.017
	$p = 0.316$	$p = 0.030$	$p = 0.011$	$p = 0.384$	$p = 0.987$
Do you know about cervical cancer?					
Good (39)	6.97 ± 3.46	20.87 ± 5.72	28.58 ± 7.28	10.58 ± 3.44	39.00 ± 12.02
Medium (88)	6.50 ± 2.98	20.04 ± 6.8	26.97 ± 8.63	10.14 ± 3.72	36.84 ± 11.44
I don't know (111)	6.67 ± 3.67	19.68 ± 6.71	26.00 ± 7.89	10.07 ± 3.72	40.66 ± 11.54
	H = 0.266	H =0. 469	H = 1.507	H = 0.293	H = 0.071
	$p = 0.566$	$p = 0.306$	$p = 0.468$	$p = 0.663$	$p = 0.329$
Have you had a Pap smear test in the last five years?					
Yes (34)	8.36 ± 3.48	21.38 ± 6.45	28.61 ± 6.99	11.11 ± 3.21	40.58 ± 12.14
No (204)	6.38 ± 3.29	19.78 ± 6.59	26.48 ± 8.25	10.02 ± 3.72	38.71 ± 11.59
	Z = –3.243	Z = –1.422	Z = –1.350	Z = –1.437	Z = 0.888
	$p = 0.001$	$p = 0.155$	$p = 0.177$	$p = 0.151$	$p = 0.375$

Z = the Mann-Whitney U test, H = the Kruskal-Wallis H test, $p < 0.001$.

Table 6. Comparison of having had a cervical smear test and having a history of cancer.

	History of cervical cancer in the relatives		Statistics	Cervical cancer history		Statistics
Ever been screened for cervical cancer in the last 5 years	Yes	No		Yes	No	
Yes	12	22	$p < 0.001$	15	19	$p < 0.001$
No	142	62	$\chi^2 = 15.025$	24	180	$\chi^2 = 22.264$
Total	154	84		39	199	

Table 7. Effect of variables on having a smear test via a binary logistic regression.

Variables	β	SE	Odds ratio	Exp (β) 95% confidence interval	Sig.
Age	0.024	0.026	1.024	0.974–1.077	0.352
Marital status	–0.118	0.404	0.889	0.403–1.963	0.771
Income status	–1.030	0.877	0.411	0.068–1.992	0.332
Working status	0.515	0.523	1.673	0.601–4.663	0.325
Level of education	–0.328	0.480	0.720	0.281–1.846	0.494
Cervical cancer history	1.684	0.442	5.387	2.266–12.806	0.000
Constant	1.230	1.296	3.420	-	0.343

Cox & Snell $R^2 = 0.081$, Nagelkerke $R^2 = 0.145$. Log Likelihood = 175.091. Model: $\chi^2 = 20.125$, $p < 0.05$. Exp (β), exponentiated Beta coefficient; Sig., significance.

about HPV vaccines; therefore, the vaccination rate was very low. It was also highlighted that women opposed vaccination because of their health beliefs. The same study revealed that Somali women were concerned that their lack of knowledge about the HPV vaccine could pose a major threat to their sexual health. Pratt *et al*. [29] reported that Somali women had no information about HPV and confused HPV with human immunodeficiency virus (HIV); therefore, they believed that HPV infection was contagious. The same study highlighted that Somalis believed that HPV was unnecessary because they were Muslims and had not had sexual intercourse before marriage. According to the results of the present study, the screening rate was higher among women with a family or personal history of cervical cancer. Sewali *et al*. [30] reported that over 80% of Somali women who participated in their study believed that they would not develop cervical cancer. They also reported that Somali women had a fatalistic attitude and did not want to be screened, even if they had the disease. The same study highlighted that Somali women did not prefer early diagnosis and prevention programs because they strongly believed they were not at risk of developing the disease. Gu *et al*. [31] reported that previous screening experiences and beliefs about cervical cancer screening are important factors in promoting future motivation for screening. In Somalian report, the prevalence of HPV 16 and/or HPV 18 among women with cervical cancer is 67.2% [12]. However, most cases can be prevented through vaccination and screening, as it is now known that oncogenic HPV infections cause almost all cervical cancers [32,33]. Approximately 14 evolutionarily related HPV genotypes have oncogenic potential, and HPV 16 and 18 alone are responsible for ~70% of cervical cancers [32]. Given the recognised role of HPV in cervical cancer, there is a need for primary prevention (vaccination) and secondary prevention (screening). There is substantial evidence that HPV vaccination in early adolescence is effective in preventing vaccine-type HPV infection, precancerous lesions, and cervical cancer in young adults [32,33]. Cervical cancer rates could be reduced by 85% in those vaccinated before exposure to oncogenic HPV if current vaccines provide lifelong protection [32].

The results of this study revealed that Somali women had a low perception of cervical cancer, screening, and HPV vaccination. These findings were consistent with those of similar studies. A study of Somali migrants revealed that Somali women had difficulty understanding information about HPV vaccination and cervical cancer screening, had low levels of awareness, and did not understand the importance of screening for cancer prevention [34]. Similarly, Ghebre *et al*. [11] reported that Somali migrant women were not tested because they had little knowledge of smear testing. In another study, Ali *et al*. (2021) [35] reported that women in Africa have low health beliefs and therefore do not have knowledge about smear testing. AlShamlan *et al*. (2023) [36] approached this issue from a different perspective, stating that women's lack of knowledge about smear testing is related to health beliefs and social practices that prevent them from researching and learning about these issues. Furthermore, if young girls undergo these tests before marriage, it will negatively affect their future marriages and sexual lives. Salad *et al*. [28] reported that Somali women did not have information about Pap smear tests and were not tested because they were injured by the appearance of their vagina due to female genital mutilation.

The implementation of the health belief model in the USA, Australia, and the UK differs from that in African countries. This difference may be because patients with limited health literacy are less likely to believe in the need for screening and have difficulty communicating with healthcare providers. Other related factors are economic status and limited access to resources. Public health practices in Africa differ from those of other countries [15]. This study analysed Somali women's health beliefs about cervical cancer and made important findings. When the health beliefs of the Somali women who participated in the study were examined in relation to cervical cancer screening, perceptions of the seriousness, susceptibility, and benefits of undergoing cervical cancer screening were low and perceptions of barriers were high. A study conducted in Johannesburg, Africa, reported results similar to those of the present study [4]. This was investigated in a study of Saudi women, which found that women's scores on the HBM scale were

higher than those in this study [37]. The HBM has also been studied among healthcare workers in Saudi Arabia. According to the results of the study, the perception of barriers among Saudi health workers was lower than that among the women who participated in our study. However, the perception of benefits and health motivation was higher among women who participated in our study than among Saudi health workers [36].

Similar to this study, a study conducted in Africa has shown that sociodemographic characteristics and perceived barriers and benefits continue to play important roles in women's cervical cancer screening behaviour [15]. In this study, single women had greater perceptions of cervical cancer screening susceptibility and barriers than married women did. A systematic review of African women's health beliefs revealed that being married was associated with screening and that women could not ask their husbands for money for screening because the husband was responsible for making financial decisions [38]. Perceived susceptibility is an important element in cervical cancer screening in women living in Africa [38,39]. Perceived barriers and benefits are important for cervical cancer screening in Africa. Additionally, the influence of a woman's psychological aspects on the level of perceived susceptibility is determined by the individual domain of perception. Evidence has revealed differences in healthcare utilisation depending on the social backgrounds of patients in African regions. The researchers reported that women feared cervical cancer screening and were reluctant to participate because of health service factors such as male health workers performing the screening procedure, unavailability of screening services, poorly equipped screening centres, and lack of information dissemination about screening programs [15]. For these reasons, even if the sensitivity perception of a single woman is high, a high perception of disability affects screening status.

Women with higher educational levels had greater perceived sensitivity, whereas their perceived health motivation was lower than that of women with lower educational levels. In a systematic review of African studies by Mantula *et al*. [38], a lack of awareness and knowledge about cervical cancer and screening was found to be important for access to screening. A systematic review analysed the reasons for non-participation in screening in Somalis. Health literacy is an important factor [35], which increases with education level. The lack of information about cancer screening from health professionals and training programs is thought to affect the screening status of Somali women. Additionally, the fact that women with lower educational levels have a lower perception of sensitivity to screening indicates the importance of education. Importantly, nurses and midwives working in primary care facilities and hospitals provide women with information about cervical cancer. However, healthcare professionals should have adequate knowledge about cervical cancer. A study in Somalia reported that healthcare workers' knowledge of this issue was low [39]. In this context, training programs should be organised for health workers.

A meta-analysis of health belief model studies reported that perceived susceptibility had a significant effect on cervical cancer screening [7]. Similarly, this study revealed that women who had undergone a smear test in the last five years, those who had a disease related to the reproductive system, and single women had a greater perception of susceptibility. Perceived susceptibility is an individual's perception of the likelihood of experiencing a situation that negatively impacts their health [18]. Increasing health literacy levels and developing and implementing educational programmes that explain the importance of cervical cancer in the community are important for increasing the perception of sensitivity among Somali women. Additionally, health workers who educate women about cervical cancer screening may increase their awareness.

According to the results of the present study, women who were single, had a previous diagnosis of cervical cancer, were menopausal, had a reproductive system-related condition, and were more likely to perceive barriers. Perceived barriers are features of treatment or prevention that are perceived as inconvenient, costly, inconvenient painful, or upsetting. Al-Ani *et al*. [7] reported that perceived barriers to screening were important and that the perception of barriers varied regionally. In a systematic review, a low awareness of cervical cancer screening was reported as the most important barrier to screening [40]. Cultural acceptance of screening tests has also been reported as an important barrier. The same study reported that reasons, such as women in African countries not wanting to be seen by male doctors, also increased the perception of barriers. Regardless of intention, engagement in health behaviours is strongly influenced by the characteristics of the health system, economic conditions, and sociocultural norms [7]. Somalia is a Muslim country, and the cultural perceptions of women may be a barrier to screening. Therefore, further research on this topic is required.

Perceived severity is defined as a person's interpretation of the level of intensity of a condition; that is, the extent to which the person believes that the condition can be very demanding, influencing their interpretation of the barriers that can prevent progression, access, and progress [18]. This study found that women with higher incomes, women with cervical cancer, and women with cervical cancer among their relatives had greater perceptions of seriousness. However, this study revealed that perception of seriousness was not effective in screening. Similarly, a meta-analysis conducted by Al-Ani *et al*. [7] did not find that perceived seriousness was effective in enforcing protective behaviours. The perception of the importance of cervical cancer screening is greater among Somali women with a high-income status. Access to health services is improved by high-income status. In interviews with female partici-

pants in this study, they stated that they had difficulty accessing governmental health services and that the quality of services was poor. Therefore, Somali women prefer fee-paying hospitals. A systematic review of African women revealed the effect of financial status on screening uptake [38].

Health motivation is a generalised state of intention that leads to behaviours aimed at maintaining or improving health [18]. This study revealed that health motivation for cervical cancer screening was greater among employed than unemployed women. The perceived benefits of having a Pap smear, motivation, and health motivation were greater among those living in nuclear families. Health motivation was greater in menopausal women than in non-menopausal women. Older women are more likely to engage in protective behaviours [7].

Limitations

This study had some limitations. Firstly, women who participated in the study were selected from Mogadishu City and one hospital and were mostly educated. Therefore, the results may not be generalisable to all women in Somali. Secondly, the HBM scale was adapted from Turkish to Somali and applied according to the guidelines. The researcher who conducted the interviews spoke Somali and Turkish considerably well. This can be considered as a limitation. Thirdly, this study is a cross-sectional study and the self-report of the participants is a limitation.

5. Conclusions

In light of the above according to the results of this study the majority of Somali women have low levels of perceptions about cervical cancer screening and HPV and low rates of screening participation. Furthermore, women's health beliefs about screening and a history of cancer are important predictors of their participation in screening.

This finding calls for more awareness campaigns to educate Somali women about cervical cancer. There is a need for awareness campaigns regarding cervical cancer as most of the women interviewed were unaware of cervical cancer and HPV. Given the high incidence of cervical cancer in Somalia, this study recommends strategies to improve cervical cancer screening and HPV vaccination statistics in women. It is also important to identify the factors that influence Somali women's health behaviors and plan interventions to address these issues in order to increase their participation in screening.

Availability of Data and Materials

The datasets generated and analyzed during the current study are not publicly available due to ethical restrictions and participant confidentiality, but are available from the corresponding author on reasonable request.

Author Contributions

FHT collected the data. ED analyzed the data, drafted the manuscript, and supervised the entire study. GT, SA, SYS, and HHE contributed to the interpretation of the data. In addition, SA assisted in data collection. All authors contributed to the critical revision and editorial changes of the manuscript. All authors have read and approved the final version of the manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study was approved by the Somalia Mogadishu Recep Tayyip Erdogan Research and Training Hospital Scientific Research Ethics Committee (document Date and Number: 30.03.2024/MSTH/17690). Informed consent was obtained from the participants who agreed to participate in the study and were identified and informed about the study. The principles of the Declaration of Helsinki were strictly followed to protect the rights of participants.

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Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.31083/CEOG26978.

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