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Cervical cancer screening utilization and associated factors among female health workers in public health facilities of Hosanna town, southern Ethiopia: A mixed method approach --Manuscript Draft--

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Keywords:	cervical cancer, screening, health worker, Ethiopia
Abstract:	<p>Abstract</p> <p>Backgrounds Worldwide, a substantial portion of women had low cervical cancer screening services utilization. Cervical cancer screening practices among female health workers are paramount in preventing cervical cancer due to health workers' roles to play in promoting the utilization of cervical cancer screening services. However, there is a paucity of evidence in utilization of cervical cancer screening services among female health workers and inconsistent findings in Ethiopia. This study aimed to assess the magnitude of cervical cancer screening utilization and associated factors among female health workers in public health facilities of Hosanna town, Southern Ethiopia.</p> <p>Methods Facility-based cross-sectional study design complemented with the qualitative inquiry was conducted among randomly selected 241 study participants in Hossana town from June 1 to July 1, 2021. Logistic regression models were used to determine the association between dependent and independent variables with the assumption of a variable with a p-value < 0.05 was considered statistically significant. Qualitative data were transcribed verbatim then translated to English and analyzed using open code version 4.03.</p> <p>Results Out of the total study participants, 19.6% were screened for cervical cancer. Having a diploma level of education (AOR=0.48;95%CI:0.24,0.98), having three or more children (AOR=3.65;95%CI:1.44,9.21), having multiple sexual partners(AOR=3.89;95%CI: 1.38,11.01), and knowledge of cervical cancer screening (AOR=2.66;95% CI:1.19,5.95) was statistically significantly associated with cervical cancer screening utilization. In-depth interviews suggested additional barriers for low screening utilization including lack of health educational materials, limitation of service to a specific area, service interruption, provider incompetency, and miss-trust and lack of attention by a trained provider.</p> <p>Conclusion The magnitude of cervical cancer screening service utilization among female health workers is low. Having a diploma level of education, having three or more children, a history of multiple sexual partners, and knowledge about cervical cancer were predictors of cervical cancer screening utilization. Contextualized health talks and promotion through training with a special focus on low level of knowledge, had lower educational level, and the availability of cervical cancer screening services are critical.</p> <p>Keywords: cervical cancer, screening, health worker, Ethiopia</p>
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1 Cervical cancer screening utilization and associated 2 factors among female health workers in public health 3 facilities of Hosanna town, southern Ethiopia: A mixed 4 method approach

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12 Abstract

13 Backgrounds



14 Worldwide, a substantial **portion** of women had low cervical cancer screening services
15 utilization. Cervical cancer screening practices among female health workers are
16 paramount in preventing cervical cancer due to health workers' roles to play in promoting
17 the utilization of cervical cancer screening services. However, there is a paucity of
18 evidence in utilization of cervical cancer screening services among female health workers
19 and inconsistent findings in Ethiopia. This study aimed to assess the magnitude of

20 cervical cancer screening utilization and associated factors among female health workers
21 in public health facilities of Hosanna town, Southern Ethiopia.

22 **Methods**

23 Facility-based cross-sectional study design complemented with the qualitative inquiry
24 was conducted among randomly selected 241 study participants in Hossana town from
25 June 1 to July 1, 2021. Logistic regression models were used to determine the association
26 between dependent and independent variables with the assumption of a variable with a
27 p-value < 0.05 was considered statistically significant. Qualitative data were transcribed
28 verbatim then translated to English and analyzed using open code version 4.03.

29 **Results**

30 Out of the total study participants, 19.6% **were** screened for cervical cancer. Having a
31 diploma level of education (AOR=0.48;95%CI:0.24,0.98), having three or more children
32 (AOR=3.65;95%CI:1.44,9.21), having multiple sexual partners(AOR=3.89;95%CI:
33 1.38,11.01), and knowledge of cervical cancer screening (AOR=2.66;95% CI:1.19,5.95)
34 **was** statistically significantly associated with cervical cancer screening utilization. In-
35 depth interviews suggested additional barriers for low screening utilization including lack
36 of health educational materials, limitation of service to a specific area, service interruption,
37 provider incompetency, and miss-trust and lack of attention by a trained provider.

38 **Conclusion**

39 The magnitude of cervical cancer screening service utilization among female health
40 workers is low. Having a diploma level of education, having three or more children, a
41 history of multiple sexual partners, and knowledge about cervical cancer were predictors
42 of cervical cancer screening utilization. Contextualized health talks and promotion through

43 training with a special focus on low level of knowledge, had lower educational level, and
44 the availability of cervical cancer screening services are critical.

45 **Keywords:** cervical cancer, screening, health worker, Ethiopia

46 **Introduction**

47 Cervical cancer (CC) is the fourth most common cancer detected among women globally
48 and ranks second cancer as the most incident and mortal cancer among women in sub-
49 Saharan Africa [1.2].

50 There were approximately 236,000 deaths from cervical cancer worldwide and it was the
51 most common cancer in the east and middle Africa [3.4]. About 90% of cases and 85%
52 of these deaths have occurred in Low and Middle-Income Countries (LMICs); the highest
53 has occurred in Sub-Saharan Africa (SSA) and approximately 311,000 women died from
54 cervical cancer [2].

55 The cause of cervical cancer is Human Papilloma Virus (HPV) and it is the most common
56 viral infection of the reproductive tract, nearly all sexually active individuals will be infected
57 with HPV at some point in their lives and some may repeatedly get infected [3].

58 Cervical cancer screening is watching for precursors before a person has any symptoms
59 and has the benefit to reduce the incidence and the progression to an advanced stage of
60 cancer as well as its mortality [5].

61 In Ethiopia, the utilization of cervical cancer screening is low and vary in different **setting**
62 **for instance the** prevalence of cervical cancer utilization in Arba Minch town, Southern
63 Ethiopia (9.6%), Sidama zone Southern Ethiopia(11.4%), and Mekelle town, northern
64 Ethiopia(10.7%) among female health worker [6-8].

65 The lower rate of cervical cancer screening at low- income countries may be related to
66 the complexity of screening service and the common inherent barriers in the setting such
67 as other socio-cultural issues, limited access to information, lack of knowledge of cervical
68 cancer, lack of healthcare infrastructure required, lack of trained practitioners and the
69 absence of sustained prevention programs [9].

70 Global commitments to reduce the burden of cervical cancer have been done. For
71 instance, the World Health Organization designed a 90–70-90 triple-intervention strategy
72 aimed to achieve 90% HPV vaccination coverage, 70% of women being screened at least
73 twice in their lifetime, and 90% of women having access to cervical pre-cancer and
74 cervical cancer treatment and palliative care services by 2030 [10].

75 American obstetrics and gynecology recommended that the initiation of screening with
76 pap smear at the age of 21 every three years interval until the age of 29 years followed
77 by screening with pap smear and HPV testing every five years until the age of 65 [11].

78 Ethiopia practiced cervical cancer screening services age at least every three years
79 based on WHO recommendations [12].

80 There is a limited number of studies that have considered factors associated with the
81 female health worker's utilization of cervical cancer screening services in Ethiopia.

82 However, none of these studies have assessed the association between the convenience
83 of screening time and the barrier to utilizing cervical cancer screening services were not

84 qualitatively captured. Therefore, this study aimed to determine the prevalence of cervical
85 cancer screening services utilization and associated factors among female health
86 workers. Health workers are chiefpromotors of health care programs for their community,
87 particularly; female health workers are role models that likely to have a better

88 understanding of the benefits of cervical screening than others are and their utilization is
89 a predictor of societal health behavior on the control of cervical cancer [13].

90 **Methods and Materials**

91 **Study Area**

92 This study was conducted in Hosanna town, the capital town of Hadiya Zone, found in the
93 southern nation nationalities people's regional state (SNNPR) of Ethiopia. The town is
94 situated 232 Km Southwest of Addis Ababa and 194 Km northwest of the regional town
95 of Hawassa. It has an average elevation of 2276 meters above sea level and a total area
96 of 23sq.km. The total population of Hosanna town is 92,735 of this female accounts for
97 48808 and there are 21,607 reproductive age group women. In Hosanna town
98 administration there is one teaching Hospital, and three health centers namely Hosanna
99 health center, Bobicho health center, and Lichamba health center.

100 **In Hossana town public health facilities** there are 643 female health workers such as 247
101 clinical nurses,113 midwives, 59 laboratory technologists, and technicians,55
102 pharmacists and druggists, 49 medical doctors, 39 health officers, 13 anesthetics, 37
103 urban health extension workers, 11 public nurses, six psychiatry nurses, seven
104 environmental nurses, and five radiographers. Screening service for cervical cancer **was**
105 given in the teaching Hospital and Hosanna health center [14].

106 **Study design, period, and population**

107 A facility-based cross-sectional study complemented with the qualitative inquiry was
108 conducted from June 1 to July 1, 2021.

109 The source population comprised all female health workers working in the public health
110 facilities of Hosanna town, while the study population encompassed randomly selected
111 female health workers in selected public health facilities of Hosanna town. Female health
112 workers who were working in selected public health facilities of Hosanna town and whose
113 age is 21 and above were included in this study. Critically ill female health workers who
114 had a total hysterectomy, and were on leave during data collection time were excluded
115 from the study.

116 **Sample size determination and sampling technique**

117 The sample size was calculated by applying two population proportion formulas using
118 Epi-Info version 7 and taking a 5% margin error, 80% power, and a 1:1 ratio of an
119 exposed group to a non-exposed group ($r = 1$). Assuming the proportion of attitude
120 towards screening of cervical cancer (85.9%) and (AOR=3.42) from a study conducted in
121 Mekelle Town [8]. The calculated sample size was 332.

122 Since study **population was small need correction** formula, $nf = n/1 + n/N$

$$123 \quad \quad \quad nf = 332/1 + 332/643 = 219$$

124 Considering the non-response rate of 10% in the estimation of the sample size required
125 for the study. The final sample size for this study was 241.

126 A simple random sampling technique was used to recruit study participants. In Hossana
127 town, there are four public health facilities (one hospital & three health centers). The
128 sample size was allocated proportionally based on the number of female health workers.
129 For each health facility, a sampling frame was prepared from the payroll of the human
130 resources department in each public health facility in Hosanna town (Fig 1).

131 **Fig 1: Schematic presentation of the sampling procedure of this study**

132 **Data collection tool and procedure**

133 Data were collected using a structured and pretested questionnaire adapted in the
134 English language from the available relevant literature that **addresses** the objective of the
135 **stud** [6-8]. The questionnaires contained five parts, **Socio-demographic** factors,
136 knowledge of cervical cancer and screening-related factors, attitude/perception about
137 cervical cancer and screening, and reproductive health and behavioral factors. The
138 qualitative in-depth interview (IDIs) were conducted using a semi-structured interview
139 guide to gain a deeper understanding of the participants to explore the barriers to
140 utilization of cervical cancer screening. IDIs were administered to a purposely-selected
141 subset of selected female health workers working in the cervical cancer-screening unit,
142 who have management experience in leading the cervical cancer unit, have led the
143 cervical cancer unit of town health administration, and female health workers in Hosanna
144 town public health facility. IDIs were audio-recorded, translated from the local language
145 into English, and then transcribed verbatim.

146 **Operational definitions**

147 **Female health workers:** Female health professionals who have contact with
148 patients/clients including nurses, doctors, health officers, lab technicians/technologists,
149 pharmacists/ druggists, anesthetics, radiographers, urban health extension workers,
150 public nurses, psychiatry nurses, and environmental nurses [6].

151 **Utilization of cervical screening:** whoever screened at least once for cervical cancer
152 [8].

153 **Knowledge about cervical cancer screening:** was assessed using ten questions asked
154 on knowledge of cervical cancer screening (risk factors about cervical cancer, prevention

155 method, vulnerability to cervical cancer and symptoms of cervical cancer, frequency of
156 screening, and screening method of cervical cancer). The response to each of the
157 questions was “yes” or “no”. Each correct answer was given a score of 1 while an incorrect
158 answer was given a score of 0. We obtained composite knowledge ranging from 0 to 10
159 points. The scores from all 10 items were summed up and the mean sums of total scores
160 were calculated. A female health worker who obtained scores of the mean and greater
161 than the mean score was considered to have good knowledge and who obtained less
162 than the mean score were considered to have poor knowledge [15].

163 **Attitude/perception of female health workers** towards cervical cancer screening was
164 assessed using a likers scale which ranges from score five (strongly agree) to score one
165 (strongly disagree). The responses were summed and a total score was obtained. Then
166 we calculated the mean score. Those who scored the mean score and above were
167 considered as having a favorable attitude or otherwise unfavorable attitudes toward
168 cervical cancer screening [15].

169 **Measurements**

170 The outcome variable, the utilization of cervical cancer screening, was measured through
171 female health worker responses about where she ever screened at least once for cervical
172 cancer.

173 **Data quality assurance**

174 The questionnaires were translated to Amharic and then back-translated to English to
175 assure the quality of data. Three-day training for data collectors and supervisors was
176 given and the questionnaire was pretested in 10% of the study population in a different
177 setting with a similar population in Fonko health center. Cronbach’s alpha was done to

178 assess internal consistency (alpha coefficient for knowledge on CCA (10 items) = 0.76,
179 attitude on CCA screening (9 items) = 0.71.

180 Interview guides were prepared in the English language by language experts for
181 qualitative study. Interviews were held in silent places which is suitable and comfortable
182 for discussions. The audio recorder was checked for functionality before recording. During
183 an interview the respondent's own words and crosschecked with notebooks. The
184 recorded voice of interviews and notebooks were crosschecked while transcribing to
185 ensure the credibility of the data.

186 **Data processing and analysis**

187 The quantitative data were entered into Epidata version 3.1 and transported to SPSS
188 version 23 software for analysis. Data were edited and cleaned by running a simple
189 frequency, cross-tabulations, and sorting to identify outliers. Descriptive statistics like
190 frequencies, percentages, and cross-tabulations were done. Binary logistic regression
191 was used to check the associations of independent variables and outcome variables.
192 Variables with p-values < 0.25 in the bivariable analysis were entered into multivariable
193 analysis to isolate predictors. The goodness of fit of the model was checked using the
194 Hosmer Lemeshow test of goodness of fit and variance inflation factors were low (<10)
195 for the multi-collinearity check. An adjusted odds ratio with 95% confidence intervals and
196 a p-value less than 0.05 were considered a statistically significant association with of
197 utilization of cervical cancer screening.

198 All the qualitative data were systematically coded and analyzed using thematic analysis
199 in open code 4.03 software. The audio recorder was transcribed verbatim in Amharic and
200 then translated into English. The initial analysis was done by importing transcribed

201 interviews to notepad and then again imported to open code 4.03 software. Starting from
202 reading several times coding was performed line by line. After checking for similar groups
203 of code were summarized into a category and final themes were created. Categorizing
204 and theming procedures were crosschecked by the advisors and agreed on common
205 categories and themes. The quantitative and qualitative findings were then triangulated.

206 **Ethics approval and consent to participate**

207 This study was approved by the Hawassa University College of medicine, and health
208 sciences research ethics review committee. Written and signed informed consent were
209 obtained from each study participant and head health facilities before the interview. The
210 data collection procedure was anonymous to keep the confidentiality of any information
211 provided by the study participants.

212 **Results**

213 **Socio-demographic characteristics of study participants**

214 A total of 235 female health workers participated in this study with a response rate of
215 97.5%. The mean (\pm SD) age of study participants was 28.8 (\pm 4.94) years. About 163
216 (69.4%) of study participants were Hadiya in ethnicity and 178 (75.7%) were protestant
217 religion followers. Concerning their educational status, two third (66%) were degrees and
218 above. One hundred fifty-three (65.1%) of study participants had three and more years of
219 working experience. Nearly three fourth (72.8%) of study participants were married and
220 142 (60.4%) were working in hospitals. Regarding profession 109(46.4%) of respondents
221 were nurses (**Table 1**).

222

223 **Table 1. Socio-demographic characteristics of study participants in Hossana town,**
 224 **southern Ethiopia, 2021 (n = 235).**

Variables	Categories	Frequency	Percent (%)
Age in years	≤24	40	17.0
	25-34	159	67.7
	≥35	36	15.3
Marital status	Married	171	72.8
	Single	64	27.2
Educational status	Diploma	80	34.0
	Degree and above	155	66.0
Religion	Protestant	178	75.7
	Muslim	13	5.5
	Orthodox	41	17.4
	Catholic	3	1.3
Service area	Hospital	142	60.4
	Health center	93	39.6
Working experience	≤2years	82	34.9
	≥3 years	153	65.1
Professions	Nurse	109	46.4
	Health officer	29	12.3
	Doctors	12	5.1
	Pharmacy	12	5.1
	Laboratory	26	11.1
	Midwifery	34	14.5
	Others*	13	5.5

225 *= radiologist, anesthesia

226 **Reproductive and behavioral characteristics**

227 One hundred seventy (72.3%) of study participants had their first sexual intercourse at an
 228 age greater than 18 years. Study participants who had a history of multiple sexual
 229 partners were 19 (8.1%) and 230 (97.9%) had no history of sexually transmitted
 230 disease(STDs). Eighty-nine (37.9%) of respondents were nulliparous women and nearly
 231 all (98.8%) of the respondents never smoked (**Table 2**).

232 **Table 2. Reproductive and behavioral characteristics of study participants in**
 233 **hosanna town southern Ethiopia, 2021(n=235).**

Variables	Categories	Frequency	Percent (%)
Parity status	Nulli parity	89	37.9
	1-2 child	83	35.3
	≥ 3 child	63	26.8
Age at first sexual intercourse	≤ 18year	65	27.7
	> 18 year	170	72.3
Having multiple sexual partners	Yes	19	8.1
	No	216	91.9
History of STDs	Yes	5	2.1
	No	230	97.9
Smoking status	Yes	3	1.3
	No	232	98.8

234

235 **Female health worker's knowledge of cervical cancer**

236 One hundred fifty-one (64.3%) of study participants had good knowledge about cervical
 237 cancer screening. Regarding symptom-related knowledge, more than half (51.5%) of
 238 study participants mentioned risk factors for cervical cancer by respondents were having
 239 multiple sexual partners, early sexual intercourse 106 (45.1%), acquiring HPV virus 107
 240 (45.5%), and Cigarette smoking 50 (21.3%). One hundred forty-three (60.9%) of study
 241 participants listed vaginal bleeding and foul-smelling vaginal discharge and contact

242 bleeding accounts (44.7%) and postmenopausal bleeding 49 (20.9%) were the symptoms
 243 of cervical cancer.

244 Knowledge related to cervical cancer screening method were assessed and study
 245 participant mentioned pap smear 108 (46.0%), HPV DNA test 51(21.7%), VILI 45(19.1%),
 246 and only 15 (6.4%) stated the VIA as the screening methods (**Table 3**).

247 Corresponding to the quantitative finding, key informant interview participants most
 248 frequently mentioned female health workers have a low understanding of cervical cancer
 249 screening services, as illustrated below:

250 “...The first **hugeness and hardness of the problem** are not understood about the
 251 disease and screening service, as I think there is no adequate understanding. However
 252 cervical cancer is known as a killer there is no sufficient understanding about prevention
 253 methods, risk factors, and availability of screening services, as I think these all may
 254 reason for underutilization.” [Female, Age:34, Reproductive health specialist]

255 Another participant reaffirmed the above saying “... Ok what makes female health workers
 256 for not being screened as I tell you above they have no knowledge and awareness and
 257 also do not know as the service present in the facility. The first thing they have no specific
 258 knowledge about cervical cancer that makes them screen” [Female, Age: 26 midwifery].

259 **Table 3. Knowledge of risk factors, symptoms, and screening methods among female**
 260 **health workers of Hosanna town southern Ethiopian 2021(n=235).**

Variables		No of responded yes	Percentage (%)
Knowledge of Risk factors *	Having multiple sexual partners	121	51.5

	Early sexual intercourse	106	45.1
	Acquiring HPV virus	107	45.5
	Cigarette smoking	50	21.3
Knowledge of symptoms*	Vaginal bleeding	143	60.9
	Foul-smelling vaginal discharge	143	60.9
	Contact bleeding	105	44.7
	Postmenopausal bleeding	49	20.9
Knowledge of screening methods*	Pap smear	108	46.0
	VIA	15	6.4
	VILI	45	19.1
	HPV DNA test	51	21.7

261

262 NB. Those with an asterisk (*) were not added up to 100% because of multiple
263 responses

264 **Attitude towards cervical cancer screening**

265 More than half of the respondents (51.5%) had a favorable attitude towards cervical
266 cancer screening. As shown in the **Table below around** 80.4% of study participants
267 perceived that cervical **cancer is the killer cancer in Ethiopia and** Cervical cancer
268 screening helps in the prevention of carcinoma of the cervix. Out of the total respondents,
269 177(75.3%) agree that Cervical cancer screening causes no harm to the clients, and

270 171(72.8) participants will screen for cervical cancer if the service needs payment. The
271 majority of the participants 188 (80%) agreed that cervical cancer screening tests find
272 changes before it becomes cervical cancer (**Table 4**)

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292 **Table 4. Attitude towards cervical cancer screening among female health workers**
 293 **in Hossana town, southern Ethiopia, 2021(n=235)**

Variables	Level of agreements	
	Agree Frequency (%)	Disagree Frequency (%)
CC is killer cancer in Ethiopia ?	189(80.4)	46(19.6)
CC screening helps in prevention of carcinoma of cervix ?	188(80)	47(20)
CC screening causes no harm to the clients	177(75.3)	58(24.7)
I will screened for cervical cancer if the service need payment	171(72.8)	64(27.2)
Adult women including you could be acquired cervical cancer	184 (78.3)	51(21.7)
CC screening tests find changes before it becomes cervical cancer	188 (80.0)	47(20.0)
CC screening procedure is embracement	38 (16.2)	197(83.8)
CC screening will you allow male doctors to examine you	155 (66.0)	80(34.0)
If you have cervical cancer do you consult doctors without being scarce	217 (92.3)	18(7.7)

294

295 **Reasons for not utilizing cervical cancer screening service**

296 The most common reasons mentioned by participants for not being utilized for cervical
297 cancer screening were feeling healthy 119 (54.8%) followed by do not know the place of
298 service 25 (11.5%) and carelessness 24 (11.1%) (Fig2)

299 **Figure 2 Main reasons not utilized cervical cancer screening among female health**
300 **workers in Hossana Town, Southern Ethiopia, 2021.**

301 Corroborating to our quantitative findings, key informant participants articulated that
302 female health workers did not utilize cervical cancer screening services because of a
303 feeling of being healthy; do not know as service is given in their facility, fear of pain,
304 Carelessness of female health workers as illustrated below:

305 *"...a problem is we always think that as we always live healthily. I think the prevalence is*
306 *increasing currently by understanding these, everyone must be aware as they may*
307 *acquire the disease I need to tell to all mothers to internalize this idea" (Age: 29, female*
308 *health workers).*

309 Another key informant indicated that carelessness and knowledge-related factors play
310 important role in getting screened saying

311 *".... As I think what makes female health worker not to be screened is carelessness, lack*
312 *of attention and knowledge...." [Female, Age: 26, midwifery working in screening unit].*

313 Around one-third (32.3%) of study, participants mentioned that cervical screening service
314 is not convenient with their regular working time.

315 In line with this finding, results from a qualitative study showed that female health workers
316 were not convenient with their regular working time. Key informant participants mentioned
317 the major reason that they do not utilize screening services is they are busy and
318 overburdened with their duty, so they have no time to screen. Therefore arranging a

319 screening on weekend days is necessary. A 26-year-old participant said: “*Indeed female*
320 *health workers most of the time are busy due to their duty associated with their work. So*
321 *they have no gate time to screen, therefore arranging to screen on weekend days is*
322 *necessary to increase cervical cancer screening utilization.*” [Female, Age: 36, midwifery
323 *working in screening unit].*

324 **Cervical cancer screening service utilization**

325 According to the finding of this study, forty-six (19.6%, 95% CI: 14.5%, 24.7%) of the
326 study participants had ever been screened at least once for cervical cancer.

327 **Factors associated with utilization of cervical cancer screening service**

328 Table 5 summarizes a bivariate logistic regression analysis of socio-demographic and
329 other characteristics of study participants that are associated with female health workers’
330 utilization of cervical cancer screening services. Among those variables, age, marital
331 status, educational status, service area, working experience, history of multiple sexual
332 partners, parity, comprehensive knowledge of cervical cancer and its screening method
333 were positively associated with female health worker’s utilization of cervical cancer
334 screening services during bivariate analysis (**Table 5**).

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341 **Table 5. Multivariable logistic regression analysis on factors associated with**
 342 **utilization of cervical cancer screening among female health workers in Hosanna**
 343 **town, southern Ethiopia, 2021 (n = 235).**

Variables	Utilization of cervical cancer screening		COR (95%CI)	AOR (95%CI)
	Yes n (%)	No n (%)		
Age in year				
≤24	4 (10.0)	36 (90.0)	1	1
25-34	30 (18.9)	129 (81.1)	2.09(0.69,6.33)	1.22 (0.34,4.28)
≥35	12 (33.3)	24 (66.7)	4.50(1.21,5.61)	1.38 (0.31,6.33)
Marital status				
Married	40 (23.4)	131(76.6)	2.95(1.18,7.35)	1.64(0.45,6.01)
Single	6 (9.4)	58 (90.6)	1	1
Service area				
Hospital	33 (23.2)	109(76.8)	1.86(0.92,3.76)	1.82 (0.88, 4.05)
Health center	13 (14.0)	80(86.0)	1	1
Parity status				
Nulli parity	9(10.1)	80(89.9)	1	1
1-2 Children	18(21.7)	65(78.3)	2.46(1.04,5.84)	2.15(0.87,5.31)
≥3 children	19(30.2)	44(69.8)	3.84(1.60,9.20)	3.65(1.44,9.21)**
Educational status				
Diploma	24(15.5)	131(84.5)	0.48(0.25,0.93)	0.48 (0.24,0.98)**
Degree and above	22(27.5)	58(72.5)	1	1
Working experience				
≤2 year	9(11.0)	73(89.0)	1	1
≥3 year	37(24.2)	116(75.8)	2.58(1.18,5.67)	1.52(0.57,4.03)
Knowledge of cervical cancer screening				
Good	36(23.8)	115(76.2)	2.32(1.08,4.95)	2.66(1.19,5.95)**
Poor	10(11.9)	74(88.1)	1	1
Had multiple sexual partners				
Yes	8(42.1)	11(57.9)	3.41(1.28,9.04)	3.89(1.38,11.01)**
No	38(17.6)	178(82.4)	1	1

344 **= significant variables at p value level <0.05 1= reference group

345 The odds of cervical cancer screening service utilization were 3.65 times [(AOR=3.65;
346 95% CI: (1.44, 9.21)] higher among female health workers having three or more children
347 as compared to those who were nulliparous female health workers. The odds of cervical
348 cancer screening service utilization among diploma female health workers were 52% less
349 likely [(AOR=0.48; 95% CI: (0.24, 0.98)] when compared with those who were degree and
350 above educational status.

351 The key informant explained that female health workers with low-level educational status
352 had a low-level understanding so that not utilize the service, saying:

353 “...When looked at *while I provide training, most of the health workers especially those*
354 *with low educational levels have difficulty with the understanding of cervical cancer*
355 *screening. Now the problem among health workers a little bite knowledgeable put them*
356 *in unnecessary confidence resulted in them for the resistant of screening.*”[Male , Age:
357 45, gynaecologist].

358 Concerning knowledge-related factors, the odds of cervical cancer screening service
359 utilization were 2.66 times (AOR=2.66;95% CI: 1.19,5.95) higher among female health
360 workers who had good knowledge of cervical cancer screening, risk factors, and
361 symptoms as compared to who had poor knowledge.

362 Of nine interviews, six of them said poor knowledge and lack of awareness are the main
363 reason for not utilizing screening services, as illustrated below:

364 “.....*regarding cervical cancer, as I think there is no sufficient knowledge deeply among*
365 *professionals, so more information and awareness needed.*”[Female, Age: 35, Public
366 *health specialist*].

367 Another participant from the Hospital added her idea:

368 “... The female health worker most of the time don't know about cervical cancer screening
369 and its knowledge because the service is not provided widely and no media that explain
370 about it...” [Female, Age: 26, midwifery working in screening unit].

371 Another key informant mentioned even those who had awareness were not properly using
372 cervical cancer screening services, as illustrated below:

373 “Female health workers did not give attention for cervical cancer screening as a general
374 and they do not know means as there is no anything expose me, they not feel about
375 screening whether they have screened or not screened.”[A Female, Age: 28 BSc
376 midwifery].

377 Similarly, the odds of cervical cancer screening service utilization were 3.89 times
378 (AOR=3.89 95% CI: 1.38, 11.01) higher among female health workers who had a history
379 of multiple sexual partners as compared to those not having multiple sexual partner
380 histories.

381 **Discussion**

382 This study aimed to assess cervical cancer screening utilization and associated factors
383 among female health workers in Hossana town public health facilities. **The magnitude of**
384 **cervical cancer screening utilization was 19.6%.** Factors like education level, parity,
385 history of multiple sexual partners, and knowledge of cervical cancer screening were
386 significantly associated with the utilization of cervical cancer screening.

387 In this study, the finding of cervical cancer screening utilization was 19.6%, which is
388 almost similar to studies that were conducted in Ethiopia (22%), in lower resource settings
389 of Nigeria (20.6%), in Baghdadi (18.8%), in Chennai corporation (18.4%), in Tanzania
390 (15.4%) and other study done in Dar es Salaam, Tanzania (21%)[17-19,23,24]. This

391 consistency between studies in Ethiopia, Tanzania, and lower resource setting areas was
392 comparable with the current socio-demographic status. However, similar to the study in
393 Baghdadi and Chennai Corporation could be an approachable sample size and study
394 participants.

395 The finding of this study was lower than the studies done in Saudi Arabia (26.2%), Uganda
396 (75%), Cameroon (41%), and Ibadan, Nigeria (34.6%) [15, 20-22]. This difference might
397 be differences in study settings, sample size, and study participants. Additional
398 justification could be the time of implementing cervical cancer screening practice and the
399 difference in the level of countries' health service coverage. The finding of this study also
400 higher than the studies done in Sidama zone, Southern Ethiopia (11.4%), Arba Minch
401 town, Southern Ethiopia (9.6%), Mekelle town, northern Ethiopia (10.7%), Uttar Pradesh,
402 India (10%), Korea (13%), South-eastern Nigeria (7.2%), rural India (7%), Sokoto,
403 Nigeria (10%) [6-8, 25-29]. This change may be due to time variation, and differences in
404 the study setting majority of study participants were from rural districts and included
405 support staff, but our study participants were mainly female health workers which
406 probably accounted for the observed difference. This suggests the current increase in
407 screening utilization is due to service availability and accessibility in governmental
408 institutions free of charge. It may considerably increase cervical cancer screening
409 utilization.

410 The most common reasons mentioned by study participants for not being utilized for
411 cervical cancer screening were feeling healthy 119 (54.8%) followed by do not know the
412 place of service 25 (11.5%) and carelessness 24(11.1%). This finding is supported by
413 studies conducted in Korea and Arba Minch town, Southern Ethiopia [6,26]. Additionally,

414 it can be explained as the fact that when people are feeling healthy they do not bother
415 about preventive services as they have other competing problems. Study participants who
416 do not know the service area of cervical cancer screening further fuel the underutilization
417 of screening services. The finding from a qualitative study in which most participants in
418 in-depth interviews participants indicated a feeling of being healthy supported this, do not
419 know what service is given in their facility, fear of pain, and carelessness as the major
420 barrier to utilizing cervical cancer screening services.

421 Furthermore, participants described a lack of health educational materials, not having
422 appropriate supplies and logistics, limitation of service to a specific area, service
423 interruption, a distance from the health facility, provider incompetency, and miss-trust and
424 lack of attention by a trained provider and cultural and spiritual factor among female health
425 worker and the unsuitability of environment hindered female health worker from the
426 utilization of cervical cancer screening.

427 Educational status was one of the significant factors in the utilization of cervical cancer
428 screening services. Diploma female health workers were less likely to utilize cervical
429 cancer screening services when compared with those who had a degree and above
430 educational status. This finding was supported by the studies done in Debremarkos town
431 in Northwest Ethiopia, Wolaita zone, Southern Ethiopia and Nigeria [29-31]. This
432 consistency might be those female health workers who have a degree and above are
433 more educated to have an understanding of the cause, risk factors, prevention
434 mechanism, and screening methods of cervical cancer and as such can demand
435 screening services. Furthermore, education can increase female health workers' access
436 to information from different sources within their educational career and positive effect on

437 self-efficacy, confidence, and motivation, in search of health interventions for their health
438 including cervical cancer screening utilization. Moreover, interviewees in the qualitative
439 study explained that female health workers with low-level educational status had low-level
440 understanding as a reason for the underutilization of cervical cancer screening.

441 The odds of cervical cancer screening service utilization were higher among female
442 health workers those having three or more children as compared to those who were
443 nulliparous female health workers. The result of our study is comparable with a study
444 conducted in low resource setting areas of Nigeria, rural India, and Debremarkos
445 Northwest Ethiopia [23, 28,30]. The reason might be explained by these female health
446 workers with three and more children would have experienced repeated exposure to
447 different contact in health facilities (during pregnancy, delivery, postnatal period,
448 immunization, and other health services) might help them to gain information on sexual
449 and reproductive health issues including the benefits of early cervical cancer screening.
450 The history of multiple sexual partners is also an important predictor of cervical cancer
451 screening utilization. The odds of cervical cancer screening service utilization were higher
452 among female health workers who had a history of multiple sexual partners as compared
453 to those not having multiple sexual partners history. The finding is consistent with a study
454 conducted in the Tigray region, Northern Ethiopia, Debremarkos town, Northwest
455 Ethiopia, and Addis Ababa, Ethiopia [8,30,32]. The possible explanation could be the
456 more sexual partners a woman has, the greater her chances of becoming infected with
457 the human immune-deficient virus and other sexually transmitted diseases including
458 Human Papillomavirus, the most common risk factor for the development of cervical
459 cancer. Therefore, they would have the chance to be infected with the sexually

460 transmitted disease with its signs and symptoms, which increased health facility visits,
461 and the chance of seeking medical help. Moreover, they might get more health care
462 counseling about cervical cancer screening utilization.

463 The findings of our study revealed that female health workers' knowledge level has a
464 positive effect on cervical cancer screening utilization. The odds of cervical cancer
465 screening service utilization were higher among female health workers who had good
466 knowledge of cervical cancer screening, risk factors, symptoms, and screening methods
467 as compared to those who had poor knowledge. Similar studies done in Arba Minch town,
468 Southern Ethiopia supported our findings [6]. The qualitative finding also revealed that
469 poor knowledge and lack of awareness contributed to the reasons for not utilizing cervical
470 cancer screening. This consistency might be explained because female health workers
471 with good knowledge about cervical cancer have clear uncertainty about cervical cancer
472 and will have self-initiative to undergo screening and finally increase their awareness
473 about the advantage of knowing about cervical cancer risk factors and benefits of its
474 screening.

475 The limitation of this study is the fact that since the study design was a cross-sectional
476 study, temporal relations could not be established. In addition to this, since it is a facility-
477 based study and included participants only from selected health institutions, it does not
478 consider women who did not visit and not working in the health facilities. This might affect
479 the representatives of our findings to Hosanna town. The data were self-report by the
480 study participants; thus subject to recall and social desirability bias may affect the result
481 of the study. Regardless of these limitations, our findings have a strength of using the
482 mixed quantitative and qualitative methods allowing for triangulation to confirm findings

483 and qualitative data to address health facility-related factors, service provider-related
484 factors, female health worker-related factors, and cultural factor inquiry for further
485 explanation of ideas.

486 **Conclusion**

487 The study revealed **the magnitude** of cervical cancer screening service utilization among
488 female health workers is relatively lower than the Ethiopian national guideline for cervical
489 cancer prevention and control that recommended coverage for the target group.
490 Educational status, parity of respondent, history of multiple sexual partners, and
491 knowledge about cervical cancer were significantly associated with cervical cancer
492 screening utilization. Common **reasons given by study participants for not undergoing**
493 **screening were feeling of health**. One-third of study participants revealed that cervical
494 cancer screening time is not convenient.

495 Moreover, IDIs described that lack of health educational materials, not having appropriate
496 supplies and **logistics, limitation of service to a specific area, service interruption, the**
497 **distance of health facility, provider incompetency, miss-trust and lack of attention by a**
498 **trained provider, shortage of trained provider and cultural and spiritual factor among**
499 **female health worker and the unsuitability of environment hindered from the utilization of**
500 cervical cancer screening.

501 **Data sharing statement**

502 All relevant data are within the paper and its Supporting Information files.

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504 This study was not funded.

505 **Author contributions**

506 **Conceptualization:** Zemzem Jemal and Netsanet Abera

507 **Data curation:** Zemzem Jemal

508 **Formal Analysis:** Zemzem Jemal and Habtamu Hassen

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510 **Software:** Zemzem Jemal and Habtamu Hassen

511 **Supervision:** Netsanet Abera and Nana Chea

512 **Validation:** : Zemzem Jemal , Habtamu Hassen, Nana Chea and Netsanet Abera

513 **Writing- original draft:** Zemzem Jemal and Habtamu Hassen

514 **Writing-Review and editing:** Zemzem Jemal , Habtamu Hassen ,Tsegaab Tesfaye, Nana

515 Chea and Netsanet Abera

516 All contributed significantly and gave the final approval for the paper to be published;

517 agreed to be accountable for all impacts of the work.

518 **Disclosure statement**

519 The authors declare that there is no conflict of interest in this work.

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523 **Ethics approval and consent to participate**

524 Permission to conduct the study was obtained from Hawassa University, College of
525 medicine and health sciences research ethics review committee. Written and signed
526 informed consent were obtained from each study participant and head health facilities
527 before the interview. The data collection procedure was anonymous to keep the
528 confidentiality of any information provided by the study participants.

529 **Abbreviations**

530 **AOR**, Adjusted Odds ratio; **CC**, Cervical cancer **CI**, Confidence interval; **IDIs**. Indepth
531 interviews; **HPV**, Human Papillomavirus; **STI**, sexually transmitted infections; **SD**,
532 Standard deviation , **SRS**, Simple random sampling; **H/C**, health center; **WUNEMMCSH**,
533 Wachamo University Nigist Elleni Mohammed Memorial comprehensive Specialized
534 Hospital

535 **References**

- 536 1. Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J, et al. Estimates
537 of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *Lancet Glob*
538 *Heal.* 2020;8(2):e191–203.
- 539 2. Barrow A, Onikan A, Nzopotam CI, Ekholuenetale M. Prevalence and determinants of
540 cervical cancer awareness among women of reproductive age: evidence from Benin and
541 Zimbabwe population-based data. *Appl Cancer Res.* 2020;40(1).
- 542 3. WHO/NMH/NMA. UN Joint Global Programme on Cervical Cancer Prevention and
543 Control. The United Nations Global Cervical Cancer Programme 2016.
- 544 4. Bruni L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, et al. Human
545 Papillomavirus and Related Diseases in Ethiopia. 2017

- 546 5. Aranda S, Berkley S, Cowal S, Dybul M, Evans T, Iversen K, Moeti M, Osotimehin B,
547 Peterson S, Piot P, Purandare CN. Ending cervical cancer: A call to action. International
548 Journal of Gynecology & Obstetrics. 2017 Jul;138:4-6.
- 549 6. Seyoum T, Yesuf A, Kejela G, Gebremeskel F. Utilization of Cervical Cancer Screening
550 and Associated Factors among Female Health Workers in Governmental Health
551 Institution of Arba Minch Town and Zuria District, Gamo Gofa Zone, Arba Minch, Ethiopia,
552 2016. Arch Cancer Res. 2017;05(04):4–9.
- 553 7. Dulla D, Daka D and Wakgari N. Knowledge about cervical cancer screening and its
554 practice among female health care workers in Southern Ethiopia: a cross-sectional study.
555 Int J Women's Health 2017; 9: 365–372
- 556 8. Gebreegziabher M, Asefa NG, Berhe S. Factors Affecting the Practices of Cervical
557 Cancer Screening among Female Nurses at Public Health Institutions in Mekelle Town,
558 Northern Ethiopia, 2014: A Cross-Sectional Study. J Cancer Res. 2016;2016:1–7
- 559 9. Ngugi CW BH, Muigai AW, Wanzala P, Mbithi JN. Factors affecting uptake of cervical
560 cancer early detection measures among women in Thika, Kenya. Health Care Women
561 Int. 2012; 33(595–613
- 562 10. Brisson M, Kim JJ, Canfell K, Drolet M, Gingras G, Burger EA, et al. Impact of HPV
563 vaccination and cervical screening on cervical cancer elimination : comparative modeling
564 analysis in 78 low-income and lower-middle-income countries. 2020;575–90
- 565 11. ACOG. Cervical Cancer Screening 2017 [updated September 2017].
566 <https://www.acog.org/Patients/FAQs/Cervical-Cancer-Screening>.
- 567 12. Federal Democratic Republic of Ethiopia Ministry of Health. Guideline for cervical
568 cancer prevention and control in Ethiopia; 2015.

- 569 13. Nwobodo H, Ba-Break M. Analysis of the determinants of low cervical cancer
570 screening uptake among Nigerian women. *J Public Health Africa*. 2016;6(2):12–9.
- 571 14. Hadiya zone health office report 2013 E.C.
- 572 15. Obol JH, Lin S, Obwolo MJ, Harrison R, Richmond R. Knowledge, attitudes, and
573 practice of cervical cancer prevention among health workers in rural health centers of
574 Northern Uganda. *BMC Cancer*. 2021;21(1):1–15.
- 575 16. Kress CM, Sharling L, Owen-Smith AA, Desalegn D, Blumberg HM, Goedken J.
576 Knowledge, attitudes, and practices regarding cervical cancer and screening among
577 Ethiopian health care workers. *Int J Womens Health*. 2015;7:765–78
- 578 17. Rashied AM, Yarmook A, Hospital T. Barriers for Uptaking The Pap Smear among
579 Nurse – Midwives in Baghdad City Ahrar M . Rashied , M . Academic Nurse Specialist ,
580 Ministry of Health, Al Yarmook. 2014;4(3):1–12.
- 581 18. Sudharshini S, Anantharaman V, Chitra A. A cross-sectional study on knowledge,
582 attitude, and practice on cervical cancer and screening among female health care
583 providers of Chennai corporation, 2013. *J Acad Med Sci*. 2012;2(4):124.
- 584 19 Urasa M, Darj E. Knowledge of cervical cancer and screening practices of nurses at a
585 regional hospital in Tanzania. *Afr Health Sci*. 2011;11(1):48–57.
- 586 20. Aldohaian AI, Alshammari SA, Arafah DM. Using the health belief model to assess
587 beliefs and behaviors regarding cervical cancer screening among Saudi women: A cross-
588 sectional observational study 11 Medical and Health Sciences 1117 Public Health and
589 Health Services. *BMC Women's Health*. 2019;19(1):1–12
- 590 21. Tebeu PM, Major AL, Rapiti E, Petignat P, Bouchardy C, Sando Z, et al. The attitude
591 and knowledge of cervical cancer by Cameroonian women; a clinical survey conducted

592 in Maroua, the capital of Far North Province of Cameroon. *Int J Gynecol Cancer*.
593 2008;18(4):761–5.

594 22. Arulogun OS, Maxwell OO. Perception and utilization of cervical cancer screening
595 services among female nurses in University College Hospital, Ibadan, Nigeria. *Pan Afr*
596 *Med J*. 2012;11:69

597 23. Ifemelumma CC, Anikwe CC, Okorochukwu BC, Onu FA, Obuna JA, Ejikeme BN, et
598 al. Cervical Cancer Screening: Assessment of Perception and Utilization of Services
599 among Health Workers in Low Resource Setting. *Int J Reprod Med*. 2019;2019:1–8.

600 24. Kileo NM , Michael D, Neke NM, and Moshiro C, et al. Utilization of cervical cancer
601 screening services and its associated factors among primary school teachers in Ilala
602 Municipality, Dar es Salaam, Tanzania. *BMC Health Services Research* (2015) 15:552

603 25. Khanna D, Khargekar N, Budukh A. Knowledge, attitude, and practice about cervical
604 cancer and its screening among community healthcare workers of Varanasi district, Uttar
605 Pradesh, India. *J Family Med Prim Care* 2019;8:1715-9.

606 26. Tran NT, Taylor R, Choe SI, Pyo HS, Kim OS, So HC. Knowledge, Attitude and
607 Practice (KAP) Concerning Cervical Cancer and Screening among Rural and Urban
608 Female Healthcare Practitioners in the Democratic People’s Republic of Korea. *Asian*
609 *Pac J Cancer Prev*. 2011; 12(11):3023–3028.

610 27. U.W. DOZIE ,ET AL. Determinants of cervical cancer screening uptake among female
611 undergraduates in a tertiary institution in southeastern Nigeria: a cross-sectional study. *J*
612 *PREV MED HYG* 2021; 62: E213-E221

- 613 28. Shekhar S, Sharma C, Thakur S, Raina N. Cervical cancer screening: knowledge,
614 attitude, and practices among nursing staff in a tertiary level teaching institution of rural
615 India. *Asian Pac J Cancer Prev.* 2013; 14(6):3641–3645
- 616 29. Oche MO, Kaoje AU, Gana G, Ango JT. Cancer of the cervix and cervical screening:
617 current knowledge, attitude, and practices of female health workers in Sokoto, Nigeria.
618 *Int J Med Med Sci.* 2013;5(4): 184–190
- 619 30. Aynalem BY, Anteneh KT, Enyew MM. Utilization of cervical cancer screening and
620 associated factors among women in Debreworkos town, Amhara region, Northwest
621 Ethiopia: Community based cross-sectional study. *PLoS One [Internet].* 2020;15(4):1–13.
- 622 31. Tekle T, Wolka E, Nega B, Kumma WP, Koyira MM. Knowledge, attitude, and practice
623 towards cervical cancer screening among women and associated factors in hospitals of
624 Wolaita zone, southern Ethiopia. *Cancer Manag Res.* 2020;12:993–1005
- 625 32. Teame H, Addissie A, Ayele W, Hirpa S, Gebremariam A, Gebreheat G, et al. Factors
626 associated with cervical precancerous lesions among women screened for cervical
627 cancer in Addis Ababa, Ethiopia: A case-control study. *PLoS One.* 2018;13(1):1–13.

628 **Supporting information**

629 **S1 Data collection tool (DOC)**

630 **S2 SPSS data set (SAV)**

631 **S3 Fig 1 (TIFF file)**

632 **S4 Fig 2 (TIFF file)**

633 **S5 others (pdf)**

634

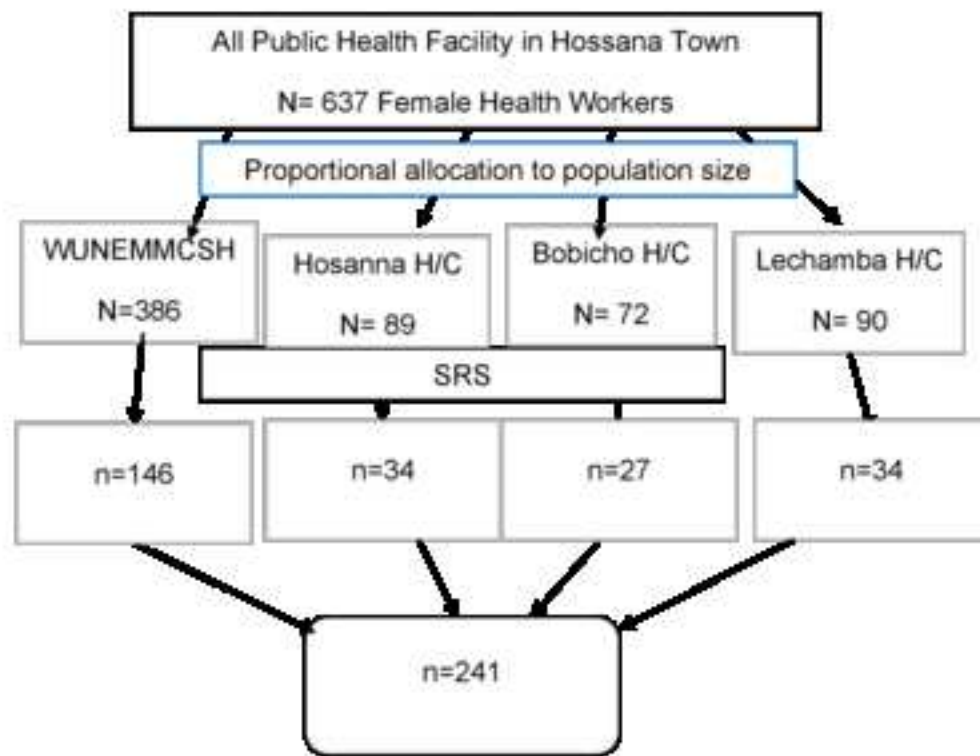


Fig 1: Schematic presentation of the sampling procedure of this study.

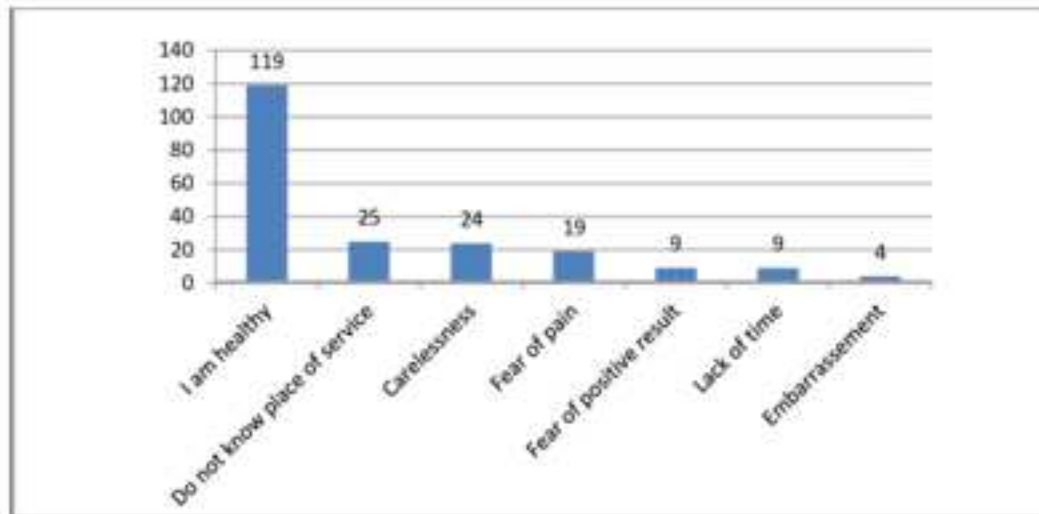


Figure 2 Main reasons not utilized cervical cancer screening among female health workers in Hoassa Town, Southern Ethiopia, 2021.



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