ORIGINAL RESEARCH

Social Determinants of Cervical Cancer Screening among Women Aged 35-64: A Quantitative Analysis of the Demographic and Health Survey Data, Haiti, 2016-2017

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Introduction

Cervical cancer ranks third in most cancer cases and cancer deaths among women in Haiti (1). In 2020, cervical cancer accounted for about 10% of all new cancer cases among females and 5% of all cancer-related deaths in Haiti (2). This burden in cervical cancer morbidity and mortality could be the result of the high prevalence of carcinogenic human papillomavirus (HPV) and insufficient widespread screening (3). Pap smear (Pap test) is Haiti's primary cervical cancer screening method (4). Research conducted in Haiti to assess cervical cancer screening has primarily included non-randomly selected participants from specific sites, lacking representativeness and generalizability. Therefore, research exploring the social determinants of cervical cancer screening using population-based data is needed. The objective of the study was to identify the social determinants of cervical cancer screening among women aged 35-64 in Haiti.

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Methods

Setting: The study was conducted in Haiti, a Caribbean nation where women play a central role in the society and local economy (5). Its total population is roughly 12 million inhabitants (6). Administratively, the country is composed of 10 geographic departments, 42 districts, and 140 communes (7). Similarly, the healthcare system encompasses health directorates, district health units, and health facilities at the department, district, and commune levels, respectively (8). The median age of the Haitian population is 23 years, and women of reproductive age account for about 28% of the total population (7). Haiti has faced numerous natural disasters, notably the devastating 2010 earthquake and the severe cholera epidemic that ensued; the country continues to rank poorly in health indicators, especially in maternal and child health (9). Haiti is considered the poorest country in the Latin America and Caribbean (LAC) region and scores low on the United Nations Human Development Index (10). Lastly, the proportion of Haiti's budget allocated by the government of Haiti to health decreased markedly from 16.6% in 2004 to 4.4% in 2017 (11); its health budget is significantly below the average health budget observed across the LAC region, representing less than 50% of their typical health expenditures (12).

Data Source: We relied on secondary data from Haiti's latest Demographic and Health Survey (Haiti DHS 2016-2017), a population-based survey implemented periodically to generate accurate estimates to support decision-making (13). The

study employed a two-stage randomized cluster sampling strategy for data collection. First, 450 primary sampling units or clusters were systematically selected across Haiti's ten geographic departments based on a probability proportional to size sampling methodology where the number of households of a cluster determined its size. Second, 13,546 households were systematically selected based on a simple random sampling (equal probability) from each cluster, of whom 13,451 were identified during the survey. Eligible inhabitants of identified households were invited to participate, including women of reproductive age, 15-49 years, and women aged 50-64. Data were collected from November 2016 through April 2017. Data on cervical cancer screening were available only for women aged 35-64. Therefore, our analysis was restricted to this specific age group.

Dependent Variable: The dependent variable was cervical cancer screening, a binary outcome variable where 1 is defined as women who had ever had a cervical cancer screening and 0 as women who had never had a cervical cancer screening.

Explanatory Variable: We selected the explanatory variables based on a literature review: age groups (35-44,45-54, 55-64 years), highest educational attainment (no education, primary, secondary, higher), household wealth (poorest, poorer, middle, richer, richest), place of residence (urban, rural), region of residence (Aire Metropolitaine, Reste-Ouest, Sud-Est, Nord, Nord-Est, Artibonite, Centre, Sud, Grand'Anse, Nord-Ouest, Nippes), religion [Catholic, Protestant, others (e.g., No religion, Vaudousant, and other minority faiths such as Judaism and Islam)], and parity (0, 1, 2, 3, ≥3).

Data Analysis: All the analyses were conducted using STATA version 17.0. The command “svyset” of STATA was used to account for the survey weights during the analysis. At first, descriptive analyses were conducted, and the findings were reported in unweighted frequency and weighted proportions. Then, bivariate analyses were conducted to determine the distribution of covariates across the dependent variable categories. Multivariable logistic regression was conducted to determine the factors associated with cervical cancer screening. Both crude odds ratio (COR) and adjusted odds ratio (AOR) were reported with a 95% confidence interval (CI). A p-value<0.05 was considered statistically significant in the final model.

Ethical considerations: Per Georgia State University's policy, studies that use DHS data are categorized as non-human subject studies and do not require IRB approval.

Results

A total of 2,537 women aged 35-64 participated in the survey, of whom 255 (11.47%) reported having ever been screened for cervical cancer. About one-third (31.54%) had been screened over three years ago (Figure 1). Cervical cancer screening proportions were 11.38% in the age group 35-44, 13% in women aged 45-54, and 9.27% in the age group 55-64 (Table 1). More than one-third (35,18%) of the respondents with higher education attainment reported having been screened for cervical cancer, against 5.32% in the group with no education, 10.53% in the group with primary education, and 22.27% among those with secondary education. Cervical cancer screening proportions were 22.12% and 5.90% in the metropolitan area and Nord-Ouest, respectively. About 20% of the urban respondents reported cervical cancer screening, while about 6% of the respondents who live in rural areas reported having undergone cervical cancer screening.

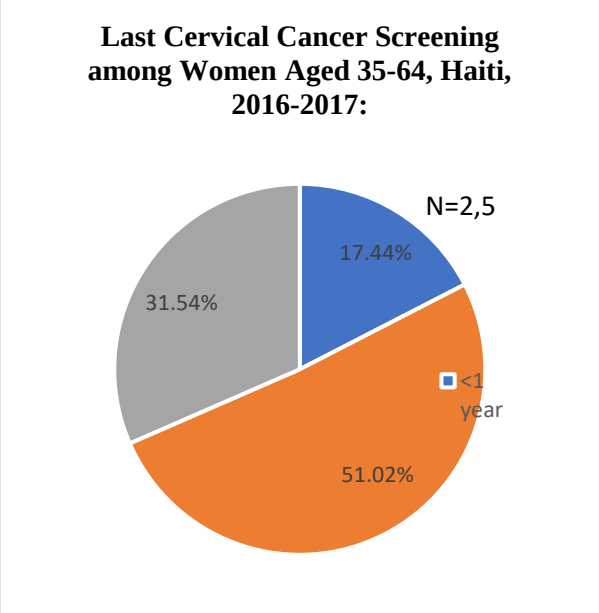

Table 1. Background Characteristics of the Participants and Prevalence of Cervical Cancer Screening by Covariates (N= 2,537)

Covariates	Total		Cervical Cancer Screening				P-value
			No		Yes		
	N[a]	%[b]	n[a]	%[b]	n[a]	%[b]	
Age groups (in years)							0.1708
35–44	1,007	42.08	905	88.62	102	11.38	
45-54	859	33.25	758	87	101	13	
55-64	671	24.68	619	90.73	52	9.27	
Highest educational attainment							<0.0001
No education	1,203	45.57	1141	94.68	62	5.32	
Primary	804	30.41	732	89.47	72	10.53	
Secondary	460	20.71	368	77.73	92	22.27	
Higher	70	3.31	41	64.82	29	35.18	
Household wealth							<0.0001
Poorest	599	18.5	583	97.91	16	2.09	
Poorer	597	20.52	569	95.69	28	4.31	
Middle	486	19.04	448	92.71	38	7.29	
Richer	446	21.01	387	86.63	59	13.37	
Richest	409	20.93	295	71.65	114	28.35	
Place of residence							<0.0001
Urban	856	40.56	696	80.43	160	19.57	
Rural	1,681	59.44	1586	94.17	95	5.83	
Region of residence							<0.0001
Aire Métropolitaine	290	21.04	227	77.88	63	22.12	
Rest-Ouest	244	16.19	230	93.98	14	6.02	
Sud-Est	204	5.89	191	93.3	13	6.7	
Nord	252	11.24	216	87.53	36	12.47	
Nord-Est	183	3.35	169	92.48	14	7.52	
Artibonite	321	15.3	294	91.82	27	8.18	
Centre	196	6.69	175	88.68	21	11.32	
Sud	229	7.57	206	89.43	23	10.57	
Grand'Anse	186	4.06	169	90.53	17	9.47	
Nord-Ouest	254	5.21	239	94.1	15	5.9	
Nippes	178	3.46	166	93.48	12	6.52	
Religion							0.0264
Catholic	1,113	40.63	999	88.7	114	11.3	
Protestant	1,277	52.42	1144	87.61	133	12.39	
Others[c]	147	6.95	139	95.52	8	4.48	
Parity							0.122
0	1,233	46.83	1111	89.38	122	10.62	
1	128	5.63	109	82.74	19	17.26	
2	207	9.33	174	83.52	33	16.48	
3	208	9.18	187	88.95	21	11.05	
≥3	761	29.02	701	90	60	10	
Total	**2,537**	**100.00**	**2,282**	**88.60**	**255**	**11.40**	

[a] Unweighted frequency
[b] Weighted percentages
[c] Includes: no religion, Vodouisant, and others

In crude logistic regression analysis, cervical cancer screening was significantly associated with educational attainment, household wealth, place of residence, and region of residence (Table 2). In adjusted logistic regression analysis, educational attainment, and household wealth, and age were significantly associated with cervical cancer screening. Women aged 45-54 years were more likely to have ever been screened for cervical cancer (AOR = 1.62, 95% CI: 1.12-2.34) than those aged 35-44. Cervical cancer screening was more prevalent among women whose highest educational attainment was higher and secondary levels compared to those with no education: AOR = 4.94, CI: 2.46-9.89 and AOR = 2.28, CI: 1.44-3.61, respectively). For household wealth, women in the "richest" group were 8.15 times more likely to have ever been screened for cervical cancer (CI: 3.97 – 16.72) than the "poorest" category; screening was 4.38 times higher in the "richer" group (CI: 2.23 – 8.59), 2.9 times higher in the "middle" group (CI: 1.53 – 5.49), and 1.80 times higher in the "poorer" group (CI: 0.95 – 3.40) compared to the "poorest" group.

Table 2: Crude and Adjusted Logistic Regression Showing the Factors Associated with Cervical Cancer Screening

Covariates		95% CI				95% CI		
	COR	Lower Limit	Upper Limit	P-value	AOR	Lower Limit	Upper Limit	P-value
Age								
35–44	Ref				Ref			
45-54	1.23	0.90	1.68	0.189	1.62	1.12	2.34	0.011
≥55	0.76	0.53	1.11	0.154	1.18	0.70	2.00	0.533
Highest educational attainment								
No education	Ref				Ref			
Primary	1.80	1.26	2.58	0.001	1.26	0.85	1.86	0.252
Secondary	4.57	3.20	6.52	0	2.28	1.44	3.61	0
Higher	13.60	7.67	24.09	0	4.94	2.46	9.89	0
Household wealth								
Poorest	Ref				Ref			
Poorer	1.79	0.96	3.36	0.068	1.80	0.95	3.40	0.071
Middle	3.11	1.70	5.67	0	2.90	1.53	5.49	0.001
Richer	5.58	3.15	9.89	0	4.38	2.23	8.59	0
Richest	14.40	8.26	25.13	0	8.15	3.97	16.72	0
Place of residence								
Urban	Ref				Ref			
Rural	0.26	0.19	0.34	0	0.91	0.60	1.39	0.665
Region of residence								
Aire Métropolitaine	Ref				Ref			
Rest-Ouest	0.21	0.11	0.40	0	0.55	0.27	1.09	0.086
Sud-Est	0.24	0.12	0.47	0	0.70	0.34	1.42	0.32
Nord	0.59	0.35	1.00	0.048	1.09	0.65	1.83	0.743
Nord-Est	0.29	0.15	0.57	0	0.77	0.39	1.53	0.46
Artibonite	0.32	0.19	0.55	0	0.82	0.48	1.41	0.478
Centre	0.43	0.24	0.79	0.006	1.43	0.76	2.68	0.269
Sud	0.39	0.22	0.70	0.002	1.03	0.56	1.90	0.919
Grand'Anse	0.34	0.18	0.65	0.001	1.35	0.69	2.63	0.374
Nord-Ouest	0.22	0.11	0.42	0	0.61	0.31	1.17	0.136
Nippes	0.25	0.12	0.50	0	0.86	0.41	1.80	0.687
Religion								
Catholic	Ref				Ref			
Protestant	0.99	0.75	1.32	0.965	0.89	0.67	1.19	0.436
Others	0.50	0.23	1.08	0.077	0.81	0.37	1.78	0.595
Parity								
0	Ref				Ref			
1	1.49	0.85	2.60	0.165	0.68	0.36	1.29	0.235
2	1.58	1.01	2.48	0.044	0.93	0.54	1.58	0.783
3	1.00	0.60	1.66	0.989	0.72	0.40	1.31	0.283
≥3	0.79	0.56	1.10	0.166	1.03	0.68	1.58	0.878

Discussion

The overall cervical cancer screening prevalence was 11% among women aged 35-64 years in Haiti. Household wealth and education attainment were significantly associated with cervical cancer screening after adjusting for relevant confounders such as place of residence, region of residence, religion, and parity. While cervical cancer screening increased with household wealth and education attainment, it did not increase among women aged 55-64. However, women aged 45-54 were more likely to have ever been screened for cervical cancer compared to those aged 35-44.

A population-based study that used Cameroon's DHS data found comparable results. Women whose education attainment was higher and were in the "richest" group had significantly greater odds of having been screened for cervical cancer compared with women with no education; in the "poorest" group, the adjusted odds ratios were 1.85 and 4.14, respectively. However, Cameroon's DHS surveyed women of childbearing age (15-49 years), controlled for HIV screening status, and found that urban vs rural residence and geographic location were positively associated with cervical cancer screening (14). Likewise, South Africa's DHS data analysis found significantly greater odds of reporting a Pap smear test as education attainment and wealth index (rich vs poor) increased. The study in South Africa controlled for other factors, such as race and perceived health status, that were irrelevant or not measured in our study (15). Lastly, a non-population-based study conducted in Haiti also found that education attainment was positively associated with Pap smear test (4).

We identified at least two limitations. First, our study may be prone to information bias. Participants may have had difficulty recalling cervical cancer screening tests or may have provided socially acceptable answers. However, enumerators were trained for five weeks for effective data collection (5), and major recall differences between women who had ever been screened for cervical cancer and those who had never been screened would be unlikely. Second, some variables could not be assessed. We could not include marital status in our analysis as a covariate because of substantial missing values (around 45%) and health insurance status due to lack of power (only 2% of the participants had reported having health insurance). To our knowledge, our study is the first to use nationally representative data to identify potential factors associated with cervical cancer screening in Haiti among women aged 35-64. Therefore, the results of our study can be generalized to this population.

Our study identified two major social determinants of cervical cancer screening in Haiti: education attainment and household wealth. These findings reflect similar studies conducted in other resource-limited settings. Because of the burden of cervical cancer in Haiti, more efforts are needed to enhance cervical cancer screening among disadvantaged groups to address health disparities, strengthen access to screening, and provide optimal care. Eventually, adding the HPV vaccine to Haiti's immunization schedule can also contribute to reducing cervical cancer incidence in the future.

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Copyright Materials/Tools
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