International Journal of Modern Medicine
VOLUME05 ISSUE02
PUBLISHED DATE: - 02-03-2026
DOI: https://doi.org/10.55640/ijmm-05-02-02
Page 8-21
eISSN: 2156-5198 pISSN: 2156-518X

RESEARCH ARTICLE

Educational Attainment as a Structural Determinant of Cervical Cancer Prevention Behaviour Among Women in Southeast Nigeria

The PENKUP Collaboration

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ABSTRACT

Cervical cancer remains a leading cause of cancer morbidity and mortality among women in Nigeria, despite the availability of effective preventive interventions such as Pap smear screening and human papillomavirus vaccination. Empirical evidence increasingly suggests that disparities in prevention uptake are shaped less by individual attitudes alone and more by structural factors that influence access to information, services, and decision-making capacity. Drawing on data from a cross-sectional study of 402 women attending primary health centres in Nnewi-North Local Government Area, Anambra State, this paper examines educational attainment as a key determinant of knowledge, attitudes, and preventive behaviour related to cervical cancer. Education emerged as the most consistent and statistically significant predictor of awareness of cervical cancer, understanding of Pap smear screening, knowledge of HPV vaccination, and willingness to recommend vaccination. In contrast, age, parity, sexual activity, and marital status showed limited or no association with preventive behaviours. The findings highlight education not merely as an individual attribute, but as a structural enabler of health literacy, agency, and engagement with preventive services. The paper argues that cervical cancer prevention strategies in Nigeria must move beyond awareness campaigns alone and adopt education-sensitive approaches that address entrenched inequalities in access to information and care. Integrating cervical cancer prevention into routine primary healthcare, alongside targeted community education for women with lower educational attainment, is essential for reducing persistent gaps between awareness and practice.

Keywords: Cervical cancer, education, Pap smear, HPV vaccination, health inequality, Nigeria.

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1. INTRODUCTION

Cervical cancer continues to place a significant burden on women in Nigeria, where it remains one of the most common cancers affecting those of reproductive age. Recent estimates from the ICO/IARC Information Centre on HPV and Cancer indicate that more than 12,000 Nigerian women are diagnosed with cervical cancer each year, and close to 8,000 die from the disease, making it the second most frequent cancer among women nationally (ICO/IARC, 2023). These figures highlight the persistent gaps in prevention, early detection, and access to timely treatment, despite the fact that cervical cancer is largely preventable through HPV vaccination and regular screening.

Global strategies have increasingly prioritised cervical cancer elimination, with the World Health Organization calling for widespread HPV vaccination, high-performance screening, and effective treatment pathways. Nigeria has aligned itself with these goals, yet implementation challenges remain, particularly at the primary healthcare level where screening and vaccination services are often limited (Federal Ministry of Health, 2025). Many facilities lack trained personnel, functional equipment, or consistent supply chains, which restricts women's ability to access preventive care even when they are aware of its importance.

Much of the existing literature has focused on individual knowledge and attitudes as explanations for low screening and vaccination uptake. Although these factors matter, recent scholarship suggests that awareness alone does not reliably translate into preventive action. Women may understand that cervical cancer is a serious health concern but still face barriers such as cost, distance, competing responsibilities, or limited-service availability (Lawal et al., 2023). These findings point to the influence of broader social and structural determinants that shape women's health behaviours.

Educational attainment is one of the most powerful determinants of health outcomes and plays a central role in shaping women's engagement with cervical cancer prevention. Education influences how women interpret health information, navigate healthcare systems, and make decisions about screening and vaccination. It also affects confidence in interacting with health professionals and understanding the purpose of preventive services. In Nigeria, where educational inequalities remain pronounced across regions and socioeconomic groups, these differences can significantly affect women's ability to protect their health.

Understanding the role of education is especially important in Southeast Nigeria, where disparities in health literacy and service utilisation continue to influence women's experiences of cervical cancer prevention. This paper examines educational attainment as a key determinant of preventive behaviour among women in Nnewi-North Local Government Area. Drawing on data from a facility-based cross-sectional study, the analysis explores how education shapes knowledge, attitudes, and practices related to cervical cancer, Pap smear screening, and HPV vaccination. Education is treated not simply as a demographic characteristic but as a structural factor that mediates women's

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interaction with the health system and their capacity to act on available information.

2. Conceptual Framework: Education and Preventive Health Behaviour

Education plays a central role in shaping health outcomes, and its influence operates through several interconnected pathways. Higher levels of education are strongly associated with improved health literacy, which enhances an individual's ability to access, interpret, and apply health information in everyday decision-making. Recent evidence from Nigeria shows that health literacy remains unevenly distributed, with many adults lacking the skills needed to understand preventive health messages or navigate the health system effectively (Olabanji, 2023). Education also affects employment opportunities and income, which in turn influence access to healthcare services, the ability to pay for preventive interventions, and the capacity to prioritise long-term health needs.

Within models of preventive health behaviour, education functions as both a cognitive and structural resource. Cognitively, education supports the development of critical thinking, enabling individuals to understand disease causation, evaluate the benefits of preventive interventions, and recognise the importance of early detection. Structural influences arise from the social and economic advantages that education confers, including greater autonomy, improved communication with healthcare providers, and increased exposure to formal health information channels. These advantages help individuals navigate health systems more effectively and reduce reliance on informal or inaccurate sources of information.

Limited education can constrain these processes. Studies in Nigeria have shown that lower educational attainment is associated with reduced health literacy, greater dependence on non-medical sources of information, and higher susceptibility to misconceptions about disease and prevention (Enebeli, 2025). Such constraints may reinforce fatalistic beliefs or culturally embedded explanations of illness, which can discourage engagement with preventive services. These patterns are particularly relevant in contexts where misinformation about cancer, screening, or vaccination circulates widely and where health systems struggle to provide consistent, accessible information.

Cervical cancer prevention illustrates these dynamics clearly. Pap smear screening requires more than simple awareness of its existence. Women need to understand its preventive purpose, recognise the value of early detection, and know where and how to access services. They must also feel confident undergoing a procedure that may be perceived as invasive or embarrassing. Research from Europe and other regions shows that women with higher education are more likely to participate in cervical screening programmes, partly because they possess greater knowledge and partly because they experience fewer structural barriers (Torres et al., 2023). Similar patterns are evident in HPV vaccination, which depends on trust in biomedical interventions, comprehension of long-term benefits, and engagement with formal health services. Education shapes each of these dimensions,

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making it a critical determinant of cervical cancer prevention behaviour.

Understanding education as a structural determinant rather than a background characteristic provides a more nuanced lens for analysing preventive health behaviour. It highlights how educational inequalities can translate into health inequalities and underscores the importance of designing interventions that address both informational and structural barriers. This perspective is particularly relevant in Nigeria, where disparities in educational attainment continue to shape women's access to and use of preventive health services.

3. Methods

3.1 Study Design and Setting

The study adopted a descriptive cross-sectional design with an analytical component, a design commonly used in public health research to explore associations between socio-demographic characteristics and health behaviours (Wright et al., 2023). Data were collected from women attending primary health centres in Nnewi-North Local Government Area of Anambra State, Southeast Nigeria. The area comprises both urban and semi-urban communities and is served by several primary healthcare facilities that provide maternal, child health, and preventive services. Primary health centres remain the first point of contact for many women in Nigeria, making them suitable settings for research on preventive health behaviour (Ogah et al., 2024).

3.2 Study Population and Sampling

The study population consisted of women aged 21 to 65 years who attended selected primary health centres during the study period. Eligibility criteria included being within the specified age range and providing informed consent. A multistage random sampling technique was used to select health facilities and respondents, a method widely applied in Nigerian health systems research to ensure representativeness across facility types and locations (Wright et al., 2023). In total, 427 questionnaires were distributed, and 402 were completed and returned, resulting in a response rate of 94.1 per cent.

3.3 Data Collection and Variables

Data were collected using a structured interviewer-administered questionnaire. This approach is frequently used in Nigerian primary healthcare research due to varying literacy levels and the need to ensure accurate interpretation of questions (Adejumo et al., 2025). The questionnaire captured socio-demographic characteristics, including educational attainment, alongside knowledge, attitudes, and practices related to cervical cancer, Pap smear screening, and HPV vaccination.

Educational attainment was categorised into four groups: no formal education, primary education, secondary education, and tertiary education. Outcome variables included awareness of cervical cancer, awareness of Pap smear screening, awareness of HPV vaccination, and willingness to recommend HPV vaccination. These variables reflect key indicators used in previous studies examining preventive health behaviour in similar settings (Ogah et al., 2024).

3.4 Data Analysis

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Data were analysed using SPSS version 25. Descriptive statistics were used to summarise participant characteristics and distribution of key variables. Chi-square tests were employed to examine associations between educational attainment and prevention-related outcomes. This analytical approach aligns with established methods for assessing relationships between categorical variables in cross-sectional studies (Adejumo et al., 2025). Statistical significance was set at $p < 0.05$.

4. Results

4.1 Educational Profile of Respondents

Most respondents reported at least secondary education, and nearly one quarter had completed tertiary education (Table 1). A smaller proportion had primary education, while only a few indicated no formal education. This pattern reflects the educational profile commonly observed among women who utilise primary healthcare services in Southwest Nigeria, where secondary education remains the most frequent level of attainment among adult female service users (Olamide et al., 2025).

Table 1: Socio-Demographic Characteristics of Respondents (N = 402)

Variable	Category	n	%
Age group (years)	21–30	133	33.1
	31–40	114	28.4
	41–50	76	18.9
	51–65	71	17.7
Educational level	No formal education	12	3.0
	Primary	22	5.5
	Secondary	280	69.7
	Tertiary	88	21.9
Marital status	Single	113	28.1
	Married	262	65.2
	Widowed	18	4.5
	Divorced	9	2.2
Sexually active	Yes	286	71.1
	No	116	28.9
Number of children	No child	86	21.4
	1 child	18	4.5
	2 children	63	15.7
	3 children	75	18.7
	4 children	80	19.9
	5 children	60	14.9
	6 children	17	4.2
	7 children	3	0.7

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4.2 Education and Awareness of Cervical Cancer

Educational attainment showed a strong and statistically significant association with awareness of cervical cancer. All women with tertiary education reported having heard of cervical cancer, and most respondents with secondary education also demonstrated awareness (Table 2). None of the women without formal education reported any knowledge of the disease. This gradient aligns with evidence that education is a key determinant of cancer awareness in Nigerian communities, particularly for conditions requiring specialised knowledge such as cervical cancer (Irowa et al., 2025). The strength of this association in the present study highlights the central role of education in shaping foundational health awareness.

Table 2: Education Level vs Awareness and Attitudes (N = 402)

Education level	Cervical cancer heard (n)	Cervical cancer not heard (n)	Pap smear heard (n)	Pap smear not heard (n)	HPV vaccine heard (n)	HPV vaccine not heard (n)	Would recommend HPV vaccine (n)	Would not / not sure (n)
No formal	0	21	5	16	4	17	6	15
Primary	5	37	7	35	7	35	14	28
Secondary	86	9	84	11	32	63	34	61
Tertiary	39	3	33	9	30	12	31	11

4.3 Education and Knowledge of Pap Smear Screening

Most respondents (75.9%) had heard of the Pap smear test, an important method for early detection of cervical cancer. This shows that although general awareness of cervical cancer was high, knowledge of the specific screening test was comparatively lower. Those who had heard of the Pap smear were asked about its purpose. Nearly two-thirds (65.7%) correctly stated that the test is used to detect early cervical changes that may lead to cancer, while 23.4% believed it is used to treat cancer. A further 10.9% reported not knowing its purpose. These findings suggest that although many respondents were familiar with the Pap smear, their understanding of its preventive role was incomplete. Awareness of the Pap smear differed significantly by education level (24% among women with no/primary education vs. 79-88% among women with secondary/tertiary education) ($\chi^2 = 84.5$, $p < 0.001$). This highly significant difference indicates that better-educated women were far more likely to be aware of Pap screening. This finding is consistent with recent research showing that screening knowledge in Nigeria is strongly influenced by educational attainment, which enhances both exposure to health information and confidence in engaging with preventive services (Ike et al., 2025).

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Only a minority of respondents had ever undergone a Pap smear. As shown in Table 3, 11.2% had been screened at least once, while 88.8% had never done so. This indicates low utilisation of screening services despite relatively high awareness.

Table 3: Utilization of Pap Smear Screening among Respondents (N = 402)

		Frequency	Percent
Valid	no	357	88.8%
	yes	45	11.2%
	Total	402	100.0%

Among those who had not been screened, several reasons were reported. The most common was not knowing where to have the test (38.6%), followed by lack of time (25.4%) and fear of the result (18.2%). Smaller proportions cited cost (10.5%) or a belief that the test was unnecessary (7.3%). Chi-square tests showed no significant associations between any demographic factor and having undergone a Pap smear (all $p > 0.05$). For example, uptake was around 10% among women with secondary education and about 5% in other groups, but these differences were not statistically significant.

Respondents were also asked how often they believed the Pap smear should be done. Knowledge of the recommended screening interval was generally poor and showed no significant demographic pattern. Only a small proportion selected the correct interval of every three years, while most answered “every year” or “I don’t know”. No socio-demographic variable strongly predicted correct knowledge of screening frequency.

Willingness to have a free Pap smear was high across the sample. Around 70% of women said they would undergo the test if it were offered at no cost, and this pattern was consistent across all demographic groups. None of the measured variables showed a significant association with willingness to be screened.

4.4 Education and HPV Vaccination Awareness and Attitudes

A substantial proportion of respondents (69.6%) reported knowing at least one person who had received the HPV vaccine, suggesting that vaccination is becoming increasingly visible within the community. Most respondents (83.5%) also indicated that they would recommend the HPV vaccine to other women, reflecting generally positive attitudes toward vaccination.

Educational attainment was the only demographic factor that significantly predicted willingness to recommend the vaccine ($\chi^2 = 21.7$, $p < 0.001$). In this sample, 74% of tertiary-educated women said they would recommend HPV vaccination, compared with only about 30 to 36% of women in lower-education groups. This pattern suggests that women with higher education were more likely to hold favourable views toward HPV vaccination, consistent with broader evidence that education

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strengthens vaccine-related understanding and shapes acceptance in many African contexts (Olaoye & Macdonald, 2024). No other demographic factor showed a significant association with willingness to recommend the vaccine.

Education level was also strongly associated with awareness of the HPV vaccine ($\chi^2 = 32.3$, $p < 0.001$). Only around 17% (7 out of 42) of women with primary education had heard of the vaccine, compared with 71% (30 out of 42) of those with tertiary education. No other demographic variable, including age or marital status, showed a significant effect. This pattern mirrors wider findings that HPV awareness tends to be lower among women with limited formal education.

These results show that education plays a central role in shaping both HPV vaccination awareness and willingness to recommend it. Other demographic characteristics did not significantly influence knowledge or attitudes, suggesting that educational attainment remains the strongest and most consistent predictor in this context.

5. Discussion

The findings of this study highlight educational attainment as the most influential determinant of cervical cancer prevention knowledge and attitudes among women in Southeast Nigeria. Education consistently shaped awareness of cervical cancer, understanding of Pap smear screening, and engagement with HPV vaccination. Other demographic variables showed limited or inconsistent associations, reinforcing the centrality of education in shaping preventive health behaviour in this context.

These results align with wider evidence from low- and middle-income countries, where education has repeatedly been identified as a key driver of health literacy and preventive action. A recent systematic review of cervical cancer screening interventions in LMICs found that women with higher education were more likely to understand screening recommendations and participate in prevention programmes (Tin et al., 2023). Similarly, global analyses of cervical cancer elimination efforts emphasise that educational inequalities contribute to persistent gaps in awareness and uptake of preventive services (Bhadra Vale & Teixeira, 2023). The present study reinforces these patterns by demonstrating that education remains a decisive factor in shaping foundational knowledge and positive attitudes toward prevention.

The absence of a strong association between education and actual Pap smear uptake in this study does not diminish the importance of education. Instead, it points to the presence of structural barriers that limit women's ability to act on their knowledge. Evidence from LMICs shows that even when women understand the value of screening, uptake remains low when services are unavailable, unaffordable, or difficult to access (Shin et al., 2021). These barriers include shortages of trained personnel, limited screening equipment, and fragmented referral pathways, all of which are well-documented challenges within many Nigerian primary healthcare settings. The findings of this study therefore suggest that education enables awareness but cannot, on its own, overcome systemic constraints.

The results also challenge the assumption that awareness campaigns alone are sufficient to improve prevention uptake. Although awareness was relatively high among women with secondary and tertiary education, screening rates remained low across all educational groups. This pattern mirrors findings from other LMIC settings, where awareness campaigns have improved knowledge but have not translated into substantial increases in screening or vaccination uptake without parallel investments in service delivery and system strengthening (Gomes et al., 2023). The implication is that education enhances understanding and positive attitudes, but structural limitations within the healthcare system continue to restrict women's ability to translate awareness into action.

Overall, the findings underscore the need for a dual approach to cervical cancer prevention in Nigeria. Strengthening educational opportunities and health literacy remains essential, but these efforts must be accompanied by improvements in service availability, affordability, and accessibility. Without addressing these systemic barriers, gains in awareness are unlikely to produce meaningful increases in screening or vaccination uptake.

Author Contribution

All authors played a substantive role in shaping this study and developing the manuscript. K.G.I. conceptualised the work and designed the overall study framework. Data analysis, interpretation of data and validation of findings were carried out collaboratively, with each author contributing to the discussions that informed the final results. K.G.I. and K.O.O. prepared the initial manuscript draft, covering the introduction, methods, results and discussion. Co-authors strengthened the analysis, offered detailed revisions and enhanced the clarity and coherence of the final document. Every author reviewed the complete manuscript, approved the final version and accepted responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflicts of interest.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgement

The authors would like to acknowledge the management and technical staff of PENKUP Research Institute, Birmingham, United Kingdom for their excellent assistance and for providing manuscript writing/editorial support in accordance with Good Publication Practice (GPP3) guidelines.

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