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Assessing the impact of cervical cancer education in two high schools in Ghana

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Abstract

Background Cervical cancer is one of the commonest female cancers in Ghana. However, it is preventable. Prevention through Human Papilloma Virus immunization and early detection by screening have their foundation in awareness and a good knowledge about the disease. Acquiring the right knowledge about cervical cancer should be earlier rather than later while mindsets are still being formed to translate into the right attitudes and behaviours later in life.

Methodology An unpaired pre- and post-test quasi experimental study was conducted at two Ghanaian senior high schools. An educational intervention was carried out comprising a drama, PowerPoint lecture, question and answer session and cervical cancer information leaflet distribution. A self-administered questionnaire was given as a pre-test and repeated as a post-test after 3 months. The total score for each domain of knowledge tested was categorized into adequate knowledge (≥ 50%) and inadequate knowledge (< 50%).

Results The number of participants in the pre- and post-test were 1,107 and 1,276 girls respectively, with average age of 16 years. General knowledge on cervical cancer improved to 94.4% from 73% following the intervention, but only 46.2% said cervical cancer was curable following the education. Knowledge on symptoms improved from 78 to 87.1% and risk factor knowledge improved from 81.8 to 89.3%. After the intervention, 37% from an initial 42% still thought that having sex at a young age (adolescence) was not a risk factor. Screening and prevention knowledge improved from 82.9 to 91% but only 37.2% knew the recommended age to begin screening with pap smears, even after the education. Overall knowledge on cervical cancer after the education significantly improved from 79.1 to 92.3%.

Conclusion Knowledge of cervical cancer among young girls in two High Schools, improved with the educational intervention. Areas of education to be emphasized are: cervical cancer is curable if diagnosed early, increased risk with early onset of sexual activity, and recommended age to start screening. Educating young girls on cervical cancer increases their awareness and gives them adequate knowledge which should influence their attitudes and behaviour towards cervical cancer in the future. It should be considered for adoption into high school curricula.

Keywords Cervical cancer, Knowledge, Educational intervention, High schools, Ghana, Girls

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Background

Globally, cervical cancer is the 5th commonest cancer with age-standardized incidence of 13.3/100,000 and the 7th cause of cancer mortality. However, in Africa it is the 2nd most common cancer contributing 22.3% of female cancers [1]. It is the leading cause of cancer mortality accounting for 13.4% of cancer deaths in Africa [1]. Similarly, in Ghana cervical cancer is the 3rd commonest cancer contributing 11.6% of all cancers, and 19.9% of female cancers, second only to breast cancer. It is the commonest cause of cancer deaths, accounting for 20% of cancer deaths [1]. Countries with under resourced health systems, like Ghana, are struggling to cope with the rapid rise of cancers in addition to all the other prevailing diseases [2]. Focusing on prevention and early detection of cancers will eventually reduce the incidence and positively impact on individuals, their families and the nation [2]. Cervical cancer is the first cancer for which the World Health Organization (WHO) has developed a global strategy for its elimination as a public health program. This projected elimination is said to be achievable by all countries using the pillars of prevention, early detection through screening and effective treatment [3].

Cervical cancer is mainly caused by Human Papilloma Virus (HPV) infections [3, 4] and starts with precancerous lesions that over time develop into full blown cancer [3]. It is therefore mostly a preventable disease and represents a failure of the healthcare system if HPV infection cannot be prevented or precancerous lesions detected early and treated [2, 3, 5]. Prevention and early detection have their foundation in people being aware of and well educated on cervical cancer and the strategies of prevention which include HPV immunization and regular screening to detect very early disease [5–11]. Studies on barriers to screening for cervical cancer confirm lack of awareness as one of the major reasons why women do not engage in screening for cervical cancer [5, 9, 11, 12]. The lack of organized population-based cervical cancer screening and immunization programs are responsible for the high prevalence of cervical cancer in developing countries including Ghana [3, 13]. In the more developed countries cervical cancer deaths are relatively less than in the developing countries [2, 3] due to screening programs, early detection and treatment in the early stages of the disease. In these countries the incidence of cervical cancer has fallen with the introduction of immunization against HPV, the causative agent of almost all cases of cervical cancer [3]. Vaccination of young girls against HPV can prevent the development of cervical cancer, while pre-malignant lesions caused by HPV if diagnosed early are easily treatable [3]. However, in Ghana and other less developed countries most patients diagnosed with cervical cancer have poor prognosis as they present with late disease.

Several women resort to alternative treatments including herbs, prayers and homeopathy with the belief that cervical cancer has spiritual causes and also cannot be cured medically [14]. These beliefs, attitudes and practices are irrespective of one's educational, ethnic or religious background and stems from a lack of awareness about cervical cancer. From our practice, it is a common observation to find both the very well-educated and illiterates holding on to the same beliefs which are deeply rooted in our culture. A higher level of education does not seem to translate into an increased level of understanding about cervical cancer. Adequate awareness encompasses knowledge about the causes, risk factors, preventive measures and treatment of the disease [9, 12, 14, 15] which this paper explores. Mindsets are formed right from childhood and lack of awareness with its associated myths and misconceptions at this stage are carried into adulthood. When faced with a crisis, people tend to fall on their deeply held beliefs. Cervical cancer awareness therefore needs to start at an early age to bring about a positive change in mindset by providing the right knowledge which will influence the attitudes and behaviours [6, 7, 16–18]. A study in Japan on cervical cancer prevention focusing on female high school students buttresses this point as it resulted in increased numbers of students who intended to be screened in the future [6]. This in the long run would translate into prevention, early detection, early treatment and a reduction in unnecessary deaths from cervical cancer. Unfortunately, Ghana currently does not have any national screening recommendation nor a national HPV vaccination program and only 3% or less of women in Ghana have had cervical cancer screening [4, 13]. The aim of this project was to reach out to young girls to change their mindsets through education long before they encounter this disease. It is believed that education at an early age will translate into healthy decisions in adulthood. The evidence from this research will inform the need for nationwide health education in secondary schools.

Methodology

This study was conducted as part of a pilot educational activity on breast and cervical cancer in senior high schools in Ghana. The findings on the impact of the education on breast cancer have already been reported by Nsaful et al. [19].

A pre- and post-test quasi experimental study was conducted at two selected senior high schools, both with boarding facilities as that is what commonly pertains in Ghanaian high schools. One school was a public girls' school in the Central Region and the other, a private co-educational school in the Eastern region of Ghana. Students travel from across the regions to schools of their choice and the head teacher is responsible for the

students' safety and upkeep. Permission was therefore given for the school to participate in the study by the head teachers.

The educational activity consisted of a short drama, followed by a PowerPoint presentation on breast and cervical cancer, a question-and-answer session and distribution of educational leaflets on breast and cervical cancer. The script for the drama was shared with the school. It is a story of 3 friends having a conversation which highlights some of the symptoms and misconceptions relating to breast and cervical cancers and the right actions to take when faced with these symptoms. Following this, a 40-minute power point presentation was delivered by 2 doctors on breast and cervical cancer respectively. The cervical cancer presentation lasted 20 min and briefly discussed the anatomy of the female reproductive tract, definition of cervical cancer and its features, risk factors, prevention and screening as well as debunking common myths and misconceptions. This was followed by a question-and-answer session where students were given the opportunity to either ask questions verbally or in writing. Then the educational leaflets summarizing symptoms and prevention of cervical cancer were distributed to each student at the end of the intervention.

Prior to the commencement of the educational activity a pre-test was administered after the procedure had been explained to the students and the option given to opt out. All consenting female students filled out a self-administered questionnaire (supplementary file). This consisted of 18 multiple choice and True/False style questions. Four main domains on cervical cancer were covered consisting of 4 questions to assess basic knowledge (Domain I using questions 1 &2), 4 questions on symptoms (Domin II using question 3), 4 questions on risk factors (Domain III using question 4) and 6 questions on the prevention and screening (Domain IV using questions 5,6 & 7). The same questionnaire was administered as a post-test to the same group of students 3 months after the educational activity to assess the impact of the intervention. All consenting students for both the pre- and post-tests signed a written consent.

Statistical analysis

The questionnaires for the pre- and post-test were not paired on the same individual, allowing students who opted out of pre-test to participate in the post-test. Therefore, unpaired probability estimates were used in the statistical analysis so as not to affect the outcome.

Each of the questions in the four domains on general knowledge of cervical cancer, symptoms, risk factors and prevention/ screening of cervical cancer was equitably scored. Each correct answer was scored one [1] point and each incorrect answer or non-response a zero. The percentage of correct answers given by the girls on each question was then calculated. For the 4 broad domains and the overall score, the score was calculated by summing the score of all the questions in that domain and it ranged from 0 to 4 for domains I to III and 0–6 for domain IV. The percentage scores were then calculated. Total score for each domain was categorized into adequate knowledge > or = 50% and inadequate knowledge < 50% of correct answers given by each study participant. The overall score was calculated by summing all the scores for domain I-IV. A Chi-square test of proportion was used to test differences in knowledge of cervical cancer between pre-education and post-education for each question in a domain and for domain total. Continuous variables were summarized as means and standard deviations (SD), and categorical variables as count and percentages. Stata 14.0® was used for the statistical analysis and $p < 0.05$ was considered statistically significant.

Ethical considerations

The Institutional Review Board of Korle Bu Teaching Hospital for Medical Research (KBTH-IRB) (study protocol ID KBTHIRB/00063/2018) gave ethical approval. The head teachers of the two schools gave permission and each girl gave written informed consent/assent after the procedure had been explained and the option given to withdraw at any stage. Those who opted out of the pre-test were still allowed to participate in the educational activity.

Results

One thousand three hundred and three (1303) high school girls participated in the educational activity with 1,107 (85% response rate) taking the pre-test and 1,276 (98% response rate), the post-test.

The average age of the girls for the pre-test was 16.12 years and for the post-test 16.13 years. The girls were all aged between 14 and 18 years with a mean of 16.1 ± 0.8 years and were all in Senior High School forms 1, 2 or 3.

General knowledge on cervical cancer

On the pre-test, half of the girls (50.1%) knew that cervical cancer is caused by Human Papilloma Virus (HPV). Less than half of them knew that it is curable and can occur in women less than 30 years (31.3% and 48.3% respectively) as shown in Table 1. After the intervention, the levels of knowledge significantly increased for all three questions ($p < 0.001$) and for knowledge on where the cancer starts from.

Knowledge on symptoms of cervical cancer

The level of knowledge about symptoms of cervical cancer were generally high even before the educational intervention was carried out with 67.3%, 77.3% and 62.3% knowing about abnormal vaginal bleeding, offensive

Table 1 General knowledge on cervical cancer

Characteristic		Incorrect Answer n, %[1]	Correct Answer n, %[1]	p-value
Cervical cancer is caused by Human papilloma virus (HPV)				**< 0.001**
	Pre-Lecture	552 (49.9)	555 (50.1)	
	Post-Lecture	214 (16.8)	1,062 (83.2)	
Cervical cancer is curable				**< 0.001**
	Pre-Lecture	761 (68.7)	346 (31.3)	
	Post-Lecture	686 (53.8)	590 (46.2)	
Women less than 30 years cannot have cervical cancer				**< 0.001**
	Pre-Lecture	572 (51.7)	535 (48.3)	
	Post-Lecture	244 (19.1)	1,032 (80.9)	
Cervical cancer begins in the cervix				**< 0.001**
	Pre-Lecture	347 (31.3)	760 |(68.7)	
	Post-Lecture	231 (18.1)	1045 (81.9)	

[1]Row percentages

Table 2 Knowledge of symptoms of cervical cancer

Characteristic		Incorrect Answer n, %[1]	Correct Answer n, %[1]	p-value
Abnormal vaginal bleeding				**< 0.001**
	Pre-Lecture	362 (32.7)	745 (67.3)	
	Post-Lecture	319 (25.0)	957 (75.0)	
Frequent urination				**< 0.001**
	Pre-Lecture	654 (59.1)	453 (40.9)	
	Post-Lecture	612 (48.0)	664 (52.0)	
Offensive vaginal discharge				**< 0.001**
	Pre-Lecture	251 (22.7)	856 (77.3)	
	Post-Lecture	151 (11.8)	1,125 (88.2)	
Pain during sex				**< 0.001**
	Pre-Lecture	417 (37.7)	690 (62.3)	
	Post-Lecture	411 (32.2)	865 (67.8)	

[1]Row percentages

vaginal discharge and pain during sex respectively. Only 4 in 10 of the girls (40.9%) knew that frequent micturition was not a symptom of cervical cancer. Again, after the educational activity, knowledge about all the symptoms was significantly increased ($p<0.001$). (Table 2)

Knowledge of risk factors of cervical cancer

Table 3 shows the level of knowledge about the risk factors for cervical cancer. Between 57.6 and 76.2% of the girls knew that having sex at a young age, having a sexual partner who has many partners and having many sexual partners are all risk factors for cervical cancer. This level of knowledge increased to between 62.6 and 85.6%. About half of them (51.5%) incorrectly thought that excessive weight gain was a risk factor before the education. This significantly reduced to just 16.1% after the education ($p<0.001$).

Table 3 Knowledge of factors increasing risk of getting cervical cancer

Characteristic		Incorrect Answer n, %[1]	Correct Answer n, %[1]	p-value
Having sex at a young age				0.013
	Pre-Lecture	469 (42.4)	638 (57.6)	
	Post-Lecture	477 (37.4)	799 (62.6)	
Having many sexual partners				**< 0.001**
	Pre-Lecture	263 (23.8)	844 (76.2)	
	Post-Lecture	184 (14.4)	1,092 (85.6)	
Having a sexual partner who has many partners				**< 0.001**
	Pre-Lecture	359 (32.4)	748 (67.6)	
	Post-Lecture	288 (22.6)	988 (77.4)	
Excessive weight gain				**< 0.001**
	Pre-Lecture	570 (51.5)	537 (48.5)	
	Post-Lecture	206 (16.1)	1,070 (83.9)	

[1]Row percentages

Knowledge of prevention and screening for cervical cancer

Prior to the educational activity, 88% knew that cervical cancer can be prevented with 85.2% knowing about regular pap smears/screening and 75.2% knowing about HPV immunization. There was significant increase in the level of knowledge to 94.3%, 91.1% and 82.5% respectively after the educational intervention. 28.3% of the girls answered correctly in the pre-test that the recommended age to start pap smear is 21 years, this significantly increased after the educational intervention to 37.2% but was still inadequate (Table 4).

Overall knowledge about cervical cancer

The level of general knowledge on cervical cancer, its symptoms, risk factors and screening/ prevention prior to the educational activity were 73%, 78%, 81.8% and 82.9% respectively. These levels of knowledge though adequate, all significantly increased after the educational activity to 94.4%, 87.1%, 89.3% and 91% respectively. Overall, the level of knowledge of cervical cancer increased from 79.1 to 92.3% after the educational intervention ($p<0.001$) (Table 5).

Discussion

This study has demonstrated an increase in knowledge of cervical cancer among teenage girls after an educational intervention using a drama, Power Point presentation, question and answer session and informational leaflets.

Table 4 Knowledge of cervical cancer screening and prevention

Characteristic		Incorrect Answer n, %[1]	Correct Answer n, %[1]	p-value
Avoidance of smoking can help prevent cervical cancer				**0.015**
	Pre-Lecture	527 (47.6)	580 (52.4)	
	Post-Lecture	544 (42.6)	732 (57.4)	
HPV immunization can help prevent cervical cancer				**< 0.001**
	Pre-Lecture	275 (24.8)	832 (75.2)	
	Post-Lecture	223 (17.5)	1,053 (82.5)	
Regular screening/pap smear can help prevent cervical cancer				**< 0.001**
	Pre-Lecture	164 (14.8)	943 (85.2)	
	Post-Lecture	114 (8.9)	1,162 (91.1)	
Regular exercise can help prevent cervical cancer				**< 0.001**
	Pre-Lecture	896 (80.9)	211 (19.1)	
	Post-Lecture	862 (67.5)	414 (32.5)	
Age at which a woman should have her first pap smear				**< 0.001**
	Pre-Lecture	794 (71.7)	313 (28.3)	
	Post-Lecture	801 (62.8)	475 (37.2)	
Cervical cancer be prevented				**< 0.001**
	Pre-Lecture	133 (12.0)	974 (88.0)	
	Post-Lecture	73 (5.7)	1,203 (94.3)	

[1]Row percentages

Table 5 Domain analysis

Characteristic		Inadequate n, %[1]	Adequate n, %[1]	p-value
Domain I				
General knowledge of cervical cancer				**< 0.001**
	Pre-Lecture	299 (27.0)	808 (73.0)	
	Post-Lecture	72 (5.6)	1,204 (94.4)	
Domain II				
Knowledge of symptoms of cervical cancer				**< 0.001**
	Pre-Lecture	244 (22.0)	863 (78.0)	
	Post-Lecture	164 (12.9)	1,112 (87.1)	
Domain III				
Knowledge of factors increasing risk of getting cervical cancer				**< 0.001**
	Pre-Lecture	201 (18.2)	906 (81.8)	
	Post-Lecture	137 (10.7)	1,139 (89.3)	
Domain IV				
Knowledge of cervical cancer screening and prevention				**< 0.001**
	Pre-Lecture	189 (17.1)	918 (82.9)	
	Post-Lecture	115 (9.0)	1,161 (91.0)	
Overall				
Overall knowledge				**< 0.001**
	Pre-Lecture	231 (20.9)	876 (79.1)	
	Post-Lecture	98 (7.7)	1,178 (92.3)	

[1]Row percentages

General knowledge of cervical cancer

Prior to the education, half (50.1%) of the students were able to correctly identify HPV as the cause of cervical cancer while the remaining 49.9% thought that candida, Human Immunodeficiency Virus or malaria was responsible for causing cervical cancer. The intervention resulted in a significant increase to 83.1% of the girls identifying HPV as the causative agent. The poor baseline knowledge found in this study is similar to that of other studies where the majority of participants did not know the aetiology of cervical cancer [6, 7, 9, 11, 18, 20–22]. Knowledge about the causal link between HPV and cervical cancer is one of the factors that increases vaccination uptake [6]. Hence this knowledge gained has the potential to increase vaccination uptake by these girls to prevent cervical cancer. There was also a significant increase in knowledge concerning the anatomical location of cervical cancer. After the education, 81.9% of the girls correctly identified the cervix, as compared to 68.7% before.

Just under half (48.3%) of the students thought that cervical cancer could occur in women less than 30 years of age but after the intervention, there was a significant increase to 80.9%. As the young girls develop into young women, it is important that they appreciate their personal risk. When women do not perceive that they are at risk for cervical cancer they are less likely to engage in preventive and early detection activities [6, 12, 14]. Regarding whether cervical cancer is curable or not, only about a third (31.3%) of the girls thought so and although this significantly increased to 46.2% after the education, more than half of them still thought it was not curable. This could be because emphasis was placed on early disease being curable and so depending on how the question was interpreted, some of the girls could have said it was not curable with advanced disease in mind. Alternatively, it could also be a difficult misconception to address, requiring more emphasis during the educational intervention. Similarly in a study among women of reproductive age in Ethiopia where a third of the participants where aged 15–24 years, 53% thought that cervical cancer was not curable [22]. Whereas in a study in Ugandan women, a much higher proportion (75%) stated that cervical cancer is curable if detected early [14]. This is an important fact about the disease which must be clarified in subsequent educational activities. When it is believed that there is no cure, women are less likely to seek medical attention [14] and so end up in the hospitals with very advanced incurable diseases. This then tends to fuel the misconception

in the society that cervical cancer is not curable, creating a vicious cycle that is difficult to break.

Knowledge of symptoms of cervical cancer

In contrast to other studies conducted among females in Ghana and India where the majority had no idea of the symptoms of cervical cancer and there was also a lack of knowledge about the risk factors [5, 8], this study found the girls generally had high levels of knowledge regarding symptoms of cervical cancer even before the education. There was however a significant increase in this knowledge after the intervention. Unfortunately, the study did not enquire about their source of information on cervical cancer in the pre-test and so it is difficult to explain the high levels of knowledge prior to the educational intervention. The most common symptom that the girls knew about was offensive vaginal discharge with 77.3% correctly identifying this, increasing to 88.2% after the intervention. The next commonly identified symptom was abnormal vaginal bleeding known by 67.3% increasing to 75% after the education. Also 62.3% correctly identified pain during sex as a symptom of cervical cancer with an increase to 67.8% after the intervention. Similarly, 83% of Ugandan women who participated in a study on cervical cancer were able to mention at least one symptom [14]. Being knowledgeable about symptoms of any disease condition is crucial as that can contribute to the individual seeking medical attention, knowing the possibility of the diagnosis. The girls were asked if frequent micturition was a symptom of cervical cancer and knowledge about that was inadequate as only 40.9% of them correctly answered that it was not a symptom. The educational intervention led to a significant increase to 52% after the intervention. This is therefore a point that must be clarified during future educational sessions with students.

Knowledge of risk factors of cervical cancer

Most of the girls correctly identified having many sexual partners and a partner with many sexual partners as risk factors for cervical cancer prior to the education. However, after the intervention there was a significant increase from 76.2 to 85.6% and from 67.6 to 77.4% respectively. A lower proportion of 57.6% were able to correctly identify that having sex at a young age was a risk factor and though this number improved to 62.6% after the intervention, it was not statistically significant. This is very important information for the young generation to know and hence should be emphasized in future interventions especially as the reported range of median age at first sexual intercourse in Ghana is 17–18.4 years [4]. This is no different from age of 1st sexual intercourse of 15–17 years reported in several other countries around the world [23]. A deficiency in knowledge of risk factors can negatively impact mortality rates [16].

Similar to a study involving females in Nigeria and Uganda [14, 24], the majority of the girls (88%) prior to the education knew that cervical cancer can be prevented and 75% had knowledge about HPV immunization in our study. This level of knowledge significantly increased to 94.3% and 82.5% respectively after the intervention. However, regarding behavioural factors that can help prevent cervical cancer, only 52.4% correctly identified avoidance of smoking, with this figure slightly increasing to 57.4% which was not statistically significant. Smoking prevalence is very low (<1%) in Ghana [4] and so the girls might not have paid attention to this point as they could have found it irrelevant. Whereas a study involving Korean middle school girls showed that only 40% knew about regular screening and pap smears [18], in our study, the majority (85.2%) before the intervention, knew about regular screening and pap smears, and this significantly increased to 91.1% after the education. However, only 28.3% were able to correctly identify the recommended age of 21 years to have the first pap smear in Ghana. Although there was a significant increase to 37.2% after the intervention, this remains inadequate and as such, must be emphasized in future educational interventions. Along similar lines, in a study in Uganda, most participants did not know the recommended age to start screening and less than 1% knew the recommended frequency of screening tests [14].

Overall, the girls had good levels of knowledge even before the intervention, with more than 70% getting at least half of the answers correct in all the domains examined. The interventions significantly increased these levels of knowledge to more than 85% getting at least half of the answers correct in all the domains. Specifically, general knowledge of cervical cancer significantly increased from 73 to 94% having >50% of the answers correct. Knowledge of symptoms also significantly increased from 78 to 87% getting more than half of the answers correct while for risk factors there was a significant increase from 82 to 89%. Similarly for the questions on the prevention and screening of cervical cancer, there was a significant increase from 83 to 91%. This contrasts with a study done among health professional students in Pakistan were there were huge gaps in knowledge about cervical cancer [20]. This study found relatively high baseline knowledge about cervical cancer which may be due to the recent increase in cervical cancer awareness activities. However, this educational intervention has clearly led to increased knowledge in all domains of cervical cancer addressed. Similarly, several studies have also found educational interventions using a variety of modalities including lectures, audio-visual presentations, leaflets etc. to improve knowledge, attitudes and practices relating to cervical cancer among female adolescents and adults [23, 25–28]. There is therefore the call for health education to be one

of the major strategies for cervical cancer prevention in the youth and this can be incorporated into the curriculum for high schools [28]. Limitations of this study are the assessment of the impact of the multi modal educational intervention as a whole. Future studies can assess the impact of each modality individually. Also, using non paired pre- and post-tests limits the generalizability of the results.

Conclusion

Knowledge on cervical cancer among young girls in the two high schools, though adequate, improved with the educational intervention. Areas of education that need to be emphasized are the fact that it is curable, young women are at risk, initiating sexual activity at a young age increases the risk and the recommended age to start screening with pap smears. Educating young girls on cervical cancer increases their awareness and gives them adequate knowledge which should influence their attitudes and behaviour towards cervical cancer in the future, especially concerning prevention and early detection through screening. Consideration should be given to adopting cervical cancer education into high school curricula to positively impact on the WHO proposed pillars to eliminate cervical cancer globally, as a public health problem.

Abbreviations

WHO World Health Organization
HPV Human Papilloma Virus

Supplementary Information

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Supplementary Material 1

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Author contributions

FD, JN, JNCL conceptualized and carried out the study. Data curation and Data analysis; EN. Data interpretation; EN, FD. Drafting of manuscript; FD, EN. Editing of manuscript; FD, JN, JNCL, JL, EN, NAAA, CK. Final revision and approval of manuscript; FD, JN, EN, JNCL, JL, NAAA CK. All authors read and approved the final manuscript.

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Data availability

The dataset for this study has been deposited at Figshare available at Dedey, Florence (2024). Cervical Cancer Data: Impact of cervical cancer education. figshare. Dataset.https://doi.org/10.6084/m9.figshare.25604424.v1.

Declarations

Ethical approval

This research was carried out in accordance with the guidelines and regulations for human research (Helsinki declaration). The Institutional Review Board of Korle Bu Teaching Hospital for Medical Research (KBTHIRB) granted approval for the study (ID KBTHIRB/00063/2018). Permission was given by the heads of the schools for the students to participate in this project. Written informed consent was given by each participant and legal guardian after the procedure had been explained. The option to withdraw at any stage was given to participants. Those who opted out of the pretest were not excluded from participating in the educational intervention.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209–49.
2. Ginsburg O, Bray F, Coleman MP, Vanderpuye V, Eniu A, Kotha SR, et al. The global burden of women 's cancers: a grand challenge in global health. Lancet. 2017;389(10071):847–60.
3. Geneva. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020.
4. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjose S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human papillomavirus and Related Diseases in the World. Summary Report 10March 2023. (Assessed 29 October 2024).
5. Bansal AB, Pakhare A, Kapoor N, Mehrotra R, Kokane AM. Knowledge, attitude, and practices related to cervical cancer among adult women: a hospital-based cross-sectional study. J Nat Sci Biol Med. 2015;6(2):324–8. https://doi.org/10.4103/0976-9668.159993.
6. Nakamura T, Sasaki A. A literature review regarding Cervical Cancer Prevention Targeting Junior and Senior High School Students. Health (Irvine Calif). 2020;12:932–42.
7. Eittah HF, Aljohani KA, Alhojani MS. Enhancing the Knowledge of Cervical Cancer Screening among Female Nursing Students: An Interventional Education Program. Sudan J Med Sci. 2020;15(4):431–439.DOI10.18502/sjms.v15i4.8166.
8. Binka C, Nyarko SH, Doku DT. Cervical Cancer knowledge, perceptions and screening behaviour among female University students in Ghana. J Cancer Educ. 2016;31:322–7.
9. Georges K, Nk AH, Ma TSR, Charlette J. Knowledge and behavior of women on cervical cancer in the northern region of Cameroon. Front Women's Heal. 2017;2(3):1–4.
10. Ekechi C, Olaitan A, Ellis R, Koris J, Amajuoyi A, Marlow LAV. Knowledge of cervical cancer and attendance at cervical cancer screening: a survey of black women in London. BMC Public Health. 2014;14(1096):1–9.
11. Siddharthar J, Rajkumar B, Deivasigamani K. Knowledge, awareness and Prevention of Cervical Cancer among women attending a Tertiary Care Hospital in Puducherry, India. J Clin Diagn Res. 2014;8(6):8–10.
12. Akinlaja OA, Anorlu RI. Knowledge of Cervical Cancer, awareness and attitude to screening among patients at a Cytology Clinic. Austin J Obstet Gynecol. 2014;1(1):1–4.
13. Calys-tagoe BNL, Aheto JMK, Mensah G, Biritwum RB, Yawson AE. Cervical cancer screening practices among women in Ghana: evidence from wave 2 of the WHO study on global AGEing and adult health. BMC Public Health. 2020;20(49):1–9.
14. Mukama T, Ndejjo R, Musabyimana A, Halage AA, Musoke D. Women 's knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda. BMC Womens Health. 2017;17(9):1–8.

15. Nartey Y, Hill P, Amo-antwi K, Asmah R, Nyarko K, Yarney J, et al. Recommendations for cervical cancer prevention and control in Ghana: public education and human papillomavirus vaccination. Ghana Med J. 2018;52(2):94–102.
16. Calderón-Garcidueñas AL, Flores-peña Y, De León-leal S, Vázquez-martínez CA, Farías-calderón AG, Melo-santiesteban G, et al. An educational strategy for improving knowledge about breast and cervical cancer prevention among Mexican middle school students. Prev Med Rep. 2015;2:250–4.
17. Osei EA, Appiah S, Gaogli JE, Boadi EO. Knowledge on cervical cancer screening and vaccination among females at Oyibi Community. BMC Womens Health. 2021;21(148):1–9.
18. Kim HW, Lee YJ, Lee DB, Lee EJ. Heliyon effects of cervical cancer prevention education in middle-school girls in Korea: a mixed-method study. Heliyon. 2019;5:e01826.
19. Nsaful J, Dedey F, Nartey E, Labi J, Adu-Aryee NA, Clegg-Lamptey JN. The impact of a breast cancer educational intervention in Ghanaian high schools. BMC Cancer [Internet]. 2022;22(893):1–10. https://doi.org/10.1186/s12885-022-09991-6
20. Aga SS, Yasmeen N, Khan MA. Cervical Cancer and its screening: assessing the knowledge, awareness, and perception among Health and Allied students. Educ Res Int. 2022;4608643. https://doi.org/10.1155/2022/4608643.
21. Ali SF, Ayub S, Manzoor NF, Azim S, Afif M, Akhtar N, et al. Knowledge and awareness about Cervical Cancer and its Prevention amongst interns and nursing staff in Tertiary Care hospitals in Karachi, Pakistan. PLoS ONE. 2010;5(6):1–6.
22. Mengesha A, Messele A, Beletew B. Knowledge and attitude towards cervical cancer among reproductive age group women in Gondar town, North West Ethiopia. BMC Public Health. 2020;20(209):1–10.
23. Flood T, Wilson IM, Prue G, McLaughlin MHCM. Impact of school-based educational interventions in middle adolescent populations (15-17yrs) on human papillomavirus (HPV) vaccination uptake and perceptions / knowledge of HPV and its associated cancers: a systematic review. Prev Med. 2020;139:106168. Epub 2020 Jun 27. PMID: 32603795.
24. Ogundipe L, Ojo T, Oluwadare T, Olayemi E, Oluwafemi F, Oni O. Cervical cancer screening and vaccination: knowledge, awareness, and attitude of female staff in a Nigerian University. BMC Womens Health. 2023;23(218):1–9.
25. Ebu NI, Amissah-essel S, Asiedu C, Akaba S, Pereko KA. Impact of health education intervention on knowledge and perception of cervical cancer and screening for women in Ghana. BMC Public Health. 2019;19(1505):1–11.
26. Thahirabanuibrahim I, Logaraj M. Impact of health education intervention in promoting cervical cancer screening among rural women of Chengalpattu district - the community based interventional study. Clin Epidemiol Glob Heal. 2021;12(November):100895.
27. Naz MSG, Kariman N, Ebadi A, Ozgoli G, Ghasemi V, Fakari FR. Educational interventions for Cervical Cancer Screening Behavior of women: a systematic review. Asian Pac J Cancer Prev. 2018;19(4):875–84.
28. Krokidi E, Rao AP, Ambrosino E, Thomas PPM. The impact of health education interventions on HPV vaccination uptake, awareness, and acceptance among people under 30 years old in India: a literature review with systematic search. Front Reprod Health. 2023;5:1151179. https://doi.org/10.3389/frph.2023.1151179. PMID: 37215327; PMCID: PMC10198780.

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