

Innovations

Effect of Educational Intervention on Perception of Mothers and Secondary School Girls on Human Papilloma-virus Vaccine in Ondo State, Nigeria

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Abstract

Background: Cervical cancer (CC) is a global challenge with Nigeria accounting for a noteworthy cases and deaths from CC. The most significant risk factor for CC is high-risk (types 16 & 18) Human Papillomavirus (HPV). This study analyzed the effect of educational intervention on HPV vaccine perception and intention uptake among secondary school girls and their mothers with the aim of bridging the gap in knowledge and uptake of HPV vaccine. **Methods:** The study adopted quasi-experimental design using multi-stage sampling method to select (85) secondary school' girls with their mothers or female caregivers (85) from randomly selected public and private secondary schools. The study involved four stages of data collection process which are (i) Obtaining Parental consent (ii) Pretest data collection, (iii) Educational intervention (i.e. health education), (iv) Posttest data collection. Data analysis used SPSS version 25, statistical significance level in the comparisons was set at a p-value (0.05). **Results:** There was a significantly improved HPV vaccine perception and uptake intention among the respondents at post- intervention level when compared with the pre-intervention level with p-value (0.000). Furthermore, results indicated that educational intervention improved mothers' and adolescents' perception on Human Papilloma-virus vaccine and increased the HP uptake desire. The study shows that the level of girls' and mothers' knowledge on HPV vaccine in prevention of CC pre-training was low (48.2%) (58.8%) while post-training was high (92.6%) (72.9%) respectively. **Conclusion:**

Educational intervention enhances secondary school girls' and mothers' perception on HPV vaccination and increased the uptake intention desire.

Keywords: *Human Papillomavirus, vaccine. Adolescence, Mothers, Educational Intervention, secondary school girls, and Nigeria.*

Short Condensation: *educational intervention improves Human papilloma-virus vaccine uptake intention of adolescents and their mothers.*

1. Introduction

Cancer is the top to second leading cause of death before the age of 70 in 112 of 183 nations and the third or fourth leading cause of death before the age of 70 in 23 countries¹. Cervical cancer is the fourth most prevalent cancer affecting women globally and the second most frequent cancer among women in Nigeria². Approximately, 36.6 to 56.2 million Nigerian women over the age of 15 are at risk of developing cervical cancer³. The number of females in Nigeria affected by cervical cancer annually is estimated to be 12075, and 7968 die from the disease⁴. Chronic, persistent infection with the oncogenic strains (16 and 18) of HPV is linked with cervical cancer in more than 99% of cases⁵.

Preventive strategies for cervical cancer in preteens and teens include human papilloma-virus (HPV) vaccination⁶, which can lower the long-term future burden of cervical cancer⁷. The majority of infections with the human papilloma-virus are often contracted shortly after becoming sexually active, and the vaccine functions best when administered early, before initiation of sexual activity and HPV exposure⁸. The developed countries have achieved a significant reduction in the prevalence of cervical cancer through effective HPV vaccination, however, in low-income countries, populations with the highest incidence and mortality of disease, like Nigeria, remain largely unprotected³. Uptake of HPV vaccination is low due to identified barriers, including accessibility constraints, financial constraints, low awareness, poor knowledge, wrong perception, culture, demographics characteristics of women, and religion⁹.

2. Literature Review

A review of intervention studies conducted in the United States shows the effectiveness of educational interventions in statistically improving the uptake of vaccines, especially when they involve a parent-targeted strategy¹⁰. Majority of studies conducted in Nigeria were limited to either health workers' or university students. General knowledge about prevention of cervical cancer through HPV, is not appropriate enough to represent the general views of mothers and secondary school students, especially those in the age bracket of the recommended dose of HPV

vaccines. A previous study underpinned by health behavioral theory, suggested further studies on HPV vaccine with mothers and secondary school girls simultaneously^{11,16}. A survey on HPV vaccination awareness and understanding among selected secondary school students in Nigeria revealed that the vast majority of respondents had no knowledge of HPV or the HPV vaccine, and Ondo State was not among the states selected¹². In addition, in Nigeria, young people's parents and guardians have shown little understanding of cervical cancer prevention for their children^{13,17}. Lack of such information could harm the acceptance and adoption of the HPV vaccine. Hence, this study was carried out simultaneously among secondary school girls and their mothers or primary female caregiver.

The theory underpinning the study is health belief model. According to the model, a person's perception of four crucial factors—the gravity of a potential illness, their susceptibility to it, the benefits of taking preventive action, and the barriers impeding that action—determines individual's behavior^{14,19}. Educational intervention in this study provided information on these four crucial factors as regard cervical cancer and HPV vaccine with the aim to bridge a gap in knowledge and perception; and improve uptake desire of human papillomavirus vaccine among secondary school girls and their mothers.

3. Objective of the study

The objective of this study is to find out the effect of educational intervention on HPV vaccine perception and intention uptake among secondary school girls and their mothers with the aim of bridging the gap in knowledge and uptake of HPV vaccine.

4. Methods of the study

Research Design: The study is a quasi-experimental design using a survey-type analytic research method approach to address all the objectives and measure the impact of an exposure (E) or intervention (I) on an outcome (O), i.e., the relationship between two factors. This approach is preferred because it will produce data that can affect the intervention of health programs and the formulation of policies for HPV vaccination. The instrument that was used for this study is a self-designed structured questionnaire, which was administered by the researcher to the consenting respondents. The questionnaire was in two forms (a pre-test questionnaire and a post-test questionnaire) and consisted of open-ended and multiple-choice questions that were constructed in English. Pretest questionnaires and post-test questionnaires were administered to the respondent before and after the researcher's educational intervention, respectively. The researcher employed a trained research assistant in the selected schools who worked with the researcher in the administration of the questionnaires. The study involved four stages of data collection: (i) parental consent forms; (ii) pre-test questionnaires; (iii) educational interventions (i.e., health

education); and (iv) post-test questionnaires. A parental consent form was given to the selected subjects for their parent's approval to participate in the research before they were asked to respond to the questionnaire, and the same was retrieved immediately. Research respondents were approached and informed of the purpose of the study; both written and verbal consent was obtained. Only those who indicated their willingness to be part of the study were given the questionnaire. Each student took the primary caretakers/ mothers' questionnaire home and gave it to her primary caretakers/mother to fill out, collected it back after it was filled out, and returned it to the researcher in the school. The period of data collection was three months.

5. Data used: Data generated was analyzed using IBM Statistical Package for Social Sciences (IBM SPSS) version 25. The results were presented in frequency tables and charts. Inferential statistics were used to determine relationships between variables, and only the information gathered from the completed questionnaires was examined. The mean scores (along with standard deviations) of the respondents' responses were calculated using the frequency distributions of all variables. In the pre- and post-test background data, the level of HPV vaccination and knowledge was assessed. A paired-sample T-test of the multivariate analysis was used to compare the pretest and post-test with their responses to the questions and statements assessing their impression and knowledge of HPV and the HPV vaccine, respectively, of those respondents who were aware of HPV and the HPV vaccination. A p-value of 0.05 was chosen as the threshold for statistical significance in the comparisons.

6. Data Analysis

Background Information of Girls' and Mothers' Respondents: Table 1 shows that all respondents (girls) fall within the age bracket of the recommended dose of HPV vaccines, which is 9 to 19. The majority of respondents were from monogamous families and practiced Christianity (87%). The majority of respondents' mothers had formal education, and all of them indicated that they have girls at the adolescent stage. Lastly, 96.5% had no history of cervical cancer.

Table 1: Girls' Background Data

Variables		GIRLS	MOTHERS	TOTAL
Age		Frequencies (%)	Frequencies (%)	
9 to 15	1	76 (89.4)	N/A	76
16 to 19	2	9 (10.6)	N/A	9
Religion				
Christianity	1	76 (89.41)	74 (87.06)	150
Islam	2	8 (9.41)	10 (11.76)	18
Traditional	3	1 (1.18)	1 (1.18)	2
Family Background				
Polygamous	1	7 (8.24)	13 (15.29)	20
Single Parent	2	11 (12.94)	11 (12.94)	22
Monogamous	3	63 (74.12)	59 (69.41)	122
No response	4	4 (4.71)	2 (2.35)	6
Educational Background				
Primary	1	N/A	40 (47.06)	40
Secondary	2	N/A	42 (49.41)	42
Tertiary	3	N/A	3 (3.53)	3
None	4	N/A	0 (0)	0
No of adolescent you have				
1 to2	1	N/A	42 (49.41)	42
3 and above	2	N/A	43 (50.59)	43
Any History of Cervical Cancer				
Yes	1	3 (3.53)	1 (1.18)	4
No	2	82 (96.47)	84 (98.82)	166

Keys: N/A= Not Applicable, % = Percentage

Information of Respondents on Assessment of Secondary School Girls' and Mothers' Perception on Human Papilloma-virus Vaccination

Table 2 demonstrates girls and mother pre- and post- intervention data. According to the data, 48.2% at pre- intervention and 97.6% at post-intervention of girls, respectively, were aware that the HPV vaccine could be given to preteen and teen children. Similarly, pre-training 38.8% and post-training 92.9% of girls were aware that children ages 9 to 16 should be vaccinated with HPV. Also, 60% and 83.5% of the secondary girls at pre-training and post-training level respectively, recognized that the HPV vaccine could prevent genital warts, anal cancer, and cervical cancer. Likewise, pre-training and post-training data show that 38.8% and 54.1% of mothers,

respectively, were aware that children ages 9 to 16 should be vaccinated with HPV. In addition, 58.8% and 72.9% of mothers (pre-training and post-training data, respectively) were aware that the HPV vaccine can prevent genital warts, cervical cancer, and oral cancer.

Table 2: Assessment of secondary school girls' and mothers' perceptions of human papilloma-virus vaccination

Assessment of secondary school girls and mothers' perception on Human Papillomavirus vaccination.	C	GIRLS		MOTHERS	
		Pre-Training Data	Post-Training Data	Pre-Training Data	Post-Training Data
		F (%)	F (%)	F (%)	F (%)
Are you aware that the HPV vaccine could be given to preteen and teen children?	YES	41 (48.2)	83 (97.6)	33 (38.8)	54 (54.1)
	NO	44 (51.8)	2 (2.4)	52 (61.8)	39 (45.9)
Are you aware that child age 9 to 16 should be vaccinated with HPV?	YES	33 (38.8)	79 (92.9)	21 (24.7)	34 (40)
	NO	52 (61.2)	6 (7.1)	64 (75.3)	51 (60)
Have you ever thought about been vaccinating against HPV	YES	19 (22.4)	11 (12.9)	7 (8.2)	8 (9.4)
	NO	66 (77.6)	74 (87.1)	78 (91.8)	77 (90.6)
Have you ever discussed HPV vaccine with your parent before?	YES	12 (14.1)	17 (20)	10 (11.8)	8 (9.40)
	NO	73 (85.9)	68 (80)	75 (88.2)	77 (90.6)
Do you know that the HPV vaccine can prevent cervical cancer/anal cancer/genital warts?	YES	51 (60)	71 (83.5)	50 (58.8)	62 (72.9)
	NO	34 (40)	14 (16.5)	35 (41.2)	23 (27.1)

Keys: C= Categories, % = Percentage, F = Frequences

Information from Respondents on the Practice Desire of Adolescence and their Mothers on Human Papilloma-virus Vaccination

Table 3 shows pre-training and post-training data. 89.4% and 98.8%, respectively, of respondents believe that the source of information about the HPV vaccines facilitates the practice desire of adolescents for human papilloma-virus vaccination. Also, pre-training and post-training, 89.4% and 98.8%, respectively, of respondents agree that prior consultation regarding HPV vaccine information is needed. Likewise, pre-training and post-training data show that 81.2% and 98.8%, respectively, of

respondents believe that practicing the desire to vaccinate against HPV increases uptake of the HPV vaccine. Moreover, pre-training and post-training, 83.5% and 100%, respectively, of respondents believe that your decision to be vaccinated against HPV is very important. Likewise, Table 3 shows pre-training and post-training data. 95.3% and 95.3%, respectively, of respondents' mothers believe that the source of information about the HPV vaccines facilitates the practice desire of adolescents for human papilloma-virus vaccination. Also, pre-training and post-training, 85.9% and 88.2%, respectively, of respondents agree that prior consultation regarding HPV vaccine information is needed. Moreover, pre-training and post-training, 89.4% and 94.1%, respectively, of respondents believe that your decision to be vaccinated against HPV is very important. Likewise, pre-training and post-training data show that 91.8% and 94.1%, respectively, of respondents believe that encouraging others on the importance of HPV vaccination will increase uptake of HPV vaccine.

Table 3: The Uptake Desire of Adolescence and their Mothers on Human Papilloma-virus Vaccination.

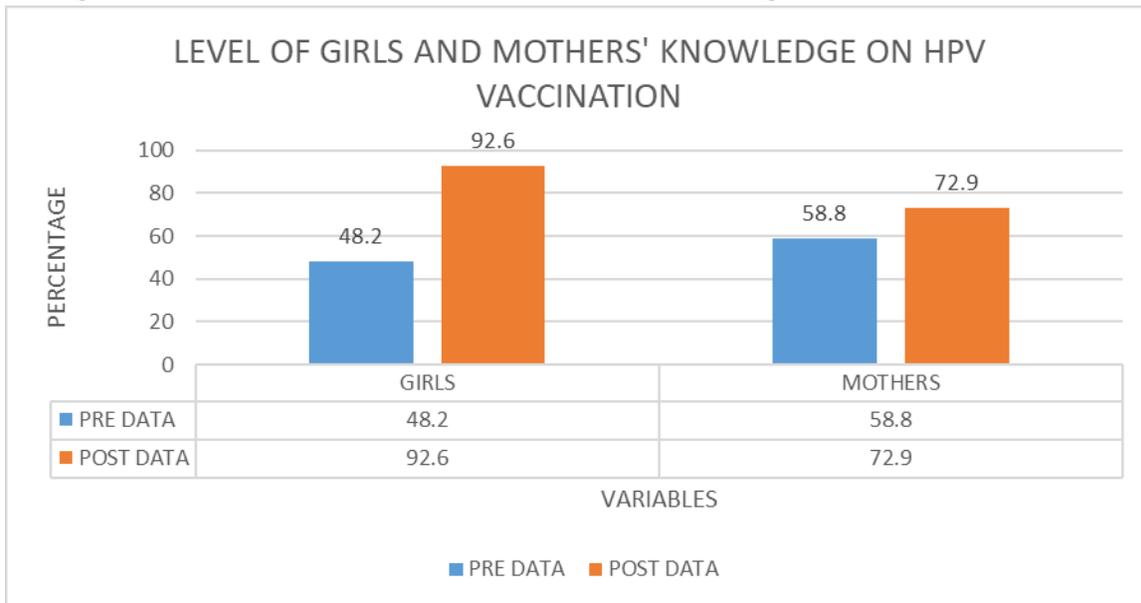
The uptake desire of adolescence and their mothers on Human Papilloma-virus vaccination.	C	Girls		Mothers	
		Pre-Training Data	Post-Training Data	Pre-Training Data	Post-Training Data
		F (%	F (%)	F (%)	F (%)
Source of information about the HPV vaccine encourage one uptake desire for vaccination such as Health workers, Social medial, Parents, & Friends	T	76 (89.4)	84 (98.8)	81 (95.3)	81 (95.3)
	F	9 (10.6)	1 (1.2)	4 (4.7)	4 (4.7)
Prior consultation regarding HPV vaccine information is needed to facilitate uptake desire	T	69 (81.2)	84 (98.8)	73 (85.9)	75 (88.2)
	F	16 (18.8)	1 (1.2)	12 (14.1)	10 (11.8)
Willingness of vaccinating against HPV increase uptake of HPV vaccine	T	65 (76.5)	84 (98.8)	68 (80)	69 (81.2)
	F	20 (23.5)	1 (1.2)	17 (20)	16 (18.8)
Your decision to be vaccinated against HPV is very important	T	71 (83.5)	85 (100)	76 (89.4)	80 (94.1)
	F	11 (16.5)	0 (0)	8 (9.4)	5 (5.9)
Encouraging others on importance of HPV vaccination is good decision	T	76 (89.4)	84 (98.8)	78 (91.8)	80 (94.1)
	F	9 (10.6)	1 (1.2)	7 (8.2)	5 (5.9)

Keys: C= Categories, % = Percentage, Fr = Frequency, T= True, F= False

Level and Classification of Girls and Mothers' Knowledge on HPV Vaccination

According to Clin Med International Library, perception and knowledge are classified as high (80% and above), average (60 to 79%), low (40 to 59%), and very low (40% below). Therefore, the level of girls' knowledge on HPV vaccine in the prevention of cervical cancer pre-training was low (48.2%), while post-training was high (92.6%). Likewise, mothers' knowledge of the HPV vaccine in the prevention of cervical cancer pre-training was low (58.8%), while post-training was average (72.9%).

Figure 1: Level of Girls and Mothers' Knowledge on HPV Vaccination



Relationship between Pre- and Post-Educational Intervention Data from Adolescents' Perceptions of HPV Vaccination

Table 4 shows there was a significant difference between adolescents' perceptions of human papilloma-virus vaccination pre and post intervention ($\chi^2 = 5.2595$; $df = 1.22$; $P\text{-value} = 0.000$), teen acceptance or uptake of human papilloma-virus vaccination pre and post intervention ($\chi^2 = 6.9516$; $df = 0.90$; $P\text{-value} = 0.000$), and teens' practice desire for human papilloma-virus vaccination pre and post intervention ($\chi^2 = 4.0779$; $df = 0.75$; $P\text{-value} = 0.000$); therefore the null hypothesis is rejected and the alternate hypothesis is accepted. Moreover, table 4 revealed a significant difference between mothers' perceptions of human papilloma-virus vaccination pre- and post-intervention ($\chi^2 = 2.7335$; $df = 0.34$; $P\text{-value} = 0.0035$) and mothers' acceptance or uptake of human papilloma-virus vaccination pre- and post-intervention ($\chi^2 = 1.7993$; $df = 0.27$; $P\text{-value} = 0.0369$). The null hypothesis is therefore rejected and the alternate hypothesis accepted.

Table 4: Relationship between Pre- and Post-Educational Intervention Data from Adolescents' Perceptions of HPV Vaccination

Variables	Pre-data	Post-data	df	T-test (x ²)	P Value
	Mean	Mean			
Adolescences' perception on Human Papilloma-virus vaccination, pre and post intervention	8.16470 6	6.94117 6	1.22	5.2595	0.0000
Practice desire of adolescence on Human Papilloma-virus vaccination, pre and post intervention	5.80000 0	5.04705 9	0.75	4.0779	0.0000
Mothers' perception on HPV vaccination, pre and post intervention	8.57647 1	8.14117 6	0.34	2.7335	0.0035
Mother's acceptance of HPV vaccination, pre and post intervention.	7.74117 6	7.47058 8	0.27	1.7993	0.0369

Keys: df = different between pre-data mean and post-data mean

Discussion

This study analyzed the impact of educational intervention in the surveyed 85 secondary school girls in Ondo State and 85 mothers or female caretakers of secondary school girls' perceptions on HPV and HPV vaccine simultaneously due to the fact that many earlier studies were restricted to the knowledge of health professionals and university students about the prevention of cervical cancer through HPV, which is insufficient to represent the general views of mothers and secondary school students, especially those in the age range of the recommended dose of HPV vaccines, according to Cheeet *al.*, (2019), and the results are extremely interesting. We noticed that the study sample was quite representative and diverse when we looked at the aspects of the respondents' demographic profile. The respondents to the study had a well-balanced age distribution; the majority of them were preteens or adolescents and were therefore eligible to get the recommended dose of the HPV vaccine, according to Cosmas et al., (2022). Despite the fact that the survey was conducted in Yoruba territory, Igbo, Hausa, and Yoruba, the three main tribes of Nigeria, were all fairly well represented. The fact that only a relatively small percentage of our respondents, who practiced traditional faiths, participated in the survey shows that the distribution of respondents in terms of their religious beliefs was skewed. Since that traditional religion is only practiced by a small portion of the people in Nigeria, this skewedness is to be expected. The poll includes both private and public schools, among other educational institutions. The great majority of survey participants had no idea what HPV or the HPV vaccine were. This outcome is

consistent with earlier studies that looked at the knowledge of HPV and its vaccine among young people and teenagers in Nigeria (Poongodiet *et al.*, 2021). Additionally, Nigeria's general ignorance of HPV and the HPV vaccine is comparable to that of high-income and other middle-income nations, showing that this problem is universal and not exclusive to Nigeria or Ondo State (Mabeya *et al.*, 2021). According to this research and the result of the analysis, it was evidenced that educational intervention has increased the girls' and mothers' perceptions of human papilloma-virus vaccination. Also, the above confirmed that educational interventions are extremely effective instruments that can be wisely applied to educating Nigerian secondary school pupils, particularly on health-related topics. It's also interesting to observe that many of the respondents who said they knew about HPV and HPV vaccines actually didn't know enough about them. It could be inferred from this that their sources of knowledge regarding HPV and the HPV vaccine were unreliable or inaccurate; nevertheless, other researchers have found that the accuracy of certain health-related information sent to the public, particularly online and on social media, is suspect. This suggests that educational intervention should be conducted sometimes and can be included in the school curriculum. However, considering the low level of HPV and HPV vaccine awareness among them, it can be deduced from this study that many young people in Ondo State who are attending school have a higher risk of developing diseases linked to HPV, including malignancies. HPV-induced malignancies are unfortunately one of the most well-known viral disease types ever known to man Shaokai *et al.* (2020). A key factor in the prevention of a disease is having sufficient knowledge about it. Isara and Osayi, (2021) If the youth in Ondo State and Nigeria as a whole are not educated about HPV and preventive measures, will be at risk (like HPV vaccination and the use of safe sexual practices), and they have a very high chance of developing HPV infections later on also supported by Cosmas *et al.*, (2022). It was evidenced in the study that educational intervention has increased the willingness of both adolescents and mothers' acceptance or uptake of human papilloma-virus vaccination for themselves and their children, supported by the study conducted by Chee *et al.*, (2019) among the students of a Chinese international school that suggested that there should be promotion of HPV vaccines with sex education because this will increase their acceptance or uptake of HPV vaccination.

7. Conclusion

This research work investigated and dealt with the prevailing issues that concern the effect of educational intervention on mothers and secondary school girls' perceptions of the human papilloma-virus vaccine in Ondo State. Based on the results and empirical analysis, the research concludes that educational intervention enhances the adolescent and mother's perception of HPV vaccination and increases

the practice desire of adolescence and their mothers for human papilloma-virus vaccination. Conclusively, to increase both mothers and girls' perceptions of HPV vaccination, educational intervention must be employed through the inclusion of a lesson on HPV and HPV vaccinations in the school curriculum. Likewise, an extensive school-based campaign or sensitization on HPV prevention (with a focus on HPV-induced malignancies) is urgently required by the Federal Government of Nigeria in order to integrate the HPV vaccination into the nation's routine immunization program.

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Checklist Used: Development and validation of the guideline for reporting evidence-based practice in educational interventions and teaching (GREET) (Phillips *et al.*, 2016)

Conflict of Interest: None

References

1. Chee Kai Chan,¹ Gulzhanat Aimagambetova,¹ Talshyn Ukybassova,² Kuralay Kongrtay,¹ and Azliyati Azizan (2019) *Human Papillomavirus Infection and Cervical Cancer: Epidemiology, Screening, and Vaccination—Review of Current Perspectives*, *Journal of oncology*, onlinelibrary.wiley.com
2. Cosmas Nanma T., Lohya Nimzing, Daniel Egah, Ayo Famooto, Sally N. Adebamowo (2022) *Prevalence of vaginal HPV infection among adolescent and early adult girls in Jos, North-Central Nigeria*, *BMC Infectious Diseases* volume 22, Article number: 340.
3. Dominik Stelzle¹, Luana F Tanaka², Kuan Ken Lee³, Ahmadaye Ibrahim Khalil⁴, Iacopo Baussano⁴, Anoop S V Shah⁵, David A McAllister⁶, Sami L Gottlieb⁷, Stefanie J Klug², Andrea S Winkler⁸, Freddie Bray⁴, Rachel Baggaley⁹, Gary M Clifford⁴, Nathalie Broutet⁷, Shona Dalal (2021), *Estimates of the global burden of cervical cancer associated with HIV*, *Lancet Glob Health*(2):e161-e169.
4. Ferlay Jacques, Murielle Colombet, Isabelle Soerjomataram, Donald M. Parkin, Marion Piñeros, Ariana Znaor, Freddie Bray. (2021) *Cancer statistics for the year 2020: An overview*. *International journal on cancer* Citations: 1,419.
5. Hillary Mabeya, (2021) *Mothers of adolescent girls and Human Papilloma Virus (HPV) vaccination in Western Kenya*. *Pan African Medical Journal*. 2021;38:126.
6. Hyuna Sung, PhD¹; Jacques Ferlay, MSc, ME²; Rebecca L. Siegel, MPH¹; Mathieu Laversanne, MSc²; Isabelle Soerjomataram, MD, MSc,

- PhD2; Ahmedin Jemal, DMV, PhD1; Freddie Bray, BSc, MSc, PhD2 (2021) *Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer Journal of Clinicians. 2*
7. Isara AR, Osayi N (2021). Knowledge of Human Papillomavirus and Uptake of its Vaccine among Female Undergraduate Students of Ambrose Alli University, Ekpoma, Nigeria. *Journal of Community Medicine and Primary Health Care. 33 (1) 64-75*
 8. Jiayao Lei, Ph.D., Alexander Ploner, Ph.D., K. Miriam Elfström, Ph.D., Jiangrong Wang, Ph.D., Adam Roth, M.D., Ph.D., Fang Fang, M.D., Ph.D., Karin Sundström, M.D., Ph.D., Joakim Dillner, M.D., Ph.D., and Pär Sparén, Ph.D. (2020) HPV Vaccination and the Risk of Invasive Cervical Cancer. *The New England Journal of Medicine*
 9. MafianaJoy J, Sushma Dhital, MohamednourHalabia, Xiaohui Wang (2022). Barriers to uptake of cervical cancer screening among women in Nigeria: a systematic review. *Affiliations expand PMID: 36407354, PMCID: PMC9652621*
 10. Mélanie Drolet*, Jean-François Laprise*, Dave Martin, Mark Jit, Élodie Bénard, Guillaume Gingras, Marie-Claude Boily, Michel Alary, Iacopo Baussano, Raymond Hutubessy, and Marc Brisson (2021). Optimal human papillomavirus vaccination strategies to prevent cervical cancer in low-income and middle-income countries in the context of limited resources: a mathematical modelling analysis. *The Lancet Infectious Diseases Journal*
 11. Mukamal Trasias, Rawlance Ndejjo1*, Angele Musabyimana2, Abdullah Ali Halage1 and David Musoke1(2017). Women's knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda. *journal on BMC Women's Health (2017) 17:9*
 12. Neha Tanejal, Bhavika Chawla1, Aanchal Anant Awasthi2, Kumar Dron Shrivastav, PhD2, Vinita Kumar Jaggi3, and Rajiv Janardhanan1 Tanejal (2021). Knowledge, Attitude, and Practice on Cervical Cancer and Screening Among Women in India: A Review. *journal on Cancer Control. Journal of the moffitt cancer center,*
 13. OkunadeKehinde Sharafadeen(2020), Human papillomavirus and cervical cancer. *Journal of Obstetrics and Gynaecology Volume 40, 2020 - Issue 5*
 14. Omotayo F. Fagbule1,2, Kehinde K. Kanmodil,2, Emmanuel O. Aliemekel, Kayode E. Ogunniyi1, Mike Ogbeide and Samuel O. (2020). Knowledge of HPV and HPV vaccine among senior secondary

school students in Nigeria: Implications on cancer prevention strategies, the CHANCE Study.

15. Philip A.C., Lucy K. L, Maureen P. M, James G, Paul G, David M, Julie K. T and Marie T. W (2016) research article *Development and validation of the guideline for reporting evidence-based practice educational interventions and teaching (GREET)*
16. Poongodi Chellapandian¹, Sindhura Myneni², Divya Ravikumar², Padmavathy Padmanaban², Kavin Mozhi James³, and VahithaMala (2021) *Knowledge on cervical cancer and perceived barriers to the uptake of HPV vaccination among health professionals. BMC Womens Health*
17. RezqallaJuman, Mariam Alshatti, Amna Ibraheem, Danah Omar, Houda Al-Failakawi, Shamayel AlHaqqan, Sarah AlGhurair, Saeed Akhtar (2021) *Human Papillomavirus (HPV): unawareness of the causal role of HPV infection in cervical cancer, HPV vaccine availability, and HPV vaccine uptake among female schoolteachers in a Middle Eastern country. Journal of Infection and Public Health*
18. Shaokai Zhang¹, Huifang Xu¹, Luyao Zhang¹, Youlin Qiao^{1,2} (2020). *Epidemiology, risk factors and screening. Journal on Cervical cancer*
19. Uchendu Iheanyi, Jaqui Hewitt-Taylor, Angela Turner-Wilson and Candidus Nwakasi (2021) *Knowledge, attitudes, and perceptions about cervical cancer, and the uptake of cervical cancer screening in Nigeria: An integrative review. Scientific African inter- and multidisciplinary scientific journal*