Introduction
Cervical cancer is the fourth most common cancer affecting women globally with low and middle income countries bearing a disproportionate burden of the disease [1]. Cervical cancer is the most common gynaecologic cancer in Nigeria [2]. The age-standardized incidence rate is in the range 20.6–30.2 per 100,000 population with mortality in the range of 9.8–17.0 per 100,000 population [1]. This makes cervical cancer a major cause of morbidity and mortality among women. The causative organism for cervical cancer is the Human Papilloma virus (HPV) with its over 100 serotypes [3]. However, vaccines against the HPV are available for use but the cost is prohibitive limiting its usefulness in the high-burden setting of low- and middle-income countries [4]. The vaccine is recommended for girls prior to their sexual debut. The HPV vaccine has not yet been deployed in the National Programme on Immunization (NPI) in Nigeria which provides vaccines free, but it is available for a fee. In this study we determined the effect of peer education on the knowledge of female adolescents about HPV, cervical cancer, its treatment and prevention.

Methods: This was an intervention study. The knowledge and awareness of female students of four secondary schools were assessed using a pre-tested self-administered questionnaire prior to the training of some of the students (peers). The trained students delivered messages on cervical cancer and HPV using fliers containing key information (peer training) to their school mates in formal delivery in a class setting. The knowledge and awareness of students, post-peer training, was then assessed.

Results: There were 1337 students who responded to the baseline questionnaire while 1201 responded to the post-peer training questionnaire. Awareness of cervical cancer, knowledge of risk factors and cause of cervical cancer was low prior to the peer training. There was statistically significant improvement in awareness about cervical cancer and in the knowledge domains following peer training. Mean knowledge score prior to training was 12.94 ± 9.23 and this increased significantly to 53.74 ± 10.69 following peer training p < 0.0001.

Conclusion: Peer training is effective in improving knowledge and awareness of secondary school students about HPV and cervical cancer.
adolescents have problems when attempting to acquire information for their age-related concerns [8].

It is highly unlikely that cervical cancer will be discussed in a regular class setting in Nigeria, but it is important that adolescents acquire health-related information while at this stage of development as the information will prove useful before they take such decisions as commencement of sexual activity. Also, as many of these adolescents in Nigeria do not pursue higher education after secondary school [9], it is an opportunity to provide information that will be useful in their reproductive health when they become adults. More so, being the mothers of the next generation, they will be better equipped to take better health care decisions for their own children. It is also believed that the uptake of the vaccine will be improved if adolescents have information on the utility of the vaccine than if their parents simply request them to be vaccinated. Studies have, in fact shown that lack of information about cervical cancer and HPV vaccine is a major contributory factor to not being vaccinated [10, 11].

One of the most important sources of reproductive health information for the adolescent is their peer. Several studies have shown the impact of peer education on improvement of knowledge [12, 13]. Some studies have evaluated this approach in disseminating information on cervical cancer to adult women in Nigeria with good results [14, 15]. In Nigeria, disseminating health information is challenging as trained and knowledgeable health educators are few and often not enough funds are provided for such activities. The aim of this study was to assess the knowledge of female secondary school students about cervical cancer and to determine if their knowledge could be improved using peer-to-peer transfer of knowledge.

Methodology

Study Locale: Benin City is the capital of Edo state in the South-South geo-political zone of Nigeria. It is largely urban.

Ethical consent

Ethical clearance for the study was obtained from the Ethical Review Committee of the College of Medical Sciences, University of Benin. Permission to carry out the study was obtained from the Principals of the various schools. Verbal consent/assent was obtained from the participating students.

Study participants

Secondary education in Nigeria is provided by the government and private educational facilities. There are three levels in junior secondary (JSS1, JSS2 and JSS3) and three levels in the senior secondary (SS1, SS2 and SS3). Age at entry into secondary school is at least 10-years.

Female students from four secondary schools were recruited for the study. Baseline information was obtained from about 30% of the population of each school using a self-administered questionnaire. The questionnaires were distributed during break period and retrieved immediately after completion. The students were randomly selected. The baseline data was collected one week before a training seminar on Human Papilloma virus and cervical cancer was done.

Students from the different classes JSS1, JSS2, JSS3, SS1, SS2 and SS3 were selected to attend the training seminar. The lecture on cervical cancer and HPV was given by one of the authors (CO). Key information on cervical cancer was emphasized while each student was given a flier containing the key information. Within two weeks of the training, each student delivered a mini lecture on the subject to her classmates using the flier as a guide and to emphasize key points. At the seminar pre- and post-test assessment were done using the same questionnaire that was used for collecting baseline data.

Within a week of the students delivering their lectures, using the same questionnaire, information on cervical cancer and human papilloma virus was obtained from 30% of the students in each school. The questionnaires were also distributed during break period and retrieved immediately after completion. The pre-training questionnaires were not linked to post training questionnaires in the seminar and school cohorts.

Study instrument

The questionnaire used for the pre- and post-test at the seminar as well as for collecting the baseline data in the schools and post-peer training in the schools was pre-tested at a secondary school that was not involved in the study. It consisted of two sections. The first section sought demographic information such as age, class, maternal and paternal levels of education and religion. The second section consisted of questions which sought information on awareness about cervical cancer and various knowledge domains such as causative organism, risk factors, treatment and prevention.

Data analysis

Data was entered into an SPSS spread sheet and the same software was used for analysis. The students who responded to the questionnaires in school are referred to as the school cohort while those who received training at the seminar are called the seminar cohort.

The proportion of students with certain attributes was recorded as simple percentages. Association between variables was tested using Fishers Exact test and Chi-squared test as appropriate. Differences in variables between pre and post intervention were determined. Correct answers to questions on knowledge were awarded one point each while zero was awarded to non-response, wrong response or don’t know response. Total scores were converted to percentages. Mean knowledge scores were calculated for different categories of students. The significance of the difference between multiple means was tested using ANOVA. The level of significance was set at 0.05 at 95% confidence level.

Results

There were 1337 female students in the school cohort from whom baseline data was collected. This consisted of 873 (65.3%) students from junior secondary and 420 students from senior secondary.
(31.4%) from senior secondary school while 44 (3.3%) students did not indicate their classes. Following peer training in the schools, 1201 students consisting of 724 (60.3%) from junior secondary and 452 (37.6%) from senior secondary school responded to the post intervention questionnaire; 25 (2.1%) did not indicate their classes. The seminar cohort consisted of 124 students comprising 65 (52.4%) students from junior secondary school and 59 (47.6%) from senior secondary school. Table 1 shows the sociodemographic characteristics of the subjects. The median age of the students was 13-years with a range of 9 to 17 years.

Knowledge of cervical cancer
There was low awareness of cervical cancer among the students prior to the training with only 198/1337 (14.8%) and 18/124 (14.5%) of the school cohort and seminar cohort respectively having ever heard of cervical cancer Table 2. There was a statistically significant increase in awareness to 1174/1337 (97.8%) among the school cohort after the intervention p < 0.0001. Majority of the school cohort 940/1337 (70.3%) knew that cervical cancer was not uncommon in Nigeria which was not significantly different from 92/124 (74.2%) of the seminar cohort. Awareness about cervical cancer being common increased significantly following the intervention. Of the 124 students in the seminar cohort none knew the causative agent of cervical cancer which was not statistically different from the few 32/1337 (2.4%) of the school sample that knew that HPV was the causative organism p = 0.11. A few of the school sample ascribed other more commonly talked about organisms such as Staphylococcus aureus and syphilis as causative organisms. A statistically significant increase in knowledge of the causative organism increased to 100% and 99.9% in the seminar and school cohorts respectively following the training at the seminar and peer training in the schools.

| Table 1: Sociodemographic characteristics of students in the seminar and school cohorts. |
|---------------------------------|-----------------|-----------------|-----------------|
| **Characteristic** | **Seminar cohort** | **School cohort (Pre-intervention)** | **School cohort (Post-intervention)** |
| Mean age in years (SD) | 124 | 13.71 (1.71) | 1337 | 13.01 (1.82) | 1201 | 13.36 (1.64) |
| Fathers LOE |  |  |  |  |  |  |
| Nil | 3 | 2.4 | 50 | 3.7 | 36 | 3.0 |
| Primary | 23 | 18.5 | 196 | 14.7 | 222 | 18.5 |
| Secondary | 46 | 37.1 | 628 | 47.0 | 667 | 55.5 |
| Tertiary | 52 | 41.9 | 446 | 33.3 | 276 | 23.0 |
| Not indicated | – | – | 18 | 1.3 | – | – |
| Mothers LOE |  |  |  |  |  |  |
| Nil | 0 | 0.0 | 72 | 5.4 | 9 | 0.8 |
| Primary | 29 | 23.4 | 208 | 15.6 | 285 | 23.7 |
| Secondary | 74 | 59.7 | 813 | 60.8 | 735 | 61.2 |
| Tertiary | 21 | 16.9 | 225 | 16.8 | 172 | 14.3 |
| Not indicated | – | – | 19 | 1.4 | – | – |
| Type of school |  |  |  |  |  |  |
| Junior secondary | 65 | 52.4 | 873 | 67.5 | 724 | 61.6 |
| Senior secondary | 59 | 47.6 | 420 | 32.5 | 452 | 38.4 |
| Religion |  |  |  |  |  |  |
| Christian | 122 | 98.4 | 1190 | 99.1 | 1214 | 90.8 |
| Muslim | 2 | 1.6 | 11 | 0.9 | 118 | 8.8 |
| Not indicated | – | – | – | – | 5 | 0.4 |

LOE: Level of education, SD: Standard deviation.
(27.1%)], and in those who have had babies [152/1337 (11.4%)]. However, the knowledge about these risk factors increased to 75.9–93.7% for the different risk factors and the increase in knowledge for each of the risk factors was highly statistically significant p < 0.0001 Table 2.

Knowledge of prevention and treatment
The majority of those in the seminar cohort knew that cervical cancer could be prevented by regular PAP smear 123/124 (99.2%) and by vaccination 123/124 (99.2%). In contrast only 585/1337 (43.8%) and 460/1337 (34.4%) from the school cohort knew that yearly PAP smear and vaccination respectively were prevention strategies (p < 0.0001). Abstinence was considered a preventive strategy by 92/124 (74.2%) students in the seminar cohort and 621/1337 (46.5%) of the school cohort. The difference between the seminar and school cohorts with regards to abstinence as a preventive strategy was statistically significant p < 0.0001. There was a statistically significant improvement in the proportion of students in the seminar cohort who considered abstinence a preventive strategy following the training (p = 0.007) but the improvement following peer training in the school cohort was not statistically significant (p = 0.21).

Correct knowledge about treatment modalities among the seminar cohort was 54/124 (43.5%) for surgery and

### Table 2: Knowledge of students in the seminar and school cohorts about risk factors, treatment and prevention of HPV and cervical cancer.

| Knowledge Domain          | Respondents with correct response | Seminar Cohort | School Cohort | p value |
|---------------------------|----------------------------------|----------------|---------------|---------|
|                           | Pre n = 124% | Post n = 124% | Pre n = 1237% | Post n = 1201% |         |
| Awareness about CC        |                      |                |               |         |
| Ever heard of CC          | 18 (14.5%) | 120 (96.8%) | 198 (14.8%) | 1174 (97.8%) | <0.0001 |
| CC uncommon in Nigeria    | 92 (74.2%) | 113 (91.1%) | 940 (70.3%) | 1101 (91.7%) | <0.0001 |
| Causative organism        |                      |                |               |         |
| Staph aureus              | 0 (0.0%) | 124 (100.0%) | 68 (5.1%) | 1191 (99.2%) | <0.0001 |
| Human Papilloma virus     | 0 (0.0%) | 124 (100.0%) | 32 (2.4%) | 1192 (99.3%) | <0.0001 |
| Gonorrhea                 | 1 (0.8%)  | 122 (98.4%) | 37 (2.8%)  | 1180 (98.3%) | <0.0001 |
| Syphilis                  | 0 (0.0%) | 124 (100.0%) | 97 (7.3%) | 1191 (99.2%) | <0.0001 |
| Risk Factors              |                      |                |               |         |
| Multiple partners         | 0 (0.0%) | 109 (87.9%) | 380 (28.4%) | 1101 (91.7%) | <0.0001 |
| One sexual partner        | 0 (0.0%) | 108 (87.1%) | 351 (26.3%) | 1093 (91.0%) | <0.0001 |
| Presence of STI           | 0 (0.0%) | 124 (100.0%) | 99 (7.4%) | 1181 (98.3%) | <0.0001 |
| Bathe with hot water      | 0 (0.0%) | 94 (75.8%) | 365 (27.3%) | 937 (78.0%) | <0.0001 |
| Susceptibility            |                      |                |               |         |
| Married women only        | 1 (0.8%)  | 94 (75.8%) | 122 (9.1%) | 910 (75.8%) | <0.0001 |
| Young girls only          | 0 (0.0%) | 106 (85.5%) | 362 (27.1%) | 1075 (89.5%) | <0.0001 |
| Older women only          | 1 (0.8%)  | 10 (8.1%)  | 186 (13.9%) | 984 (81.9%) | <0.0001 |
| Those with children       | 0 (0.0%) | 117 (94.4%) | 152 (11.4%) | 937 (78.0%) | <0.0001 |
| Treatment                 |                      |                |               |         |
| Antibiotics               | 0 (0.0%) | 109 (87.9%) | 90 (6.7%) | 1117 (93.0%) | <0.0001 |
| Surgery                   | 54 (43.5%) | 118 (95.2%) | 505 (37.8%) | 1192 (99.3%) | <0.0001 |
| Cold water bath           | 90 (72.6%) | 123 (99.2%) | 622 (46.5%) | 1192 (99.3%) | <0.0001 |
| Radiotherapy              | 43 (34.7%) | 74 (59.7%) | 334 (25.0%) | 1099 (91.5%) | <0.0001 |
| Prevention                |                      |                |               |         |
| Abstinence                | 92 (74.2%) | 71 (57.3%) | 621 (46.5%) | 616 (51.3%) | 0.1200 |
| Pap smear                 | 123 (99.2%) | 123 (99.2%) | 585 (43.8%) | 1192 (99.3%) | <0.0001 |
| Vaccination               | 123 (99.2%) | 123 (99.2%) | 460 (34.4%) | 1192 (99.3%) | <0.0001 |
| Better to treat than prevent | 0 (0.0%) | 105 (84.7%) | 437 (32.7%) | 1063 (88.5%) | <0.0001 |

Pre – Pre-training, Post – Post-training, CC – cervical cancer, STI – sexually transmitted infection, Staph – Staphylococcus.
43/124 (34.7%) for radiotherapy while it was 505/1337 (37.8%) and 334/1337 (25.0%) respectively for those in the school cohort. There was significant misconception that antibiotics was a treatment modality by 43/124 (34.4%) and 675/1293 (50.5%) among students in the seminar cohort and school cohort respectively. This misconception was corrected following training in both the seminar and school cohorts.

Mean knowledge score
The mean knowledge score prior to training for the seminar cohort was 12.94 ± 9.23 which was not statistically significantly different from that of the school cohort 12.07 ± 9.74.

Table 3. The mean knowledge scores were not significantly different between classes in the seminar cohort (p = 0.12) and the school cohort (p = 0.79). There was also no significant difference in the mean scores between different ages either in the seminar cohort (p = 0.78) or in the school cohort (p = 0.44).

Following training the mean knowledge score for the seminar cohort was 60.39 ± 9.75 which was highly statistically significantly different from the pre-training mean score (p < 0.0001). Following peer training the mean knowledge score of the school cohort 53.74 ± 10.69 was highly statistically significantly higher than their pre-training mean knowledge score p < 0.0001. The mean knowledge score for the seminar cohort post-training was statistically significantly higher than that of the school cohort (p < 0.0001). The mean knowledge scores were statistically significantly higher post-training for all classes and ages. However, there was no statistically significant difference in the mean scores between classes (p = 0.68) and between ages (p = 0.27) in seminar cohort following training. Following peer training there was no significant difference in the mean scores between classes (p = 0.26) and between different ages (p = 0.60) in the school cohort.

The mean knowledge scores were also not significantly associated with maternal level of education in the pre-peer training school cohort (p = 0.11) and in the post-peer training school cohort (p = 0.63).

The mean knowledge score improved by 47.45 percentage points among those in the seminar cohort compared to 41.67 percentage points among those in the school cohort.

Discussion
This study showed that majority of the students had never heard about cervical cancer even though most of them felt that it was not uncommon in Nigeria. This is in keeping with a systematic review which reported low awareness about cervical cancer in sub-Saharan Africa [16]. The finding in this study is, however, in contrast to findings in Hong Kong where up to 95.9% of school girls of similar age group to those in this study were reported to be aware.

Table 3: Pre- and Post-intervention mean knowledge scores of students in the seminar and school cohorts by class and age.

| Variable | Seminar cohort | School cohort | p value | Seminar cohort | School cohort | p value |
|----------|----------------|---------------|---------|----------------|---------------|---------|
|          | n   | MKS  | SD    | MKS  | SD    | n   | MKS  | SD    | n   | MKS  | SD    |
| Overall  | 124 | 12.94| 9.23  | 60.39| 9.75  | < 0.0001 | 1319 | 12.07| 9.74  | 1201| 53.74| 10.69 |
| Class    |      |      |       |      |       | < 0.0001 |      |      |       |      |      |
| JSS1     | 5    | 13.6 | 14.03 | 55.00| 8.25  | < 0.0012 | 297  | 11.57| 10.00| 37  | 53.08| 11.76 |
| JSS2     | 19   | 17.68| 11.65 | 59.16| 9.00  | < 0.0001 | 151  | 12.05| 9.06 | 196 | 53.88| 10.44 |
| JSS3     | 41   | 10.54| 8.89  | 60.57| 10.21 | < 0.0001 | 425  | 12.15| 9.53 | 483 | 53.28| 10.84 |
| SS1      | 26   | 12.62| 8.66  | 59.54| 10.51 | < 0.0001 | 176  | 11.70| 9.66 | 165 | 55.59| 10.63 |
| SS2      | 18   | 12.0 | 7.88  | 61.56| 8.36  | < 0.0001 | 135  | 12.41| 10.91| 174 | 53.15| 10.44 |
| SS3      | 15   | 14.93| 7.32  | 63.14| 10.43 | < 0.0001 | 109  | 13.10| 10.24| 111 | 53.37| 10.90 |
| Age      |      |      |       |      |       | < 0.0001 |      |      |       |      |      |
| 9        | 1    | 12.00| –     | 60.00| –     | < 0.0001 | 2    | 4.00 | 5.66 | 3   | 56.00| 14.42 |
| 10       | 3    | 6.67 | 11.55 | 52.00| 6.93  | < 0.0001 | 125  | 10.85| 8.89 | 49  | 55.67| 10.03 |
| 11       | 5    | 14.40| 8.76  | 58.40| 10.04 | < 0.0001 | 129  | 12.99| 11.08| 75  | 53.92| 10.69 |
| 12       | 21   | 15.62| 9.79  | 59.24| 9.35  | < 0.0001 | 299  | 11.49| 9.05 | 216 | 52.95| 10.34 |
| 13       | 34   | 12.24| 11.40 | 60.24| 10.65 | < 0.0001 | 319  | 12.29| 9.82 | 378 | 53.59| 10.95 |
| 14       | 15   | 12.80| 6.45  | 56.53| 8.80  | < 0.0001 | 134  | 11.49| 9.45 | 157 | 53.10| 10.81 |
| 15       | 22   | 10.91| 8.66  | 62.18| 9.70  | < 0.0001 | 144  | 12.86| 10.82| 173 | 54.26| 10.21 |
| 16       | 19   | 13.89| 7.47  | 63.33| 8.92  | < 0.0001 | 141  | 12.82| 10.13| 106 | 55.25| 11.13 |
| 17       | 4    | 12.94| 9.27  | 68.00| 9.24  | < 0.0001 | 26   | 11.85| 9.01 | 34  | 52.59| 11.41 |

MKS – Mean knowledge Score, SD – standard deviation, JSS – Junior secondary school, SS – Senior Secondary.
of cervical cancer [17]. In this study, also in consonance with the low awareness about cervical cancer, more than 90% of the respondents did not know that HPV was the cause of cervical cancer. A few of the students attributed cervical cancer to more commonly known organisms. Many studies [17–20] have reported a lack of knowledge about risk factors which is important in taking decisions to adopt healthy life-styles. This study also demonstrated sub-optimal knowledge about possible risk factors for acquisition of HPV and cervical cancer. Health education programmes for adolescents will need to emphasize these risk factors which are not only significant for HPV and cervical cancer but also for other sexually transmitted infections. This study also showed that the students did not appreciate the susceptibility of all females that were sexually active. This is in keeping with findings in previous studies among adult women in which most felt that they were not at risk for HPV and cervical cancer [14, 21].

Sexual activity was low in the students studied as only about 3% had engaged in sex. The low prevalence of sexual activity in this study is in contrast to other studies from Nigeria and other developed countries [22–24]. The low sexual activity among these students provides a window of opportunity for providing them important sexual information and health education prior to sexual debut. They are also at an opportune stage during which they can receive the HPV vaccine as majority are yet to commence sexual activity.

Interestingly, almost all the students in the seminar cohort knew about vaccination and PAP smear as prevention modalities for HPV and cervical cancer prior to the training. This was in contrast to the school cohort in which less than half of the students knew about these interventions. This suggests that the students who attended the seminar may have been told about this prior to their coming for the seminar. Lack of knowledge about preventive tools has been implicated in the low uptake of PAP smear and HPV vaccination [10, 11, 21, 25].

There was marked improvement in most knowledge domains following training and peer training in the seminar and school cohorts respectively. However, there was no significant increase in the proportion of students who knew that abstinence was a preventive strategy for HPV and cervical cancer. It is not clear as to why this was so.

In this study there was no difference in mean knowledge scores between the different classes. This is contrast to findings in Hong Kong in which students in higher grades scored significantly higher in knowledge scores [17]. This difference may be due to the low availability of information in the general population. Studies from Nigeria have documented low knowledge in other population groups such as women living in a slum, market women and women attending antenatal clinics [21, 26, 27], although some studies have reported reasonable knowledge among others such as female health care workers and teachers [6, 28]. With low general knowledge about cervical cancer in the population students are unlikely to have information about HPV and cervical cancer.

There was also no difference in the mean knowledge score between different ages. This is similar to findings in a Nigerian study on knowledge of secondary school students about cancer in general and cancer risk factors [22]. However, the finding was in contrast to findings from Europe in which knowledge was found to positively increase with age [29]. The general low information in the population and the tendency for a general avoidance of discussions on sexually related health information at family and community level may be responsible for the observations in this study.

In keeping with previous documentation on peer education this study showed that peer training was effective in improving knowledge in the study population. Peer education on cervical cancer has been successful in adult women but this study is the first, to the best knowledge of the researchers, to utilize this approach for disseminating information on HPV and cervical cancer to an adolescent population. Different methods have been proposed for the delivery of peer education [7]. The method used in this study was that of formal delivery in a class setting. The advantage of this method is the ability to increase knowledge in a large number of persons in a short period of time with minimal resources. The impact of this strategy is likely to be more as the adolescents were encouraged to discuss the information received with family members and with friends who are not in their schools. The use of key points to enhance recall and its use for peer training is an important method to emphasise important must-know facts.

This study has also shown that students at different stages of development (age and class) can be taught the same thing with good comprehension. There was no significant difference in mean knowledge scores of students who received similar training. Although mean knowledge score was significantly higher in the seminar cohort compared to the school cohort following the intervention, most knowledge domains were above 80%. The higher knowledge score in the seminar cohort could have been because they were assessed immediately after the training while for those in the school cohort assessment occurred within 3–5 days after peer training.

In conclusion, there was a dearth of knowledge about HPV and cervical cancer among female Nigerian adolescents in secondary schools. Peer education is an effective strategy for rapidly improving knowledge in the target group and portends optimal resource utilisation. It is recommended that all schools should use the strategy for disseminating information garnered from seminars outside their schools in which their students participated.

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**Competing Interests**

The authors have no competing interests to declare.

**Author Contributions**

This study is part of an institutional research by the Institute of Child Health, University of Benin. All authors contributed to the concept of the study, CO delivered the
lecture to the students at the seminar, all authors were involved in the analysis and interpretation of the data, AES wrote the initial draft while all authors read and approved the final draft.

References
1. International Agency for Research on Cancer and World Health Organization. Globocan 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012—Cervical cancer fact sheet. Available at: globocan.iarc.fr. Accessed 15th August 2017.
2. Ajah LO, Ezeonu PO, Ozonu NC, Iyoke CA, Nkwo PO and Ajah MI. A five-year review of cervical cytology in Abakaliki, Nigeria. American J Cancer Prev. 2015; 3: 23–26.
3. Hariri S, Dunne E, Seraiya M, Unger E and Markowitz L. Human papilloma virus. In: Roush SW and Baldy LM (eds.), Manual for the surveillance of Vaccine-preventable diseases. 5th Ed. Atlanta, GA: Centers for Disease Control and Prevention; 2011: Available at: http://www.cdc.gov/vaccines/pubs/surv-manual.
4. Clendenin C, Zhang Y, Warburton RN and Light DW. Manufacturing costs of HPV vaccines for developing countries. Vaccine. 2016; 34: 5984–9. DOI: https://doi.org/10.1016/j.vaccine.2016.09.042
5. Ferrer H, Trotter C, Hickman M and Audrey S. Barriers and facilitators to HPV vaccination of young women in high-income countries: a qualitative systematic review and evidence synthesis. BMC Public Health. 2014; 14: 700. Available at: http://www.biomedcentral.com/1471-2458/14/700. DOI: https://doi.org/10.1186/1471-2458-14-700
6. Ajah LO, Iyoke CA, Ezeonu PO, Ugwu GO, Onoh RC and Ibo CC. Association between knowledge of cervical cancer/screening and attitude of teachers to immunization of adolescent girls with human papilloma virus vaccine in Abakaliki, Nigeria. American J Cancer Prev. 2015; 3: 8–12.
7. Abdi F and Simbar M. The peer education approach in adolescents—narrative review article. Iranian J Puhl Health. 2013; 42: 1200–06.
8. Azizi M, Hamzehgardeshi Z and Shahhosseini Z. Influential factors for the improvement of peer education in adolescents: a narrative review. J Pediatr Rev; 2016.
9. Oanda I and Akudolu L. Addressing gender inequality in higher education through targeted institutional responses: field evidence from Kenya and Nigeria. In: O’Hara S (ed.), Higher education in Africa: equity, access opportunity. New York: Institute of International education (IIE).
10. Ozyer S, Uzunlar O, Ozler S, et al. Awareness of Turkish female adolescents and young women about HPV and their attitudes towards HPV vaccination. Asian Pac J Cancer Prev. 2013; 14: 4877–81. DOI: https://doi.org/10.7314/APJCP.2013.14.8.4877
11. Gualano MR, Stillo M, Mussa MV and Zotti CM. Cross sectional study investigating the differences in knowledge and behaviours about HPV between vaccinated and non-vaccinated girls. J Prev Med Hyg. 2016; 57: E121–E127.
12. Adeomi AA, Adeoye OA, Asekun-Olarinmoye O, Abudurin OL, Olugbenga-Bello AI and Sabageh AO. Evaluation of the effectiveness of peer education in improving HIV knowledge, attitude and sexual behaviours among in-school adolescents in Osun state, Nigeria. AIDS Research and Treatment; 2014. DOI: https://doi.org/10.1155/2014/131756
13. Medley A, Kennedy C, O’Reilly K and Sweat M. Effectiveness of peer education intervention for HIV prevention in developing countries: a systematic review and meta-analysis. AIDS Edu Prev. 2009; 21: 181–206.
14. Mbachi C, Dim C and Ezeoke U. Effects of peer health education on perception and practice of screening for cervical cancer among urban residential women in south east Nigeria: a before and after study. BMC Women’s Health. 2007; 17: 41. DOI: https://doi.org/10.1186/s12905-017-0399-6
15. Abiodun OA, Olu-Abiodun OO, Sotunsa JO and Oluwole FA. Impact of health education intervention on knowledge and perception of cervical cancer and cervical screening uptake among adult women in rural communities in Nigeria. BMC Public Health. 2014; 14: 814. Available at: http://www.biomedcentral.com/1471-2458/14/814. DOI: https://doi.org/10.1186/1471-2458-14-814
16. Perlman S, Wamai RG, Bain PA, Welty T, Welty E and Ogembo JG. Knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-saharan Africa: a systematic review. PLOSone. 2014; 9: e90912.
17. Lee A, Ho M, Cheung CKM and Keung VMW. Factors influencing adolescent girls’ decision in initiation for human papillomavirus vaccination: a cross-sectional study in Hong Kong. BMC Public Health. 2014; 14: 925. Available at: http://www.biomedcentral.com/1471-2458/14/925. DOI: https://doi.org/10.1186/1471-2458-14-925
18. Fasanu AO, Akindele RA, Ademimpe WA, et al. Knowledge of risk factors and utilization of cervical cancer screening services among health care workers in a teaching hospital in south western Nigeria. Int J Med Med Sci. 2014; 4: 172–77.
19. Kress CM, Shawling L, Owen-Smith AA, et al. Knowledge, attitudes and practices regarding cervical cancer and screening among Ethiopian health care workers. Int J Women’s Health. 2015; 7: 765–72.
20. Carey C, Pined D, Tebeu PM, et al. Awareness of HPV and cervical cancer prevention among Cameroonian health care workers. BMC Women's Health. 2011; 11: 45. Available at: http://www.biomedcentral.com/1472-6874/11/45. DOI: https://doi.org/10.1186/1472-6874-11-45
21. Balogun MR, Odukoya OO, Oyediran MA and Ugwu PI. Cervical cancer awareness and preventive practices: a challenge for female urban slum
dwellers in Lagos, Nigeria. Afr J Reprod Health. 2012; 16: 75–82.

22. Sule ST, Shehu SM and Ukwenya JE. Risk factors to common cancers in Nigeria: knowledge, attitudes and practice among secondary school students in Kaduna, Nigeria. Int J Med Med Sci. 2014; 6: 34–41. DOI: https://doi.org/10.5897/IJMMS2013.0970

23. Vaidakis D, Moustaki I, Zervas I, et al. Knowledge of Greek adolescents on human papilloma virus(HPV) and vaccination – a national epidemiologic study. Medicine open. 2017; 96: e5287.

24. Guttmacher Institute. American teens’ sexual and reproductive health. Fact sheet. September 2016. Available at: https://www.guttmacher.org/sites/default/files/factsheet/fb-atsrh.pdf Accessed 15th August 2017.

25. Ebu NI, Mupepi SC, Siakwa MP and Sampelle CM. Knowledge, practice and barriers toward cervical cancer screening in Elmina, southern Ghana. Int J Women's Health. 2015; 7: 31–9.

26. Obi AI. Cervical cancer Knowledge and screening practices among women of reproductive age in Benin City, Edo state. J Commun Health Prim Health Care. 2015; 29: 59–66.

27. Ahmed SA, Sabitu K, Idris SH and Ahmed R. Knowledge, attitude and practice of cervical cancer screening among market women in Zaria, Nigeria. Nig Med J. 2013; 54: 316–9. DOI: https://doi.org/10.4103/0300-1652.122337

28. Ugwu EO, Obi SN, Ezechukwu PC, et al. Acceptability of Human papilloma virus vaccine and cervical cancer screening among female health care workers in Enugu, Southeast Nigeria. Nig J Clin Pract. 2013; 16: 248–52. DOI: https://doi.org/10.4103/1119-3077.110141

29. Patel H, Jeve YB, Sherman SM and Moss EL. Knowledge of human papilloma virus and the human papillomavirus vaccine in European adolescents: a systematic review. Sex Transm Infect. 2016; 92: 474–9. DOI: https://doi.org/10.1136/sxtrans-2015-052341