

Quality of 'Educational Pamphlet Intervention Tool' in Prevention of Human Papilloma Virus Infection – A Pilot Study

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Abstract— Baseline knowledge on Human Papilloma Virus (HPV) infection is crucial to establish a progressive track on prevention of HPV related cancers. This study aimed to develop informative educational pamphlet and evaluate its effectiveness. The pamphlet was developed in three stages. Stage 1: development, validation and translation. In stage 2, a pre- post-test study in urban and rural areas of Kedah state, Malaysia to assess knowledge gained. The stage 3, two-week follow-up study to assess knowledge retained. The research findings showed significant increase in knowledge gain from 37% to 67% [N = 106, Mdn = 6 (IQR = 5) to Mdn = 14 (IQR = 6), $p < .001$] and reveals a very poor knowledge and benchmark information before intervention. At the two-week follow-up, a statistically significant increase in correct responses was observed, 66% to 88% [N = 87, Mdn = 13 (IQR = 5) to Mdn = 16 (IQR = 2), $p < .001$]. The educational protocol significantly increased knowledge about HPV infection and HPV vaccination, regardless of sociodemographic characteristics and risk behaviors. Effective, informative protocols are important with booster education campaigns to prevent adverse psychosocial responses, promote healthy sexual practice and encourage Pap screening behaviors among sexually active young adult population..

Keywords— Attitude, HPV infection, Human Papilloma Virus, Knowledge, Perception, Practice.

I. INTRODUCTION

BASELINE knowledge on Human Papilloma Virus (HPV) infection and HPV vaccination is crucial to establish a progressive track on prevention of HPV related diseases and cancers. The current HPV vaccination guidelines recommends 2-dose of HPV vaccine starting before 15th birthday and the second dose given 6 to 12 months later and the 3-dose regimen is given for 9 through 26-year-old for immunocompromised including HIV infected [1]. HPV vaccination may greatly reduce cervical cancer incidence by as much as 77% [2], and anal cancer [3]. However, recent data suggest fewer than half

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of 13- to 17-year-old females in the United States have received one or more doses of HPV vaccine, and only 32% have completed 3-dose regimen [4]. It is critical that key stakeholders possess adequate knowledge in the early stages of behavior change according to multiple frameworks that characterize the stages of adoption of health behaviors [5], [6]. Moreover, adequate knowledge is a prerequisite for making informed decisions about vaccine policies by providing information to improve knowledge for behavioral interventions [7]. Despite the role of knowledge in HPV vaccination behaviors, several studies have shown knowledge is relatively low among parents and adult women in the United States [8]–[11]. Parents have also indicated that one of the main reasons why their daughters have not received HPV vaccine is a lack of information about HPV and vaccine [12]–[14]. It is quite surprising to note, there are a substantial population among age eligible adult vaccination population without being vaccinated due to either inadequate knowledge or lack of financial strength. Parents are the key stakeholders in HPV vaccination and main decision makers for their age eligible children to HPV vaccine [5]. Although healthcare provider recommendation is the single best predictor of HPV vaccination, [15], [16] most females receive HPV vaccine at doctors' office [17] and provider recommendation is a key determinant [11], [18], [19]. More than one-third of parents of age eligible female children do not receive recommendation [16] and less than a quarter recommend male adolescents [20]. Among the very few intervention studies conducted, all showed that simple strategies (e.g., providing written materials or verbal information) improved knowledge among parents, adult women, or students [21], [22]. The objective of this study was to develop informative educational pamphlet and evaluate its effectiveness to fill the gap in literature by assessing whether such intervention tool (educational pamphlet) could increase the baseline knowledge among young adults.

II. MATERIALS AND METHODS

We conducted an HPV education campaign which consisted of education intervention sessions using pre-validated, well-structured educational pamphlets among young adults aged 18 to 26 years at university campus, work places and residential areas. A baseline study was conducted before education

intervention to assess the knowledge level about HPV infection and vaccination.

The HPV educational intervention tool was prepared in three stages. In stage 1, a group of five specialists, one in each of community medicine, general medicine, gynaecologist, epidemiologist from faculty of medicine, AIMST University and a practicing clinical pharmacist, MOH hospital, Malaysia were approached to discuss the substance, content and organization of the educational pamphlet regarding HPV infection and vaccination. The pamphlet was outlined with information that could be easily understood, fairly easy to read and free of jargon's which tool roughly 15 minutes to complete. With a specific goal to assess the effectiveness of intervention tool for its readability, understanding and clarity, the pamphlet contained the following information: HPV prevalence and transmission, diseases associated, abnormal Pap test, clinical manifestation and complications, risk factors, preventions of HPV related diseases, sources, course and dosage schedule, efficacy and safety recommendations of HPV vaccine. The prepared intervention tool was cross checked by the panel and their remarks were accommodated. The tool was then content validated in two sessions by a group of five experts from pharmacology unit, followed by 8 members from clinical pharmacy and pharmacy practice unit from a private university. In stage 2, a pilot test at baseline was done using pre-validated questionnaire to test knowledge, attitude and perception. The intervention tool (pamphlet) was then administered to potential respondents after a pre-test for baseline knowledge and after allowing sufficient period of time to go through the pamphlet, a post-test was performed to assess the knowledge gained. Any doubts or questions arising thereon from the pamphlet was addressed and made note of for improvement. The respondents were approached two weeks after the pamphlet was administered and the survey was repeated as pre-test, post-test to access the knowledge retained. The percentage score of all the test items with correct answers were summed and computed. McNemar's test was used to estimate the significant difference in knowledge scores between pre- and post-test results. The percentage scores for individual items and the total median score for the questionnaire were computed. Wilcoxon signed rank test was used to assess the precise difference in knowledge scores.

The educational pamphlet was forward and backward translated and compared to the original and the second version was prepared. The inter-rater reliability, Cohen's κ was run to determine if there was agreement between the English and the Malay version of the pamphlet which showed substantial agreement between the two versions, $\kappa = .69$ (95% CI), $p < 0.001$. The final version of the Malay pamphlet was completed after making necessary corrections and the tool was made available for reliability and validity studies.

Readability analysis was performed on the pamphlet using well-validated scales that have been commonly used to evaluate healthcare-related materials. The simplicity and readability was assessed using online 'Text Readability

Consensus Calculator. The consensus report was found to be fairly easy to read and understand using the score or grade of Flesch Reading Ease score (68.8), Gunning Fog score (10.4) and Flesch-Kincaid grade level (7.3).

III. RESULTS

The construct and content validation of HPV Educational Pamphlet was established using a pamphlet evaluation response form which tested the respondents understanding and concerns regarding the pamphlet. In analyzing each individual category of responses in the response sheet, the following percentages of response were obtained for each question in Likert's scale (Table 1): The overall response among the respondents were strongly agree or agree to all the ten feedback questions and based on their feedback, the pamphlet was accepted and believed to deliver the information that is most required regarding HPV infection and vaccination.

TABLE I
HPV PAMPHLET EVALUATION RESPONSE

No.	Questions	SA	A	DA	SD	p value
1.	Evaluate the appearance of the pamphlet	12 (40)	11 (37)	7 (23)	0 (0)	0.497
2.	Is the front of the alphabets appropriate?	23 (77)	5 (17)	2 (7)	0 (0)	<0.001 **
3.	Is the content on HPV infection easy to read and understand	17 (57)	11 (37)	2 (7)	0 (0)	0.003*
4.	Is the content on the Pap Smear easy to read and understand	16 (54)	13 (43)	1 (3)	0 (0)	0.002*
5.	Is the content on the age of HPV vaccine easy to read and understand	18 (60)	12 (40)	0 (0)	0 (0)	0.273
6.	Is the content on the dose of HPV vaccine easy to read and understand	22 (73)	8 (27)	0 (0)	0 (0)	0.011*
7.	Is the content on the dose frequency of HPV vaccine easy to read and understand	17 (57)	12 (40)	1 (3)	0 (0)	<0.001 **
8.	Is the content on the availability of HPV vaccine easy to read and understand	17 (57)	13 (43)	0 (0)	0 (0)	0.465
9.	Would you take the pamphlet home to read later	18 (60)	12 (40)	0 (0)	0 (0)	0.273
10.	Will you get HPV vaccinated for yourself or your child	14 (47)	13 (43)	3 (10)	0 (0)	0.025*

SA = Strongly agree, A = Agree, DA = Disagree, SD = Strongly disagree.
Chi square test, $p < 0.05^*$, $p < 0.001^{**}$

A. Effect of HPV educational intervention tool before and after intervention

Of the 121 respondents, the mean age in stage 2 was 23 (IQR 2, ranging 20-26 years). Ninety seven (80%) of the respondents were females, 85 (70%) of the respondents were Chinese, 66 (55%) revealed graduate education and 64 (53%) were from urban areas. A pre- and post-intervention test with correct answers is shown in Table 2 and the percentage of correct answers for knowledge gained increased significantly

from 63% to 89% [median score 10 (4) vs. 14 (3), $p < 0.001$].

A two-week follow-up test at stage 3 for knowledge retention was significantly higher than the pre-intervention test 66% to 90% [median score 11 (4) vs. 14.5 (3), $p < 0.001$].

The results of stage 2 reveals the respondents had a moderate knowledge as per original Bloom's cut-off score and benchmark information about HPV infection and HPV vaccination, however were keen to learn more and observed the tool to be a useful and successful.

The question 12 produced about more than 280% increase in knowledge and questions 4 produced over 100% increase and the rest of the questions produced about 60-80% increase in knowledge score. The questions to produce less than 25% knowledge increase were 2, 5, 6, 10, 14 and 16. Most of the respondents were not aware about the best age for HPV vaccination and who are mostly affected by HPV infection. The data concerning HPV transmission and vaccination age made a generous impact on the respondents. Statistical analysis of stage 2 showed that pre-intervention knowledge scores did not contrast by age, gender, race, education or location. Be that as it may, the median knowledge scores at pre-intervention, $Mdn = 11$ ($IQR = 4$) were higher in the age category of 24-26 years in contrast to other age categories.

Interestingly, knowledge scores at post-intervention did not vary by socio-demographic variables. The median age in stage 3 was 23 ($IQR = 6$, range 20-26 years). Of the 92 respondents, 54 (59%) were 21-23 years, 71 (77%) female, 66 (72%) Chinese, 50% with undergraduate education and 47 (51%) belonging to urban areas. The outcome of the pre-and post-intervention analysis in stage 3 were like those for stage 2 and is shown in Table 2. Though the percentage of knowledge retained only increased marginally (63% to 66%) from pre-to post-intervention at follow-up visit, the knowledge gained substantially increased from 66% to 88% [$Mdn = 11$ ($IQR = 4$) vs. 14.5 (3), $p < 0.001$]. Before accepting the educational intervention, most of the respondents were not aware of the correct HPV vaccination age.

IV. DISCUSSION

In this study, an educational intervention tool (pamphlet) was developed, translated and tested to validate the efficiency of the educational pamphlet in improving awareness and knowledge regarding HPV infection and HPV virus. The intervention tool was found to significantly increase the knowledge and awareness irrespective of age, gender, ethnicity, education and location. The educational pamphlet was developed based on the factual information given by WHO and the CDC along with the vaccine manufacturer's information leaflet. Of late, there has been an ontogeny of HPV education intervention studies internationally. Studies have demonstrated that educational interventions on HPV-related illness effectively increased knowledge along with vaccine acceptability in America [23], [24], Sweden [25], Korea [26], Turkey [27], [28], and Hong Kong [29], [30].

The respondents' feedback form reported responses were positive and gave room for improvement and strength. Studies reported "tailored, gender specific educational materials are more effective for improving HPV knowledge." Studies link literacy as an index of positive health outcomes. A study identified literacy and culture as indispensable factors for HPV educational material [31]. This provides additional challenges related to language and information in the HPV pamphlet for both, educated as well as less educated respondents.

The pamphlet was tested for readability and translated to Bahasa Malaysia, and further, the agreement between both versions of translation was tested using Cohen kappa statistics [32] to measure the degree of agreement between the two raters. All were found to be satisfactory with moderate to good agreement. Hence the basic validation of the pamphlet satisfied the requirements.

The HPV pamphlet met the appreciation and approval of the participants. More than 90% indicated the educational tool was acceptable in content, appearance and readability. There was no total disagreement for any items in the evaluation form. There was one recommendation for preparing eye catchy, coloured pamphlets. Upon group agreement, few corrections were made to the HPV pamphlet. The final revised pamphlet was colour printed and used for the intervention study.

After substantial care was taken in the development of the education intervention tool and subjecting it for the various validation studies, the effect of intervention tool using 'educational pamphlets' in increasing knowledge regarding HPV infection and HPV vaccination was tested using pre-validated 16 item knowledge based questions among young adults aged 18-26 years.

This cross sectional study conducted located in the rural and urban areas demonstrated that the beliefs and perception regarding prevention of HPV infection can substantially improve the knowledge level. After the intervention, the respondents showed significantly more favorable attitude and beliefs towards prevention of HPV infections and were more tending to practice careful sexual practice with new partner. Results endorse that female respondents had better knowledge at baseline [33], [34]. However, similar increase in knowledge was revealed among either gender, whose knowledge seemed to be retained during the 2-week follow-up period. A study conducted under the recommendation of ACIP, USA for HPV vaccination among both genders, aged 11-26 years reported the same outcome among adults over an extended period [35]. A study in Germany, reported "using a balanced health information leaflet can increase girls' and parents' knowledge of HPV vaccination and vaccination uptake" [36]. Another study reported, a threefold increase in intent to vaccination among college girls using a 20-minute intervention [37].

TABLE II
PROPORTION OF CORRECT RESPONSES TO MULTIPLE CHOICE QUESTIONS ADMINISTERED BEFORE AND AFTER THE EDUCATIONAL INTERVENTION AMONG ADULT RESPONDENTS

Q. No.	Knowledge Items	Stage 2 of intervention tool development (N = 121)			Stage 3 of intervention tool development (N = 92)		
		Pre-test N (%)	Post-test N (%)	*P value	Pre-test N (%)	Post-test N (%)	*P value
1	HPV infection affects skin and the moist membranes that line the human body.	63 (52)	108 (89)	<0.001	49 (53)	81 (88)	<0.001
2	I came to know about HPV infection through advertisements (radio, TV, internet)/ friends/parents/ teachers.	96 (79)	109 (90)	0.037	75 (82)	82 (89)	0.230
3	HPV can infect males, females or both.	73 (60)	108 (89)	< 0.001	58 (63)	80 (87)	0.405
4	HPV infects mostly females.	53 (44)	108 (89)	< 0.001	36 (39)	81 (88)	< 0.001
5	Women infected with HPV are more likely to get cancer of the cervix.	95 (79)	108 (89)	0.037	73 (79)	81 (88)	0.152
6	Those infected with HPV are more likely to get pelvic warts, genital warts, penile cancer, cervical cancer and some other less common cancers.	91 (75)	102 (84)	0.109	57 (62)	83 (90)	< 0.001
7	Most people who are infected with HPV do not know that they are infected.	75 (62)	106 (88)	<0.001	53 (58)	81 (88)	<0.001
8	Signs and symptoms of HPV infection will take few months to years for developing.	68 (56)	107 (88)	< 0.001	52 (57)	83 (90)	<0.001
9	Mostly, HPV infection is transmitted through sexual intercourse.	65 (54)	108 (89)	<0.001	78 (85)	85 (92)	0.189
10	A vaccine is a biological preparation that improves immunity against a particular disease.	95 (79)	107 (88)	0.045	69 (75)	83 (90)	0.018
11	The HPV vaccination prevents HPV infection-associated development of cervical cancer, penile cancer, genital warts, and some less common cancers.	83 (69)	106 (88)	0.001	56 (61)	84 (91)	<0.001
12	The course of the HPV vaccination comprises of one, two or three doses.	29 (24)	113 (93)	0.003	70 (76)	85 (92)	<0.001
13	The best age for HPV vaccination is between 9-14, 15-20 or 21-26 years.	71 (59)	108 (89)	< 0.001	67 (73)	84 (91)	0.009
14	The HPV vaccination can be given from the age of 9 to 26 years.	94 (78)	108 (89)	< 0.001	49 (53)	83 (90)	0.005
15	Pap smear test can be used to screen pelvic cancer, cervical cancer or oral cancer.	63 (52)	102 (84)	0.026	58 (63)	82 (89)	<0.001
16	Under 30 years of age, Pap smear test is done once in every one, two or three year(s)	96 (79)	106 (88)	0.003	73 (79)	82 (89)	0.064
Total Median (IQR) Score		10 (4)	14 (3)	< 0.001 **	11 (4)	14.5 (3)	<0.001 **
Percentage of correct answers		63%	89%		66%	90%	

*McNemar's Test; **Wilcoxon Signed Rank Test; MCQs - Multiple Choice Questions.

This study was found promising that the knowledge score was significantly higher among adults at pre- to post-intervention (Mdn 10 → 15, possible 16) between baseline and post intervention. The total knowledge score significantly improved, and interestingly, the increase in knowledge and beliefs from baseline to follow-up was higher among adults (63% vs. 89%). As detected, there was a significant enhancement in belief that “HPV may cause cervical cancer” and “Cervical cancer may be prevented by vaccination,” indicates, better knowledge correlates with positive health beliefs. Poor perception about the risk factors has been reported as potential barriers for vaccination [38]-[40].

Studies revealed, cognitive understanding about Pap tests and HPV plays a significant role in predicting behavioral and psychosocial responses to Pap screening and HPV infection

[41], however, adults reported confident responses on intention to practice safe sex and undergo periodical Pap screening. A Finnish study noted, the survey questionnaire by itself can be a stimulus to provide sufficient knowledge [42]. In this study, the repeated administration of same questionnaires at two different time points may have acted as a trigger to prompt for information regarding the severe infection which might have further initiated discussion between near and dear about the prevention of the infection and related cancers. It was also inspiring to note that these respondents reported higher perceived scores for awareness to risks. There was significant differences identified between baseline and intervention regarding perceived severity. All studies are investigating the effectiveness of interventions, irrespective of the methods, aimed at common goals, either to

protect from sexually transmitted infections (STIs) or to improve sexual health. Previous studies are in agreement with these findings which reported most young adults have a poor HPV knowledge [43].

This study found, upon receiving the pamphlet, knowledge scores increased significantly. The baseline differences may be attributed to the differences in knowledge and education about STIs [44]. An interesting contradiction was noted while assessing the respondents' intention for cancer prevention. They generally had a positive attitude and most of the respondents (70–75%) were in favour of being vaccinated. This studies primary focus was to evaluate the impact of educational intervention on HPV and related cancers, their prevention attitudes and their responses towards future sexual behavior in commencing early sexual activity [45]. We were happy to note that educational intervention has magnified the respondents' perception towards HPV infection as a serious threat.

Poor knowledge score was reported in Malaysia [46] and elsewhere [47]. A Norway study reported only 20% of women had ever heard about HPV. Although most studies in sub-Saharan Africa report poor knowledge levels [48], a study in Tanzania reported no respondents including girls, parents and teachers knew about HPV vaccine [49]. Similarly, another study from Kenya reported the same. There is evidence that increased knowledge about the disease and its vaccine have proven to be the determining factor of health beliefs and practices. Thus, improving public awareness and knowledge on HPV links to cervical cancer and HPV vaccine safety with its benefit are important factors for health and health promotion programs implemented by the government. Although HPV vaccine is available in Malaysia since November, 2006 and national vaccination programme for 13 year old females since 2010, high price is still a barrier that prevent age eligible unvaccinated women from vaccination.

Educational protocol developed for this study may be useful for providers to guide patients in clinical setting as well as stake holders in community setting. The possible approaches based on provider and patient for HPV education include the use of pamphlets to reach the large population, providing answers to frequently asked questions. However, those with positive Pap test results or HPV infection would require one-on-one education in a clinical setting. A few people prefer information from providers due to privacy [50]. These people may benefit from the protocol developed which allows interactive information sharing by clinicians.

V. CONCLUSION

In conclusion, the results presented in this study give an insight into the effects of educational intervention pamphlet in improving knowledge among adult population regarding HPV infection and HPV vaccination. This study results confirm that the educational initiatives have proven to increase awareness and enhancing beliefs for appropriate practice towards HPV prevention. Therefore, in addition to providing clear, precise

and tailored information regarding implications of HPV infection, addressing misconceptions, its prevention, fears of screening and vaccination is of utmost importance. As a approach towards acquiring low cervical cancer incidence, greater efforts in health education is needed. Education should also focus on educating safe sexual behaviour by encouraging reduction in sexual partners, regular cervical cancer screening and promoting use of condoms. Since the price of HPV vaccination course (approximately RM1200) in Malaysia is nearly half of the average domestic earnings among middle class (RM3000), the government should seriously consider increasing health care budgets to vaccinate age eligible unvaccinated adult population at ages currently 20-26 years. Further, a comprehensive and sustainable HPV and cervical cancer education should be incorporated into health education from the early teen-ages in order to achieve the desired impact.

REFERENCES

- [1] E. Meites, A. Kempe, L. E. Markowitz, "Use of a 2-Dose Schedule for Human Papillomavirus Vaccination — Updated Recommendations of the Advisory Committee on Immunization Practices," *MMWR. Morb Mortal Wkly Rep* 2016., vol. 65, no. 49, pp 1405-1408.
- [2] J. S. Smith, L. Lindsay, B. Hoots, J. Keys, S. Franceschi, R. Winer, et al., "Human papilloma virus type distribution in invasive cervical cancer and high-grade cervical lesions: a meta-analysis update." *Int. J. Cancer.*, vol. 121, pp. 621–632, 2007
- [3] U.S. Food and Drug Administration. December 22, 2010 approval letter - Gardasil. Available from: <http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm238074.htm>.
- [4] Centers for Disease Control and Prevention (CDC). "National and state vaccination coverage among adolescents aged 13-17 years—United States, 2010." *MMWR Morb Mortal Wkly Rep* 2011., vol. 60, pp.1117–1123.
- [5] N. D. Weinstein. "The precaution adoption process." *Health Psychol.*, vol. 7, pp. 355–386, 1988.
- [6] K. Glanz, B. K. Rimer, K. Viswanath, "Health behavior and health education: theory, research, and practice. Fourth edition. San Francisco, CA: Jossey-Bass; 2008.
- [7] C. Abraham, S. A. Michie, "Taxonomy of behavior change techniques used in interventions." *Health Psychol* vol. 27, pp. 379–387, 2008.
- [8] N. D. Weinstein, "The precaution adoption process." *Health Psychol.*, vol. 7, pp. 355–386, 1988.
- [9] S. L. Pruitt, P. A. Parker, S. K. Peterson, T. Le, M. Follen, K. Basen-Engquist, "Knowledge of cervical dysplasia and human papillomavirus among women seen in a colposcopy clinic." *Gynecol Oncol.*, vol. 99, no. 3, Suppl. 1, pp. S236–244, 2005.
- [10] K. I. Fazekas, N. T. Brewer, J. S. Smith, "HPV vaccine acceptability in a rural southern area." *J. Womens Health (Larchmt)*, vol. 17, pp.539–548, 2008.
- [11] J. D. Allen, M. K. Othus, R. C. Shelton, Y. Li, N. Norman, L. Tom, et al., "Parental decision making about the HPV vaccine." *Cancer Epidemiol Biomarkers Prev.*, vol. 19, pp. 2187–2198, 2010.
- [12] A. F. Dempsey, L. M. Abraham, V. Dalton, M. Ruffin, "Understanding the reasons why mothers do or do not have their adolescent daughters vaccinated against human papillomavirus." *Ann Epidemiol.*, vol. 19, pp. 531–538, 2009.
- [13] D. S. Read, M. A. Joseph, V. Polishchuk, A. L. Suss, "Attitudes and perceptions of the HPV vaccine in Caribbean and African-American adolescent girls and their parents." *J. Pediatr Adolesc Gynecol.*, vol. 23, pp. 242–245, 2010.
- [14] K. R. Ylitalo, H. Lee, N. K. Mehta. "Health care provider recommendation, human papillomavirus vaccination, and race/ethnicity in the US National Immunization Survey." *Am. J. Public Health*, vol. 103, pp. 164-169, 2013.
- [15] M. Lau, H. Lin, G. Flores, "Factors associated with human papillomavirus vaccine-series initiation and healthcare provider

- recommendation in U.S. adolescent females: 2007 National Survey of Children's Health." *Vaccine*, vol. 30, pp. 3112-3118, 2012.
- [16] L. M. Gargano, N. L. Herbert, J. E. Painter, J. M. Sales, C. Morfaw, K. Rask, D. Murray, R. J. DiClemente, J. M. Hughes, "Impact of a physician recommendation and parental immunization attitudes on receipt or intention to receive adolescent vaccines." *Hum Vaccin Immunother.*, vol. 9, pp. 2627-2633, 2013.
- [17] M. Rahman, T. H. Laz, C. J. McGrath, A. B. Berenson, "Provider recommendation mediates the relationship between human papillomavirus vaccine awareness and HPV vaccine initiation and completion among 13-17 year old US adolescent children." *Clin Pediatr (Phila.)*, vol. 54, pp.371-375, 2015.
- [18] P. L. Reiter, J. R. Cates, A. L. McRee, S. L. Gottlieb, A. Shafer, J. S. Smith, et al., "State wide HPV vaccine initiation among adolescent females in North Carolina." *Sex Transm Dis.*, vol. 37, pp. 549-556, 2010.
- [19] S. L. Rosenthal, T. W. Weiss, G. D. Zimet, L. Ma, M. B. Good, M. D. Vichnin, "Predictors of HPV vaccine uptake among women aged 19-26: importance of a physician's recommendation." *Vaccine*, vol. 29, pp. 890-895, 2011.
- [20] J. S. Luque, Y. N. Tarasenko, B. T. Dixon, R. L. Vogel, S. H. Tedders, "Recommendations and administration of the HPV vaccine to 11- to 12-year-old girls and boys: a statewide survey of georgia vaccines for children provider practices." *J. Low Genit Tract Dis.*, vol. 18, pp. 298-303, 2014.
- [21] T. L. Malo, A. R. Giuliano, J. A. Kahn, G. D. Zimet, J. H. Lee, X. Zhao, S. T. Vadaparampil, "Physicians' human papillomavirus vaccine recommendations in the context of permissive guidelines for male patients: A national study." *Cancer Epidemiol Biomarkers Prev.*, vol. 23, pp. 2126-2135, 2014.
- [22] M. Gottvall, T. Tyden, A. T. Hoglund, M. Larsson, "Knowledge of human papillomavirus among high school students can be increased by an educational intervention." *Int. J. STD AIDS.*, vol. 21, pp. 558-562, 2010.
- [23] P. L. Reiter, B. Stubbs, C. A. Panozzo, D. Whitesell, N. T. Brewer, "HPV and HPV vaccine education intervention: effects on parents, healthcare staff, and school staff." *Cancer Epidemiol Prev Biomarkers*, vol.201, no.11, pp. 2354-2361, Nov. 2011.
- [24] S. Hopfer, "Effects of a narrative HPV vaccination intervention aimed at reaching college women: A randomized controlled trial". *Prev Science*, vol. 13, no. 2, pp. 173-182, April 2012.
- [25] S. Zaridah, "A review of cervical cancer research in Malaysia." *Med J Malaysia*. Vol. 69, pp. 33-41, Aug. 2014.
- [26] J. K. Oh, M. K. Lim, E. H. Yun, E. H. Lee, H. R. Shin, "Awareness of and attitude towards human papillomavirus infection and vaccination for cervical cancer prevention among adult males and females in Korea: a nationwide interview survey." *Vaccine.*, Vol. 28, no. 7, pp. 1854-1860, Feb. 2010.
- [27] O. Uzunlar, S. Ozyer, E. Başer, C. Togrul, M. Karaca, T. Gungor, "A survey on human papillomavirus awareness and acceptance of vaccination among nursing students in a tertiary hospital in Ankara, Turkey." *Vaccine.*, vol. 31, no. 17, pp. 2191-2195, Apr. 2013.
- [28] E. Tonguc, T. Gungor, T. Var, E. Kavak, M. Yucel, O. Uzunlar, "Knowledge about HPV, relation between HPV and cervix cancer and acceptance of HPV vaccine in women in eastern region of Turkey." *J gyn oncology*. Vol. 24, no. 1, pp. 7-13, Jan 2013.
- [29] T. T. Kwan, S. S. Lo, K. F. Tam, K. K. Chan, H. Y. Ngan, "Assessment of knowledge and stigmatizing attitudes related to human papillomavirus among Hong Kong Chinese healthcare providers." *Int. J. Gyne & Obst.*, vol. 116 no. 1, pp. 52-56, Jan. 2012.
- [30] T. T. Kwan, K. F. Tam, P. W. Lee, K. K. Chan, H. Y. Ngan, "The effect of school-based cervical cancer education on perceptions towards human papillomavirus vaccination among Hong Kong Chinese adolescent girls." *Patient education and counseling.*, vol. 84, no. 1, pp. 118-122, July 2011.
- [31] E. L. Cohen, K. J. Head, "Identifying knowledge-attitude-practice gaps in parental acceptance of adolescent vaccinations in Appalachian Kentucky: Implications for communication interventions." *J Commu in Healthcare.*, vol. 7, no. 4. :295-302, Dec. 2014.
- [32] P. A. Sharpe, H. M. Brandt, D. H. McCree, E. Owl-Myers, B. Taylor, G. Mullins, "Development of culturally tailored educational brochures on HPV and Pap tests for American Indian women." *J of Trans Nursing.*, vol. 24, no. 3, pp. 282-290, July 2013.
- [33] H. Baer, S. Allen, L. Braun, " Knowledge of human papillomavirus infection among young adult men and women: implications for health education and research." *J. commun health.*, vol. 25, no. 1, pp. 67-78, Feb. 2000.
- [34] S. J. Klug, M. Hukelmann, M. Blettner, "Knowledge about infection with human papillomavirus: a systematic review." *Prev med.*, vol. 46, no. 2, pp. 87-98, Feb. 2008.
- [35] L. M. Kester, R. B. Shedd-Steele, C. A. Dotson-Roberts, J. Smith, G. D. Zimet, "The effects of a brief educational intervention on human papillomavirus knowledge and intention to initiate HPV vaccination in 18-26-year old young adults." *Gyneco oncology.*, vol. 132, pp S9-12, Mar. 2014.
- [36] O. Wegwarth, S. Kurzenhäuser-Carstens, G. Gigerenzer, "Overcoming the knowledge-behavior gap: the effect of evidence-based HPV vaccination leaflets on understanding, intention, and actual vaccination decision." *Vaccine*. vol. 32, no. 12, pp. 1388-1393, Mar. 2014.
- [37] M. S. Gross, C. H. Tran, K. H. Sutherland, J. C. Castagno, R. J. Amdur, "Pilot Study: Can an Educational Intervention Increase Human Papillomavirus Vaccination in Female College Students?" *Obstetrics & Gynecology.*, vol. 123, no. 11, pp. 4S-5S, May 2014.
- [38] K. Davis, E.D Dickman, D. Ferris, J. K. Dias, "Human papillomavirus vaccine acceptability among parents of 10-to 15-year-old adolescents," *J lower genital tract disease.*, vol. 8, no. 3, pp. 188-1894, July 2004.
- [39] C. Wetzel, A. Tissot, L. M. Kollar, P. A. Hillard, R. Stone, J. A. Kahn, "Development of an HPV educational protocol for adolescents." *J. ped & adol gynec.*, vol. 20, no. 5, pp. 281-287, Oct. 2007.
- [40] S. C. Woodhall, M. Lehtinen, T. Verho, H. Huhtala, M. Hokkanen, E. Kosunen, "Anticipated acceptance of HPV vaccination at the baseline of implementation: a survey of parental and adolescent knowledge and attitudes in Finland." *J. Adol Health.*, vol. 40, no. 5, pp. 466-469, May 2007.
- [41] J. A. Kahn, S. L. Rosenthal, T. Hamann, D. I. Bernstein, "Attitudes about human papillomavirus vaccine in young women." *Int. J. STD & AIDS.*, vol. 14, no. 5, pp. 300-306, May 2003.
- [42] H. W. Kim, "Effects of prevention education on human papillomavirus linked to cervix cancer for unmarried female university students." *J. Korean Aca Nursing*. Vol. 39, no. 4, pp. 490-498, Aug. 2009.
- [43] A. F. Dempsey, G. D. Zimet, R. L. Davis, L. Koutsky, "Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV." *Pediatrics.*, vol. 117, no. 5, pp. 1486-1493, May 2006.
- [44] D. R. Williams, "Racial/ethnic variations in women's health: the social embeddedness of health." *American J. pub health.*, vol. 92, no. 4, pp. 588-597, Apl. 2002.
- [45] L. Koutsky, "Epidemiology of genital human papillomavirus infection." *American J. med.*, vol. 102, no. 5, pp. 3-8, May 1997.
- [46] L. P. Wong, "Knowledge and attitudes about HPV infection, HPV vaccination, and cervical cancer among rural southeast Asian women." *Int. J. behav med.*, vol. 18, no. 2, pp. 105-111, June 2011.
- [47] G. G. Donders, M. Gabrovska, G. Bellen, J. Van Keirsbilck, T. Van Den Bosch, I. Riphagen, M. Verjans, "Knowledge of cervix cancer, human papilloma virus (HPV) and HPV vaccination at the moment of introduction of the vaccine in women in Belgium." *Archives of gyneco and obstetrics.*, vol. 277, no. 4, pp. 291-298, Apr. 2008.
- [48] S. Perlman, R. G. Wamai, P. A. Bain, T. Welty, E. Welty, J. G. Ogembo, "Knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-Saharan Africa: a systematic review." *PloS one.*, vol. 9, no. 3, pp. e90912, Mar. 2014.
- [49] P. Remes, V. Selestine, J. Changanlucha, D. A. Ross, D. Wight, S. de Sanjose, et al., "A qualitative study of HPV vaccine acceptability among health workers, teachers, parents, female pupils, and religious leaders in northwest Tanzania." *Vaccine.*, vol. 30, no. 36, pp. 5363-5367, Aug. 2012.
- [50] D. H. McCree, P. A. Sharpe, H. M. Brandt, R. Robertson, "Preferences for sources of information about abnormal Pap tests and HPV in women tested for HPV." *Prev Med.*, vol. 43, no. 3, pp. 165-170, Sep. 2006.