



Review

HPV vaccine acceptability in Africa: A systematic review

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ABSTRACT

Objective. The objective of this study was to provide a systematic review of peer-reviewed literature on the factors associated with HPV vaccine acceptability among adults in African countries.**Methods.** A systematic search was conducted across five electronic databases: EMBASE, PsychINFO, CINAHL, Global Health and Ovid MEDLINE, to identify studies related to HPV vaccination acceptability in African countries (August 2013). The Health Belief Model was used to guide data abstraction and synthesis.**Results.** Fourteen unique studies representing ten sub-Saharan African countries were identified, with more than half published within the last two years. Acceptability of the HPV vaccine for daughters was high (range 59–100%); however, vaccine-related awareness and knowledge were low. Perceived barriers including accessibility and cost concerns were important for acceptance, as were cues to action from healthcare providers and governments.**Conclusions.** This review suggests that acceptability of the HPV vaccine in countries in this region will be high. Broad knowledge gaps were highlighted regarding HPV and cervical cancer and these should be addressed. Education on the vaccine's effectiveness and reducing perceived barriers to vaccination would also be useful. Public endorsement by governments and healthcare providers will likely also increase acceptance.

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Introduction

The quadrivalent human papillomavirus (HPV) vaccine is manufactured by Merck & Co. and has been available commercially since 2006. The vaccine protects against strains of HPV that cause approximately 70% of cervical cancer cases and 90% of anogenital wart cases worldwide. The cost is high (approximately \$400 US for a three-series dose) and until recently this presented a significant barrier to implementation within low-resource countries. The Global Alliance for Vaccine Initiatives (GAVI) recently negotiated a \$4.50/dose fee for GAVI-supported countries. At the same time, GAVI announced support for eight projects in African countries that will begin over 2013–2014 (GAVI, 2013). This is positive as in the past there have been decades of delay between new vaccine production and implementation in developing countries (Kane et al., 2006).

African countries carry the largest burden of cervical cancer worldwide. Globally, the prevalence of HPV infection is estimated at 11–12%; however in sub-Saharan Africa (SSA) the estimate is substantially higher at 24% (Forman et al., 2012). In 2008, world estimates of new cervical cancer cases were 530,000, and 75,000 of these were from SSA countries, representing almost 15% of the world's burden (Forman et al., 2012). This burden is largely due to the lack of organized, preventative services, such as cytological screening (i.e. Pap smears), and the prevalence of risk factors for the disease (Bosch and de Sanjosé, 2003; Sankaranarayanan and Ferlay, 2006). Coinfection with HIV also increases the risk of HPV infection and progression by substantially reducing immunity (Palefsky et al., 2006). Promisingly, widespread vaccination with the HPV vaccine is expected to substantially reduce the burden of cervical cancer, especially when combined with other preventative measures (Garnett et al., 2006).

Health behaviors are conceptually complex and a number of frameworks have been used for their explanation. One that has been used to understand vaccination and cervical cancer screening behaviors in the past is the Health Belief Model (HBM) (Allen et al., 2010; Brewer and Fazekas, 2007; Johnson et al., 2008; Prematunge et al., 2012). As an expectancy model, the HBM predicts that an individual's health behavior will depend on the value placed on achieving a goal and the belief that a certain behavior will achieve that goal (Poss, 2001). The model includes aspects of perceived likelihood (individual susceptibility), perceived severity, and perceived effectiveness and benefits. There are also cues to action (external or internal stimuli) and perceived barriers to action. In this review, in addition to these five constructs, HPV vaccine-related awareness and knowledge and other modifying factors previously found to predict acceptability are included.

The purpose of this paper is to present a systematic review of peer-reviewed literature on the factors associated with HPV vaccine acceptability among adults with and without children from African countries. Acceptability in this context refers to a reported/predicted willingness and intention to receive a vaccination, and not actual uptake. A systematic review similar to this topic has been published recently (Perlman et al., 2014); however the current review is unique in its focus on adults, the quantification of results and use of the HBM framework which allows comparability to a previous US review (Brewer and Fazekas, 2007).

Methods

Search strategy

A health sciences librarian with experience conducting systematic reviews assisted with the search of five electronic databases: EMBASE, PsychINFO, CINAHL, Global Health and Ovid MEDLINE (August 2013). All literature relating to HPV vaccination in African countries was sought and the search consisted of database-specific vocabulary and use of Boolean operators for: human papillomavirus vaccin* and Africa. No restriction was placed on date or language. Reference sections of included articles were examined and journals were hand-searched for articles that may have been recently published. Authors

were contacted for in-press publications when abstracts were identified. The complete search strategy is presented in Appendix A.

Study selection

From the broader search, the search was narrowed to identify studies that involved the examination of HPV vaccine acceptability, and awareness, knowledge or attitudes related to HPV vaccines in any African country. Although the importance of the role of healthcare workers for HPV vaccine acceptance is recognized, the focus of this review was among adults and parents. In some studies, adolescents were included alongside an adult population and this has been noted. No additional limit was placed on the type of study participants; however, studies examining the effects of educational interventions or uptake were excluded. No limit was placed on study design; however, included articles were required to report original data (i.e. not reviews, editorials or commentary). Titles and abstracts of all articles returned from the initial search were screened and those irrelevant were excluded. Remaining articles were given full-text review and further excluded if they did not meet the inclusion criteria. Articles with multiple publications were counted as a single overall study.

Data collection and abstraction

A data abstraction form was created after a preliminary scan of the relevant literature, the measures used in previous systematic HPV vaccine acceptability studies (Allen et al., 2010) and a prior American synthesis (Brewer and Fazekas, 2007). The HBM constructs were used to organize the data collected under the following headings: awareness and knowledge, perceived likelihood, perceived severity, perceived effectiveness, perceived barriers, cues to action and other factors. These constructs were used to synthesize results in a qualitative manner, without statistical pooling of individual-level data. Study-level data for awareness and knowledge was summarized using article-reported statistics to calculate a summary percent. These were calculated by dividing the sum of affirmative responses (numerators) by the sum of study sample sizes (denominators) for each common variable.

Results

As shown in Fig. 1, 229 unique articles were identified after database searches, 29 were given full-text review with 14 meeting inclusion criteria. One article was identified by hand-searching (Ports et al., 2013). The final number of articles included in this review is 15 representing 14 unique studies (Table 1). These studies span ten countries from SSA: Botswana (1), South Africa (2), Nigeria (2), Kenya (3), Ghana (1), Uganda (1), Mali (1), Zambia (1), Tanzania (1) and Malawi (1). At the time of these studies, none of the countries had begun demonstration projects or national rollout of the vaccine. Formally excluded articles are described in Appendix A.

All included studies were conducted after 2006 and more than half were published within the last two years. Ten studies were cross-sectional and reported quantitative results (Table 2). Of these ten studies, six were completed using a self-administered questionnaire, and in four studies an interviewer administered the questionnaire. Nearly all studies presented findings using descriptive statistics only, with one reporting results of a multivariable model. The remaining five studies presented qualitative results from focus groups or interviews. The age of participants ranged from 10 to 84; however the majority of participants were older than 18, and all but three represented individuals from urban or semi-urban areas. The sample sizes ranged from 24 to 409 and most studies were conducted among females, although 5 of the 14 studies included males. Response rates were very high, with seven reporting >93%.

Eleven studies asked the participant's willingness to vaccinate their daughters (acceptability); however five studies, not exclusive to parents, required participants to imagine hypothetical daughters. Acceptability reported in these studies ranged from 59 to 100%. Six studies questioned if the participants would vaccinate themselves and willingness ranged from 58 to 100%. Of the three studies that asked participants about both themselves and their child, only one reported differences in acceptability: 100% said they would accept the vaccine

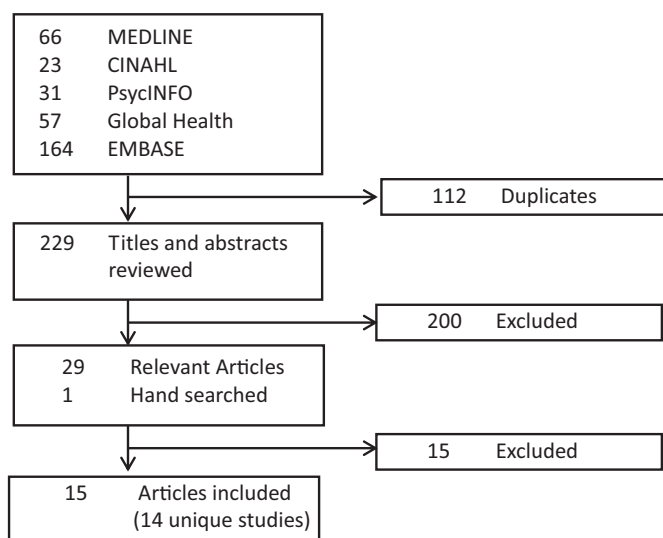


Fig. 1. Selection of articles for inclusion in the systematic review after a search conducted in August 2013.

for themselves, and 75% would accept for their children (Poole et al., 2013). This question was hypothetical for those without children and was asked among a particularly young sample: 40% of participants were between the ages of 12–17.

HPV-related awareness and knowledge

While overall awareness of cervical cancer was moderate: 67% aware of the disease across nine studies (range 5%–100%), one study found that for some, cervical cancer awareness only meant that the word was familiar (Ports et al., 2013). Two studies including focus groups acknowledged that the terminology surrounding cervical cancer was not common, and that the disease was often understood only by its symptoms. In some instances, “cancer of the womb,” or, “cancer of the opening or mouth to the womb,” was used to describe the disease (Francis et al., 2011; Katahoire et al., 2008).

Knowledge of the Pap smear test was moderate (45%, range 7%–74%). An understanding of its use as a preventative, rather than diagnostic, test may have been unclear to participants. For instance, one study found that although 69% knew the Pap smear could be used to test for cervical cancer, only 18% thought this was a way cervical cancer could be prevented (Rositch et al., 2012). Focus groups reported additional misconceptions, with women suggesting that the test could be used to treat and “cleanse the womb” (Harries et al., 2009).

Awareness of HPV (26%, range 0%–36%, seven studies) and the HPV vaccine (15%, 0%–40%, six studies) was low across studies. Measures of additional HPV-related knowledge among participants varied. Across five studies, an average of 24% knew HPV was a sexually transmitted infection (range 2%–52%) although one study found that 89% did not know infection could be asymptomatic (Iliyasu et al., 2010). Across nine studies, less than a third (24%, range 0%–66%) knew of a relationship between HPV infection and cervical cancer, and in studies conducted among university students knowledge that HPV also caused genital warts was low (20% and 13%, respectively) (Iliyasu et al., 2010; Makwe et al., 2012).

Two studies examined the relationship between acceptability and awareness. Awareness of HPV (Iliyasu et al., 2010), awareness of cervical cancer (Coleman et al., 2011; Iliyasu et al., 2010), and knowledge of the existence and purpose of the Pap smear test (Coleman et al., 2011) had strong, positive associations with acceptance. These three variables were not significant in another study (Omondi-Ogutu and M’Imunya, 2013).

Health belief model constructs

Perceived likelihood

Among university students, perceived personal risk of HPV infection or cervical cancer was low (6% and 7%, respectively) (Makwe et al., 2012). Some students (39%) thought that it was an inherited disease (Iliyasu et al., 2010). While among parents and adults, perceived risk of HPV infection of cervical cancer for their daughters was high, ranging 41%–78% (Coleman et al., 2011; DiAngi et al., 2011; Francis et al., 2010; Harries et al., 2009). Personal risk among respondents for HPV infection or cervical cancer appeared lower, with a range of 15%–37% (Coleman et al., 2011; Francis et al., 2010). In studies that included measures of both personal and daughter’s risk, it appeared that adults rated their

Table 1
Characteristics of included studies from a systematic search across five electronic databases (August 2013).

	Year of study	Country	Study design	Study instrument	Location	N	Age	Sex	Statistics for acceptability
Becker-Dreps et al. (2010)	2007	Kenya	Cross-sectional	Interview-administered questionnaire	SU	147	A	F	Descriptive
Coleman et al. (2011)	2009	Ghana	Cross-sectional	Self-administered questionnaire	U	264	A	F	Descriptive
DiAngi et al. (2011)	2009	Botswana	Cross-sectional	Self-administered questionnaire	U, SU	376	A	F, M	Bivariate models
Francis et al. (2010); ^a	2008	South Africa	Cross-sectional	Self-administered questionnaire	U	86	P	F	Descriptive
Francis et al. (2011); ^a	2008	South Africa	Qualitative	Focus groups	U	24	P	F	–
Harries et al. (2009)	2007–2008	South Africa	Qualitative	Focus groups	U, SU	43	P	F	–
Iliyasu et al. (2010)	–	Nigeria	Cross-sectional	Self-administered questionnaire	U	375	CS	F	Descriptive, Multivariable
Katahoire et al. (2008)	2007	Uganda	Qualitative	Focus groups, interviews, workshop	U, R	–	A, Y	F, M	–
Liu et al. (2012)	2009	Zambia	Cross-sectional	Interview-administered questionnaire	U	310	A	F	Descriptive
Makwe et al. (2012)	2010	Nigeria	Cross-sectional	Self-administered questionnaire	U	368	CS	F	Descriptive
Omondi-Ogutu and M’Imunya (2011)	2011	Kenya	Cross-sectional, Qualitative	Self-administered questionnaire, interviews	U	332, 50	P	F, M	Descriptive
Poole et al. (2013)	2011	Mali	Cross-sectional	Interview-administered questionnaire	SU	51	A, Y	F, M	Descriptive
Ports et al. (2013)	2011	Malawi	Qualitative	Semi-structure interviews	U, R	30	P	F	–
Remes et al. (2012); ^b	2010	Tanzania	Qualitative	Interviews, group discussion	U, R	151	P, Y	F, M	–
Rositch et al. (2012)	2007–2009	Kenya	Nested cross-sectional within cohort (HIV-discordant couples)	Interview-administered questionnaire	U	409	A	F	Descriptive

Age: A = adults, P = parents, CS = college students, Y = adolescents. Location: U = urban, SU = semi-urban, R = rural. ‘–’ = data not available or applicable.

^a Francis et al., 2011 were a subgroup of women from Francis et al., 2010.

^b This review studied the parents ($n = 60$), female students ($n = 54$) and teachers ($n = 37$) of this study.

Table 2

Awareness and knowledge of HPV among studies conducted in African countries. Studies were identified from a systematic search across five electronic databases (August 2013).

	Heard of HPV	Heard of HPV Vaccine	Heard of cervical cancer	Knowledge of Pap smear test ^a	Know HPV is an STI ^a	Aware of relationship between HPV and cervical cancer ^a
Becker-Dreps et al., 2010	–	0%	15%	–	–	–
Coleman et al., 2011	–	40%	87%	72%	52%	66%
DiAngi et al., 2011	35%	9%	71%	–	–	–
Francis et al., 2010	29%	–	61%	74%	22%	19%
Francis et al., 2011	–	–	–	–	–	–
Harries et al., 2009; ^b	–	–	–	–	–	0%
Iliyasu et al., 2010	36%	–	54%	28%	23%	18%
Katahoire et al., 2008	–	–	–	–	–	–
Liu et al., 2012	–	–	72%	–	–	–
Makwe et al., 2012	18%	14%	56%	7%	–	11%
Omondi-Ogutu and M'Imunya, 2011	26%	–	79%	48%	–	14%
Poole et al., 2013	–	–	5%	–	2%	49%
Ports et al., 2013	–	0%	100%	–	–	0%
Remes et al., 2012; ^b	0%	0%	–	–	–	–
Rositch et al., 2012	18%	–	–	69%	12%	22% ^c
Summary ^d	26%	15%	67%	45%	24%	24%

HPV = human papillomavirus, STI = sexually transmitted infection.

^a – Indicates the question was not measured quantitatively in the study.^a Percent frequency is calculated using each study's sample size as the denominator.^b Among parents only (Harries et al., 2009, *n* = 43 and Remes et al., 2012, *n* = 60).^c Considered STI/virus/HPV.^d Summary percent is calculated by dividing the sum of affirmatory responses (numerators) by the sum of study sample sizes (denominators) for each column. This summary measure should be interpreted with caution given that the measurement of these outcomes may have been different across studies.

daughter's risk higher (Coleman et al., 2011; Francis et al., 2010). The relationship between acceptability and perceived likelihood was examined in two studies with opposite findings. One study found no relationships between their daughter's perceived risk of HPV, genital warts, or cervical cancer and acceptance (DiAngi et al., 2011), while another found that those accepting were more likely to rate both their own and their daughter's cervical cancer risk as high (Coleman et al., 2011).

Perceived severity

Parents and adults recognized that cervical cancer was a severe and deadly disease among women (Becker-Dreps et al., 2010; Coleman et al., 2011; DiAngi et al., 2011; Francis et al., 2011; Ports et al., 2013; Remes et al., 2012). Few studies examined the relationship between perceived severity and acceptability empirically. In the two studies that examined this construct, both found that those who recognized cervical cancer as a disease of higher severity were also more likely to accept the vaccine (Coleman et al., 2011; DiAngi et al., 2011).

Perceived effectiveness and benefits

The benefits and effectiveness of vaccines in general were discussed positively among focus group participants (Francis et al., 2011; Katahoire et al., 2008; Ports et al., 2013; Remes et al., 2012). Discussion and concerns among studies were: vaccines given to low-resource countries were inherently inferior (Harries et al., 2009); protection against HPV infection was recognized as a benefit by parents concerned about sexual abuse among girls in their community (Francis et al., 2011); half the women surveyed did not know the vaccine was effective for those not infected with HPV (Coleman et al., 2011); and, a higher proportion thought the vaccine should be given only to those who were already sexually active, rather than before sexual initiation (Makwe et al., 2012).

In relation to acceptability, within one study, effectiveness was the fourth (of five) most important characteristics (Francis et al., 2010). Two studies stated that the effectiveness of previous vaccinations (e.g. polio, measles) influenced participant acceptance of this additional vaccine (Katahoire et al., 2008; Ports et al., 2013). Finally, one study found that acceptance was associated with concerns about the vaccine truly preventing HPV infection, but not among those concerned about prevention of cervical cancer (Coleman et al., 2011).

Perceived barriers

Participants were asked about several potential barriers including cost, safety, dosing, side effects, lack of information, accessibility, fear and promiscuity. Although concerns were expressed, most of these did not deter participants from accepting the vaccine. Cost appeared to be an important barrier; some conditioned willingness on the vaccine being offered at no cost (Rositch et al., 2012), and some participants thought the vaccine should be free (Francis et al., 2011; Harries et al., 2009), while others indicate a minority willing to pay some amount, albeit substantially less than the actual cost (Becker-Dreps et al., 2010; DiAngi et al., 2011; Poole et al., 2013; Liu et al., 2012).

Associations with acceptability among studies were reported as cost concerns, safety and side-effects (Coleman et al., 2011), preference for lower dosing (Becker-Dreps et al., 2010), and vaccine message framing as cervical cancer prevention rather than sexual transmitted infection (STI) prevention (Harries et al., 2009). In one study, male teachers were especially concerned with promiscuity (i.e. would encourage risky sexual behaviors among girls) and this negatively influenced their acceptance (Remes et al., 2012).

Concerns of access were a common acceptance barrier. Those who were more likely to accept thought the vaccine would be easy to obtain (DiAngi et al., 2011), expressed self-efficacy in finding a doctor or clinic (Coleman et al., 2011) and were living further (i.e. more rurally) from healthcare services (DiAngi et al., 2011). In another study, distance from health services was discussed as a barrier to vaccinations, but did not deter women from seeking vaccination (Ports et al., 2013).

Cues to action

Recommendation from a healthcare provider was an important cue for acceptance (DiAngi et al., 2011; Francis et al., 2010; Makwe et al., 2012; Ports et al., 2013), although some indicated that they did not trust doctors (Omondi-Ogutu and M'Imunya, 2013). Recommendation and endorsement from the government were also important (Katahoire et al., 2008; Ports et al., 2013; Remes et al., 2012). Acknowledgment that members of their communities and others held favorable attitudes towards the vaccine was found to be important (Iliyasu et al., 2010; Katahoire et al., 2008) and was associated with acceptance (Coleman et al., 2011).

Mothers were recognized as key health care decision-makers, including decisions about vaccinations, while spousal input was also usually recognized. In one study, participants who thought they would be involved in the decision-making were more willing to accept (DiAngi et al., 2011). One study reported that men had more autonomy in vaccine decision-making for their children; however, collapsing adolescent and adult categories for comparisons may have been misleading (Poole et al., 2013). If adult women and men are compared, the autonomy in decision-making appears quite similar (75% and 85%, respectively).

Other factors associated with acceptability

A previous history of Pap smear testing was not related to acceptance in the single study that examined this relationship (Coleman et al., 2011). A history of cervical cancer, genital warts, HPV/STI infection and HIV-positive status were not found to be significantly associated with acceptance (Coleman et al., 2011; DiAngi et al., 2011; Rositch et al., 2012). Acceptors were found to have more life-time sexual partners (Coleman et al., 2011). Two studies argued for an early age of vaccination due to perceived earlier sexual debut among girls in their community (Harries et al., 2009; Remes et al., 2012). Studies that included questions about religious beliefs found mixed results (Coleman et al., 2011; Iliyasu et al., 2010; Omondi-Ogutu and M'Imunya, 2013). No study examined the relationship between acceptability and specific tribal/cultural groups.

In terms of socio-demographic factors associated with acceptability, two studies found that older age groups were more likely to accept (Coleman et al., 2011; Iliyasu et al., 2010), and a third study found an insignificant relationship with age (DiAngi et al., 2011). The relationship between parental sex and acceptance was not found to be significant (DiAngi et al., 2011; Omondi-Ogutu and M'Imunya, 2013) and marital status was not important (Coleman et al., 2011; DiAngi et al., 2011). One study found that more education was associated with lower likelihood of acceptance (DiAngi et al., 2011), another found the opposite (Iliyasu et al., 2010), while two others found no relationship (Coleman et al., 2011; Omondi-Ogutu and M'Imunya, 2013). No study specifically examined occupation, although a qualitative study that involved teachers noted that 5/14 male teachers were unaccepting due to fears of encouraging risky sexual behaviors and side-effects (Remes et al., 2012). In one study, acceptors were found to have higher incomes (Coleman et al., 2011), and in another, there was no relationship (DiAngi et al., 2011).

Discussion

This systematic review found high acceptance of the HPV vaccine among young adults, adults, and parents in SSA countries, despite low awareness of HPV and the HPV vaccine. This review was structured using the Health Belief Model (HBM) and demonstrates the utility of the HBM for integrating qualitative and quantitative research findings for understanding the factors influencing vaccine acceptance.

The included studies were moderately-sized, quantitative cross-sectional studies and qualitative syntheses of interviews and focus groups. Evaluating the quality of qualitative research can be difficult and quite subjective (Dixon-Woods et al., 2004); however, generally, the qualitative studies reviewed appeared to be of good quality. Studies had transparent presentation of their methods, including participant selection and sample size, methods of triangulation and enhancement of rigor, themes used for discussion and specific methodology for the synthesis of results. Studies that reported quantitative relationships largely presented descriptive statistics with a simple measurement of acceptability (i.e. not conditional on cost, dosage, etc.). There was variability in the method of construct measurement across studies, which limited study comparability. Although response was quite high, there are limitations in the generalizability of findings since all studies were conducted among purposively selected samples (e.g. clinic attendees)

or among specific sub-groups of the population (e.g. university students). Rural populations were not adequately represented in the literature, despite the general recognition that women from these areas are likely at higher risk and have differential uptake (Watson-Jones et al., 2012a,b). Further, no study was exclusive to males and studies that included males may not have been sufficiently powered to make comparisons. The attitudes of fathers may be important to consider, especially if it appears they may hold opposing opinions (Remes et al., 2012). A focus on both females and males in future studies may be important for a more complete understanding of HPV vaccine acceptance.

Overall, we were able to highlight that HPV-related awareness and knowledge is very low and that awareness is strongly associated with vaccine acceptance. This finding is in agreement with another systematic review of SSA countries (Perlman et al., 2014) and contrasts a study from the USA (Brewer and Fazekas, 2007). The relationship between perceived likelihood of HPV infection or cervical cancer and vaccine acceptance was unclear and this may be partially due to low awareness and understanding. This review also revealed misconceptions surrounding the timing and effectiveness of the vaccine for those already sexually active. As suggested by Sudenga et al. (2013) perceived likelihood of this disease might be based upon an individual's perceptions about cancer in general. Vaccine campaigns and other knowledge dissemination activities have been shown to influence vaccine uptake (Rondy et al., 2010; Watson-Jones et al., 2012a,b). The results synthesized here suggest that campaigns may wish to emphasize the relationship between HPV and cervical cancer, using local phrases and terms to describe the disease and report on the effectiveness of the vaccine.

Perceived effectiveness and its positive relationship with acceptance were rooted in experience with previous vaccinations. Thus, it may be beneficial to frame messages using these experiences while critically to emphasizing that this vaccine does not *completely* protect against cervical cancer. Maintaining public trust in immunizations is key to the success of these programs (Cooper et al., 2008) and there has been some hesitation in implementing this vaccine due to fears of controversy (Katahoire et al., 2008). Public endorsement of the vaccine by healthcare providers and governments are importance for acceptance. Physicians have been recognized as a strong influence for vaccine uptake in the USA (Rosenthal et al., 2011); however the differing health roles in low-income countries requires other healthcare workers (i.e. nurses) also be educated and approving of the vaccine (Ayissi et al., 2012). Studies piloting and evaluating actual uptake of the HPV vaccine within SSA have supported the prediction of high acceptance within these countries. Although programs are variable in terms of the population groups, vaccination strategies (e.g. school-based, health centres) and sensitization methods used, the vaccination coverage results are promising: Uganda, 88.9% (LaMontagne et al., 2011); Rwanda, 93.3% (Binagwaho et al., 2012); South Africa, 97.8% (Moodley et al., 2013); Tanzania, 76.1% (Watson-Jones et al., 2012a,b); Cameroon, 64.5% (Ladner et al., 2012); and Lesotho, 84.3% (Ladner et al., 2012). Future studies examining the psychosocial aspects of uptake or non-uptake in these countries may be useful for developing strategies to increase coverage.

Cost barriers were a common concern. In SSA countries, the vaccine is likely to be administered freely to participants; further financial barriers could be minimized by reducing the indirect costs incurred by individuals (e.g. costs of travel). In contrast to findings from the USA (Brewer and Fazekas, 2007), concerns regarding the vaccine promoting adolescent sexual activity were not common. In this review, another significant barrier was accessibility of the vaccine and this was not found among studies in the USA.

This review has strengths in that it examines recently published literature and is timely given the recent announcement of vaccination efforts within this region. Furthermore, the results are structured similarly, and may be compared and contrasted, to a previous review conducted of American studies (Brewer and Fazekas, 2007). We also believe that inclusion of both quantitative and qualitative research studies

has increased the depth and explanatory nature of the findings. Although use of the HBM is considered a strength for its explanatory power and structure, the model itself does have limitations. Constructs used for evaluation have not been standardized and there are likely other factors and external conditions that may be important. This review was also focused on a sub-group of the population and did not include healthcare workers. Since these factors and populations are not considered, some of the findings are decontextualized, and it is also important to note that the review is not generalizable to all African countries. There may also be potential misclassification of demographic data; the origin of the participants may have been different from where the interviews took place and because there do appear to be differences in HPV vaccine acceptance across rural and urban settings, this may be important. A final limitation is the possibility that there are other eligible studies not identified in the search, or studies that were not published (publication bias).

Conclusion

Implementation of the HPV vaccine in African countries is an important step towards reducing the high burden of cervical cancer in this region. Recent announcements from the GAVI of HPV vaccine demonstration projects beginning in SSA offer an encouraging step toward this goal. Based on this review, the acceptability and uptake of the HPV vaccine among these countries are expected to be high. However, broad knowledge gaps have been highlighted and should be addressed. Efforts to educate about effectiveness and reduce the perceived barriers to vaccination, such as cost and accessibility, may also be useful. Publically highlighting acceptance by governments and healthcare providers may also increase acceptance.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.ypmed.2014.08.035>.

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