START 238: Reframing the HPV Vaccine Final Results

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February 16th, 2024

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START OVERVIEW

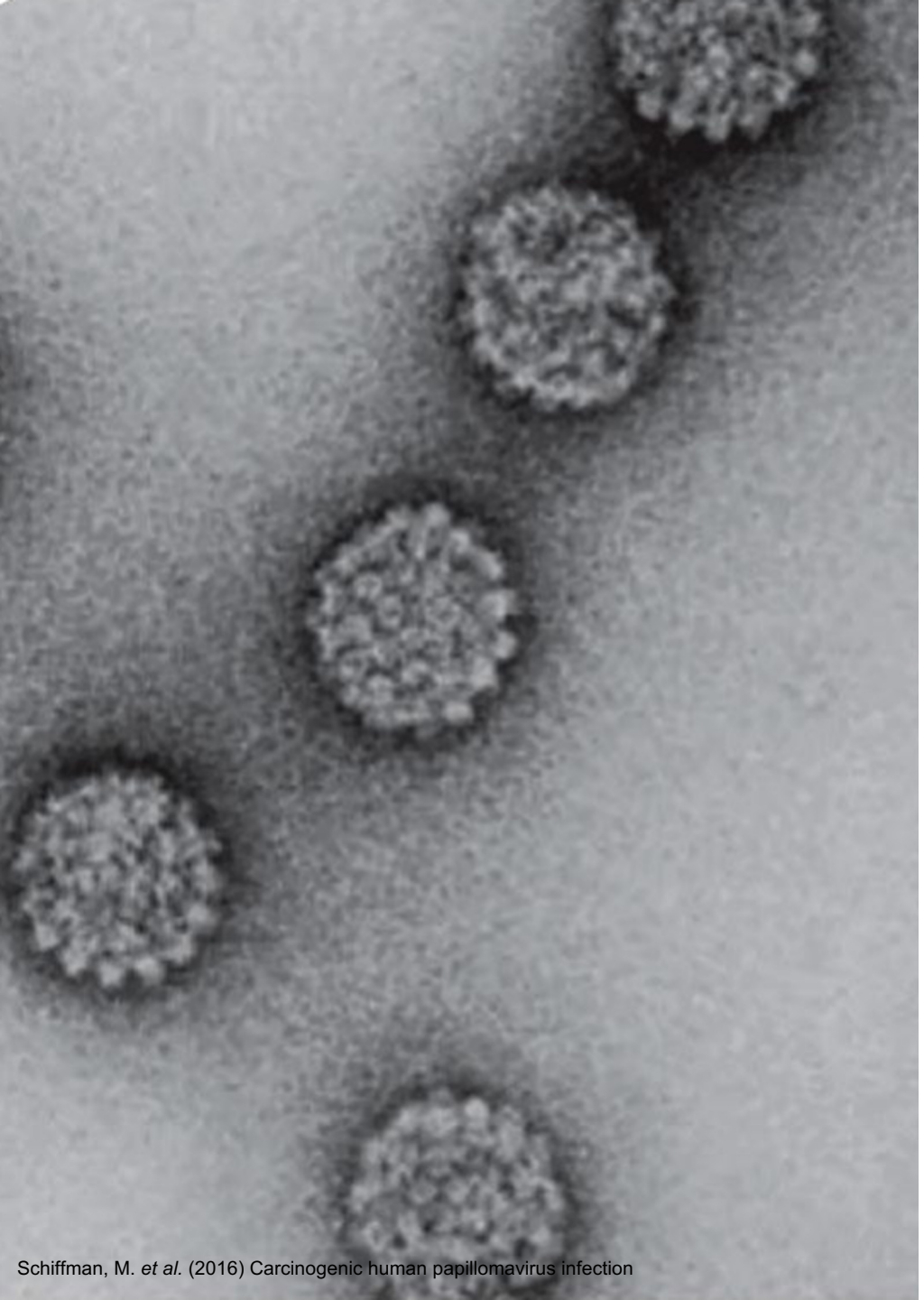
Leverages leading content expertise from across the University of Washington

Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers

Provides structured mentorship and training to University of Washington graduate research assistants

PROJECT OVERVIEW

To provide an objective, accessible report summarizing the scope of peer-reviewed literature on parental acceptance/perceptions of HPV vaccination among young girls, associations with sexual debut/activity, and amenability to vaccination by parents, communities, or ministries of health if packaged with sexual health versus cancer health/prevention.



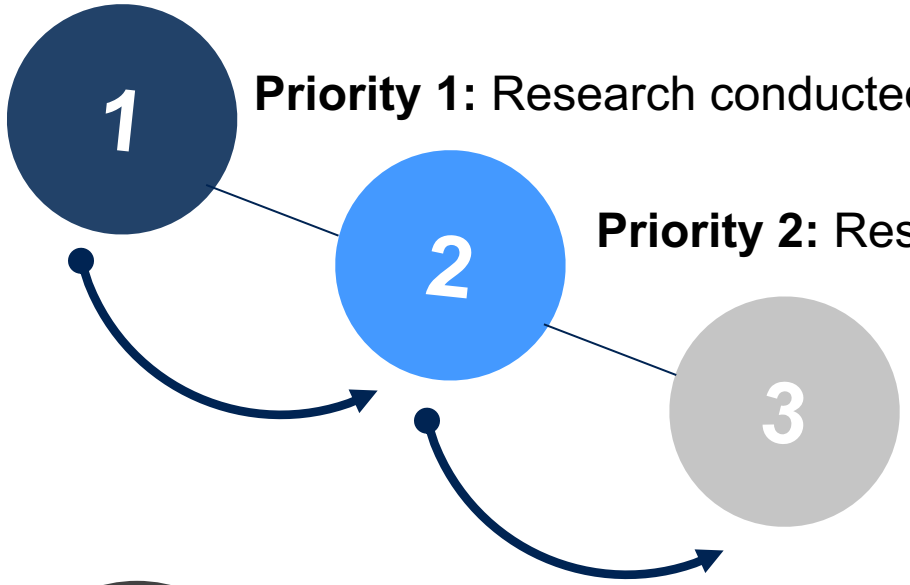
Schiffman, M. *et al.* (2016) Carcinogenic human papillomavirus infection

SPECIFIC RESEARCH OBJECTIVES

1. Is there evidence confirming/refuting fears that HPV vaccination will lead to female adolescent sexual activity, thus lowering parental acceptance around the vaccine?
2. Is there any evidence that suggests or refutes that HPV vaccination information, when packaged with information sessions around girls' rights to understanding sexual and reproductive health, results in parental reluctance to permit HPV vaccination?
3. Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?
4. Are there more or less favorable reactions by parents, communities, or ministries of health in packaging the HPV vaccine within sexual health vs cancer health?

PROJECT OVERVIEW

Geographic and Demographic Scope



Priority 1: Research conducted in Africa or SE Asia

Priority 2: Research conducted in South America, Mexico or Europe

Priority 3: Research conducted in the USA, UK, or Canada.

Focus on young girls aged 9 – 14 years and parents, healthcare providers, and other community leaders involved in HPV vaccination decision making.

PROJECT OVERVIEW (CONT.)

Project Deliverables

Short report, including citations, with a section devoted to each of the 4 research questions.

Slide Deck

- Key Findings and Considerations
- Literature Sources

Excel Paper Tracker, including basic article information, study details, relevant quantitative and qualitative estimates, and sources of bias or data limitations.

PROJECT FINDINGS

PROJECT FINDINGS

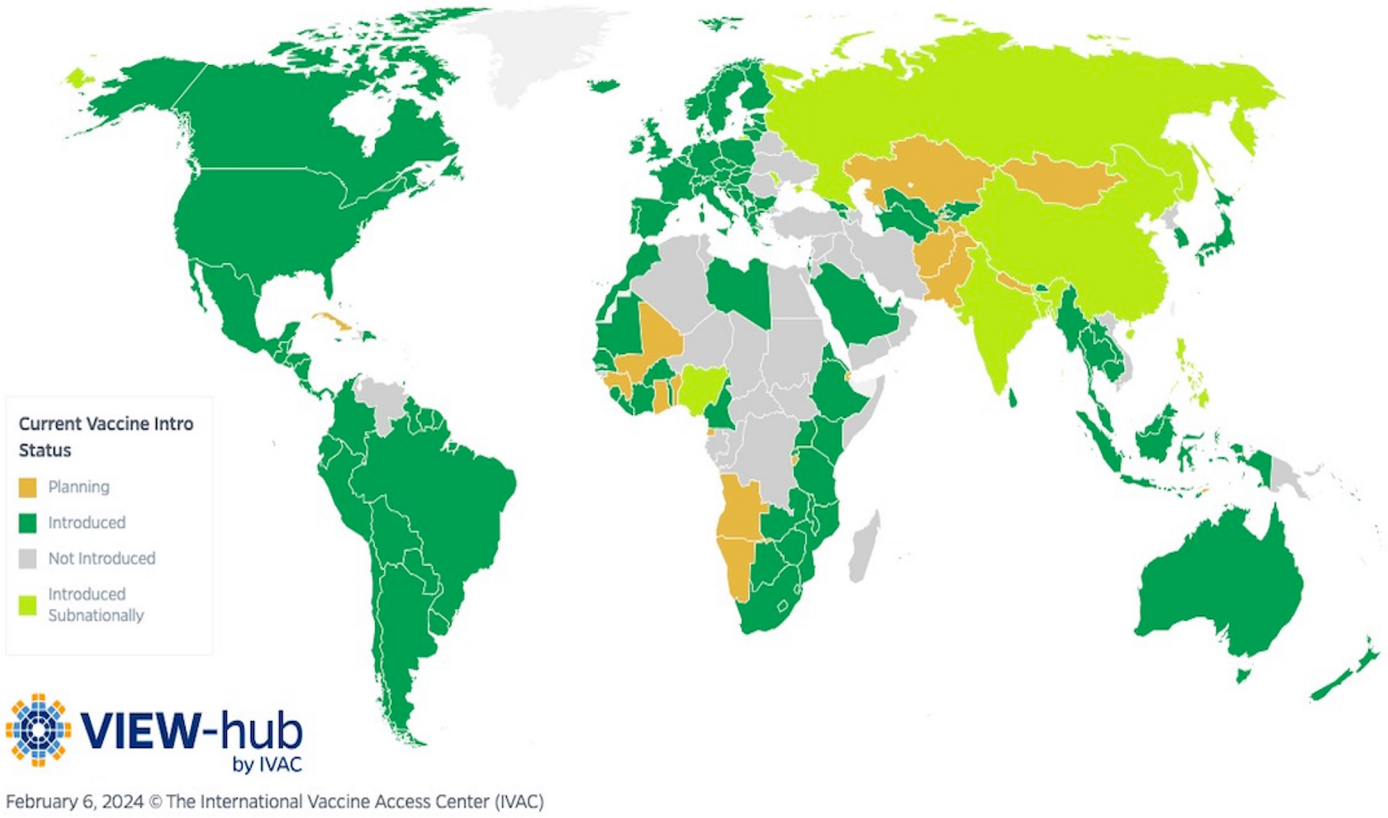


Figure: Current status of HPV vaccination introduction into national immunization programs. *The International Vaccine Access Center (IVAC) 2024.*

HPV vaccines were first introduced into national immunization programs in 2006; however, **50 countries have yet to introduce HPV vaccines nationally or sub-nationally as of January 2024.**

In countries that have implemented HPV vaccination, **coverage remains low** due to several factors, including:

- Parental concerns of sexual promiscuity
- Fears of vaccine impacts on fertility
- Vaccine costs
- Availability
- Misconceptions about the HPV-cervical cancer association

Improving coverage rates require an understanding of these factors and how they influence vaccine marketing among adolescent girls, their parents, and other community stakeholders.

PROJECT FINDINGS

Q1 Is there evidence confirming/refuting fears that HPV vaccination will lead to female adolescent sexual activity, thus lowering parental acceptance around the vaccine?

RELEVANT PUBLICATIONS (N = 36)

Articles published between **2004 - 2023** A1-36

Study designs include:

- Cross-sectional (n = 17)
- Qualitative (n = 14)
- Systematic Review (n = 3)
- Intervention (n = 1)
- Case-control (n = 1)

GEOGRAPHIC SCOPE

Denmark, France, Netherlands, Sweden, United Kingdom

Ethiopia, Kenya, Nigeria, Tanzania, Uganda, Zambia

Argentina, Brazil, Chile, Colombia, Peru

China, India, Hong Kong

United States

PROJECT FINDINGS

Q1 Is there evidence confirming/refuting fears that HPV vaccination will lead to female adolescent sexual activity, thus lowering parental acceptance around the vaccine?

Qualitative studies suggest that low uptake of the HPV vaccine among young girls is linked to parental fears that the vaccine will lead to increased sexual activity.

Parents believed the HPV vaccine encourages sex and is a rite of passage that provides implicit consent to having earlier sex: A2,4,11,18,28,29,31,33

"…[A]s a parent, you don't want to think of your 11-year-old being sexually active. As a mom you think, okay, if you give them this shot, is that in their mind then a rite of passage to, 'Oh, now I'm free from this sexually transmitted disease, so now it's okay to have sex.'?" A29

Parents also expressed concerns that the HPV vaccine was associated with teenage pregnancy, decreased condom use, and having multiple sexual partners: A6,9,14,25,33

"I don't want my daughter to have early sexual intercourse. She is too young to be pregnant. You can't put in their head that vaccine will protect them. Then they'll have sexual intercourse without condoms and then if girls get pregnant at 15, what do we do?" A33

Despite issues of promiscuity being of concern among parents, other pertinent parental concerns included adverse health outcomes of the vaccine, such as infertility among their adolescent daughters: A9,21,24,33

"She [a mother of a student] was telling me that it is going to make our girls infertile, or maybe they will become sexually active, she said 'me I refused my child to go for it', but I didn't ask anything more about it, so I left it at that…" - Teacher A9

PROJECT FINDINGS

Q1 Is there evidence confirming/refuting fears that HPV vaccination will lead to female adolescent sexual activity, thus lowering parental acceptance around the vaccine?

Quantitative studies demonstrated that parental concerns about early onset of sexual activity among adolescent daughters significantly reduced the uptake of the HPV vaccine.

- Among relevant studies, up to 45% of parents opposed the HPV vaccine over concerns that it would promote risky sexual behaviors.[A1,2,7,8,10,16,23,26,30,32,34,35]
- Differences in the perceived importance of changes in sexual behaviors among adolescent daughters by parents or guardians were observed across geographic regions, religious affiliations, and rural versus urban settings.[A15,19]

The importance of sexual promiscuity as a barrier to vaccination among parents is not weighted equally across the world.

- Studies in Africa, Southeast Asia, and South America more frequently cited parents prioritizing issues of vaccine costs, availability, lack of HPV and cervical cancer health information, stigma, and concerns of vaccine safety and impacts on fertility when considering whether to vaccinate their adolescent daughters.[A25,27,33,36]
- In the United States, Canada, and Europe, fears of sexual promiscuity or misinformation about vaccine safety and side effects were most commonly cited as barriers to vaccination .[A1,4,8,16]

PROJECT FINDINGS

Q1 Is there evidence confirming/refuting fears that HPV vaccination will lead to female adolescent sexual activity, thus lowering parental acceptance around the vaccine?

Geographical trends in the hierarchy of barriers to parental willingness to vaccinate adolescent daughters against HPV

Africa, South America, & SE Asia

1. Limited information regarding vaccination services or availability
2. Limited knowledge of HPV pathogenesis and association with cervical cancer
3. Vaccine costs
4. Misinformation about vaccine safety, including concerns about effects on infertility
5. Decision autonomy
6. Fears of sexual promiscuity and earlier sexual debut
7. Stigma of sexually transmitted infections

United States, Canada, & Europe

1. Misinformation about vaccine safety and side effects
2. Fears of sexual promiscuity and earlier sexual debut
3. Decision autonomy
4. Stigma of sexually transmitted infections
5. Vaccine costs
6. Limited knowledge of HPV pathogenesis and association with cervical cancer
7. Limited information regarding vaccination services or availability

PROJECT FINDINGS

Q2 Is there any evidence that suggests/refutes that HPV vaccination information, when packaged with information on sexual/reproductive health topics, results in parental reluctance to permit HPV vaccination?

RELEVANT PUBLICATIONS (N = 19)

Articles published between **2010 - 2023** B1-19

Study designs include:

- Cross-sectional (n = 13)
- Qualitative (n = 2)
- Systematic Review (n = 2)
- Randomized Trial (n = 1)
- Discrete Choice Experiment (n = 1)

GEOGRAPHIC SCOPE

Cameroon, Nigeria, Ethiopia, Kenya, South Africa

Indonesia, Malaysia, Thailand, Vietnam

United States

PROJECT FINDINGS

Q2 Is there any evidence that suggests/refutes that HPV vaccination information, when packaged with information on sexual/reproductive health topics, results in parental reluctance to permit HPV vaccination?

A 2022 study in Kenya found that 85.6% of mothers and 77.4% of males believed that 10-year-olds should receive sex education; 83.8% of parents were willing to vaccinate their children (age 9-14 years) [B15]

Studies across the United States, sub-Saharan Africa, and Southeast Asia demonstrate that parents are willing to vaccinate their daughters (ages 9–14) against HPV, even when they are aware that HPV is a sexually transmitted infection

- Knowledge of HPV and cervical cancer was generally low among parents

Literature including parents of daughters aged 9-19 and parents of boys and girls similarly found low levels of HPV knowledge but high overall willingness to vaccinate against HPV

PROJECT FINDINGS

Q2 Is there any evidence that suggests/refutes that HPV vaccination information, when packaged with information on sexual/reproductive health topics, results in parental reluctance to permit HPV vaccination?

There is mixed evidence on how to best frame HPV vaccine messaging, relative to sexual and reproductive health:

↑ Two studies found that messaging around cervical cancer increased parental willingness to vaccinate over messaging around genital warts [B1,7]

= One study found nearly identical willingness to vaccinate whether HPV vaccine education was framed as preventing cervical cancer or genital warts (95% vs. 94%, respectively) [B2]

In a 2013 study, Nigerian mothers of adolescent girls most frequently cited vaccine access (51.5%) and cost (22.8%) as barriers to vaccination compared to sexual and reproductive health barriers (knowledge of HPV: 11.8%; exposure to risky sexual behaviors: 6.4%). [B5]

PROJECT FINDINGS

Q3 Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?

RELEVANT PUBLICATIONS (N = 28)

Articles published between **2012 - 2022** C1-28

Study designs include:

- Cross-sectional (n = 20)
- Cohort (Retrospective or Prospective; n = 4)
- Quasi-experimental (n = 2)
- Experimental Trial (n = 1)
- Ecological Study (n = 1)

GEOGRAPHIC SCOPE

Denmark, Spain, Netherlands, Sweden, Norway, France, United Kingdom

Colombia, Brazil

Uganda

Japan, China

Australia

United States, Canada

PROJECT FINDINGS

Q3 Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?

Epidemiological studies (n=26) consistently reported **no statistically significant associations between HPV vaccination and increased sexual activity among adolescent girls.** C1-14,16-23,25-28

Sexual activity was defined in several ways:

- Age at sexual debut
- Number of consistent or casual sexual partners
- Condom use
- Acquisition of other sexually transmitted infections (*Chlamydia trachomatis*, HIV, etc.)
- Receipt of abortion
- Engagement in other miscellaneous, risky sexual behaviors

Small sample sizes, use of self-reported data, and limited adjustment of potential confounding variables limit researchers' ability to draw large-scale, causal conclusions

PROJECT FINDINGS

Q3 Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?

5 studies observed increased frequency of risky sexual behaviors or earlier initiation of sexual debut after vaccination among adolescent girls. C13,18,21-23

Risky sexual behaviors associated with HPV vaccination included:

- Earlier age at sexual debut (Vaccinated: 15.5 years vs. Unvaccinated: 16.1 years; p = 0.018)
- Multiple sexual partners
- Declines in condom use from first to latest sexual act

10 studies observed decreased frequency of risky sexual behaviors after vaccination among adolescent girls. C3-5,12,13,15,19,20,22,24

Protective sexual behaviors associated with HPV vaccination included:

- Use of condoms or other modern contraceptives at sexual debut or latest sexual encounter
- More frequent routine Pap smear screening
- Fewer lifetime sexual partners
- Delay of sexual debut

PROJECT FINDINGS

Q3 Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?

LIMITATIONS

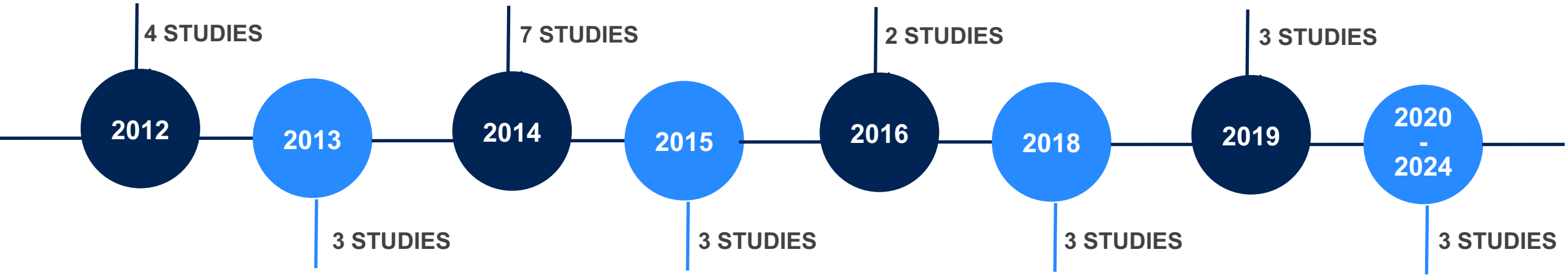
01 The majority of studies assessing changes to sexual behavior are cross-sectional, limiting our ability to draw causal conclusions that sexual behaviors change as a result of HPV vaccination.

02 Relevant studies frequently originate from North America, Europe, and Australia, limiting the generalizability of results to settings with different social/cultural practices or beliefs on sexual behavior in adolescence.

03 The absence of available literature in Africa, SE Asia, and South America is likely an artifact of the delayed, disparate introduction of the HPV vaccine into national immunization programs in those regions.

PROJECT FINDINGS

Q3 Is there any evidence indicating that once the HPV vaccine is given to girls, sexual activity is then increased?



More than 60% of studies on this topic were published prior to 2016, reflecting both a **consensus among the research community** that HPV vaccination is not associated with increased sexual risk behaviors as well as a **divergence of research prioritization** on this topic after vaccine introduction.

PROJECT FINDINGS

Q4 Are there more or less favorable reactions by parents, communities, or ministries of health in packaging the HPV vaccine within sexual health vs cancer health?

RELEVANT PUBLICATIONS (N = 19)

Articles published between **2009 - 2023** D1-19

Study designs include:

- Cross-sectional (n = 11)
- Randomized Controlled Trial (n = 4)
- Intervention (n = 2)
- Qualitative (n = 1)
- Systematic Review (n = 1)

GEOGRAPHIC SCOPE


Ethiopia, Kenya, Tanzania, Uganda


Indonesia, Japan, Malaysia


Argentina, Brazil


United States


Poland

PROJECT FINDINGS

Q4 Are there more or less favorable reactions by parents, communities, or ministries of health in packaging the HPV vaccine within sexual health vs cancer health?

Few studies (n = 6) compared cervical cancer prevention messaging to other HPV vaccination messaging approaches: [D1,4,6-8,14]

- Findings were mixed, with two studies observing no significant difference in parental intent or willingness to vaccinate their daughters among those receiving cervical cancer prevention messaging versus other messaging strategies
- Two studies found a statistically significant increase in intent/willingness to vaccinate among parents presented with cervical cancer prevention messaging
    - In Suzuki et al. 2022, no significant difference in vaccination rates between those who did versus did not see cervical cancer prevention messaging were found after 3 months (8.2% vs. 7.9%)[D14]

Cervical cancer prevention was identified by caregivers as the best reason given by providers for HPV vaccination in one US-based study.[D7]

PROJECT FINDINGS

Q4 Are there more or less favorable reactions by parents, communities, or ministries of health in packaging the HPV vaccine within sexual health vs cancer health?

Caregivers with knowledge that HPV vaccination prevents cervical cancer were more likely to indicate willingness to vaccinate their daughters.

While findings from interventional studies are inconclusive at present, it appears that **providing parents/caregivers with information about HPV and cervical cancer, alongside HPV vaccine information, does increase willingness to vaccinate compared to sexual and reproductive health framing alone.**[D1,4,6-8,14]

It is uncertain whether an increase in parental willingness to vaccinate translates to vaccine uptake in the long-term, but **observational studies support cervical cancer education as an important aspect to improving vaccine acceptance among adolescent girls and their parents.**[D2,3,5,9-13,15-19]

PROJECT FINDINGS

Q4 Are there more or less favorable reactions by parents, communities, or ministries of health in packaging the HPV vaccine within sexual health vs cancer health?

LIMITATIONS

01 Intervention-based and randomized controlled studies were from the United States and Japan, limiting generalizability of results to other settings.

02 The majority of studies assessing knowledge of HPV and willingness to vaccinate from Africa, Southeast Asia, and South America were cross-sectional, limiting our ability to draw causal conclusions.

03 Relevant studies from all geographies frequently measured intent to vaccinate, which may not translate to vaccine uptake.

PROJECT FINDINGS

SQ 1 Is there evidence that risk of HPV acquisition is greatest during, or shortly following, sexual debut among adolescent girls?

RELEVANT PUBLICATIONS (N = 11)

Articles published between **2001 - 2020**[E1-11]

Study designs include:

- Prospective Cohort (n = 7)
- Cross-sectional (n = 3)
- Randomized Controlled Trial (n = 1)

GEOGRAPHIC SCOPE

Belgium, Denmark, Finland, Germany, Italy, Spain, United Kingdom

Philippines, Taiwan, Thailand

Canada, Mexico, United States

Tanzania

Australia

Brazil

PROJECT FINDINGS

SQ 1 Is there evidence that risk of HPV acquisition is greatest during, or shortly following, sexual debut among adolescent girls?

- Previous epidemiological studies have estimated the **cumulative incidence of HPV incidence within 3 years of sexual debut ranges** from **34.2%-62%**, underscoring the importance of vaccinating young girls before sexual debut [E2-4,6,7,9]
- High-risk (HR) and low-risk (LR) genotypes were detected in adolescent girls after sexual debut [E6,9,10]
- In the United States, women who were HPV vaccinated after sexual debut were **more than 2.6 times more likely to report an HPV diagnosis** than their peers who received the vaccine before sexual debut [E11]

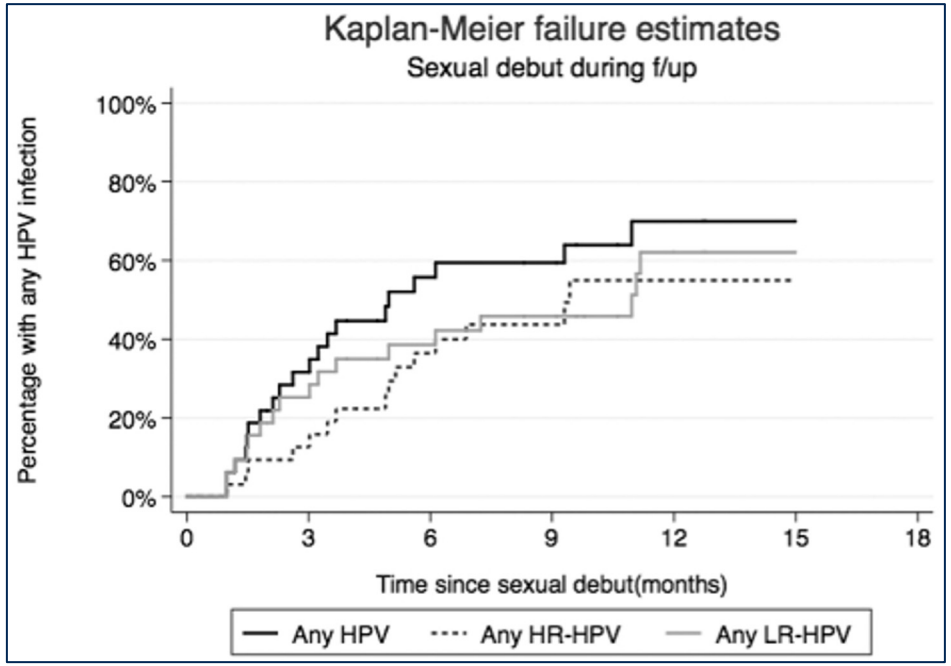


Figure: Time from sexual debut to first infection with any HPV, any HR HPV, or any LR HPV, among 41 girls who reported sexual debut during follow-up and were HPV naïve at time of reported sexual debut. *Houlihan 2016*

PROJECT FINDINGS

SQ 1 Is there evidence that risk of HPV acquisition is greatest during, or shortly following, sexual debut among adolescent girls?

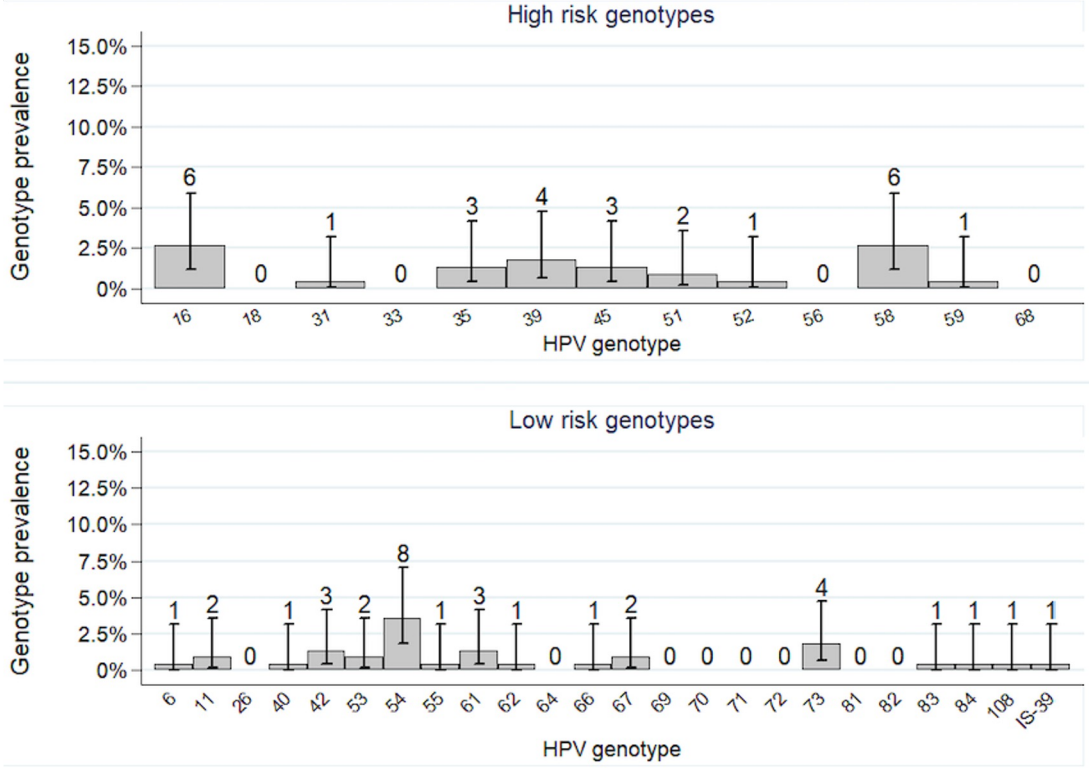


Figure: HPV genotype-specific prevalence among 222 girls attending secondary school in Mwanza, Tanzania, who report not having passed sexual debut. Vertical lines indicate 95% confidence intervals and numbers are raw frequencies. *Baisley 2019*

- Among 2 studies in Tanzania, cervical HPV infections were observed in 8.4% and 18.5% of adolescent girls **prior to self-reported sexual debut** E6,10
- Dose-response relationship observed between **intravaginal cleansing frequency and HPV DNA detection** (per unit increase in cleansing frequency category after adjustment for age; aOR: 1.54 (95% CI: 1.17–2.03)) E6
- Risk of HPV infection **increased** with the number of lifetime sexual partners: E7
  - 2-3 vs 1 partner: HR = 4.76 (95% CI: 3.82-5.95)
  - ≥4 vs 1 partner: HR = 19.22 (95% CI: 14.02-26.34)

MOVING FORWARD: OPPORTUNITIES & CONSIDERATIONS

Globally, HPV and cervical cancer health literacy among parents of girls aged 9-14 years is poor and investment in expanding health education campaigns would dispel several barriers to vaccine acceptance, including concerns of infertility, sexual promiscuity, and necessity.

Future research should prioritize expanding findings in Africa, SE Asia, and South America to better understand geographic-specific barriers and facilitators to vaccinate that may not be reflected in the current body of literature from the United States, Canada, and Europe.

As many barriers to vaccination exist among parents of adolescent girls, HPV vaccine marketing should not be siloed, but rather include culturally-specific information about HPV pathogenesis, associations with cervical cancer, costs, and dispel common misconceptions.

Additional intervention-based studies are needed to understand how delivery of cervical cancer information to parents, caregivers, and other community members impacts long-term changes to vaccination uptake among girls 9 - 14 years of age.

THANK YOU

Additional questions or follow-up can be sent to Gregory Zane (zane8@uw.ed) and the UW START Center (start@uw.edu).

START CENTER
STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER

APPENDICES

APPENDIX A: QUESTION 1 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
A1	Davis	2004	United States	Intervention (Pre-Post)	https://pubmed.ncbi.nlm.nih.gov/15874862/
A2	Brewer	2007	United States	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/17259050/
A3	Constantine	2007	United States	Cross-sectional	https://www.sciencedirect.com/science/article/abs/pii/S009174350700237X?via%3Dihub
A4	Oldach	2012	United States	Qualitative	https://pubmed.ncbi.nlm.nih.gov/22968822/
A5	Marjan Javanbakht	2012	United States	Qualitative	https://www.sciencedirect.com/science/article/abs/pii/S0264410X12005981?via%3Dihub
A6	Rosario M. Bartolini	2012	Peru	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3483308/
A7	Deborah Watson-Jones	2012	Tanzania	Case-control	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3480345/
A8	Holman	2014	United States	Systematic Review	https://pubmed.ncbi.nlm.nih.gov/24276343/
A9	Heleen Vermandere	2015	Kenya	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4566420/
A10	Susanna Alder	2015	Argentina	Cross-sectional	https://www.spandidos-publications.com/or/33/5/2521#b6-or-33-05-2521
A11	Mupandawana	2016	United Kingdom	Qualitative	https://pubmed.ncbi.nlm.nih.gov/27549328/
A12	Grandahl	2017	Sweden	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/27917484/

APPENDIX A: QUESTION 1 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
A13	Loke	2017	Hong Kong	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5553777/
A14	Andrew Kampikaho Turiho	2017	Uganda	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5577844/
A15	Abraham Degarege	2018	India	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/29596907/
A16	Fleming	2018	United States	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/29299729/
A17	William Mendes Lobão	2018	Brazil	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6231618/
A18	Folusho Balogun	2018	Nigeria	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6141096/
A19	Abraham Degarege	2018	India	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6996479/
A20	Oluwole	2019	Nigeria	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6881959/
A21	Linda K. Ko	2019	United States	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6319298/
A22	Nefta	2020	Multi-country	Systematic Review	https://pubmed.ncbi.nlm.nih.gov/32283644/
A23	Beatrice Ohareri	2020	Nigeria	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7839110/
A24	Fortress Kucheba	2020	Zambia	Qualitative	https://www.tandfonline.com/doi/full/10.1080/17441692.2020.1810734

APPENDIX A: QUESTION 1 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
A25	Risqiyat T. Ambali	2020	Nigeria	Qualitative	https://link.springer.com/article/10.1007/s13187-020-01876-1
A26	Yulan Lin	2021	China	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7872083/
A27	Mabeya	2021	Kenya	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/33912296/
A28	Ryan Arams	2021	Chile	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8071695/
A29	Morales-Campos	2022	United States	Qualitative	https://pubmed.ncbi.nlm.nih.gov/35248000/
A30	Kolek	2022	Kenya	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/35893833/
A31	Veronica Cordoba-Sanchez	2022	Colombia	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9332743/
A32	Melkam Tesfaye Sinshaw	2022	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8901188/
A33	Tran	2023	Reunion Island (France)	Qualitative	https://pubmed.ncbi.nlm.nih.gov/37028117/
A34	Eliza S. Rodrigues	2023	Brazil	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10057992/
A35	Getie Mihret Aragaw	2023	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10026865/
A36	Jean-Marc Kutz	2023	Multi-country	Systematic Review	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10214362/

APPENDIX B: QUESTION 2 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
B1	AE Leader	2009	United States	Randomized Trial	https://pubmed.ncbi.nlm.nih.gov/19183094/
B2	S Becker-Dreps	2010	Kenya	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2906622/
B3	SA Francis	2010	South Africa	Cross-sectional	https://www.sciencedirect.com/science/article/abs/pii/S0264410X10012727
B4	RG Wamai	2012	Cameroon	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/22302651/
B5	BN Ezenwa	2013	Nigeria	Cross-sectional	https://www.tandfonline.com/doi/full/10.2147/IJWH.S44483
B6	LM Niccolai	2015	United States	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4483512/
B7	S Ngorsuraches	2015	Thailand	Cross-sectional (Discrete Choice)	https://joppp.biomedcentral.com/articles/10.1186/s40545-015-0040-8
B8	M Dairo	2016	Nigeria	Cross-sectional	https://www.degruyter.com/document/doi/10.1515/ijamh-2016-0034/html
B9	MM Sopian	2018	Malaysia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6103591/
B10	B Ohareri	2020	Nigeria	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7839110/
B11	MN Sitaresmi	2020	Indonesia	Cross-sectional	https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09962-1
B12	KE Wijayanti	2021	SE Asia	Systematic Review	https://www.sciencedirect.com/science/article/pii/S0264410X210342X

APPENDIX B: QUESTION 2 PAPERS (CONT.)

Reference #	First Author	Pub. Year	Country	Study Design	Link
B13	H Humnesa	2022	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9614691/
B14	GN Mihretie	2022	Ethiopia	Cross-sectional	https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-022-01444-4
B15	CO Kolek	2022	Kenya	Cross-sectional	https://www.mdpi.com/2076-393X/10/8/1185
B16	L Elit	2022	Cameroon	Qualitative	https://bmjopen.bmj.com/content/12/11/e068212.abstract
B17	YM Larebo	2022	Ethiopia	Cross-sectional	https://www.mdpi.com/2076-393X/10/12/1988
B18	A Derbie	2023	Ethiopia	Systematic Review	https://link.springer.com/article/10.1186/s13027-023-00535-6
B19	OT Elebiyo	2023	Nigeria	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/37584977/

APPENDIX C: QUESTION 3 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
C1	Alice S. Forster	2012	United Kingdom	Prospective Cohort	https://www.sciencedirect.com/science/article/pii/S0264410X12007797?via%3Dihub
C2	Robert A Bednarczyk	2012	United States	Retrospective Cohort	https://publications.aap.org/pediatrics/article-abstract/130/5/798/32532/Sexual-Activity-Related-Outcomes-After-Human?redirectedFrom=fulltext
C3	Tanya Mather	2012	Australia	Cross-sectional	https://www.sciencedirect.com/science/article/pii/S0264410X12003441?via%3Dihub
C4	Nicole C. Liddon	2012	United States	Cross-sectional	https://www.ajpmonline.org/article/S0749-3797(11)00733-1/fulltext
C5	Teresa Cummings	2013	United States	Retrospective Cohort	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3423324/
C6	Delphine Lutringer-Magnin	2013	France	Cross-sectional	https://academic.oup.com/eurpub/article/23/6/1046/437547?login=false
C7	Erica Marchand	2013	United States	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3823717/
C8	Mary B. Rysavy	2014	United States	Cross-sectional	https://www.jpagonline.org/article/S1083-3188(13)00280-5/fulltext
C9	Nop T Ratanasiripong	2014	United States	Cross-sectional	https://journals.sagepub.com/doi/10.1177/1059840513520042?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed
C10	Magdalena Matteboa	2014	Sweden	Cross-sectional	https://www.tandfonline.com/doi/full/10.3109/13625187.2013.878021
C11	Judith Caroline Aujo	2014	Uganda	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3937049/
C12	Bo T Hansen	2014	Nordic Countries	Cross-sectional	https://www.sciencedirect.com/science/article/pii/S0264410X14009517?via%3Dihub

APPENDIX C: QUESTION 3 PAPERS (CONT.)

Reference #	First Author	Pub. Year	Country	Study Design	Link
C13	Angela M Ruiz-Sternberg	2014	Colombia	Cross-sectional	https://obgyn.onlinelibrary.wiley.com/doi/10.1016/j.ijgo.2014.03.033
C14	Harriet L. Bowyer	2014	United Kingdom	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4103453/
C15	Laura Sadler	2015	United Kingdom	Cross-sectional	https://srh.bmj.com/content/41/4/255.long
C16	Anupam B Jena	2015	United States	Longitudinal Database	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4465086/
C17	Leah M. Smith	2015	Canada	Quasi-experimental	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4312170/
C18	Edward Kumakech	2017	Uganda	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5457617/
C19	Maria Grandahl	2017	Sweden	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5669438/
C20	Gina S Ogilvie	2018	Canada	Ecological Study	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6188947/
C21	M. Jesus Purriños-Hermida	2018	Spain	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6075752/
C22	Robine Donken	2018	Netherlands	Cohort	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6034331/
C23	Rebekka O Svarrer	2019	Denmark	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/30910005/
C24	Rachel Thomas	2019	United States	Prospective Trial	https://www.tandfonline.com/doi/full/10.1080/21645515.2019.1582401

APPENDIX C: QUESTION 3 PAPERS (CONT.)

Reference #	First Author	Pub. Year	Country	Study Design	Link
C25	Andrew F. Brouwer	2019	United States	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6593582/
C26	Gilbert T. Chua	2020	China	Cross-sectional	https://www.sciencedirect.com/science/article/pii/S0264410X19315737?via%3Dihub#b0105
C27	Gustavo Saraiva Frio	2021	Brazil	Quasi-experimental	https://www.sciencedirect.com/science/article/pii/S1570677X20302161?via%3Dihub
C28	Megumi Kurosawa	2022	Japan	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8990292/

APPENDIX D: QUESTION 4 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
D1	Amy E. Leader	2009	United States	Randomized Controlled Trial	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2945723/
D2	Sharifa Wan Puteh Ezat	2013	Malaysia	Cross-sectional	https://pubmed.ncbi.nlm.nih.gov/23803068/
D3	Susanna Alder	2015	Argentina	Cross-sectional	https://www.spandidos-publications.com/or/33/5/2521#b6-or-33-05-2521
D4	Deborah Parra-Medina	2015	United States	Intervention (Quasi-experimental)	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4383719/
D5	Farias CC	2016	Brazil	Cross-sectional	https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-016-1677-y#citeas
D6	Rachael M. Porter	2018	United States	Randomized Controlled Trial	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6550298/
D7	Melissa B. Gilkey	2018	United States	Cross-sectional	https://aacrjournals.org/cebp/article/27/7/762/71573/Parents-Views-on-the-Best-and-Worst-Reasons-for
D8	Parth D. Shah	2019	United States	Randomized Controlled Trial	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6361359/
D9	Alene T	2020	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7502398/
D10	Sitaresmi MN	2020	Indonesia	Intervention (Pre-Post)	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7708115/
D11	Chaparro RM	2020	Argentina	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7064251/
D12	Mabeya H	2021	Kenya	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8051220/

APPENDIX D: QUESTION 4 PAPERS

Reference #	First Author	Pub. Year	Country	Study Design	Link
D13	Mihretie GN	2022	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9188100/
D14	Yukio Suzuki	2022	Japan	Randomized Controlled Trial	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9178460/
D15	Zastawna B	2023	Poland	Cross-sectional	https://www.mdpi.com/1648-9144/59/10/1755
D16	Aragaw GM	2023	Ethiopia	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10026865/
D17	Guillaume D	2023	Tanzania	Qualitative	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10021529/
D18	Kutz JM	2023	Multi-country	Systematic Review	https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-023-15842-1
D19	Nakayita RM	2023	Uganda	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10329291/

APPENDIX E: HPV RISK AT SEXUAL DEBUT

Reference #	First Author	Pub. Year	Country	Study Design	Link
E1	Susanne Krüger Kjaer	2001	Denmark	Prospective Cohort	https://aacrjournals.org/cebp/article/10/2/101/164349/High-Risk-Human-Papillomavirus-Is-Sexually
E2	C B Woodman	2001	United Kingdom	Prospective Cohort	https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(00)04956-4/fulltext#%20
E3	Stuart Collins	2002	United Kingdom	Prospective Cohort	https://pubmed.ncbi.nlm.nih.gov/11845815/
E4	Rachel L. Winer	2003	United States	Prospective Cohort	https://academic.oup.com/aje/article/157/3/218/71005?login=true
E5	Ana Cecilia Rodriguez	2007	Costa Rica	Prospective Cohort	https://journals.lww.com/stdjournal/fulltext/2007/07000/the_natural_history_of_human_papillomavirus.14.aspx
E6	Catherine F. Houlihan	2014	Tanzania	Cross-sectional	https://academic.oup.com/jid/article/210/6/837/2908621
E7	Xavier Castellsagué	2014	Multi-country	Randomized Controlled Trial	https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-014-0551-y
E8	Catherine F Houlihan	2016	Tanzania	Prospective Cohort	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4762460/
E9	Catherine F Houlihan	2016	Tanzania	Prospective Cohort	https://academic.oup.com/ije/article/45/3/762/2572635
E10	KJ Baisley	2019	Tanzania	Cross-sectional	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7167299/#R6
E11	Robert J Zeglin	2020	United States	Cross-sectional	https://journals.sagepub.com/doi/10.1177/0956462420937168?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed