Resolve to Prevent Cancer: HPV and Adolescent Vaccine Schedules

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Cervical* Cancer Is Preventable

- Cause is known (HPV), multiple effective screening and treatment options exist, and prevention is available (vaccine)

- Yet, ~ 660,000 new cases of cervical cancer and 350,000 deaths each year worldwide
  - > 85% occur in low- and middle-income countries (LMICs)
  - ~ 12,000 new cases and 4,000 deaths a year in the US

**I am using cervical cancer as the example here as that is where my research has focused, but much of what I will present applies to other HPV-related cancers as well (oral, anal, vaginal, penile, vulvar)*

Cervical Cancer Incidence and Mortality

- Screening primarily accounts for the dramatic reductions in the US and other places with ‘organized’ screening
- Large disparities in cervical cancer incidence and mortality exist globally, nationally, and locally

National Disparities in Cervical Cancer

- Incidence rate: 7.5 per 100,000 women
- Mortality rate: 2.2 per 100,000 women

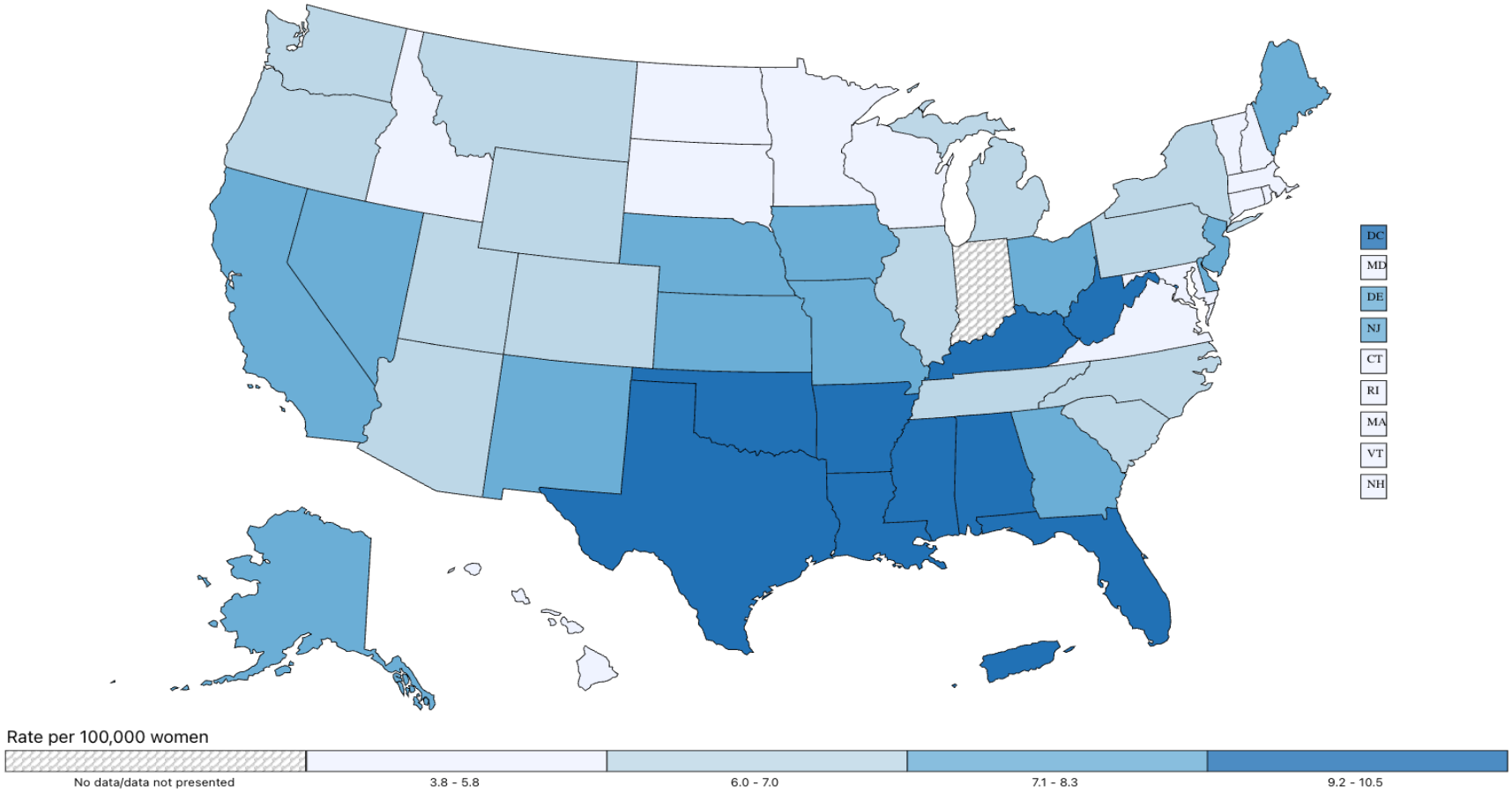
	Incidence*	Difference^ (%)	Mortality*	Difference^ (%)
White	7.3	-2.7	2.1	-4.5
Black	8.2	+9.3	3.3	+50.0
Hispanic	9.7	+29.3	2.4	+13.6
American Indian/ Alaska Native	5.8	-22.7	1.6	-27.3
Asian/ Pacific Islander	5.7	-24.0	1.5	-31.8

** Per 100,000 women*
^ Relative to the national average

U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2021 submission data (1999-2019): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, released in June 2022.

Rate of New Cancers in the United States, 2021

Cervix, All Ages, All Races and Ethnicities



Rates range from 3.8-10.5 per 100,000

Source - U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; https://www.cdc.gov/cancer/dataviz, released in June 2024.

Cervical Cancer in Missouri

	Incidence*	Mortality*
Missouri	8.9	2.4
White	8.6	2.1
Black	10.3	5.1

** Per 100,000 women*

- Black women in Missouri have **20% higher incidence** of cervical and **243% higher mortality** from cervical cancer than white women in the state
  - The disparity is much more extreme here than national rates show
- We know there are still further disparities within the state (i.e.: rural/urban)

What is contributing to these disparities?

- Decades of data show screening test efficacy, particularly when repeated over a lifetime
- If it's not the screening test itself, then there must be other systemic or structural factors influencing this
  - Cost, access, etc.

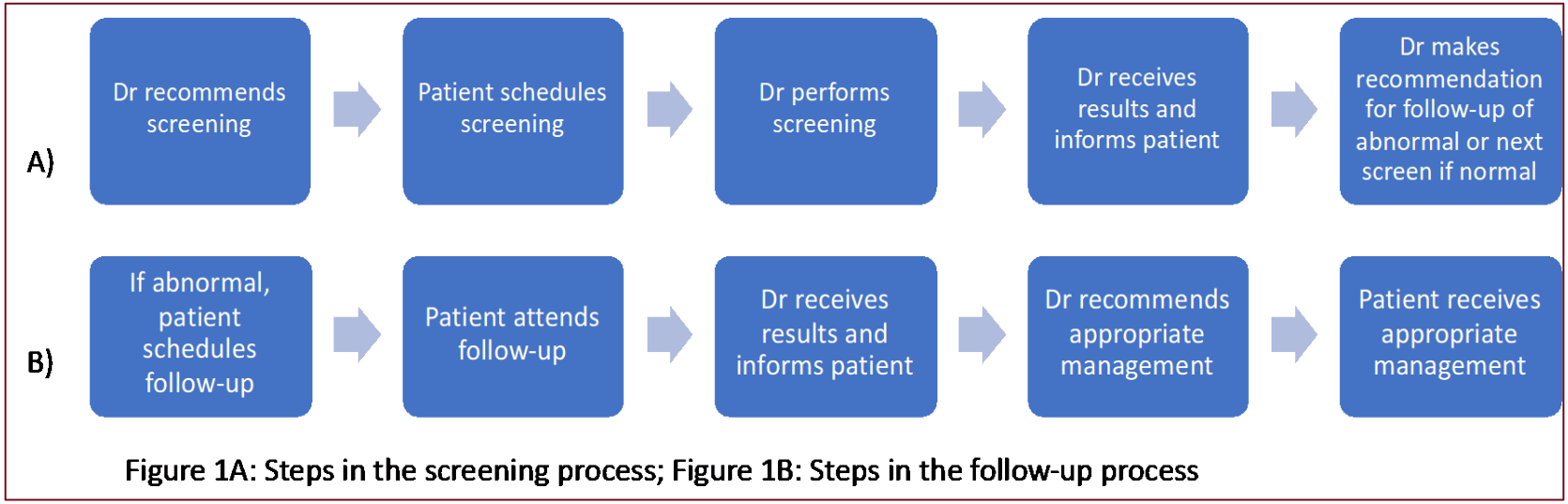
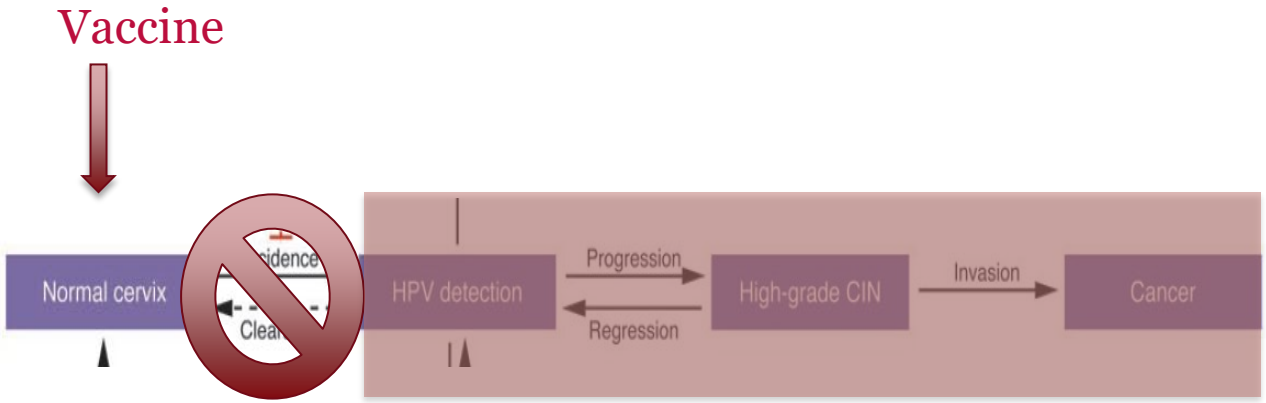


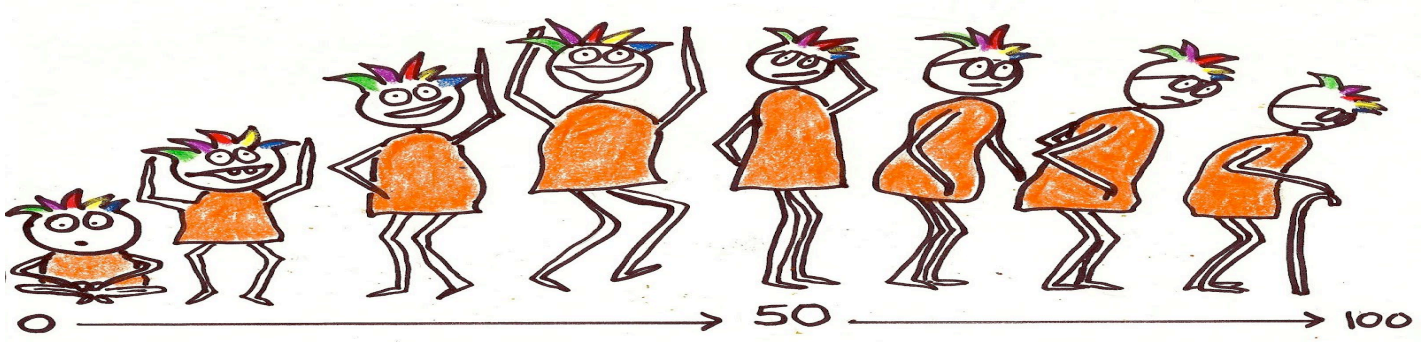
Figure 1A: Steps in the screening process; Figure 1B: Steps in the follow-up process

Cervical Cancer Elimination Goals

- WHO has a goal to reduce the incidence of cervical cancer to < 4 cases per 100,000 women in every country by 2030
- To achieve this, they set the 90–70–90 target to:
  - Vaccinate 90% of girls by age 15
  - Screen 70% of women with a high-performance test at least twice by age 45
  - Treat 90% of women identified with cervical precancer or cancer

Cervical Cancer Prevention: Vaccination





Gravitt PE. J Clin Invest. 2012:121(12):4593-99.

HPV Vaccine

- 2 vaccines licensed in 2006 containing HPV 16 and 18, which cause ~70% of cervical cancers
  - Gardasil4 also contains HPV 6 and 11, which are low-risk (non-carcinogenic) types that cause genital warts

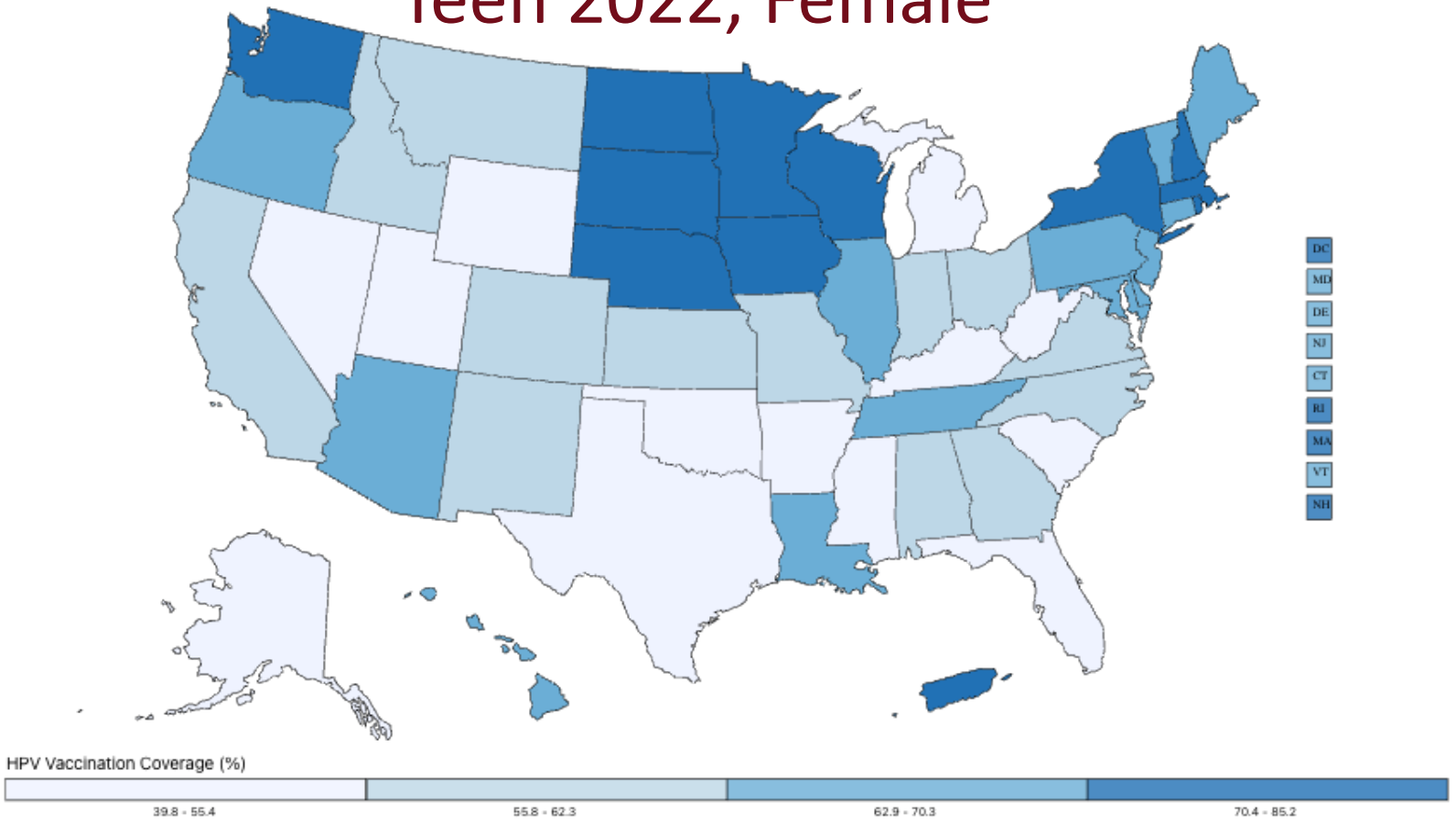
- Newest vaccine (Gardasil9) includes additional 5 high-risk HPV types, potentially eliminating the cause of 90% of cervical cancers
  - Doesn't target many common lower-risk types that can still cause mild Pap abnormalities, but carry virtually no risk of invasive disease

US HPV Vaccine Recommendations

- **Current Recommendation in the US**: 2 doses if <15 years; 3 doses if 15+
  - Push toward earlier vaccination (9-11 vs 12-13)

- Advisory Committee on Immunization Practices (ACIP) has recommended HPV vaccine initiation at ages 11-12, but American Academy of Pediatrics (AAP) shifted their recommendation earlier—to ages 9-11

Teens aged 13-17 years who were reported being up-to-date with HPV vaccinations, NIS-Teen 2022, Female



Coverage ranges from 38.5% to 85.9%

Source - U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; https://www.cdc.gov/cancer/dataviz, released in June 2024.

HPV Vaccine Uptake

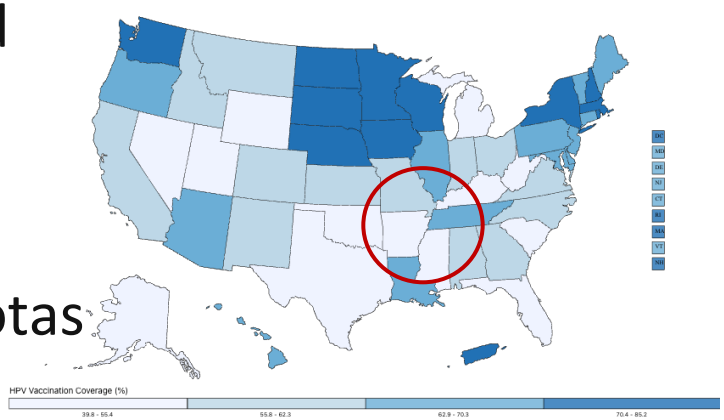
- In 2022, 60.6% of teens aged 13-17 years who were up-to-date with HPV vaccinations in the United States
  - Decreased from 61.4% in 2020
  - Missouri: 55.9%
- Large disparity in MO between metropolitan statistical areas (MSAs) and non-MSAs (rural areas) for 1+ doses (80% vs. 72%) and being up to date (64% vs. 53%), respectively

Vaccine Hesitancy Survey

- Goal: To understand the factors driving HPV vaccine hesitancy in areas with particularly low uptake in adolescents
  - Identify characteristics of vaccine hesitant parents
  - Are there factors that make parents more or less likely to vaccinate their children for HPV?
  - In addition to sociodemographics, are there additional factors such as beliefs about vaccines, sources of health information and trust in those sources that influence vaccine decisions?

Survey Methodology

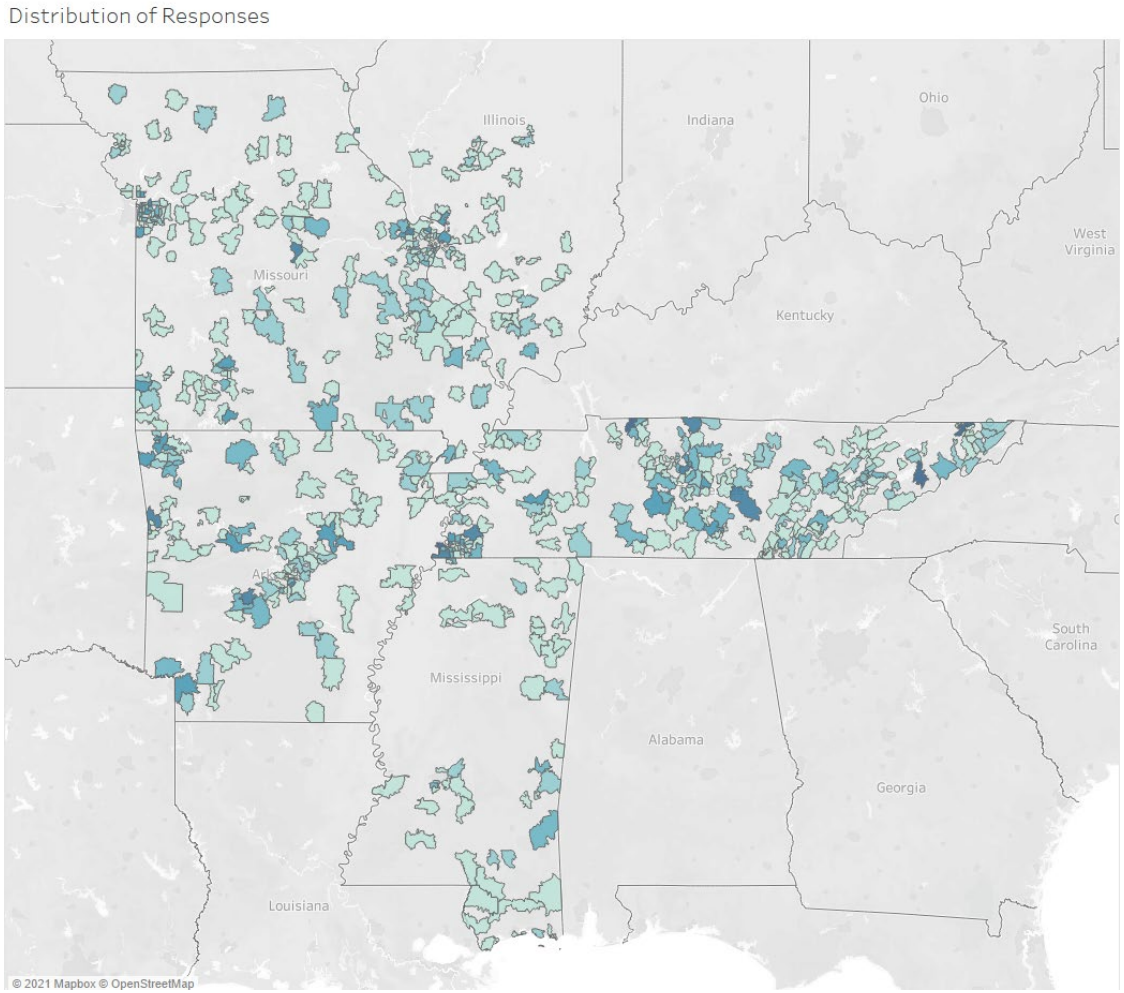
- Survey administered to parents of 9-17 years olds in MO, TN, AR, MS, and Southern IL



- To ensure a diverse sample, we implemented (and exceeded) quotas for accrual:

	Goal	Accrual	
Race			
Non-White	20% (min)	258	25.4%
White	80% (max)	758	74.6%
Geographic Area			
Non-urban	30% (min)	324	31.9%
Urban	70% (max)	692	68.1%

Geographic Distribution of Sample



Number of participants by ZIP code

1 6

Sample Size by State

- MO N= 316
- IL N=78
- TN N=363
- AR N=193
- MS N=66

- Total N=1016

Participant Characteristics

Parents

- Race: 77% white, 15% black, 9% other race
  - Varied by state from 69-83% white; 9-21% black, 3-13% other race
- Gender: 75% of respondents were female

Children

- Age: Mean= 13, SD= 2.6
- Gender: 51% male, 48% female

Children's Childhood Vaccination Status

	Total	AR	IL	MO	MS	TN
	%	%	%	%	%	%
MMR						
Vaccinated	94.3	96.1	90.6	94.0	92.8	94.7
Tdap						
Vaccinated	93.1	93.7	92.9	92.6	91.7	93.7
Meningococcal						
Vaccinated	86.0	91.2	79.8	85.6	82.1	85.7
Annual flu (20-21)						
Vaccinated	48.3	58.7	42.9	45.7	49.5	46.1
HPV						
Vaccinated	32.1	32.1	35.6	30.9	39.3	31.1

Children's HPV Vaccine Status

	Total	AR	IL	MO	MS	TN
	%	%	%	%	%	%
Yes	32.1	32.1	35.6	30.9	39.3	31.1
Not yet, but planning to	21.7	19.7	21.7	21.9	25.0	21.8
Not yet, I haven't decided	12.2	14.6	8.5	14.7	8.9	10.0
No	27.5	26.7	26.4	28.1	25.0	28.3
Don't know	6.5	6.9	7.8	4.5	1.8	8.8

Parental Reasons for Choosing HPV Vaccination

Why did you choose to vaccinate?* (N=531)	N	%
Physician recommendation	413	78
The vaccine is safe and effective	143	27
To prevent genital warts or other disease	81	15
A family member or friend recommendation	56	11
My child is sexually active	17	3
Some other reason	31	6

**select all that apply*

Parental Reasons for Not Vaccinating Yet (though they are planning to)

What are some reasons that you have not vaccinated yet?* (N=358)	N	%
My child is not old enough	160	45
I have not scheduled an appointment	119	33
Influences of the COVID-19 pandemic	71	20
My clinic isn't scheduling vaccinations right now	18	5
I haven't had time	18	5
Difficulty due to transportation	12	3
Cost	4	1
Some other reason	24	7

**select all that apply*

Parental Reasons for Not Vaccinating Yet (they have not made a decision yet)

What information do you need to make a decision? (N=202)	N	%
Information on safety of the vaccine	112	55
A physician's recommendation	98	49
Information on how well the vaccine works	94	47
If it is safe right now during the COVID-19 pandemic	46	23
I want to know what other parents are doing	19	9
My child's school to require it	13	6
Some other reason	24	12

**select all that apply*

Parental Reasons for Choosing Not to Vaccinate for HPV

Why did you choose not to vaccinate?* (N=455)	N	%
My child is not sexually active	155	34
Concerns about safety	140	31
My child doesn't need it	109	24
I didn't know it was recommended for my child	71	16
I don't know what it is	41	9
I am concerned it would lead to my child being sexually active or promiscuous	12	3
We can't afford it	5	1
Some other reason	44	10

**select all that apply*

Parent's Knowledge and Beliefs

	Total	AR	IL	MO	MS	TN
	%	%	%	%	%	%
Can HPV vaccine prevent some cancers?						
Yes	57.8	57.5	61.5	59.5	56.1	55.9
No	9.2	5.7	12.8	9.2	7.6	10.5
Don't know/ Not sure	33.1	36.8	25.6	31.3	36.4	33.6
Ideal age for HPV Vaccine?						
Don't know	19.5	21.8	20.5	16.5	21.2	20.4
9	3.9	2.1	6.4	3.5	7.6	4.1
10	4.7	6.2	3.9	5.4	1.5	4.1
11	7.0	6.7	5.1	6.7	6.1	8.0
12	23.9	28.5	28.2	23.7	22.7	21.0
13	12.9	9.3	14.1	14.2	18.3	12.4
14	5.4	5.2	5.1	6.7	3.0	5.0
15	6.9	6.7	5.1	6.3	7.6	7.7
16	4.3	2.6	3.9	4.1	9.1	4.7
17	1.2	1.0	0	2.5	0	0.6
18	6.0	7.3	5.1	5.7	3.0	6.3

Results

- Only 16% of parents thought the ideal age for vaccination was 9-11 years

- 19% of children ages 9-12 had received at least one dose of HPV vaccine, while 52% of 13–17-year-olds had received at least one dose

- 13–17-year-olds were 6 times as likely to be vaccinated as 9-12 year olds (OR: 6.01, 95% CI: 3.98-9.08)

Conclusions

- Overall adolescent HPV vaccination rates for survey participants across this 5-state region was 42.3%, which is very low compared to the national average
- Despite recommendations to initiate HPV vaccine at earlier ages of 9-11 years, most parents still believed that 12-15 years (or older) is the ideal age to vaccinate their children
  - Uptake is less than half for 9–12-year-olds compared to 13–17-year-olds
- Efforts are needed to educate both parents and providers on the benefit of earlier age of HPV vaccine initiation

Vaccine
Volume 41, Issue 25, 7 June 2023, Pages 3772-3781

Influences of sociodemographic characteristics and parental HPV vaccination hesitancy on HPV vaccination coverage in five US states

T. Shato [a b], S. Humble [b], A. Anandarajah [b c], A. Barnette [d], H.M. Brandt [e], J. Garbutt [f], L. Klesges [b], V.S Thompson [c f], M.I. Silver [g]

The association of caregiver attitudes, information sources, and trust with HPV vaccine initiation among adolescents

Akila Anandarajah, Thembekile Shato, Sarah Humble, Alan R. Barnette, Heather M. Brandt, Lisa M. Klesges, Vetta L. Sanders Thompson & Michelle I. Silver ...show less

Article: 2300879 | Received 04 Sep 2023, Accepted 28 Dec 2023, Published online: 04 Jan 2024

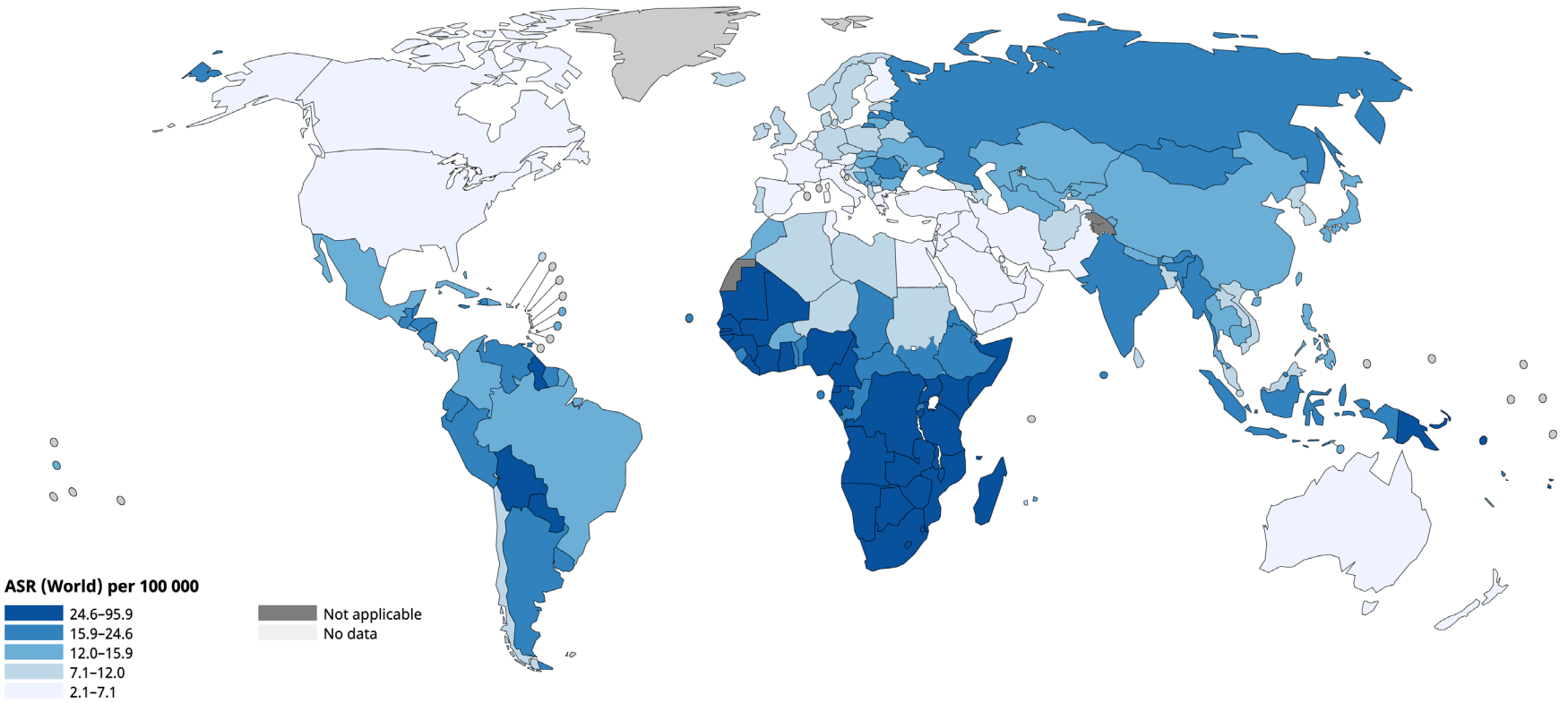
Associations of geographic-based socioeconomic factors and HPV vaccination among male and female children in five US states

Serena Xiong, Sarah Humble, Alan Barnette, Heather Brandt, Vetta Thompson, Lisa M. Klesges & Michelle I. Silver

BMC Public Health **24**, Article number: 702 (2024) | Cite this article

Cervical Cancer Worldwide

Age-Standardized Rate (World) per 100 000, Incidence, Females, in 2022
Cervix uteri



Remember: US range: 3.8-10.5

Cancer TODAY | IARC
https://gco.iarc.who.int/today
Data version: Globocan 2022 (version 1.1) - 08.02.2024

International Agency for Research on Cancer
World Health Organization

Cervical Cancer Worldwide

- > 85% occur in LMICs
- Many factors contribute to this burden including: lack of access to screening and treatment, lack of vaccination, HIV
  - In southern Africa, 64% of women with cervical cancer also have HIV, and survival rates are at least 25% lower with HIV
- WHO 2030 target of 90% of girls vaccinated fully by age 15 worldwide. LMICs, are well below this target.
  - By 2019, only 31% of girls in SSA had received one dose; even fewer had two doses (20%), though coverage varies greatly by country

HPV, HIV, and Cervical Cancer in Zambia

Table 1: Cervical Cancer, HIV, and HPV Vaccine Statistics in Zambia, Sub-Saharan Africa, and the United States [1-5,8,29,]			
	Zambia	**SSA**	**USA**
Cervical Cancer Incidence[#]	65.5	34.8	6.2
Cervical Cancer Mortality[#]	43.4	22.5	2.1
HIV Prevalence (ages 15-25)	Women: 6% Men: 2.8%	Women: 1.7% Men: 0.7%	Women: <0.1% Men: <0.1%
HPV Vaccine Coverage (1+ doses)*	--	31%	75.1%
HPV Vaccine Coverage (up-to-date)*	--	20%	58.6%

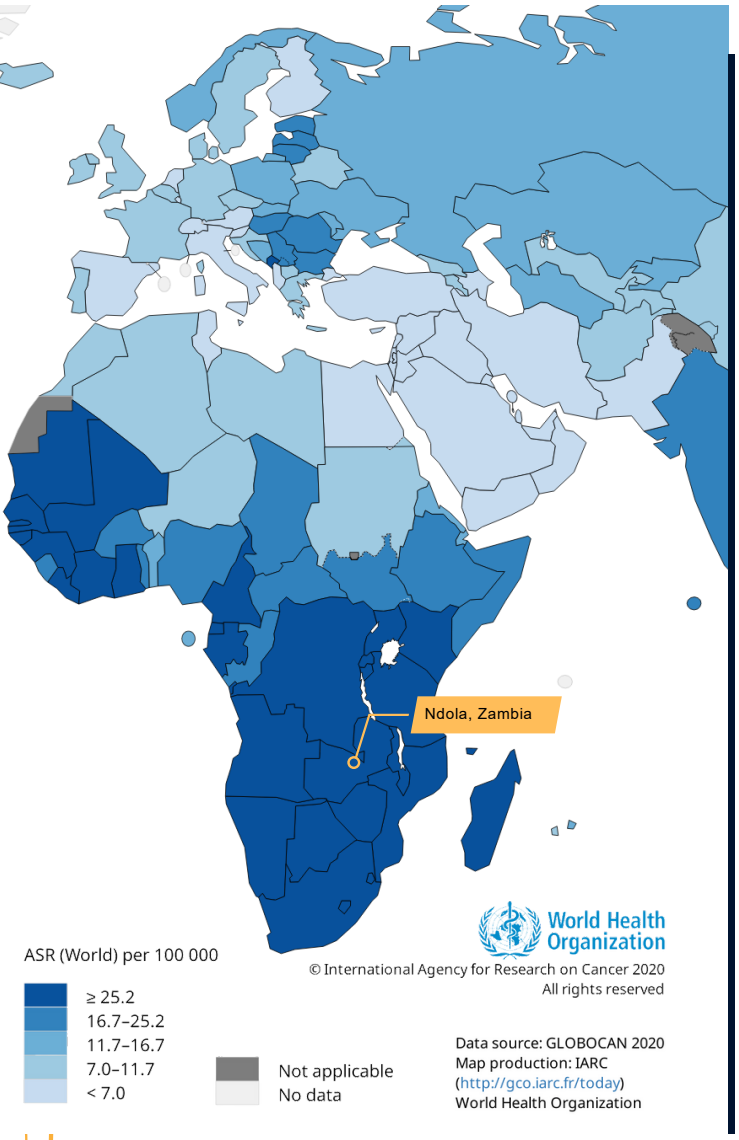
[#]Incidence and mortality rates are per 100,000
**Accurate national HPV vaccine data unavailable for Zambia; includes ages 9-14 in SSA and 13-17 in USA*

WHO HPV Vaccine recommendations

- **A one or two-dose schedule** for girls **9-14 years old**
- **A one or two-dose schedule** for girls **15-20 years old**
- Two doses with a 6-month interval for women **older than 21 years**
- Immunocompromised individuals should receive *at a minimum* two doses and *where possible* three doses
  - Emphasizes importance of prioritizing vaccine for immunocompromised people, including those living with HIV

Reaching for Equity in Adolescent Care through HPV Vaccination

Part of NCI's U01 Consortium on Implementation Science for Cancer Control in People Living with HIV in Low- and Middle-Income Countries



Study Justification

Cervical cancer is largely vaccine-preventable, but is the leading cause of cancer deaths in Zambia

Cervical cancer burden is unequally borne by women living with HIV

WHO recommends 2-3 dose vaccination schedule for people living with HIV

Challenges of introducing extra doses in current school-based and community campaigns

REACH

Study Aims

Our study aims to integrate HPV vaccination into adolescent HIV clinics so girls living with HIV can get all needed doses

AIM 1

Identify the contextual factors (barriers and facilitators) across settings that influence HPV vaccine uptake.

AIM 2

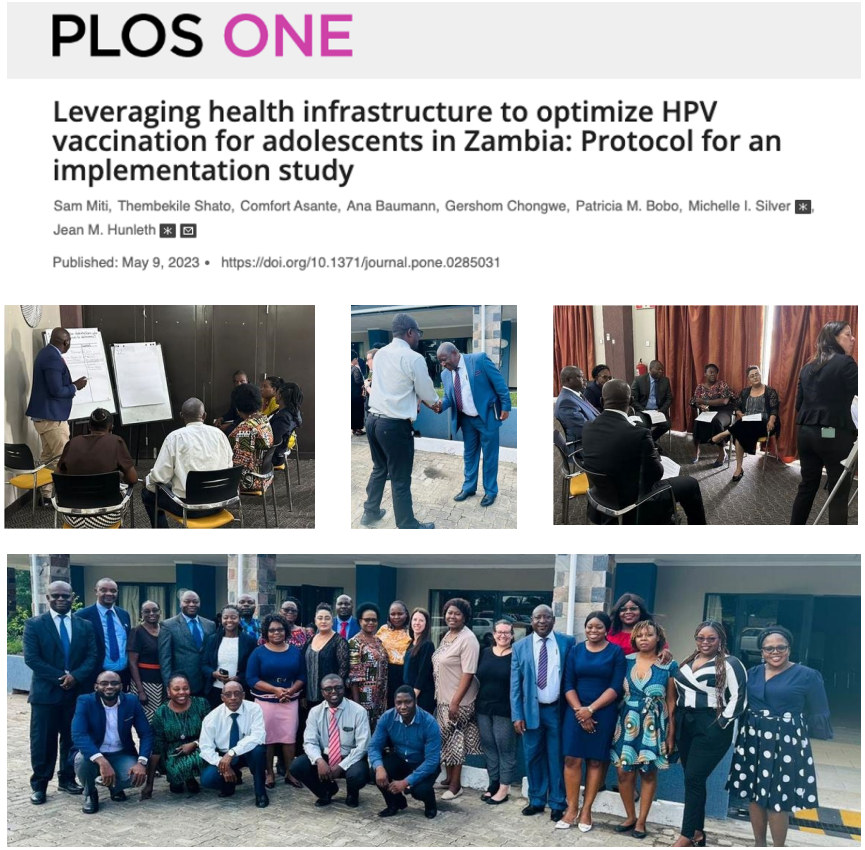
Use community partner feedback and findings from Aim 1 to inform strategies to integrate HPV vaccination into health services.

AIM 3

Test the effectiveness of the strategies selected in Aim 2 to increase HPV vaccine uptake.

REACH

Project Launch: November 2022



- **Publication of protocol paper**
- **Two stakeholder kickoff meetings:**
  - Participants from 14 organizations at local, district, and provincial levels who work in health, education, HIV care, and other adolescent services
  - Provided project feedback and recommendations for additional stakeholders

REACH

Study Locations

REACH is partnering with three distinct settings in and around Ndola, a city on the Copperbelt:

Urban Pediatric Hospital

Arthur Davison Children's Hospital– Large, Urban tertiary referral hospital with 2nd largest pediatric and adolescent care center in Zambia

Peri-urban Clinic

Lubuto Health Centre- Peri-urban, lower income residential setting clinic with youth friendly services

Rural Hospital

St. Dominic's Mission Hospital- Rural, primarily agricultural area

Aim 1: Understanding Barriers and Facilitators to HPV Vaccination

Participant Observation

Weekly Visits: Clinic & Community
Key Events: Child Health Weeks, Roll Out Vaccine (ages 9-14)

Playshops

Total: 14 (n=93 Girls, 9-14 years)
ART Related: 6 Groups
Not ART Related: 8 Groups

Key Informant Interviews

Total: 40
Clinicians: 4
Nurses: 10
Community Health Workers: 9
Other: 10

Participatory Focus Groups

Total: 13 (n=92)
Community Leaders: 7
Guardians: 6 (3 with all women)
(3 with all men)

Findings: HPV Vaccination by Sites, 2023

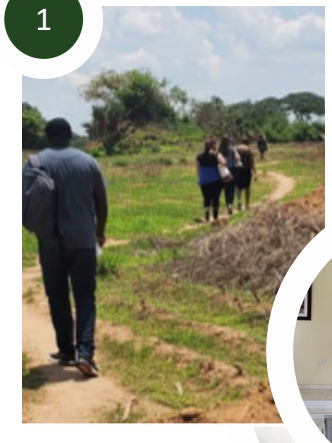
	ADCH (urban)	Lubuto (peri-urban)	St. Dominic's Mission Hospital (rural)
HPV vaccination available	Not given/No current allocation from MoH	Yes	Yes
Eligibility	--	Girls 13-16 years	Girls 14-15, not sexually active
Primary time/place vaccination	--	Child Health Week (2x per year) / schools	Child Health Week (2x per year) / schools
Vaccination available at clinic upon request	No	Yes, MCH, OPD, ART departments	Yes, MCH department
MoH policy change, eligibility 9-14yrs	--	Awaiting guidance, as soon as stocks available	Awaiting guidance
Informal changes made b/c of REACH	None	Started vaccination in ART department (clinic-initiated in response to REACH kickoff)	None

Individual, Household, and Community Level Opportunities and Challenges

1

Time and distance to clinic

- Responsibilities at home, school, work
- Wait times for services at clinics
- Distance & transportation (esp. rural site)



Information, rumors, and misconceptions

- Limited information on HPV vaccination available to public
- Rumors and misconceptions about vaccine
- Outreach and education has shown more willingness to get the vaccine

2

3

Trusted community leader influence

- Religious leaders, teachers, and other community leaders influence public opinion
- These leaders are trusted sources and have both encouraged and discouraged vaccination

4

Parent and family influence

- Parent/guardian consent needed
- Intergenerational discussion on HPV vaccine can be challenging
- Mothers, aunts, elder sisters have shown substantial positive influence

5

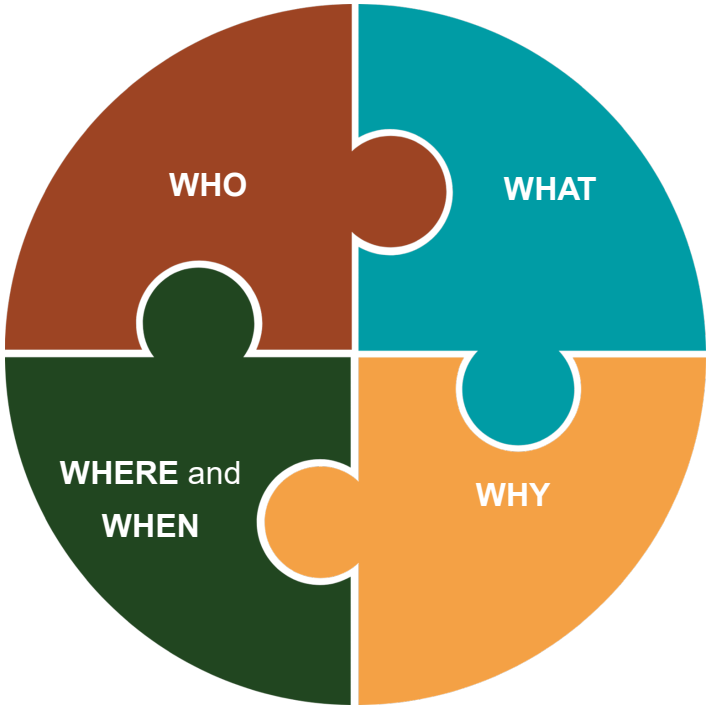
Peer-to-peer influence

- Peers provide information and personal stories to one another
- Peers have swayed decision-making to get or avoid the vaccine in schools

REACH

Aim 2: Identify strategies to integrate HPV vaccination into health services

Who are the players, roles, and organizations involved in vaccination and what is coordination between them



What HPV vaccination/ vaccine campaigns entail and what data is collected for monitoring and evaluation

Where and **when** vaccination occurs at study sites and other vaccination locations

Why isn't everyone getting the vaccines they need? **Why** are vaccine campaigns succeeding or failing?

THIS WILL LEAD INTO IDENTIFYING HOW TO INCREASE HPV VACCINATION

Acknowledgements

- This research would not be possible without the Vaccine Hesitancy Participants and Study Team and the REACH Participants and Research Team

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Thank You!

Feel free to contact me with questions:

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