



GENDER AND IMMUNIZATION

Evidence Brief

July 2024

BILL & MELINDA
GATES foundation

Acknowledgements

This report was commissioned by the Bill & Melinda Gates Foundation's Immunization Program Strategy Team (PST) and researched and written by a team from the Global Center *for* Gender Equality (GCfGE), with valuable inputs and review from foundation staff. The GCfGE Team included Anna Kalbarczyk, Elizabeth Katz, and Natasha Brownlee, with research support from Judy Rein, Shelby Bourgault, and Jenny Acton, and technical review by Abigail Donner and Angela Hartley. The report benefited from guidance from Immunization PST members Kelly Hamblin, Tove Ryman, Tasleem Kachra, Emily Dansereau, and Kiel Stroupe, and from Keiko Valente on the Gender Integration Team. Whitney Walton provided program management support; the report was copyedited by Kathy Schienle and designed by RRD Design.

Table of Contents

Executive Summary	4
1. Introduction	6
2. Methods	7
3. Results	8
4. Recommendations for learning and investment-making	19
References	21

Executive Summary

This scoping review evaluates what is known about the influence and relevance of gender barriers to immunization and gender-intentional interventions for improving immunization sector outcomes in low- and middle-income countries (LMICs). Taken together, the evidence described in this review makes a compelling case that failing to address the significant gender barriers to immunization will impede efforts to “reach children, adolescents, and adults in lower-income countries with the vaccines they need to live a life free from vaccine-preventable diseases.”¹ In other words, gender barriers are highly salient across South Asia and sub-Saharan Africa, and that cost-effective adaptations to existing vaccination programming to address these barriers could significantly accelerate global immunization outcomes. Evidence on interventions to address gender barriers is limited and more research is needed to understand what works to address these barriers to immunization coverage.

The evidence suggests that three key demand-side gender barriers and two main clinic-level factors decrease the use of vaccination services:

- 1. The barrier to immunization coverage most commonly cited in the literature is women’s lack of autonomous decision-making about their health and the health of their children.** Across geographies, many women rely on their husband’s or an elder’s permission to seek healthcare services, including immunization.
- 2. Women’s prior experiences with the healthcare system also influence the intent to vaccinate.** When women caregivers are shamed by health workers for missing appointments, forgetting to bring a child’s vaccine card, or the appearance of a child, they are less likely to return for vaccination services. Because women are disproportionately responsible for bringing their children to get vaccinated, this negative experience has an impact on immunization.
- 3. Access to immunization services is significantly impacted by women’s time poverty – that is, most women face opportunity costs and competing priorities at home and at work.** Women face competing demands on their time, including employment and gendered expectations of caregiving and household labor, that reduces their available time for immunizations.

- 4. Direct costs, including the cost of the vaccine, transportation costs to access services, and illicit fees for services, can be prohibitive.** This is particularly a problem when women caregivers rely on their husbands or other family members to provide the resources to cover these costs – a significant gender barrier documented in many studies.
- 5. Problems with clinic readiness, including inadequate numbers of women vaccinators, unreasonable wait times, and vaccine stockouts, can discourage caregivers from bringing their children to get vaccinated.** While these are well-known supply-side deterrents, they can be considered gender barriers because they directly compound the time constraints faced by women caregivers.

With respect to interventions designed to improve immunization using a gender lens, a much smaller body of evidence describes and/or evaluates programs largely focused on behavior change communication through male engagement, engagement with religious leaders, home visits, and media campaigns. Other gender-intentional interventions addressed supply-side barriers by extending service hours to benefit mothers who work outside the home, and some leveraged existing women’s self-help groups, introducing health modules to increase demand for, and access to, immunization.

What can be learned from this synthesis of evidence related to gender barriers to immunization? First, that some of the most important reasons that women do not bring their children to get vaccinated lie outside the usual purview of immunization programming: household decision-making, for example, which is deeply entwined with social norms governing the appropriate roles for men and women within families, is normally far outside the scope of the health system. Likewise, the fact that women often face multiple competing demands on their time is not easily addressed by immunization-focused interventions. However, some of the gender barriers identified in the research are quite amenable to being addressed with adaptations to vaccination programming: training providers on respectful patient treatment, for example, or offering longer clinic hours and mobile options for vaccine delivery. There is also abundant evidence that offering caregivers – especially those living in

¹ Bill & Melinda Gates Foundation. (n.d.). Immunization. Bill & Melinda Gates Foundation. <https://www.gatesfoundation.org/our-work/programs/global-development/immunization>

poverty – compensation for the direct and opportunity costs of immunization is a highly effective way of putting resources into the hands of mothers that they can use to vaccinate their children.

The evidence on gender-intentional immunization is much more limited; this is an under-researched area that merits investment. We need to know more about what it takes to tackle the diverse gender-related drivers of under-vaccination, and what is the marginal impact of programming with a gender lens. The most promising interventions from this review are ones that leverage pre-existing women's self-help groups and expand clinic hours to accommodate the schedules of women who work outside the home.

Based on this evaluation of the existing evidence base, the report offers recommendations in three areas: (1) a data and learning agenda, (2) piloting gender-intentional immunization programming, and (3) making use of the insights from gender analysis to inform important new areas of investment in reaching zero-dose populations and the introduction and scaling of new vaccines, such as HPV.

1. Invest in better gender data and research

- » *Enable global collection and reporting* of gender-related barriers to vaccination coverage.
- » *Fund new research* to assess the coverage loss attributable to gender barriers and measure the marginal impact of gender-intentional interventions.

2. Pilot innovative approaches to addressing gender barriers

- » *Leverage existing local women's organizations* to inform, mobilize, and support caregivers to vaccinate their children.
- » *Launch social and behavioral change communications campaigns* to engage men and other household-level decision-makers around the benefits of vaccination and shared responsibility for children's health.

- » *Provide incentives targeted to women* to compensate them for the opportunity cost of time and provide private access to funds for direct costs of transportation and vaccination services. Cash infusions to women, paired with supply-side interventions to improve access and quality of services, can improve women's economic empowerment and facilitate their increased decision-making.
 - » *Invest in clinic-level interventions*, including more facilities with cold chain closer to communities, expanding service hours to make vaccination services more accessible to women working outside the home, revising open-vial policies to increase access, operating mobile clinics to alleviate transportation barriers, and instituting respectful care training and accountability mechanisms for providers so that mothers receive complete and accurate information about the vaccines and their normal side effects.
 - » *Empower women healthcare workers* themselves by making provisions for their safety, compensation, and opportunities for promotion and advancement.
- ### **3. Use insights into gender barriers to guide HPV and zero-dose programming**
- » *Strengthen health services for adolescent girls*, including but not limited to services in schools, in clinics, and in the community, and empower them with respect to their own reproductive health.
 - » *Inform approaches to reaching the most under-vaccinated communities*, where women may be exceptionally disempowered with respect to healthcare decisions for their children.

1. Introduction

Global strategies for immunization have increasingly recognized the central role that gender-related barriers play in keeping children, adolescents, and adults from receiving life-saving vaccines. The Immunization Agenda 2030 (IA2030), Gavi, and the Global Polio Eradication Initiative (GPEI) all recognize that successful systems and programming will require interventions that acknowledge and address inequities, including gender barriers, that impact people’s access to, and agency over, immunization services for them and their children.

Understanding these barriers – what they are, and how to overcome them – is essential to reaching the IA2030 vision of “a world where everyone, everywhere, at every age, fully benefits from vaccines for good health and well-being.”

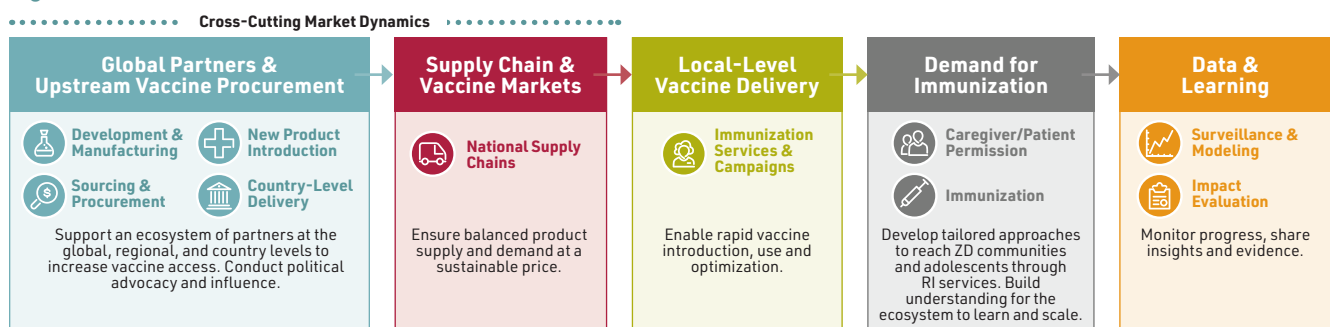
This report is the result of a scoping review of peer-reviewed academic literature commissioned by the Immunization Team at the Bill & Melinda Gates Foundation to better understand the influence and relevance of gender barriers and gender-intentional interventions along the value chain (see **Figure 1**) for increasing vaccination coverage and improving immunization sector outcomes in low- and middle-income countries (LMICs).² The review was guided by three key questions:

- What are the documented gender barriers and opportunities along the immunization value chain?
- What interventions have been designed to address gender gaps and barriers along the immunization value chain?
- What are the opportunities to contribute to the evidence on integrating gender to improve immunization sector outcomes, including implementation research and testing of promising approaches?

While the existing evidence does not allow for quantification of the value-add of gender-intentional immunization interventions, because there are so few studies and even fewer demonstrating impact on coverage, it does offer a strong sense of which gender barriers are likely to be most salient and identifies a limited number of interventions that have been designed and evaluated to address them. The comprehensive list of gender barriers identified by this review, along with several programmatic interventions to address some of these barriers, demonstrates opportunities to try new and innovative solutions that may have a stronger effect on sectoral outcomes – and to measure their impact. An important caveat: While this report synthesizes evidence collected across diverse settings, approaches must always be tailored through a validation process with local stakeholders, recognizing unique and highly salient barriers for each social and cultural context.

Taken together, the evidence described in this review makes a compelling case that failing to address the significant gender barriers to immunization will impede efforts to “reach children, adolescents, and adults in lower-income countries with the vaccines they need to live a life free from vaccine-preventable diseases.”³ In other words, gender barriers are highly salient across South Asia and sub-Saharan Africa, and programming to address these barriers could significantly accelerate global immunization outcomes. It is also abundantly clear that more well-designed implementation research is needed to inform the kinds of gender-intentional programs that are most likely to have the greatest and most sustainable impact on vaccination coverage.

Figure 1. Immunization value chain



2 Most of the evidence reviewed in the report focuses on routine childhood immunizations; the only notable exception is research on gender barriers to HPV vaccine delivery.

3 Bill & Melinda Gates Foundation. (n.d.). Immunization. Bill & Melinda Gates Foundation. <https://www.gatesfoundation.org/our-work/programs/global-development/immunization>

2. Methods

A research team from the Global Center *for* Gender Equality (GCfGE) conducted a scoping review of peer-review literature in three scientific databases. Search terms were developed to capture three concepts: 1) gender, 2) immunization, and 3) sub-Saharan Africa and South Asia [to capture specific LMICs of interest to the foundation]. Articles were included if they were related to all three concepts, published between 2000 and 2023, and published in English. Articles were excluded if the focus was on vaccine product development, if evidence was from high-income countries only, and if the analysis was limited to sex-disaggregation of findings and did not further explore gender implications.

Title and abstract reviews and full-text reviews were conducted by two independent reviewers, and any conflicts were resolved by a third reviewer and by team discussion.

Systematic and scoping reviews identified in the search were reviewed and any relevant articles contained in them were included in our analysis.

Data were extracted in Covidence, an online software program designed to support scoping reviews, and analyzed in Excel. Data were included on the specific vaccines of focus, country/region of study, details of the gender barriers and/or intervention designed to address those barriers, study methodologies, results, and author conclusions and recommendations.

3. Results

In total, 101 articles were included in the final analysis; 92 articles documented gender drivers and barriers, and nine

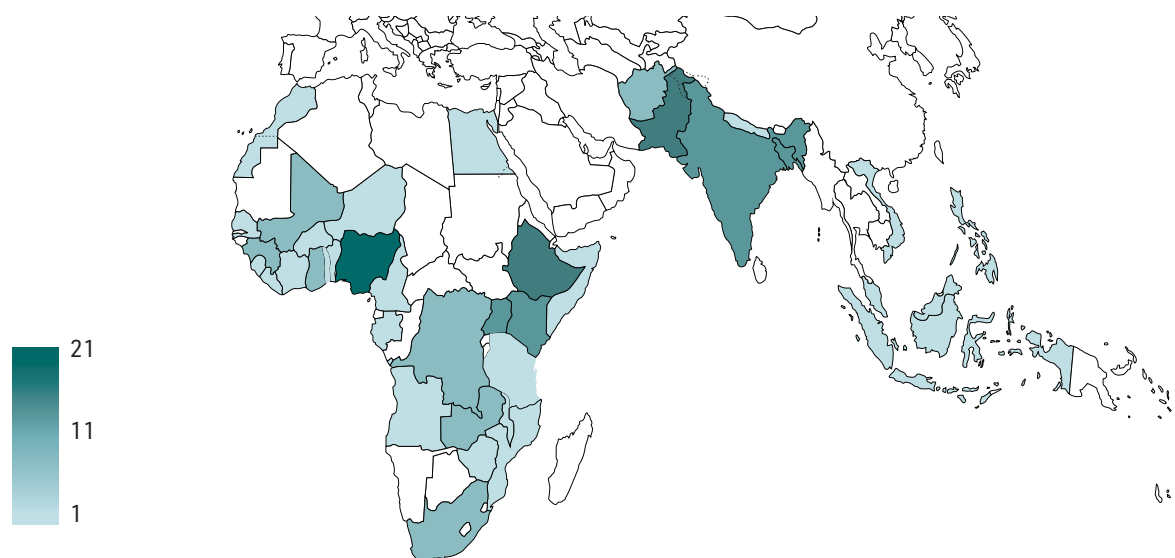
sought to describe and evaluate interventions to improve immunization uptake using a gender lens.

Gender Barriers to Immunization: What Does the Evidence Say?

Studies (focused on 25 or fewer countries) documented a range of gender-related determinants of vaccination across 43 countries in Africa and South Asia (see **Figure 2**). The most frequently studied geographies included

Nigeria (n=21), Ethiopia (n=12), and Pakistan (n=10). Three large multi-country studies contained data from approximately 160 countries.

Figure 2. Map of documented gender barriers and drivers of immunization



Along the immunization value chain, most studies documented barriers related to demand for immunization and local-level vaccine delivery; very few assessed those barriers influenced by cross-cutting market dynamics, such as the supply chain or representation in leadership

(see **Table 1** for a comprehensive overview of the gender barriers documented). The evidence suggests that three key demand-side gender barriers and two main clinic-level factors decrease the use of vaccination services:

The most common barrier to immunization coverage is women's lack of autonomous decision-making about their health and the health of their children.

Across geographies, many women rely on their husband's or an elder's permission to seek healthcare services, including immunization. Younger women can be at an increased disadvantage, with less financial independence and decision-making power than older women. Women who have more influence over a range of household decisions are statistically significantly more likely to have fully immunized children. Conversely, when women go against their husband's opposition to vaccination, they may face an increased risk of intimate partner violence.

"If my husband is present, the children can't be injected because he will get angry. When he leaves then it's time for me to go to the health center, so he doesn't know." – Mother of three in the Philippines (1)

"The women have to get our permission or inform us, this is big decision, especially since it involves money in the family, we have to know." – Father in Malaysia (2)

"Honestly for me already my husband forbids it ... I have not asked what their reasons are. You know we don't have any right over the child." – Mother in Nigeria (3)

Women's prior experiences with the healthcare system also influence the intent to vaccinate.

When women caregivers are shamed by health workers for missing appointments, forgetting to bring a child's vaccine card, or the appearance of a child, they are less likely to return for vaccination services. In contrast, women who receive facility-based antenatal services are more likely to have fully immunized children. Because women are disproportionately responsible for bringing their children to get vaccinated, this negative experience has an impact on immunization.

"I was afraid to go to the health center because I lost the vaccination card. I was not also sure about the appointment date. Besides, I was afraid the health workers could disappoint me." – Mother in Ethiopia (4)

Access to immunization services is significantly impacted by women's time poverty – that is, most women face opportunity costs and competing priorities at home and at work.

Women face competing demands on their time, including employment and gendered expectations of caregiving and household labor, that reduce their time for immunizations. The gender time barrier is exacerbated by men's limited contribution to unpaid domestic work and by constrained operating hours and long travel times to services. Children of women heads of house (i.e., single mothers) are less likely to be immunized, suggesting increased labor and household responsibility.

"During the mangoes season, women go in the early morning to sell their products. We inform them, but they refuse to stop their business for that time and bring their children for vaccination." – Community health worker in Burkina Faso (5)

Direct costs, including the cost of the vaccine, transportation costs to access services, and illicit fees for services, can be prohibitive.

This is particularly a problem when women caregivers rely on their husbands or other family members to provide the resources to cover these costs – a significant gender barrier documented in many studies. In contrast, women who have independent sources of income and spending discretion have increased odds of their children being fully immunized.

"What's the point of taking my children to a clinic to be vaccinated if I do not have money?" – Caregiver in Malaysia (6)

Problems with clinic readiness, including inadequate numbers of women vaccinators, unreasonable wait times, and vaccine stockouts, can discourage caregivers from bringing their children to get vaccinated.

While these are well-known supply-side deterrents, we consider them gender barriers because they directly compound the time constraints faced by women caregivers.

"There is a problem with vaccine supply in our health facilities. Interruptions do occur due to several reasons, including malfunctioning of refrigerators. This results in mothers not getting the service on the appointment dates and they may fail to come back for the service later." – EPI focal persons in Ethiopia (4)

Table 1 provides a comprehensive overview of the gender barriers documented, organized by the Intent/Access/Readiness framework suggested by Phillips et al. (2017) (7).

Table 1. Gender barriers and drivers of immunization, key points, relevant geographies, and references

Gender influencers on immunization	Sub-theme	Key points	Geographies/number of studies
INTENT - THE DEMAND FOR VACCINES THAT WOULD RESULT IN VACCINATION IN THE ABSENCE OF OTHER BARRIERS			
1. Women's autonomous decision-making	Lack of decision-making over health	In many settings, women rely on their husband's or an elder's permission to seek healthcare services, including immunization. Women with high household decision-making are more likely to have fully immunized children. Women who make decisions jointly with their husbands are more likely to have fully immunized children than when husbands make decisions alone. Some women who oppose their husband's decision face an increased risk of intimate partner violence.	Africa (n=37) South Asia (n=16) Cross-country studies (n=3) (1,3,6,8-49)
	Engagement with ANC	Women who attend ANC are more likely to have fully immunized children than women who do not.	Afghanistan, Ethiopia, Nepal, Senegal (n=8) (19,40,53-58)
2. Past experiences with the health system	Negative experiences	Some women reported being shamed by health workers if they missed a prior appointment, misremembered or misunderstood vaccine schedules, forgot the child's vaccine card, or if they or their child appeared dirty and/or malnourished. Caregivers were not always provided with complete information about the vaccination, including likely side effects and how best to alleviate those side effects. Caregivers who experience disrespectful treatment are least likely to return to the health system.	Burkina Faso, DRC, Ethiopia Gabon, Nigeria, Mozambique, Pakistan, Timor-Leste, Uganda (n=8) (4,5,16,29,45,50-52)
	Fears of infertility	Caregivers and health workers expressed concerns that vaccines (including HPV, COVID-19, H1N1, and childhood immunizations) could cause infertility.	Burkina Faso, Kenya, Malawi, Morocco, Tanzania, Zambia (n=7) (5,9-11,15,21,59)
3. Gendered myths and misconceptions	Promotion of earlier/increased sexual activity	Caregivers feared that HPV immunization would result in earlier sexual debut/increased sexual activity for adolescent girls.	Ethiopia, Ghana, India, Malawi, Papua New Guinea, South Africa, Zimbabwe (n=7) (9,26,44,48,60-62)

Gender influencers on immunization	Sub-theme	Key points	Geographies/number of studies
ACCESS – THE ABILITY OR INABILITY TO SUCCESSFULLY CARRY OUT THE TRANSACTION OF VACCINE UTILIZATION			
1. Time poverty	Competing demands on time	Women face competing demands on their time, including employment and gendered expectations of caregiving and household labor. This reduces their time for immunizations. Men’s limited contribution to unpaid domestic work exacerbates the demand on women’s time.	Burkina Faso, Ethiopia, Nigeria, DRC, Mozambique, Sierra Leone, Malaysia, Philippines, Pakistan, Timor-Leste, Uganda, Malawi, Gabon (n=18) (4,5,9,14,16,31,32,45,50,63–66)
	Distance to facilities	Operating hours and distance to services can compound the gender time barrier to vaccination. This effect is worse for low-income women and those who are geographically isolated.	Gabon, Malawi, Nigeria, Malaysia, South Africa, Uganda, Guinea, Malawi, Ethiopia, DRC, Mozambique, Bangladesh (n=11) (6,8,16,27,50,53,55,63,67–70)
2. Direct costs	Costs of vaccines, transportation to services, and illicit fees	Many women report that the cost of vaccine, transportation costs to access facilities, and illicit fees for services are barriers to immunization.	DRC, Ethiopia, Gabon, Guinea, India, Kenya, Malaysia, Mozambique, Nigeria, Pakistan, Philippines, South Africa, Uganda, Zambia, Zimbabwe (n=15) (6,10,14,16,20,27,48,50,52,57,59,65,69,71,72)
	Financial agency	Women lack financial agency, relying on their husbands to provide the funds and/or approve use of funds for immunization. Women with their own income and discretion about spending it have increased odds of their children being fully immunized.	DRC, Ethiopia, Gabon, Mozambique, India, Nigeria, Uganda (n=10) (16,25,29,50,55,56,63,68,73,74)
READINESS – THE HEALTH SYSTEM’S SUPPLY OF VACCINE SERVICES TO ADEQUATELY MEET DEMAND			
1. Vaccinators/ healthcare providers	Lack of women vaccinators	A lack of women vaccinators leads to increased coverage inequities, and many men prefer women/daughters to be vaccinated by women.	Bangladesh, DRC, Ethiopia, India, Nigeria, Pakistan, Somalia (n=5) (24,33,47,75,76)
	Women workers’ occupational concerns	Many women health workers experience safety issues, harassment, and low or late remuneration for their services.	Afghanistan, Bangladesh, DRC, Ethiopia, India, Nigeria (n=2) (26,77)

Gender influencers on immunization	Sub-theme	Key points	Geographies/number of studies
2. Healthcare facilities	Gender-unintentional facilities	Lack of privacy and gender-responsive facilities (i.e., functional and separate washrooms and security for transgender individuals) is a barrier.	Bangladesh, Pakistan (n=2) (24,52)
	Excessive wait times	Excessive wait times result in children not receiving immunizations and/or caregivers not being willing to return.	Burkina Faso, DRC, Guinea, Ethiopia, Mozambique, Nigeria, Uganda (n=6) (5,16,27,51,53,63)
3. Vaccine availability	Vaccine stockouts	Unavailability of vaccines can lead to pessimism and future nonadherence. Restrictive vial-opening policies result in delayed vaccination and increased frustration among caregivers.	Burkina Faso, Ethiopia, Gabon, Guinea, Nigeria, Papua New Guinea, Tanzania, Uganda (n=8) (4,5,11,27,50,51,61,63)

What can be learned from this synthesis of evidence related to gender barriers to immunization? First, that some of the most important reasons women do not bring their children to get vaccinated lie outside the usual purview of immunization programming: household decision-making, for example, which is deeply entwined with social norms governing the appropriate roles for men and women within families, is often perceived as being far outside the scope of the health system. Likewise, the fact that women often face multiple competing demands on their time is not easily addressed by immunization-focused interventions. However, some of the gender barriers identified in the research are quite amenable

to being addressed with adaptations to vaccination programming: training providers on respectful patient treatment, for example, or offering longer clinic hours and mobile options for vaccine delivery. And as argued in **Box 3** and the **Recommendations** section below, there is abundant evidence that offering caregivers – especially those living in poverty – compensation for the direct and opportunity costs of immunization is a highly effective way of giving mothers control over the resources they need to vaccinate their children.

BOX 1. WHAT IS KNOWN ABOUT THE GENDER GAP IN VACCINATION COVERAGE?

Historically, policy discussions around the intersection of gender and immunization have focused on potential differences in vaccination rates for boy and girl children, with a particular concern for girls being at greater risk of under-immunization in geographies with strong son preference (94). While this report seeks to shift the emphasis to the more salient and complex gender issues driving immunization coverage, it is valuable to review the most recent evidence on gender gaps in vaccination in order to assess its policy relevance relative to other gender-related issues.

Although global sex-disaggregated vaccination data are not reported on either the World Health Organization (WHO) or UNICEF immunization data portals, surveys such as the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) routinely collect childhood vaccine coverage by sex, which allows for estimation of gender gaps at the national and sub-national levels.

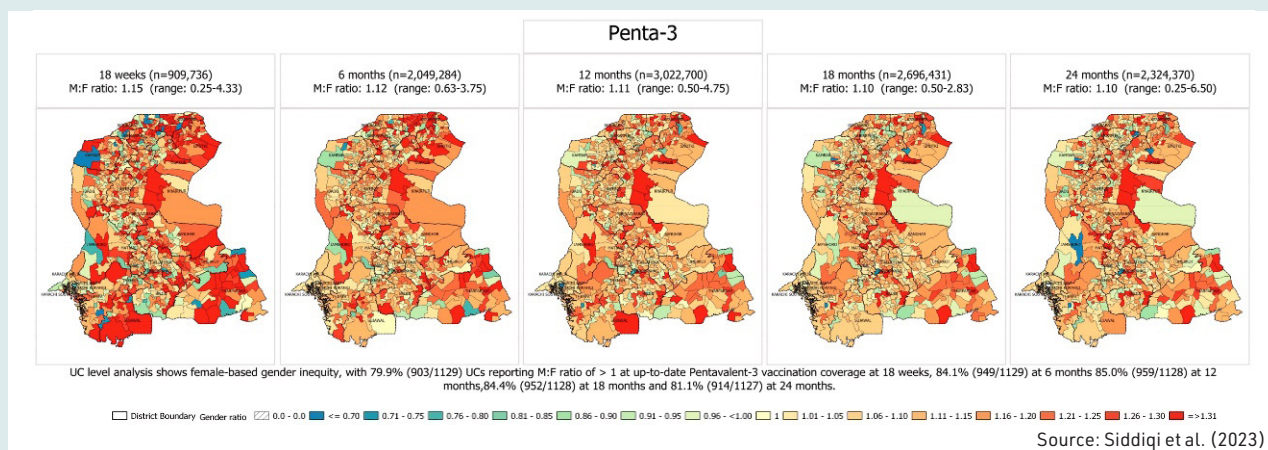
Two recent publications utilize distinct methodologies for measuring differences in immunization between boy and girl children. Utazi et al. (2022) analyze nationally representative cross-sectional data from the most recent DHS conducted between 2008 and 2018 in nine low- and middle-income countries to determine key factors (including child sex) associated with non- and under-vaccination (95). They find that the sex of the child is not a significant predictor of vaccination coverage in any of the countries – although other gender-related factors, including maternal utilization of health services (skilled birth attendance, antenatal care attendance, maternal receipt of tetanus toxoid vaccination, and postnatal care) and maternal education are commonly positively associated with children’s routine immunization.

Ali et al. (2022) conduct a meta-analysis of 36 individual studies in 18 countries, including studies focused on particular sub-national areas, and find a negative 3% average difference of girls’ routine immunization coverage relative to boys’ (78). However, there is a good deal of heterogeneity across individual countries and studies. In the majority of included studies, the risk ratios are not statistically significant, and the confidence intervals span one; a small number of studies or datasets from Bangladesh, Brazil, India, and Mongolia suggest a significant risk ratio, whereas there are no studies that suggest a significant relative benefit to being vaccinated, given female.

Further evidence of geographic variation in male/female vaccination coverage comes from Pakistan, where an analysis of 6.2 million children born from 2019 to 2022 and enrolled in the Sindh electronic immunization registry found a wide range of vaccination sex ratios across district subdivisions (Union Councils), with some areas showing boys getting vaccinated at 3 to 6 times the rate of girls (75) (see Figure 3). Low maternal education, residing in remote rural and slum regions, and receiving vaccines at fixed sites, as compared to outreach, are all factors associated with fewer females being vaccinated, as compared to males.

High-quality sex-disaggregated immunization data allows researchers and practitioners to assess where, to what degree, and for which antigens, girl children may be under-vaccinated with respect to boys – and to design interventions to address gender inequities where they exist. Continuing to support countries to collect and report such data (e.g., through routine immunization surveys and electronic medical records) is an important contribution to our understanding of gender gaps in immunization coverage.

Figure 3. Male-to-female ratios of up-to-date vaccination coverage of Pentavalent-3 at 18 weeks and 6, 12, 18, and 24 months, in 0-23-month-old children in 2019–2022 birth cohorts enrolled in SEIR (1 January 2019–31 December 2022)



BOX 2. UNIQUE GENDER CONSIDERATIONS FOR HPV PROGRAMMING

Adolescents introduce a new dynamic to decision-making norms and immunization, specifically for the HPV vaccine. They must navigate traditional gender barriers (i.e., lack of autonomous decision-making), issues of consent, and emerging myths and misconceptions about the vaccine. Rumors that the HPV vaccine causes infertility and encourages earlier/increasing sexual activity (9,26,44,48,60–62) exacerbate existing challenges to coverage. Parental consent is also an important demand-side factor, and in contexts where a husband's or father's approval matters, this could mean the difference between an adolescent's HPV vaccination or not (2,10,11,15,30,48,65,88). Consent is particularly important when girls are perceived as being 'too young.' Adolescent girls' own increase in knowledge, however, was seen as an important influencer of parental decision-making.

“Unlike infants and children, girls are not passive recipients of the HPV vaccine. Their active engagement is important not only to ensure uptake and impact of HPV vaccination; a positive experience with the health system can also lay the foundation for a lifetime of health-enhancing behaviors for themselves, and for their future children.” (81)

In South Africa, two studies linked parental motivation to vaccinate daughters with perceived threats and prevalence of gender-based violence in the community. In these cases, the vaccine was seen as a form of protection if their daughters were assaulted or raped (69,79). Maternal knowledge and perceptions of the severity of HPV was also linked to HPV vaccination coverage (60,62), and in some contexts, older mothers (and grandmothers) were more likely to support their daughters receiving the HPV vaccine than younger mothers (15,62,69).

“Culturally, young girls are not expected to indulge in sexual activities until they are married. So by giving them the vaccine, it will seem like we are giving them the green light.” – Healthcare provider, Zimbabwe (48).

Two studies found that men were unwilling to give the vaccine to their son, one describing it as a “girl's vaccine” (2,61). Another study suggests that adolescent girls who are already sexually active might feel discouraged from receiving the vaccine, which is more effective prior to sexual debut (80).

Many HPV vaccine programs globally are delivered through schools, where parents are not present to provide consent, potentially disrupting traditional decision-making dynamics. But adolescent girls who are not in school are most likely missed by such programs; these include highly vulnerable girls in poverty who contribute to household income and those in early marriages (89). One study conducted in Ethiopia found that adolescent girls in public schools were 1.9 times more likely to accept the HPV vaccine than those in private schools. The HPV vaccine is the responsibility of the Ministry of Health, which prioritizes public schools where other health messaging is already being delivered. In two studies in Pakistan and Kenya, participants recommended that the HPV vaccine be delivered in the community itself via household visits or mobile clinics, to increase uptake among out-of-school girls and those less trusting of health facilities. Participants from these studies also recommended that endorsement from the government and senior members in the community would help increase awareness and acceptance by all decision-makers, including boys and men, who can influence uptake of vaccines in girls (30,80).

HPV immunization programs represent a unique opportunity to connect with young women at a stage in their life course when they are first able to make decisions for themselves which will influence their sexual and reproductive health.

BOX 3. FINANCIAL INCENTIVES MAY ALLEVIATE SOME GENDER BARRIERS TO IMMUNIZATION COVERAGE

Results from this review highlight the importance of financial barriers to women's access to immunization. Women are often unable to afford the direct costs associated with transporting themselves and their children to fixed clinic sites, and in many contexts, they are dependent on husbands or other household members to provide them with the cash they need to cover trips to a vaccination facility. In addition to these direct costs, women face the high opportunity costs of their time.

Demand-side financial incentives, including small in-kind or mobile conditional cash transfers (CCTs), are one approach to providing mothers with the cash they need to cover the direct costs of vaccination and compensate them for the opportunity costs of their time. Although not generally considered as gender-intentional interventions, incentives targeted to women caregivers may help to alleviate an important gender barrier to vaccination, which is lack of control over financial resources. When offered as part of a larger income-support program, cash transfers conditional on health service utilization have been shown to be effective for improving child health by increasing immunization coverage (82).

Several recent randomized control trials demonstrate the potential of incentives to increase immunization coverage in low-resource settings. In rural Ghana, cash incentives ranging from USD 3 to USD 10 increased COVID-19 vaccination by 6.3% (83). And in urban Pakistan, small mobile payments of USD 0.6-1.8 per immunization visit improved both immunization coverage and timeliness by as much as 30%, with a cost as low as USD 23 per additional fully immunized child (84). The Pakistan program was also able to test the differential effects of the design features of the incentives by varying the amounts provided, the timing of payments (constant versus increasing over the course of the vaccination schedule), certain payments versus lottery payments, and payment in airtime compared to mobile money. In this program, the large gender gap in cell phone ownership (over 90% of fathers owned a personal cell phone compared to less than half of mothers) meant that the transfers went disproportionately to men. In-kind incentives have also been shown to have a positive impact on vaccination coverage: In Rajasthan, India, providing lentils and a set of plates to caregivers (the majority of whom are mothers) who were bringing their children to the immunization camps increased the number of fully immunized children by 21 percentage points (117%) to 39%, relative to only improving the delivery of immunization (96).

While the longer-term impacts of these incentive programs remain to be explored – for example, do they serve as a behavioral nudge that establishes vaccination as a regular practice, or is adherence discontinued once payment ends? – they do appear to hold potential for providing low-income caregivers with resources to facilitate child immunization.

Interventions to Address Gender Barriers to Immunization: What Works?

Our scoping review identified a limited number of studies (n=9) that described and/or evaluated interventions designed to improve immunization using a gender lens. Six interventions targeted childhood immunizations, two targeted HPV, and one focused on communication interventions for polio. Interventions largely focused on behavior change communication through male engagement, engagement with religious leaders, home visits, and media campaigns. One intervention addressed supply side barriers by extending service hours to benefit mothers working outside the home. Two others leveraged existing women's

self-help groups, introducing health modules to increase demand for and access to immunization.

Table 2 describes the gender gaps and barriers the intervention seeks to address, how the intervention uses a gender lens, the evaluation methods, and key results/conclusions. Three of the nine evaluations demonstrated increased coverage; these are discussed in more detail in **Boxes 4 and 5**. The remaining six evaluations largely produced positive results but did not measure coverage.

Table 2. Interventions designed to improve immunization using a gender lens and results of their evaluations

IMMUNIZATION FOCUS AND GEOGRAPHY	GENDER GAPS/ BARRIERS BEING ADDRESSED	INTERVENTION GENDER LENS	EVALUATION METHODS	RESULTS/CONCLUSIONS
Childhood Immunizations in Bangladesh, 2010 (85)	Inaccessibility of services (limited service hours not conducive for employed mothers)	Extended service hours to benefit employed mothers	Mixed methods; pre-test/post-test, interviews, review of service data	The level of coverage increased dramatically, and drop-out rate decreased significantly Extended service hours are beneficial for employed mothers
Childhood Immunizations in India, 2015 (86)	Lack of male engagement Lack of vaccine-related information	Male health workers recruited and trained to conduct outreach to men	Qualitative evaluation; IDIs with health workers, women, and husbands	Women and men health workers can complement each other's work to improve community demand for and delivery of services
Childhood Immunizations in India, 2018 (87)	Lack of women's empowerment and agency Lack of vaccine-related information	Self-help groups (SHGs)	Two-armed quasi-experimental study	Consistent, significant increase of age-appropriate immunization over time Statistically significant improvement in women's empowerment
Childhood Immunizations and TB in India, 2011 (88)	Lack of women's empowerment and agency Lack of vaccine-related information	Self-help groups (SHGs)	Quasi-experimental study	Immunization coverage increased significantly for children of women in SHGs The spillover effect is also significant; women in SHG villages are more likely to immunize their children than those in control villages
Childhood Immunizations in Nigeria, 2019 (89)	Harmful practices and norms that violate the rights of women and girls	Engagement with religious leaders	Desk review; Qualitative FGDs, IDIs, and KIs in four communities	Improved health-seeking behavior influenced changes in harmful gender norms and community response against GBV Leveraging the influence of faith leaders may help promote immunization uptake
Childhood Immunizations in Nigeria, 2021 (90)	Lack of women's empowerment and agency Lack of male engagement	Universal home visits	Narratives of change from men and women	Mixed results on autonomous decision-making Home visits increased men's knowledge and support for immunization and led to changes on perceptions of GBV
HPV in Uganda, 2018 (91)	Lack of male engagement Lack of vaccine-related information	Education session	Pre-post survey	Men's acceptance of HPV vaccine for daughters may increase after education *Cannot determine association
HPV in Kenya, 2022 (92)	Lack of vaccine-related information	Doctor's endorsement of the vaccine	Randomized control trial	No difference in effect by gender of the recommending doctor for likelihood of intent to vaccinate Visual communication of a doctor's support for the HPV vaccine can strengthen intentions and safety perceptions but may not be enough to persuade the vaccine-hesitant to vaccinate

IMMUNIZATION FOCUS AND GEOGRAPHY	GENDER GAPS/ BARRIERS BEING ADDRESSED	INTERVENTION GENDER LENS	EVALUATION METHODS	RESULTS/CONCLUSIONS
Polio in India and Pakistan, 2009 (93)	Misconceptions and myths	Social mobilization, media campaigns	Desk review	Strategic and synergistic communication efforts that integrate social mobilization, interpersonal communication, gender- and culturally sensitive interventions, mass/folk media and political advocacy have contributed to the polio eradication initiative's progress and to access of unreached populations in challenging socio-economic environments

What does this small body of research on gender-intentional immunization interventions tell us about what might work to address gender barriers to vaccination? First and foremost, that this is an under-researched area that merits investment. We need to know more about what it takes to tackle the diverse gender-related drivers of under-vaccination, and what the marginal impact is of programming with a gender lens. Second, the most promising interventions from this small sample are ones that leverage pre-existing

women's self-help groups (see **Box 4**) and expand clinic hours to accommodate the schedules of employed women (see **Box 5**). The remaining programs, which could broadly be categorized as social and behavioral change communications interventions, may have been successful at including men in vaccination messaging and at achieving health goals beyond immunization, but it was not possible to assess if they had any effect on immunization coverage.

BOX 4. LEVERAGING WOMEN'S EMPOWERMENT GROUPS FOR INCREASED CHILD IMMUNIZATION RATES

Two especially strong intervention evaluations/quasi-experimental studies stood out in the scoping review, both measuring the impact of women's empowerment groups on child immunization rates. In both cases, programs targeted especially marginalized communities, where women often have lower social and economic standing. Leveraging existing women's self-help groups, these interventions embedded health education components to enhance intent to immunize and access to immunization services. Both evaluations used a control group against which to measure outcomes/programmatic impact.

In Bihar, India, as part of the Bill & Melinda Gates Foundation-funded Anaya program, facilitators provide eight sessions of behavior change communication in healthy maternal and newborn practices to women's self-help groups. As compared to a control group, a study found that women in the health-focused groups were significantly more likely to provide age-appropriate immunization for their children (87). The groups also had a significant positive effect on measures of women's collective empowerment.

Elsewhere in Bihar, women's groups called "Mahila Samakhya" received training on health practices. Although these groups do not pre-determine outreach activities, many go on to share this newly gained information with others in their community through campaigns and informal interactions. Interestingly, in addition to the significant impact on immunization coverage among children of women in the program, an evaluation also found significant increase among children in program villages whose mothers were not members of the group, as compared to control villages (88). This suggests a spillover effect on the community through women's existing social networks. These results were strongest among similarly marginalized communities, who are likely to live in the same neighborhoods and have existing connections to the women in the program.

Health education through women's groups can be a strong, low-cost, and sustainable demand-side pathway to increased immunization coverage. The findings of these two studies suggest that interventions that include information-sharing and collective action, like women's and other community-level empowerment groups, may have an outsized positive impact on the larger community. Such groups can simultaneously improve gender equality outcomes and immunization coverage outcomes for improved health and wellness along the life course.

BOX 5. ENHANCING ACCESS TO IMMUNIZATION SERVICES FOR EMPLOYED MOTHERS

Between 2006 and 2007, in the urban slums of Dhaka, Bangladesh, a package of supply and demand-side interventions – implemented within the existing local healthcare system and with no additional costs – included an extended Expanded Programme on Immunization (EPI) service schedule (85). At the baseline of the study, only 14% of children of employed mothers were fully immunized, as compared to 75% among children of non-employed mothers. In an area where approximately 40% of women aged 15 to 40 are employed, the normal EPI service window of 10:00 am to 2:00 pm made it difficult for women who work outside the home to attend with their children. During the study, service hours were extended to 5:00 pm.

Although part of an overall package, the extended hours stood out as a potential standalone intervention to address the gender barrier of time poverty faced by mothers, who overwhelmingly bear the responsibility of bringing their children for vaccination. Over three times as many children were vaccinated during the extended hours versus the original hours; mothers and service providers confirmed their appreciation of the increased flexibility and convenience; and an impressive 99% of children of both employed and non-employed mothers were fully immunized at endline.

This cost-effective adaptation of existing vaccination services demonstrates that simple interventions that directly address access barriers for women, such as expanding operating hours, can have a meaningful impact on immunization coverage.

4. Recommendations for learning and investment-making

Based on the evaluation of the existing evidence base on the intersection of gender and immunization, we offer recommendations in three areas: (1) a data and learning agenda, (2) piloting gender-intentional immunization

programming, and (3) making use of the insights from gender analysis to inform important new areas of investment in reaching zero-dose populations and the introduction and scaling of new vaccines, such as HPV.

Invest in better gender data and research

Enable the global collection and reporting of data on gender-related barriers to vaccination coverage

Innovative multicountry survey efforts such as the WHO's [Behavioral and Social Drivers of Vaccination](#) (BeSD) and the [Vaccine Confidence Project](#) offer the opportunity to deepen our understanding of both demand- and supply-side gender barriers to immunization. Incorporating validated measures of these barriers into the survey instruments, and broadening the respondent criteria to include fathers and other adult decision-makers, could make an important contribution to the evidence base informing immunization policy and programming.

Fund new research to assess the coverage loss attributable to gender barriers and measure the marginal impact of gender-intentional interventions

Funders could support a pioneering learning agenda focused on high-quality intervention research to test demand- and supply-side programming addressing gender barriers to vaccination.

Pilot innovative approaches to addressing gender barriers

Leverage existing local women's organizations to inform, mobilize, and support caregivers to vaccinate their children

Building on the experiences with self-help groups in India, seed funding for immunization savings accounts could provide mothers with rotating access to their own funds for transportation and other direct vaccinations costs.

Launch social and behavioral change communications campaigns to engage men and other household-level decision-makers around the benefits of vaccination and shared responsibility for children's health

Here, it will be important that messaging does not reinforce existing harmful social norms around men's and women's roles in healthcare decision-making.

Provide incentives targeted to women to compensate them for the opportunity cost of time and provide private access to funds for direct costs of transportation and vaccination services

Well-designed and implemented cash and in-kind transfers to caregivers, conditional on vaccination, can dramatically increase immunization coverage rates.

Invest in clinic-level interventions

Invest in clinic-level interventions, including more facilities with cold chain closer to communities, expanding service hours to make vaccination services more accessible to women working outside the home, revising open-vial policies to increase access, operating mobile clinics to alleviate transportation barriers, and instituting respectful care training and accountability mechanisms for providers so that mothers receive complete and accurate information about the vaccines and their normal side effects.

Empower women healthcare workers

Empower women healthcare workers themselves by making provisions for their safety, compensation, and opportunities for promotion and advancement.

Use insights into gender barriers to guide HPV and zero-dose programming

Strengthen health services for adolescent girls, as well as empower them with respect to their own reproductive health

The introduction and scaling of the HPV vaccine in numerous LMICs presents an opportunity to distinguish the approach from other vaccination delivery systems by recognizing and respecting the (limited) agency of girls who may or may not be under their parents' authority, be in or out of school, and be at varying stages of sexual debut/initiation of sexual activity – including girls who are in child marriages. A positive experience with HPV vaccination may pave the way for these girls to continue to access the health system as they move through their life course. Simple interventions to enhance access to immunization services for girls who are already working for pay – such as expanded clinic hours or offering vaccinations near to markets and other worksites – can help to reach those who are not served by school-based vaccination.

Inform approaches to reaching the most under-vaccinated communities

Although the gender barriers identified in this report are not unique to zero-dose populations, the insights generated from this evidence base may be used to inform approaches to reaching these most underserved communities, where women may be exceptionally disempowered and need to overcome significant structural barriers with respect to healthcare decisions for their children. As evidenced by the significant geographic variation in gender gaps in vaccination coverage (see **Box 1**), it is clear that the highly localized focus of zero-dose programming is needed to both understand and address the reasons why families are not immunizing their children – which may be different for girls and boys. Financial compensation targeted to mothers, coupled with expanded clinic hours and adequate cold chain supply, may be particularly important for caregivers in zero-dose areas.

References

1. Wachinger J, Reñosa MDC, Endoma V, Aligato MF, Landicho-Guevarra J, Landicho J, et al. Bargaining and gendered authority: a framework to understand household decision-making about childhood vaccines in the Philippines. *BMJ Glob Health*. 2022 Sep;7(9).
2. Wong LP. Role of men in promoting the uptake of HPV vaccinations: focus groups' finding from a developing country. *Int J Public Health*. 2010 Feb;55(1):35-42.
3. Abad N, Uba BV, Patel P, Barau DN, Ugochukwu O, Aliyu N, et al. A rapid qualitative assessment of barriers associated with demand and uptake of health facility-based childhood immunizations and recommendations to improve immunization service delivery in Sokoto State, Northwest Nigeria, 2017. *Pan Afr Med J*. 2021 Nov 16;40(Suppl 1):10.
4. Zewdie A, Letebo M, Mekonnen T. Reasons for defaulting from childhood immunization program: a qualitative study from Hadiya zone, Southern Ethiopia. *BMC Public Health*. 2016 Dec 9;16(1):1240.
5. Kagoné M, Yé M, Nébié E, Sié A, Müller O, Beiersmann C. Community perception regarding childhood vaccinations and its implications for effectiveness: a qualitative study in rural Burkina Faso. *BMC Public Health*. 2018 Mar 6;18(1):324.
6. Salleh H, Avoi R, Abdul Karim H, Osman S, Dhanaraj P, Ab Rahman MA 'Imran. A Behavioural-Theory-Based Qualitative Study of the Beliefs and Perceptions of Marginalised Populations towards Community Volunteering to Increase Measles Immunisation Coverage in Sabah, Malaysia. *Vaccines (Basel)*. 2023 Jun 2;11(6).
7. Phillips DE, Dieleman JL, Lim SS, Shearer J. Determinants of effective vaccine coverage in low and middle-income countries: a systematic review and interpretive synthesis. *BMC Health Serv Res*. 2017 Sep 26;17(1):681.
8. Adeyanju GC, Sprengholz P, Betsch C, Essoh T-A. Caregivers' Willingness to Vaccinate Their Children against Childhood Diseases and Human Papillomavirus: A Cross-Sectional Study on Vaccine Hesitancy in Malawi. *Vaccines (Basel)*. 2021 Oct 22;9(11).
9. Adeyanju GC, Betsch C, Adamu AA, Gumbi KS, Head MG, Aplogan A, et al. Examining enablers of vaccine hesitancy toward routine childhood and adolescent vaccination in Malawi. *Glob Health Res Policy*. 2022 Aug 18;7(1):28.
10. Venturas C, Umeh K. Health professional feedback on HPV vaccination roll-out in a developing country. *Vaccine*. 2017 Apr 4;35(15):1886-91.
11. Remes P, Selestine V, Chagalucha J, Ross DA, Wight D, de Sanjosé S, et al. A qualitative study of HPV vaccine acceptability among health workers, teachers, parents, female pupils, and religious leaders in northwest Tanzania. *Vaccine*. 2012 Aug 3;30(36):5363-7.
12. Malande OO, Munube D, Afaayo RN, Annet K, Bodo B, Bakainaga A, et al. Barriers to effective uptake and provision of immunization in a rural district in Uganda. *PLoS ONE*. 2019 Feb 14;14(2):e0212270.
13. Yamanis T, Carlitz R, Gonyea O, Skaff S, Kisanga N, Mollel H. Confronting "chaos": a qualitative study assessing public health officials' perceptions of the factors affecting Tanzania's COVID-19 vaccine rollout. *BMJ Open*. 2023 Jan 31;13(1):e065081.
14. Wong LP, Alias H, Seheli FN, Zimet GD, Hu Z, Lin Y. Human papillomavirus (HPV) vaccination intent and its associated factors: a study of ethnically diverse married women aged 27 to 45 in Malaysia, a Southeast Asian country. *Hum Vaccin Immunother*. 2022 Nov 30;18(5):2076525.
15. Vermandere H, Naanyu V, Mabeya H, Vanden Broeck D, Michielsen K, Degomme O. Determinants of acceptance and subsequent uptake of the HPV vaccine in a cohort in Eldoret, Kenya. *PLoS ONE*. 2014 Oct 9;9(10):e109353.
16. Shearer JC, Nava O, Prosser W, Nawaz S, Mulongo S, Mambu T, et al. Uncovering the Drivers of Childhood Immunization Inequality with Caregivers, Community Members and Health System Stakeholders: Results from a Human-Centered Design Study in DRC, Mozambique and Nigeria. *Vaccines (Basel)*. 2023 Mar 17;11(3).
17. Shafiq Y, Khowaja AR, Yousafzai MT, Ali SA, Zaidi A, Saleem AF. Knowledge, attitudes and practices related to tetanus toxoid vaccination in women of childbearing age: A cross-sectional study in peri-urban settlements of Karachi, Pakistan. *J Infect Prev*. 2017 Sep;18(5):232-41.

-
18. Seidu A-A, Ahinkorah BO, Ameyaw EK, Budu E, Yaya S. Women empowerment indicators and uptake of child health services in sub-Saharan Africa: a multilevel analysis using cross-sectional data from 26 countries. *J Public Health (Oxf)*. 2022 Dec 1;44(4):740–52.
 19. Sarker AR, Akram R, Ali N, Chowdhury ZI, Sultana M. Coverage and Determinants of Full Immunization: Vaccination Coverage among Senegalese Children. *Medicina (Kaunas)*. 2019 Aug 14;55(8).
 20. Monguno AK. Socio cultural and geographical determinants of child immunisation in borno state, nigeria. *J Public Health Africa*. 2013 Jun 25;4(1):e10.
 21. Lohiniva A-L, Barakat A, Dueger E, Restrepo S, El Aouad R. A qualitative study of vaccine acceptability and decision making among pregnant women in Morocco during the A (H1N1) pdm09 pandemic. *PLoS ONE*. 2014 Oct 14;9(10):e96244.
 22. Limaye RJ, Sara AB, Siddique AR, Vivas C, Malik S, Omonoku K. Interpersonal and community influences affecting childhood vaccination decision-making among Nigerian caregivers: Perceptions among frontline workers in Nigeria. *J Child Health Care*. 2019 May 23;23(3):403–14.
 23. Khan MD. Toward creating equity in access to COVID-19 vaccination for female population in Multan, Punjab, Pakistan. *Health Care Women Int*. 2021 Oct 22;1–10.
 24. Jalloh MF, Bennett SD, Alam D, Kouta P, Lourenço D, Alamgir M, et al. Rapid behavioral assessment of barriers and opportunities to improve vaccination coverage among displaced Rohingyas in Bangladesh, January 2018. *Vaccine*. 2019 Feb 4;37(6):833–8.
 25. Etokidem A, Nkpoyen F, Ekanem C, Mpama E, Isika A. Potential barriers to and facilitators of civil society organization engagement in increasing immunization coverage in Odukpani Local Government Area of Cross River State, Nigeria: an implementation research. *Health Res Policy Syst*. 2021 Aug 11;19(Suppl 2):46.
 26. Dhaliwal BK, Chandrashekhar R, Rattani A, Seth R, Closser S, Jain A, et al. Community perceptions of vaccination among influential stakeholders: qualitative research in rural India. *BMC Public Health*. 2021 Nov 18;21(1):2122.
 27. Bell J, Lartey B, Spickernell G, Darrell N, Salt F, Gardner C, et al. Applying a social-ecological model to understand factors impacting demand for childhood vaccinations in Nigeria, Uganda, and Guinea. *SSM Qual Res Health*. 2022 Dec;2:None.
 28. Bell J, Lartey B, Fernandez M, Darrell N, Exton-Smith H, Gardner C, et al. A structural equation modelling approach to understanding the determinants of childhood vaccination in Nigeria, Uganda and Guinea. *PLoS Glob Public Health*. 2023 Mar 29;3(3):e0001289.
 29. Babirye JN, Rutebemberwa E, Kiguli J, Wamani H, Nuwaha F, Engebretsen IM. More support for mothers: a qualitative study on factors affecting immunisation behaviour in Kampala, Uganda. *BMC Public Health*. 2011 Sep 25;11:723.
 30. Ali RF, Arif Siddiqi D, Mirza A, Naz N, Abdullah S, Kumbhani G, et al. Adolescent girls' recommendations for the design of a human papillomavirus vaccination program in Sindh, Pakistan: a qualitative study. *Hum Vaccin Immunother*. 2022 Nov 30;18(5):2045856.
 31. Akwataghibe NN, Ogunsola EA, Broerse JEW, Popoola OA, Agbo AI, Dieleman MA. Exploring Factors Influencing Immunization Utilization in Nigeria-A Mixed Methods Study. *Front Public Health*. 2019 Dec 20;7:392.
 32. Ahmed KA, Grundy J, Hashmat L, Ahmed I, Farrukh S, Bersonda D, et al. An analysis of the gender and social determinants of health in urban poor areas of the most populated cities of Pakistan. *Int J Equity Health*. 2022 Apr 18;21(1):52.
 33. Abdullahi MF, Stewart Williams J, Sahlèn K-G, Bile K, Kinsman J. Factors contributing to the uptake of childhood vaccination in Galkayo District, Puntland, Somalia. *Glob Health Action*. 2020 Dec 31;13(1):1803543.
 34. Siddiqui M, Khan AA, Varan AK, Esteves-Jaramillo A, Sultana S, Ali AS, et al. Intention to accept pertussis vaccine among pregnant women in Karachi, Pakistan. *Vaccine*. 2017 Sep 25;35(40):5352–9.
 35. Wendt A, Santos TM, Cata-Preta BO, Costa JC, Mengistu T, Hogan DR, et al. Children of more empowered women are less likely to be left without vaccination in low- and middle-income countries: A global analysis of 50 DHS surveys. *J Glob Health*. 2022 Mar 26;12:04022.
 36. Babalola S. Determinants of the uptake of the full dose of diphtheria-pertussis-tetanus vaccines (DPT3) in Northern Nigeria: a multilevel analysis. *Matern Child Health J*. 2009 Jul;13(4):550–8.
-

-
37. Antai D. Gender inequities, relationship power, and childhood immunization uptake in Nigeria: a population-based cross-sectional study. *Int J Infect Dis.* 2012 Feb;16(2):e136-45.
 38. Singh K, Haney E, Olorunsaiye C. Maternal autonomy and attitudes towards gender norms: associations with childhood immunization in Nigeria. *Matern Child Health J.* 2013 Jul;17(5):837-41.
 39. Darebo TD, Oshe BB, Diro CW. Full vaccination coverage and associated factors among children aged 12 to 23 months in remote rural area of Demba Gofa District, Southern Ethiopia. *PeerJ.* 2022 Mar 14;10:e13081.
 40. Shenton LM, Wagner AL, Carlson BF, Mubarak MY, Boulton ML. Vaccination status of children aged 1-4 years in Afghanistan and associated factors, 2015. *Vaccine.* 2018 Aug 16;36(34):5141-9.
 41. Boulton ML, Carlson BF, Power LE, Wagner AL. Socioeconomic factors associated with full childhood vaccination in Bangladesh, 2014. *Int J Infect Dis.* 2018 Apr;69:35-40.
 42. Nnaji CA, Wiysonge CS, Adamu AA, Lesosky M, Mahomed H, Ndwandwe D. Missed Opportunities for Vaccination and Associated Factors among Children Attending Primary Health Care Facilities in Cape Town, South Africa: A Pre-Intervention Multilevel Analysis. *Vaccines (Basel).* 2022 May 16;10(5).
 43. Limaye RJ, Singh P, Paul A, Fesshaye B, Lee C, Zavala E, et al. COVID-19 vaccine decision-making among pregnant and lactating women in Bangladesh. *Vaccine.* 2023 Jun 13;41(26):3885-90.
 44. Francis SA, Katz ML. The HPV vaccine: a comparison of focus groups conducted in South Africa and Ohio Appalachia. *Matern Child Health J.* 2013 Sep;17(7):1222-9.
 45. Amin R, De Oliveira TJCR, Da Cunha M, Brown TW, Favin M, Cappelier K. Factors limiting immunization coverage in urban Dili, Timor-Leste. *Glob Health Sci Pract.* 2013 Nov 14;1(3):417-27.
 46. Ariyo T, Jiang Q. Mothers' Healthcare Autonomy, Maternal-Health Utilization and Healthcare for Children under-3 Years: Analysis of the Nigeria DHS Data (2008-2018). *Int J Environ Res Public Health.* 2020 Mar 11;17(6).
 47. Kalbarczyk A, Rao A, Adebayo A, Decker E, Gerber S, Morgan R. The influence of gender dynamics on polio eradication efforts at the community, workplace, and organizational level. *Glob Health Res Policy.* 2021 Jun 29;6(1):19.
 48. Crann SE, Barata PC, Mitchell R, Mawhinney L, Thistle P, Chirenje ZM, et al. Healthcare providers' perspectives on the acceptability and uptake of HPV vaccines in Zimbabwe. *J Psychosom Obstet Gynaecol.* 2016 Jul 11;37(4):147-55.
 49. Ambe J. Perceptions, beliefs and practices of mothers in sub-urban and rural areas towards measles and measles vaccination in Northern Nigeria. *TROPICAL DOCTOR.* 2001;
 50. Schwarz NG, Gysels M, Pell C, Gabor J, Schlie M, Issifou S, et al. Reasons for non-adherence to vaccination at mother and child care clinics (MCCs) in Lambaréné, Gabon. *Vaccine.* 2009 Aug 27;27(39):5371-5.
 51. Kajungu D, Muhoozi M, Stark J, Weibel D, Sturkenboom MCJM. Vaccines safety and maternal knowledge for enhanced maternal immunization acceptability in rural Uganda: A qualitative study approach. *PLoS ONE.* 2020 Dec 10;15(12):e0243834.
 52. Khan MD. Access to COVID-19 vaccination for transgender community in Multan, Punjab, Pakistan. *Health Care Women Int.* 2023;44(7-8):824-37.
 53. Tefera YA, Wagner AL, Mekonen EB, Carlson BF, Boulton ML. Predictors and Barriers to Full Vaccination among Children in Ethiopia. *Vaccines (Basel).* 2018 Apr 10;6(2).
 54. Legesse E, Dechasa W. An assessment of child immunization coverage and its determinants in Sinana District, Southeast Ethiopia. *BMC Pediatr.* 2015 Apr 1;15:31.
 55. Wado YD, Afework MF, Hindin MJ. Childhood vaccination in rural southwestern Ethiopia: the nexus with demographic factors and women's autonomy. *Pan Afr Med J.* 2014 Jan 18;17 Suppl 1:9.
 56. Ebot JO. "Girl Power!": The Relationship between Women's Autonomy and Children's Immunization Coverage in Ethiopia. *J Health Popul Nutr.* 2015 Sep 18;33:18.
 57. Dheresa M, Dessie Y, Negash B, Balis B, Getachew T, Mamo Ayana G, et al. Child vaccination coverage, trends and predictors in eastern Ethiopia: implication for sustainable development goals. *J Multidiscip Healthc.* 2021 Sep 21;14:2657-67.
-

-
58. Pandey S, Lee H nim. Determinants of child immunization in Nepal: The role of women's empowerment. *Health Educ J*. 2012 Nov;71(6):642-53.
 59. Limaye RJ, Paul A, Gur-Arie R, Zavala E, Lee C, Fesshaye B, et al. A socio-ecological exploration to identify factors influencing the COVID-19 vaccine decision-making process among pregnant and lactating women: Findings from Kenya. *Vaccine*. 2022 Nov 28;40(50):7305-11.
 60. Shitu BF, Atnafu DD, Agumas Y. Public school adolescents had increased odds of being willing to uptake HPV vaccinations owing to sociodemographic and healthcare access features in bahir dar city, ethiopia. *Biomed Res Int*. 2023 Apr 12;2023:2663815.
 61. Kelly-Hanku A, Newland J, Aggleton P, Ase S, Aeno H, Fiya V, et al. HPV vaccination in Papua New Guinea to prevent cervical cancer in women: Gender, sexual morality, outsiders and the de-feminization of the HPV vaccine. *Papillomavirus Res*. 2019 Dec;8:100171.
 62. Coleman MA, Levison J, Sangi-Haghpeykar H. HPV vaccine acceptability in Ghana, West Africa. *Vaccine*. 2011 May 23;29(23):3945-50.
 63. Cockcroft A, Usman MU, Nyamucherera OF, Emori H, Duke B, Umar NA, et al. Why children are not vaccinated against measles: a cross-sectional study in two Nigerian States. *Arch Public Health*. 2014 Dec 29;72(1):48.
 64. Kulkarni S, Ishizumi A, Eleeza O, Patel P, Feika M, Kamara S, et al. Using photovoice methodology to uncover individual-level, health systems, and contextual barriers to uptake of second dose of measles containing vaccine in Western Area Urban, Sierra Leone, 2020. *Vaccine: X*. 2023 Aug;14:100338.
 65. Young AM, Crosby RA, Jagger KS, Casquejo E, Pinote L, Ybañez P, et al. Influences on HPV vaccine acceptance among men in the Philippines. *Journal of Men's Health*. 2011 May;8(2):126-35.
 66. Babirye JN, Engebretsen IMS, Makumbi F, Fadnes LT, Wamani H, Tylleskar T, et al. Timeliness of childhood vaccinations in Kampala Uganda: a community-based cross-sectional study. *PLoS ONE*. 2012 Apr 23;7(4):e35432.
 67. Ports KA, Reddy DM, Rameshbabu A. Barriers and facilitators to HPV vaccination: perspectives from Malawian women. *Women Health*. 2013;53(6):630-45.
 68. Oluwadare C. The social determinants of routine immunisation in ekiti state of nigeria. *Studies on Ethno-Medicine*. 2009 Jan;3(1):49-56.
 69. Francis SA, Battle-Fisher M, Liverpool J, Hipple L, Mosavel M, Soogun S, et al. A qualitative analysis of South African women's knowledge, attitudes, and beliefs about HPV and cervical cancer prevention, vaccine awareness and acceptance, and maternal-child communication about sexual health. *Vaccine*. 2011 Nov 3;29(47):8760-5.
 70. Hanifi SMA, Ravn H, Aaby P, Bhuiya A. Where girls are less likely to be fully vaccinated than boys: Evidence from a rural area in Bangladesh. *Vaccine*. 2018 May 31;36(23):3323-30.
 71. Mabeya H, Odunga J, Broeck DV. Mothers of adolescent girls and Human Papilloma Virus (HPV) vaccination in Western Kenya. *Pan Afr Med J*. 2021 Feb 4;38:126.
 72. Krupp K, Marlow LAV, Kielmann K, Doddaiyah N, Mysore S, Reingold AL, et al. Factors associated with intention-to-recommend human papillomavirus vaccination among physicians in Mysore, India. *J Adolesc Health*. 2010 Apr;46(4):379-84.
 73. Malhotra C, Malhotra R, Østbye T, Subramanian SV. Maternal autonomy and child health care utilization in India: results from the National Family Health Survey. *Asia Pac J Public Health*. 2014 Jul;26(4):401-13.
 74. Agarwal S, Srivastava A. Social determinants of children's health in urban areas in India. *J Health Care Poor Underserved*. 2009;20(4 Suppl):68-89.
 75. Siddiqi DA, Iftikhar S, Siddique M, Mehmood M, Dharma VK, Shah MT, et al. Immunization Gender Inequity in Pakistan: An Analysis of 6.2 Million Children Born from 2019 to 2022 and Enrolled in the Sindh Electronic Immunization Registry. *Vaccines (Basel)*. 2023 Mar 17;11(3).
 76. Bhan N, McDougal L, Singh A, Atmavilas Y, Raj A. Access to women physicians and uptake of reproductive, maternal and child health services in India. *EclinicalMedicine*. 2020 Mar 5;20:100309.
 77. Kalbarczyk A, Closser S, Hirpa S, Cintyamena U, Azizatunnisa L, Agrawal P, et al. A light touch intervention with a heavy lift - gender, space and risk in a global vaccination programme. *Glob Public Health*. 2022 Dec;17(12):4087-100.
-

-
78. Ali HA, Hartner A-M, Echeverria-Londono S, Roth J, Li X, Abbas K, et al. Vaccine equity in low and middle income countries: a systematic review and meta-analysis. *Int J Equity Health*. 2022 Jun 11;21(1):82.
 79. Katz IT, Nkala B, Dietrich J, Wallace M, Bekker L-G, Pollenz K, et al. A qualitative analysis of factors influencing HPV vaccine uptake in Soweto, South Africa among adolescents and their caregivers. *PLoS ONE*. 2013 Aug 30;8(8):e72094.
 80. Watson-Jones D, Mugo N, Lees S, Mathai M, Vusha S, Ndirangu G, et al. Access and Attitudes to HPV Vaccination amongst Hard-To-Reach Populations in Kenya. *PLoS ONE*. 2015 Jun 26;10(6):e0123701.
 81. Feletto M, Sharkey A, Rowley E, Gurley N, Sinha A. A gender lens to advance equity in immunization. *ERG Discussion Paper 05*. 2018;
 82. Owusu-Addo E, Cross R. The impact of conditional cash transfers on child health in low- and middle-income countries: a systematic review. *Int J Public Health*. 2014 Aug;59(4):609-18.
 83. Duch R, Asiedu E, Nakamura R, Rouyard T, Mayol A, Barnett A, et al. Financial incentives for COVID-19 vaccines in a rural low-resource setting: a cluster-randomized trial. *Nat Med*. 2023 Dec;29(12):3193-202.
 84. Chandir S, Siddiqi DA, Abdullah S, Duflo E, Khan AJ, Glennerster R. Small mobile conditional cash transfers (mCCTs) of different amounts, schedules and design to improve routine childhood immunization coverage and timeliness of children aged 0-23 months in Pakistan: An open label multi-arm randomized controlled trial. *EClinicalMedicine*. 2022; 50, 101500.
 85. Uddin MJ, Larson CP, Oliveras E, Khan AI, Quaiyum MA, Saha NC. Child immunization coverage in urban slums of Bangladesh: impact of an intervention package. *Health Policy Plan*. 2010 Jan;25(1):50-60.
 86. Fotso JC, Higgins-Steele A, Mohanty S. Male engagement as a strategy to improve utilization and community-based delivery of maternal, newborn and child health services: evidence from an intervention in Odisha, India. *BMC Health Serv Res*. 2015 Jun 8;15 Suppl 1(Suppl 1):S5.
 87. Saggurti N, Atmavilas Y, Porwal A, Schooley J, Das R, Kande N, et al. Effect of health intervention integration within women's self-help groups on collectivization and healthy practices around reproductive, maternal, neonatal and child health in rural India. *PLoS ONE*. 2018 Aug 23;13(8):e0202562.
 88. Janssens W. Externalities in program evaluation: the impact of a women's empowerment program on immunization. *J Eur Econ Assoc*. 2011 Dec;9(6):1082-113.
 89. Nwakamma IJ, Erinmwinhe A, Ajogwu A, Udoh A, Ada-Ogoh A. Mitigating Gender and Maternal and Child Health Injustices through Faith Community-Led Initiatives. *Int J MCH AIDS*. 2019 Dec 6;8(2):146-55.
 90. Mudi H, Dutse U, Belaid L, Ansari U, Omer K, Gidado Y, et al. Impact of home visits to pregnant women and their spouses on gender norms and dynamics in Bauchi State, Nigeria: Narratives from visited men and women. *Glob Health Promot*. 2021 Sep;28(3):59-65.
 91. Moses E, Pedersen HN, Wagner EC, Sekikubo M, Money DM, Ogilvie GS, et al. Understanding men's perceptions of human papillomavirus and cervical cancer screening in kampala, uganda. *J Glob Oncol*. 2018;4:1-9.
 92. Horn S, Chapman GB, Chouhan K. Doctor recommendations and parents' HPV vaccination intentions in Kenya: A randomized survey. *Prev Med Rep*. 2022 Feb;25:101659.
 93. Obregón R, Chitnis K, Morry C, Feek W, Bates J, Galway M, et al. Achieving polio eradication: a review of health communication evidence and lessons learned in India and Pakistan. *Bull World Health Organ*. 2009 Aug;87(8):624-30.
 94. Corsi DJ, Bassani DG, Kumar R, et al. Gender inequity and age-appropriate immunization coverage in India from 1992 to 2006. *BMC Int Health Hum Rights*. 2009;9 Suppl 1(Suppl 1):S3. Published 2009 Oct 14. doi:10.1186/1472-698X-9-S1-S3
 95. Utazi CE, Pannell O, Aheto JMK, Wigley A, Tejedor-Garavito N, Wunderlich J, et al. Assessing the characteristics of un- and under-vaccinated children in low- and middle-income countries: A multi-level cross-sectional study. *PLOS Glob Public Health*. 2022; 2(4): e0000244.
 96. Banerjee AV, Duflo E, Glennerster R, Kothari D. Improving immunisation coverage in rural India: clustered randomised controlled evaluation of immunisation campaigns with and without incentives. *BMJ (Clinical research ed.)*. 2010; 340, c2220.
-