

Gender Dynamics and Vaccine Hesitancy: Investigating how Gender Roles and Dynamics affect Vaccine Decision-Making in Low-and-Middle-Income-Countries (LMICs) Households

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Abstract

This study seeks to investigate how gender roles, dynamics, and power relations influence vaccine decision-making and hesitancy in LMICs households. Using the PRISMA methodology, 39 studies were selected from an initial pool of 276 articles. The selection involved four stages: identification, screening, eligibility, and inclusion. These studies cover diverse regions, cultures, and socio-economic backgrounds, offering a comprehensive understanding of the issue. The analysis shows that gender roles significantly affect vaccine decision-making within households in LMICs. Women, who are often the primary caregivers, strongly advocate for vaccination but face significant barriers like limited decision-making power, restricted mobility, and financial constraints. Men, who usually have more decision-making authority, exhibit higher vaccine hesitancy, often influenced by misinformation and traditional beliefs. Common barriers include misinformation, distrust in healthcare systems, and limited access to vaccination services. Key factors contributing to vaccine hesitancy include misinformation, lack of awareness, religious and cultural beliefs, and healthcare access limitations. To tackle these challenges, the study suggests engaging community leaders and influencers, implementing targeted education and awareness campaigns, and developing policies that prioritize gender inclusion and equity in healthcare decision-making. The findings highlight the need to address gender-specific barriers to improve vaccine uptake in LMICs. Empowering women, engaging men, and improving healthcare access can boost vaccination rates and protect communities from vaccine-preventable diseases. Future research should explore the deeper reasons behind gender-specific vaccine hesitancy and consider the intersection of gender with other socio-economic factors for more effective interventions.

Keywords: Gender Roles, Gender Dynamics, Low-and-Middle-Income-Countries, Vaccine Hesitancy.

Introduction

Vaccine hesitancy is a significant obstacle to achieving high vaccination coverage and eliminating vaccine-preventable diseases in Low-and-Middle-Income Countries (LMICs). The World Health Organization (WHO) has identified vaccine hesitancy as one of the top ten threats to global health, highlighting the urgent need to address this issue [1].

In LMICs, gender dynamics play a crucial role in health decision-making within households, influencing attitudes and

behaviours towards vaccination. Traditional gender roles often place men in decision-making positions, while women take on the role of caregivers, responsible for the health and well-being of their families [2]. This division of roles can have significant implications for vaccination uptake, as men may have more control over healthcare decisions, including vaccination.

Research has shown that women's autonomy and decision-making power can have a positive impact on vaccination rates. A study conducted

in India found that women's autonomy was a significant predictor of vaccination uptake, with women who had more autonomy being more likely to vaccinate their children [3]. Similarly, a study in Nigeria found that women's decision-making power was a key factor in determining vaccination rates, with women who had more decision-making power being more likely to vaccinate their children [2].

Understanding the gender dynamics that play out in LMICs households is essential for developing effective public health strategies that can address vaccine hesitancy and improve vaccination rates. By recognizing the role of women in healthcare decision-making and empowering them to take on more decision-making roles, public health interventions can more effectively target the root causes of vaccine hesitancy and improve vaccination rates.

Furthermore, the Sustainable Development Goals (SDGs) aim to eliminate vaccine-preventable childhood diseases by 2030. However, if vaccine hesitancy is not addressed, this goal may not be realized in LMICs. Therefore, it is crucial to develop effective strategies that take into account the gender dynamics and power structures within households in LMICs.

Statement of the Research Problem

Despite the well-established importance of vaccines in preventing infectious diseases, vaccine hesitancy remains a persistent challenge in many LMICs. Vaccine hesitancy refers to the delay or refusal to accept vaccines, despite their availability and accessibility [1]. This phenomenon is particularly concerning in LMICs, where vaccine-preventable diseases continue to pose a significant threat to public health.

One critical factor that influences vaccine decision-making in LMICs households is gender roles and dynamics. The social, cultural, and economic contexts in which individuals live shape their perceptions, attitudes, and

behaviours towards vaccination [2]. However, the role of gender in vaccine decision-making remains poorly understood, particularly in LMICs.

Existing research has highlighted the importance of addressing gender-specific barriers and facilitators to vaccine acceptance [3]. However, a comprehensive understanding of how gender roles and dynamics influence vaccine hesitancy in LMICs households is lacking. This knowledge gap hinders the development of effective public health interventions that take into account the complex social and cultural contexts in which vaccine decisions are made.

To address this gap, this study aims to systematically review existing literature to understand how gender roles and dynamics influence vaccine hesitancy in LMICs households. By examining the current evidence, this research seeks to identify gender-specific barriers and facilitators to vaccine acceptance, providing actionable insights for public health interventions. Ultimately, this study aims to contribute to the development of more effective and targeted strategies to address vaccine hesitancy and improve vaccination rates in LMICs.

Aim and Objectives of the Study

The primary aim of this study is to explore the relationship between gender dynamics and vaccine hesitancy in LMICs. Specifically, this study seeks to investigate how gender roles, dynamics, and power relations influence vaccine decision-making and hesitancy in LMICs households.

The study aims to achieve the following specific objectives:

1. To examine the existing literature on gender dynamics and vaccine hesitancy in LMICs, identifying gaps and inconsistencies in current research.
2. To identify how gender roles and dynamics affect vaccine decision-making in LMICs households.

3. To identify the specific gender-related factors that contribute to vaccine hesitancy in LMICs households, including social, cultural, and economic factors.
4. To investigate how gender power dynamics and decision-making processes within households influence vaccine acceptance and hesitancy.
5. To provide recommendations for public health policymakers and practitioners on how to address gender-related barriers to vaccine acceptance and improve vaccination rates in LMICs.

By achieving these objectives, this study aims to contribute to a deeper understanding of the complex interplay between gender dynamics and vaccine hesitancy in LMICs, ultimately informing the development of more effective and targeted interventions to improve vaccination rates and reduce vaccine-preventable diseases in these settings.

Significance of the Study

This research is significant because it will provide valuable insights into the gender-specific factors that influence vaccine hesitancy in LMICs households. By examining the complex interplay between gender roles, dynamics, and vaccine decision-making, this study will contribute to a deeper understanding of the social and cultural factors that shape vaccine acceptance and coverage.

The findings of this research will have important implications for the development of targeted interventions aimed at enhancing vaccine acceptance and coverage in LMICs households. By identifying the specific gender-related factors that contribute to vaccine hesitancy, public health policymakers and practitioners can design more effective strategies to address these barriers and improve vaccination rates.

Moreover, this research will contribute to the elimination of vaccine-preventable diseases, which is a critical public health goal. By addressing the gender dynamics that influence

vaccine decision-making, public health strategies can be more effective in reaching underserved populations and ensuring equitable access to vaccines in LMICs households.

Ultimately, this study has the potential to inform the development of more effective and sustainable public health interventions that take into account the complex social and cultural contexts in which vaccine decisions are made. By shedding light on the gender-specific factors that shape vaccine hesitancy, this research can contribute to improved health outcomes, reduced health inequities, and enhanced well-being for individuals and communities in LMICs.

Literature Review

Vaccine hesitancy is a growing concern globally, and Low- and Middle-Income Countries (LMICs) are disproportionately affected. The WHO has identified vaccine hesitancy as one of the top ten threats to global health [1]. In LMICs, vaccine hesitancy is often exacerbated by factors such as limited access to healthcare, misinformation, and cultural beliefs [4].

Understanding the factors that contribute to vaccine hesitancy is crucial for developing effective strategies to address this issue. Research has shown that vaccine hesitancy is influenced by a complex interplay of factors, including individual, social, and environmental factors [5].

In LMICs, gender dynamics play a significant role in shaping vaccine hesitancy. Women often bear the primary responsibility for childcare and healthcare decision-making, yet they may face barriers to accessing vaccination services [2]. Furthermore, traditional gender roles and power dynamics can influence vaccine decision-making, with men often holding more decision-making power [3].

This chapter provides an overview of the literature on vaccine hesitancy, with a focus on the social and cultural factors that contribute to

this phenomenon in LMICs. The chapter also explores the role of gender dynamics in shaping vaccine hesitancy, highlighting the need for a more nuanced understanding of the complex factors that influence vaccine decision-making.

Overview of Vaccine Hesitancy

Vaccine hesitancy is a complex and multifaceted issue that refers to the delay or refusal of vaccine acceptance, despite the availability of vaccination services [5]. This phenomenon is not limited to specific countries or regions, but rather is a global concern that affects both developed and developing countries [1].

One of the primary factors contributing to vaccine hesitancy is complacency [5]. Complacency occurs when individuals or communities perceive the risk of vaccine-preventable diseases as low, and therefore, do not see the need to vaccinate. This perception can be fuelled by the success of vaccination programs in reducing the incidence of vaccine-preventable diseases, leading to a false sense of security [4].

Convenience is another factor that influences vaccine hesitancy [5]. Convenience refers to the ease with which individuals can access vaccination services. In some cases, vaccination services may not be readily available or accessible, leading to delays or refusals of vaccine acceptance.

Confidence in vaccines and vaccination programs is also a critical factor in vaccine hesitancy [5]. Confidence refers to the trust that individuals have in the safety and effectiveness of vaccines, as well as the competence of healthcare providers. When confidence is low, individuals may be more likely to delay or refuse vaccine acceptance.

Socio-cultural factors also play a significant role in vaccine hesitancy [4]. Socio-cultural factors refer to the social and cultural norms, values, and beliefs that influence individual behaviours. In some communities, socio-cultural factors may lead to misconceptions or

misunderstandings about vaccines, contributing to vaccine hesitancy. In LMICs, additional challenges such as limited access to healthcare, misinformation, and cultural beliefs exacerbate vaccine hesitancy [4]. Limited access to healthcare can lead to delays or refusals of vaccine acceptance, while misinformation and cultural beliefs can fuel misconceptions and misunderstandings about vaccines.

Country-specific examples illustrate the diverse factors driving vaccine hesitancy. In Nigeria, misinformation and mistrust in government and international health organizations have fuelled resistance to vaccination campaigns [6]. In Kenya, socio-cultural and economic factors, such as concerns about vaccine safety and side effects, as well as economic barriers, play a significant role [7]. In India, misinformation and lack of community engagement contribute to vaccine hesitancy, while educational interventions and community engagement have proven effective in increasing vaccine acceptance [8].

To address vaccine hesitancy, a comprehensive approach is necessary, incorporating community engagement, education, healthcare infrastructure improvements, and supportive policy interventions [4]. Community engagement and education can help to address misconceptions and misunderstandings about vaccines, while healthcare infrastructure improvements can increase access to vaccination services. Supportive policy interventions can also help to address economic and socio-cultural barriers to vaccine acceptance.

Gender Differences in Vaccine Hesitancy

Numerous studies have highlighted the significant gender disparities in vaccine hesitancy in LMICs. A systematic review conducted revealed that women were 3% less likely to be fully vaccinated compared to men [9]. This review also emphasized that children of mothers without formal education were significantly less likely to be fully vaccinated

than those whose mothers had at least primary education. These findings underscore the importance of education in influencing vaccine acceptance and uptake.

Another study on COVID-19 vaccines identified significant gaps in sex- and gender-specific data, highlighting the need for more gender-sensitive research in vaccine studies. This study emphasized that understanding the gender dimensions of vaccine hesitancy is crucial for developing effective interventions [10]. In Nigeria, research on vaccine hesitancy among pregnant women found that fear of side effects, distrust in the healthcare system and misinformation were major contributors to vaccine hesitancy [11]. The study also noted that women who received vaccine information from healthcare providers were more likely to accept vaccination, underscoring the crucial role of healthcare provider communication in addressing vaccine hesitancy.

A complex interplay of socio-cultural, economic, and educational factors shapes gender differences in vaccine hesitancy in LMICs. These factors may include limited access to education and healthcare, cultural and social norms that restrict women's autonomy and economic barriers that prevent women from accessing vaccination services. Tackling these differences requires targeted interventions that address the specific barriers faced by women.

Ongoing research and data collection on gender differences in vaccine hesitancy are vital for developing effective interventions and achieving global vaccination goals. Policymakers and healthcare providers can design and implement more effective strategies to address vaccine hesitancy and improve vaccination rates in LMICs by understanding the gender dimensions of vaccine hesitancy.

Gender Roles and Health Decision-Making

Gender roles play a significant role in shaping health behaviours and decision-making,

particularly in LMICs. In many of these countries, traditional gender roles often place men in decision-making positions, while women are primarily responsible for childcare and healthcare². This dynamic can have a profound impact on vaccine uptake, as women may face obstacles such as limited autonomy, restricted access to information, and lack of control over household resources.

Research has consistently shown that empowering women and involving them in health decision-making can lead to better health outcomes for children [12]. However, in many LMICs, patriarchal structures prevail, with men typically holding the power to make major household decisions, including those related to health. This can severely restrict women's ability to make health-related decisions for themselves and their children.

For instance, in some cultures, women may require permission from their husbands or male family members to seek healthcare services, including vaccinations [2]. This dependency can lead to delayed or prevented timely vaccination, increasing the risk of vaccine-preventable diseases. Furthermore, women's limited access to education, information, and economic resources can exacerbate these challenges, making it even more difficult for them to make informed decisions about vaccination.

The impact of gender roles on health decision-making is further complicated by the fact that women are often the primary caregivers for children. As a result, they may be more likely to prioritize their children's health needs over their own, potentially compromising their own health and well-being [2].

Access to Information

Access to accurate and reliable health information is a critical component of making informed decisions about vaccination. However, women in LMICs often face significant barriers to accessing health

information, exacerbating the existing health disparities.

One of the primary factors contributing to the information gap is the lower literacy rates among women in LMICs. Limited educational opportunities and restricted access to education can hinder women's ability to read and understand health information, making it difficult for them to make informed decisions about vaccination [12].

Furthermore, women's restricted mobility and limited access to media can prevent them from attending health education sessions or accessing information through various channels. In many LMICs, women's mobility is restricted due to cultural and social norms, making it difficult for them to access health facilities or attend health education sessions [2].

Health communication strategies also play a crucial role in bridging the information gap. However, these strategies may not always be designed to effectively reach women, further widening the information gap. For instance, health messages may be disseminated through channels that are not accessible to women, such as radio or television programs that are primarily targeted towards men [12].

Socio-Cultural Norms

Socio-cultural norms play a profound role in shaping health behaviours and decision-making in LMICs. Traditional gender roles, in particular, exert a significant influence on health-seeking behaviours and attitudes towards vaccination.

In many LMICs, traditional gender roles dictate that women are responsible for child-rearing and household duties, while men are the primary breadwinners and decision-makers [2]. These norms can perpetuate a cycle of limited autonomy and decision-making power for women, affecting their ability to make informed decisions about vaccination.

Moreover, socio-cultural norms can also influence attitudes towards vaccination. For example, in some communities, there may be a

prevailing belief that vaccines are unnecessary or harmful [2]. Male decision-makers, who often hold more power and influence in the household, can reinforce these beliefs, affecting the entire household's vaccination status.

Additionally, socio-cultural norms can also affect the way health information is disseminated and received within households. For instance, in some cultures, men may be more likely to receive and share health information, while women may have limited access to such information [12].

Barriers to Healthcare Access

Women in LMICs often face numerous barriers to accessing healthcare services, including vaccination. These barriers can be economic, logistical, or social, and can significantly affect women's ability to access timely and quality healthcare.

Economic barriers, such as the cost of transportation to health facilities, can be a significant obstacle for women in LMICs. Many women may not have the financial resources to travel to distant health facilities, or may have to prioritize other household expenses over healthcare [12].

Logistical barriers, such as the distance to the nearest clinic, can also hinder women's access to healthcare. In many rural areas, health facilities may be far away, and women may have to travel long distances to access care. This can be particularly challenging for women with limited mobility or those who have to care for young children [2].

Women's responsibilities at home can also limit their time to seek healthcare. Many women in LMICs have multiple responsibilities, including childcare, household chores, and income-generating activities. This can leave them with limited time to seek healthcare, and may lead to delayed or foregone care [12].

Furthermore, healthcare facilities in LMICs may not always be women-friendly. For example, facilities may lack female healthcare providers or may not have appropriate facilities

for women and children. This can deter women from seeking care, particularly if they have had negative experiences in the past [2].

Empowering Women in Health Decision-Making

Empowering women and involving them in health decision-making is a critical strategy for improving health outcomes for themselves and their children. Research has consistently shown that when women have greater autonomy and access to resources, they are more likely to seek healthcare services, including vaccinations [12].

Educational programs that target women and provide them with information about the benefits of vaccination can be an effective way to increase vaccine uptake. For example, a study in Tanzania found that women who received education on vaccination were more likely to have their children vaccinated [2]. Similarly, a study in India found that women's participation in community health initiatives was associated with increased vaccine coverage [3].

Involving women in community health initiatives and decision-making processes can also help address barriers to vaccination and improve overall health outcomes. For instance, women can provide valuable insights into the social and cultural factors that influence vaccine acceptance and uptake in their communities [12]. By engaging women in the planning and implementation of vaccination programs, healthcare providers can develop more effective and culturally sensitive strategies to promote vaccine acceptance and uptake.

Moreover, empowering women in health decision-making can have broader benefits for their families and communities. When women have greater control over household resources and decision-making, they are more likely to invest in their children's health and education, leading to improved health outcomes and socioeconomic development [2].

In conclusion, empowering women and involving them in health decision-making is a critical strategy for improving health outcomes, including vaccine uptake. By providing women with education, resources, and opportunities for participation in community health initiatives, healthcare providers can promote vaccine acceptance and uptake, and ultimately improve the health and well-being of women, children, and communities.

Socio-Cultural Influences

Socio-cultural factors play a significant role in shaping vaccine uptake in LMICs. In many of these countries, traditional gender roles often position men as the primary decision-makers in households, which can have a profound impact on vaccine uptake [13]. Men's beliefs and knowledge about vaccination can influence their decisions regarding vaccine uptake, and in some cases, may lead them to prioritize or deprioritize vaccination. For example, if men believe that vaccines are unnecessary or harmful, they may be less likely to vaccinate their children or themselves [13].

Women's limited autonomy and mobility can also hinder their ability to access vaccination services. In some cultures, women may require permission from their husbands or male family members to seek healthcare services, including vaccination [13]. This can lead to delayed or foregone vaccination, exacerbating health disparities. Cultural beliefs and misinformation about vaccines also play a significant role in shaping attitudes towards vaccination. For instance, some communities may believe that vaccines are incompatible with their cultural or religious beliefs, leading to vaccine hesitancy [5]. Misinformation about vaccine safety and efficacy can also spread quickly through social networks, further fuelling vaccine hesitancy.

Gender Roles and Decision-Making

In many LMICs, traditional gender roles assign men the responsibility of making major household decisions, including those related to

health. This can lead to a situation where men's perceptions and beliefs about vaccines heavily influence whether women and children receive vaccinations [13].

Men's decision-making power can have a significant impact on vaccine uptake, particularly if they hold misconceptions about vaccine safety or efficacy. For instance, if men believe that vaccines are unnecessary or harmful, they may decide against vaccinating their family members, regardless of the women's views [13]. This can result in low vaccine uptake and increased risk of vaccine-preventable diseases.

The dynamic between men's decision-making power and vaccine uptake underscores the importance of engaging men in health education and vaccination campaigns. By providing men with accurate information about vaccines and the benefits of vaccination, healthcare providers can help to address misconceptions and promote positive attitudes towards vaccination [13].

Women's Autonomy and Mobility

Women's limited autonomy and mobility in many LMICs pose significant barriers to vaccine uptake. In some cultures, women may require permission from their husbands or male relatives to leave the house or seek healthcare services, including vaccination [13]. This restriction can delay or prevent women from accessing vaccination services for themselves and their children.

Furthermore, women's responsibilities for household chores and childcare can limit their time and ability to travel to vaccination centers, especially if these centers are far from their homes. In many LMICs, women are expected to prioritize their domestic duties over their own healthcare needs, making it challenging for them to access vaccination services [13].

Cultural beliefs and misinformation about vaccines are significant barriers to vaccination in many LMICs. In some communities, traditional beliefs and practices may conflict

with modern medical practices, leading to skepticism about vaccines [5].

Traditional cultural beliefs can influence attitudes towards vaccination in several ways. For example:

1. Beliefs about natural vs. unnatural practices: Some communities may believe that vaccines are unnatural or interfere with traditional healing practices, leading to skepticism about their effectiveness or safety.
2. Beliefs about spiritual or supernatural causes of illness: In some cultures, illnesses may be attributed to spiritual or supernatural causes, rather than biological or environmental factors. This can lead to a lack of faith in vaccines as a means of preventing illness.
3. Beliefs about the role of traditional healers: In some communities, traditional healers may be seen as the primary providers of healthcare, and vaccines may be viewed as a Western or modern practice that is not compatible with traditional healing practices.

Misinformation about vaccines can also spread quickly and deter people from being vaccinated. Examples of misinformation include:

1. Rumours that vaccines cause infertility or contain harmful substances.
2. Claims that vaccines are not effective or are unnecessary.
3. Misconceptions about the safety and side effects of vaccines.

Economic Factors

Economic constraints are a significant barrier to vaccination in LMICs. These constraints are often exacerbated by gender dynamics, further complicating vaccine uptake. Women, who frequently have less financial independence, may struggle to afford vaccines or take time off work to be vaccinated [14].

The economic dependency of women on male household members can limit their ability

to make autonomous health decisions, including those related to vaccination. This can result in delayed or foregone vaccination, exacerbating health disparities [14].

In addition to individual-level economic constraints, broader socioeconomic inequalities can also affect vaccine impact and vaccination dropout rates. Inequalities in wealth, education, and geographic access can lead to disparities in vaccine uptake and effectiveness [9].

For instance:

1. **Wealth inequalities:** Households with lower incomes may struggle to afford vaccines or transportation to vaccination centers.
2. **Education inequalities:** Individuals with lower levels of education may be less aware of the benefits of vaccination or may be more susceptible to misinformation.
3. **Geographic inequalities:** Individuals living in rural or hard-to-reach areas may have limited access to vaccination centers or healthcare services.

Financial Independence and Autonomy

In many LMICs, women's limited financial independence is a significant barrier to vaccination. Socio-cultural norms that prioritize male control over household finances perpetuate women's economic dependency, restricting their ability to make health-related decisions, including those about vaccination [14].

The economic dependency of women on male household members can have several consequences for vaccination:

1. **Delayed or prevented vaccination:** Women may need to seek permission or financial support from their husbands or male family members to access vaccination services. If the male decision-makers do not prioritize vaccination, women may be unable to access vaccines, leading to delayed or foregone vaccination.
2. **Limited access to healthcare:** Women's economic dependency can limit their

access to healthcare services, including vaccination. Women may be unable to afford transportation to vaccination centers or pay for vaccines, leading to reduced vaccine uptake.

3. **Reduced autonomy:** Women's economic dependency can reduce their autonomy and decision-making power, making it difficult for them to prioritize their own health needs, including vaccination.

Employment and Economic Barriers

Women in LMICs often face significant employment and economic barriers that hinder their access to vaccination services. Many women in LMICs are employed in informal sectors, such as domestic work, agriculture, or small-scale entrepreneurship, which offer little job security and no paid leave [9].

The lack of economic stability and job security means that taking time off work to be vaccinated or to take their children for vaccinations can result in lost income, which many families cannot afford. This economic barrier is particularly pronounced in single-parent households or in families where the woman is the primary breadwinner. The informal nature of women's employment in LMICs also means that they may not have the flexibility to attend vaccination appointments during working hours. Vaccination centers may only be open during working hours, making it difficult for women to access vaccination services without taking time off work.

Furthermore, the economic barriers faced by women in LMICs can have long-term consequences for their health and well-being. For example:

1. **Delayed or foregone vaccination:** Women may delay or forego vaccination due to the economic costs of taking time off work, leading to reduced vaccine uptake and increased risk of vaccine-preventable diseases.
2. **Reduced economic productivity:** The economic barriers faced by women in

LMICs can reduce their economic productivity and earning potential, perpetuating poverty and inequality.

3. Increased healthcare costs: Delayed or foregone vaccination can lead to increased healthcare costs in the end, as vaccine-preventable diseases can result in costly medical treatments and hospitalizations.

Gender Inequality in Wealth and Education

Gender inequality in wealth and education is a significant factor contributing to vaccine hesitancy in LMICs. Women in LMICs often have lower levels of education compared to men, which can limit their understanding of the benefits of vaccination and increase their susceptibility to misinformation [9].

Educational disparities can have far-reaching consequences for women's health, including:

1. Limited health literacy: Women with lower levels of education may have limited understanding of health-related information, including the benefits and risks of vaccination.
2. Increased susceptibility to misinformation: Women with lower levels of education may be more likely to believe misinformation about vaccines, which can lead to vaccine hesitancy.
3. Reduced ability to advocate for health needs: Educational disparities can affect women's ability to advocate for their health needs within the household, making it more challenging to prioritize vaccination.

Wealth inequality further compounds these issues, as families with limited financial resources may prioritize immediate survival needs over preventive healthcare measures like vaccination. This can lead to:

1. Delayed or foregone vaccination: Families with limited financial resources may delay or forego vaccination due to the perceived cost of vaccination or the opportunity cost of taking time off work.

2. Reduced access to healthcare: Wealth inequality can reduce access to healthcare services, including vaccination, for families with limited financial resources.

3. Increased health disparities: Wealth inequality can exacerbate existing health disparities, as families with limited financial resources may be more likely to experience poor health outcomes due to delayed or foregone vaccination.

Geographic Access and Mobility

Geographic access to vaccination services is a critical factor that is often influenced by gender dynamics, particularly in LMICs. In many LMICs, healthcare facilities, including vaccination centers, are often located far from rural or underserved communities, requiring significant travel time and resources [9].

Women, particularly those with young children, may face unique mobility challenges that prevent them from accessing vaccination services. These challenges include:

1. Lack of transportation: Women may not have access to reliable transportation, making it difficult for them to travel to vaccination centers.
2. Cultural restrictions on movement: In some cultures, women's movement may be restricted, making it difficult for them to travel to vaccination centers without accompaniment or permission.
3. Childcare responsibilities: Women may be responsible for childcare, making it difficult for them to leave their children to travel to vaccination centers.
4. Physical barriers: Women may face physical barriers, such as lack of roads or public transportation that make it difficult to access vaccination centers.
5. These barriers can have significant consequences, including:
6. Lower vaccination rates: Women and children in areas with limited geographic access to vaccination services may have

lower vaccination rates, increasing their risk of vaccine-preventable diseases.

7. Increased risk of vaccine-preventable diseases: Women and children who are not vaccinated are at increased risk of contracting vaccine-preventable diseases, which can have serious health consequences.
8. Perpetuation of health disparities: Limited geographic access to vaccination services can perpetuate existing health disparities, particularly in rural or underserved areas.

Health Systems Barriers

Health systems in LMICs often lack gender-sensitive approaches to vaccination. This includes inadequate communication strategies that fail to address the specific concerns of women and marginalized groups. Additionally, the lack of female healthcare workers in some regions can discourage women from seeking vaccination due to cultural norms around gender interactions [13]. Barriers such as travel time, cost, and safety concerns also limit access to vaccination [9].

Inadequate Communication Strategies

Effective communication is crucial for addressing vaccine hesitancy, yet many health systems in LMICs do not tailor their communication strategies to the specific needs and concerns of women. Women often have different health information needs compared to men, influenced by their roles as primary caregivers and their unique health concerns. However, health communication campaigns frequently use a one-size-fits-all approach, which can fail to resonate with women or address their specific fears and misconceptions about vaccines. For example, women may have concerns about vaccine safety during pregnancy or breastfeeding, which need to be addressed through targeted messaging [13].

Lack of Female Healthcare Workers

The presence of female healthcare workers can significantly influence women's

willingness to seek vaccination. In many cultures, women prefer to receive healthcare from female providers due to cultural norms around gender interactions. However, in some LMICs, there is a shortage of female healthcare workers, which can discourage women from accessing vaccination services. This barrier is particularly pronounced in conservative societies where interactions between men and women are restricted. Increasing the number of female healthcare workers and ensuring they are available in vaccination programs can help overcome this barrier [9].

Travel Time and Cost

Geographic barriers, such as long travel times and high transportation costs, can significantly limit access to vaccination services, especially for women. Women in rural or remote areas may need to travel long distances to reach healthcare facilities, which can be time-consuming and expensive. This is particularly challenging for women who have limited financial resources or who are responsible for childcare and household duties. Additionally, safety concerns related to traveling alone or with young children can further deter women from seeking vaccination [9].

Safety Concerns

Safety concerns, both real and perceived, can also affect women's willingness to seek vaccination. In some regions, healthcare facilities may be located in areas that are perceived as unsafe, particularly for women traveling alone. Additionally, the quality of healthcare services, including the cleanliness and safety of vaccination sites, can influence women's decisions to be vaccinated. Ensuring that vaccination sites are safe, clean, and welcoming can help address these concerns and encourage more women to seek vaccination [13].

Gaps in the Literature

Despite extensive research on vaccine hesitancy, there is a notable lack of studies focusing on the influence of gender dynamics in LMICs. This study aims to address this gap by systematically reviewing literature to understand gender-specific factors affecting vaccine decision-making. By concentrating on gender dynamics, this research will offer a nuanced understanding of the barriers to vaccine acceptance and help develop targeted interventions.

Methodology

This study will use a systematic literature review to identify and synthesize existing research on gender dynamics and vaccine hesitancy in LMICs, following the PRISMA guidelines [15]. A systematic review is a rigorous method for identifying, evaluating, and synthesizing the findings of all relevant individual studies on a specific topic, ensuring a comprehensive understanding of the research area.

Study Population and Sampling

The review will focus on studies conducted in LMICs, as defined by the World Bank. Inclusion criteria will encompass peer-reviewed articles, reports, and grey literature published in English and in the last 20 years. Studies will be selected based on their relevance to the research questions and objectives.

There is no specific formula for calculating sample size for research studies using the PRISMA methodology. However, defining the objectives/research questions of the study, significance level, standard deviation, effect size, power level and pilot studies reviewed during literature review, it is possible to determine an appropriate sample size.

Therefore, given the following values:

n_{pilot} = sample size of pilot studies reviewed in the literature = 21

α = Confidence level of 90%

σ = Standard deviation of 10%

z-score value of confidence level of 90% = 1.6 [4]5

E = Margin of Error = $\sigma/\sqrt{n_{\text{pilot}}}$

n = Required sample size

Calculating Margin of error (E) by substituting the given values in the formula

E = Margin of Error = $\sigma/\sqrt{n_{\text{pilot}}}$

$E=10/\sqrt{21}=2.18$

Calculating the required sample size by substituting in the formula:

$n = (Z.\sigma/E)^2$

Substituting the given values in the above formula

$n = (Z.\sigma/E)^2 = (1.6 [4]5 \times 10)/2.18)^2 = 56.82$

rounding up to the nearest whole number

$n = 57$

Study Protocols and Guidelines

The systematic review will adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and reproducibility in the reporting of the review process and findings [15].

Systematic Database Search

The systematic database search will be conducted using major academic databases such as PubMed/MEDLINE, Scopus, Web of Science, EMBASE, CINAHL, and Google Scholar. These databases have been selected for their comprehensive coverage of health-related research and their inclusion of studies from LMICs. The search strategy will adhere to the PRISMA guidelines for systematic reviews [16]. The search process will involve identifying relevant studies, screening titles and abstracts, and reviewing full texts to determine eligibility.

The Search Terms

The search terms will be structured using Boolean operators to combine primary concepts related to gender dynamics, vaccine hesitancy, and LMICs. Key search terms will include variations of “gender roles,” “vaccine

hesitancy,” “decision-making,” “LMICs,” and specific country names. These terms will be combined systematically to ensure comprehensive coverage while maintaining relevance to the research objectives.

The Search Process

The search process will be managed using reference management software such as Mendeley or Zotero, with a systematic coding system for documents and detailed search logs. This ensures efficient organization and retrieval of identified literature.

Inclusion Criteria

The inclusion criteria will encompass all studies published in the past 20 years to ensure currency while capturing the evolution of gender dynamics and vaccine hesitancy in LMICs. Publications in English will be included to reflect the major language of scientific communication. The review will include peer-reviewed articles, systematic reviews, meta-analyses, program evaluations, policy documents, and government reports to provide a comprehensive understanding of the topic.

Exclusion Criteria

The systematic review will implement specific exclusion criteria to maintain focus and ensure the quality of included evidence. Studies that exclusively examine high-income countries will be excluded, as they do not align with the review’s focus on LMICs. Publications dated before 2005 will not be included to ensure currency and relevance of findings. Opinion pieces that lack empirical evidence will be excluded to maintain the scientific rigor of the analysis. In addition, conference abstracts without accompanying full papers will be omitted from the review, as they typically lack the detailed methodology and comprehensive results necessary for thorough analysis.

Data Extraction

The data extraction and analysis process for the systematic review will begin with the development of a comprehensive data extraction template, capturing study characteristics, methodological features, key findings, gender dynamics, vaccine hesitancy factors, and reported outcomes. This structured approach ensures consistent and comprehensive data collection across all included studies. The extraction template will be piloted on a sample of studies to ensure consistency and accuracy. Two reviewers will independently extract data to minimise bias, and discrepancies will be resolved through discussion or consultation with a third reviewer.

Quality Assessment

Quality assessment will be conducted using standardized tools such as the Critical Appraisal Skills Programme (CASP) checklists and the Joanna Briggs Institute (JBI) critical appraisal tools. These tools will help evaluate the methodological quality and relevance of the included studies, ensuring the reliability and validity of the review findings.

Analytical Framework

The analytical framework will involve thematic synthesis to identify common themes and patterns across the included studies. This will be complemented by a narrative synthesis to provide a detailed account of the findings, highlighting the gender dynamics, vaccine hesitancy factors, and decision-making processes in LMIC households.

Data Management and Analysis

The systematic review will employ a range of data management and analysis tools to ensure efficient handling and rigorous analysis of the collected data. Reference management software such as EndNote, Zotero, or Mendeley will be utilized to organise and manage citations effectively. The analysis methods will include content analysis of policy documents to

extract relevant information, comparative analysis of gender dynamics to evaluate different approaches, gap analysis of vaccine hesitancy factors to identify areas needing improvement, and best practice synthesis to highlight effective strategies and lessons learned. This comprehensive approach ensures a thorough and systematic analysis of the data, supporting the objectives of the review.

Thematic analysis will be employed to identify common themes and patterns across studies¹⁷. This method involves coding the data, identifying themes, and interpreting the findings in the context of the research questions. The analysis will focus on understanding how gender roles and dynamics influence vaccine decision-making and identifying barriers and facilitators to vaccine acceptance.

Ethical Considerations

Ethical considerations in research are crucial to ensure the dignity, rights, safety, and well-being of participants. Below are some key areas considered in this research study.

Ethical Approval

Since this study involves secondary data analysis, ethical approval is not required. However, the review will adhere to ethical guidelines for conducting and reporting systematic reviews, ensuring transparency and rigor. The study will follow the PRISMA guidelines to ensure a systematic and unbiased approach to data collection and analysis.

Research Integrity

Ensuring the integrity of the research is crucial. The research study will prioritised accurate representation of secondary data sources and systematic documentation. In addition, the research study will implement proper data storage and security measures. Transparency in research processes will be maintained through clear documentation, making all methodological decisions explicit and open to scrutiny.

Data Quality and Management

To ensure that data quality and management remain a critical aspect of the research study, it will involve the use of standardised quality assessment tools and adherence to established systematic review guidelines. Proper citation and attribution of sources will be ensured, with secure storage of research materials and appropriate protection of sensitive information. This approach will guarantee the reliability and validity of the research findings.

Quality Assurance

Quality assurance (QA) is a critical component in the execution of research studies, ensuring the reliability and validity of the findings. This section examines the various aspects of QA implemented in this research study.

Methodological Rigor

Methodological rigor will be maintained using standardised quality assessment tools and adherence to systematic review guidelines. This ensures the reliability and validity of the research findings.

Bias Management

The recognition and declaration of potential biases, as well as the implementation of strategies to minimise bias, are considered. The source materials used will be critically evaluated, and there will be a balanced representation of evidence.

Institutional Requirements

This research will comply with institutional research policies and integrity guidelines. The research ethics protocols will be followed, and regular reporting to supervisors will be maintained. Data protection regulations will be adhered to, securing the storage of research materials and handling sensitive information appropriately.

Professional Ethics

Professional ethics demand an unwavering commitment to scientific integrity and collaborative responsibility. This encompasses maintaining rigorous research standards through scientific objectivity and quality assurance while fostering respectful collaborative relationships with stakeholders. Key elements include adherence to established research protocols, transparent documentation, fair attribution of contributions, and clear communication with all parties involved. These ethical principles serve as the cornerstone for conducting credible research that advances knowledge and upholds the highest standards of professional conduct in the academic community.

Interpretation of Results

The results will be interpreted in the context of existing literature on vaccine hesitancy and gender dynamics. The study will discuss how gender roles influence health behaviours and decision-making processes, and the implications for public health interventions. The findings will be compared with previous studies to identify similarities and differences, and to understand the broader implications for public health.

Societal Implications

The societal relevance of this research lies in its potential to inform policy and practice in addressing vaccine hesitancy in LMICs. By identifying the gender dynamics that influence vaccine decision-making, the findings can help develop targeted interventions to improve vaccine uptake and health outcomes in these settings.

Scientific Implications

The scientific relevance of this research is rooted in its contribution to the evidence base on gender dynamics and vaccine hesitancy. The systematic review will provide a comprehensive synthesis of the existing

literature, identifying gaps in knowledge and areas for future research. This will advance the understanding of how gender roles and dynamics affect vaccine decision-making in LMIC households and inform the development of more effective health interventions.

Policy Implications

The findings will inform the development of gender-sensitive policies and programs to reduce vaccine hesitancy in LMICs. Recommendations will include strategies to empower women, improve access to information, and engage men in vaccination efforts. For example, involving men in health education programs and promoting shared decision-making within households may enhance vaccine uptake.

Limitations of the Study

Potential limitations include the reliance on published literature, which may introduce publication bias, and the exclusion of non-English studies. These limitations will be acknowledged and addressed in the discussion. The study will also consider the potential impact of cultural differences and socioeconomic factors on the generalizability of the findings.

Results, Findings, and Discussion

Results

This section presents the results of the study, providing a detailed analysis of the data collected. The results are organised to address the primary research questions and objectives, highlighting significant trends, patterns, and correlations. The following subsections will delve into specific aspects of the results, offering a comprehensive understanding of the study's outcomes.

Study Selection

The study selection process was meticulous and systematic, adhering to the PRISMA methodology [16]. From an initial pool of 276

articles identified through database searches, registers, websites, citations, 39 studies met the inclusion criteria and were selected for in-depth review. The selection process involved four key stages:

1. Identification,
2. Screening,
3. Eligibility, and
4. Inclusion.

In the identification stage, all potentially relevant studies were collected based on predefined search terms related to vaccine hesitancy and gender dynamic in LMICs. During the screening stage, titles and abstracts were reviewed to exclude studies that did not meet the inclusion criteria. The eligibility stage involved a thorough examination of the full texts of the remaining studies to ensure they aligned with the research objectives. Finally, in the inclusion stage, studies that met all criteria were selected for detailed analysis. The selected studies spanned 15 LMICs, providing a diverse and comprehensive understanding of the research topic.

Study Characteristics

The 39 selected studies varied in their research design, including cross-sectional surveys, qualitative interviews, and mixed-methods research. Most of these studies focused on childhood vaccination, maternal influence, and household decision-making processes¹⁸. The geographical distribution of the studies was extensive, covering regions in

Africa, Asia, and Latin America. This diversity allowed for a rich analysis of gender dynamics and vaccine hesitancy across different cultural contexts and socio-economic backgrounds. Key variables extracted from these studies included gender roles, vaccine hesitancy rates, reasons for hesitancy, and decision-making authority within households. These variables provided a comprehensive dataset for understanding the multifaceted nature of vaccine hesitancy in LMICs.

Data Extraction and Synthesis

Data extraction was conducted using a structured approach to capture relevant information on gender dynamics and vaccine hesitancy. A data extraction template was developed to ensure consistency and comprehensiveness in capturing study characteristics, methodological features, key findings, and contextual factors. Thematic synthesis was employed to identify common themes and patterns across the studies, focusing on how gender roles and dynamics influence vaccine decision-making. Narrative synthesis complemented this approach by providing a detailed account of the findings, highlighting specific examples and contextual insights. This combination of thematic and narrative synthesis facilitated a comprehensive and detailed analysis of the findings, allowing for a nuanced understanding of the factors influencing vaccine decision-making in LMIC households.

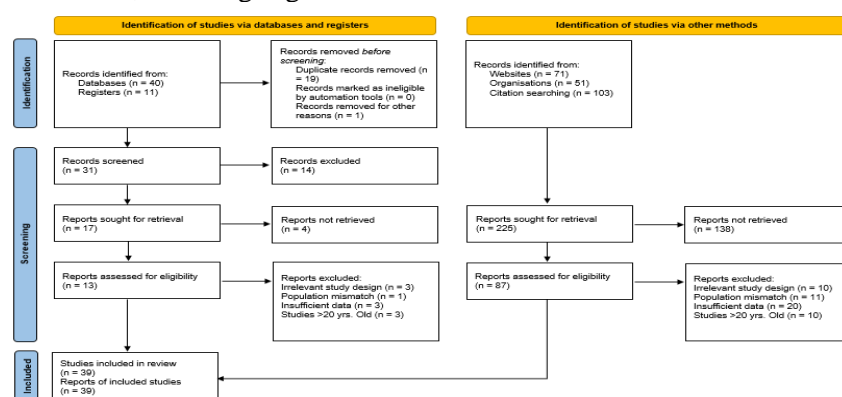


Figure 1. PRISMA 2020 Flow Diagram for New Systematic Reviews, which included Searches of Databases, Registers and Other Sources [15].

Findings

This section presents the key findings from the research study, highlighting the critical insights and trends identified through our analysis. The findings are organised to provide a comprehensive understanding of the data, addressing the primary research questions and objectives.

Gender Roles and Decision-Making

This subsection explores the impact of gender roles on decision-making processes related to vaccination. Gender dynamics within households and communities significantly influence health-related decisions, including the acceptance and uptake of vaccines. Key findings in this area include:

Cultural Norms and Decision-Making Power

The analysis revealed that gender roles significantly affect vaccine decision-making within households in LMICs. Women often serve as primary caregivers and strong advocates for vaccination, while men hold more decision-making power and exhibit higher levels of vaccine hesitancy [19]. Cultural norms in many LMICs dictate male dominance in household decisions, which can lead to lower vaccination rates when men are hesitant. These traditional gender roles often place women in supportive and nurturing roles, limiting their autonomy and ability to make independent healthcare decisions. As primary caregivers, women are responsible for the health and well-being of their families, yet their limited decision-making power hampers their ability to ensure timely vaccination. The entrenched cultural expectations often dictate that men, as heads of households, have the final say in health-related matters. This male dominance in decision-making can be detrimental, especially when men harbour skepticism or misconceptions about vaccines.

Women's Influence in Healthcare Decisions

Despite having limited decision-making power, women play a crucial role in advocating for vaccination and seeking health information for their families. The studies indicate that women's influence is often exercised through informal channels, such as maternal networks, community groups, and peer interactions, which can positively affect vaccination uptake [20]. Women's advocacy for vaccination is often driven by their role as primary caregivers and their desire to protect their children's health. They actively seek information from healthcare providers, community health workers, and other mothers to make informed decisions about vaccination. Women's networks serve as vital platforms for sharing experiences and knowledge, thereby promoting positive health behaviours. However, their efforts are sometimes constrained by the lack of formal decision-making authority within the household, necessitating the need for more inclusive and empowering approaches.

Barriers to Vaccination

The findings identified several common barriers to vaccination, including misinformation, distrust in healthcare systems, and limited access to vaccination services. Gender-specific constraints, such as women's restricted mobility and lack of financial independence, exacerbate these barriers [21]. Men's reluctance to vaccinate often stems from skepticism about vaccine efficacy and safety, influenced by cultural and social norms. Additionally, logistical challenges, such as long travel distances to vaccination centers, economic constraints, and inadequate healthcare infrastructure further hinder vaccine uptake. Women's restricted mobility, dictated by cultural norms and responsibilities, limits their ability to access vaccination services. Financial constraints, particularly in single-income households, often prioritize immediate survival needs over preventive healthcare measures like vaccination. The combined effect

of these barriers results in lower vaccination rates, leaving communities vulnerable to vaccine-preventable diseases.

Vaccine Hesitancy Factors

In this subsection, the study examines the various factors contributing to vaccine hesitancy. Vaccine hesitancy is a complex and multifaceted issue influenced by a range of determinants. The key factors identified in this research study include:

Misinformation and Lack of Awareness

Both men and women reported vaccine hesitancy due to misinformation and lack of awareness about vaccine benefits and safety [22]. Men exhibited higher levels of skepticism and were more influenced by anti-vaccine narratives, often spread through social media, community networks, and informal communication channels. Women's hesitancy was also influenced by misinformation but was compounded by their limited access to accurate health information. Misinformation about vaccines, including false claims about their safety, efficacy, and potential side effects, perpetuates vaccine hesitancy. The lack of reliable and accessible health information further exacerbates this issue, particularly in remote and underserved areas where healthcare communication is often inadequate.

Religious and Cultural Beliefs

Religious and cultural beliefs play a significant role in vaccine acceptance and hesitancy. Many communities hold traditional beliefs and misconceptions about vaccines, leading to resistance among male decision-makers [23]. For instance, some cultural beliefs view vaccines as unnatural or harmful, while certain religious beliefs may oppose vaccination on doctrinal grounds. These beliefs are deeply ingrained and can significantly influence health behaviours and attitudes toward vaccination. Cultural narratives that equate vaccines with foreign or modern interventions can create resistance, especially

in communities that prioritise traditional or holistic approaches to health. Religious opposition to vaccination, based on doctrinal teachings or mistrust of medical interventions, further complicates efforts to achieve widespread vaccine acceptance.

Healthcare Access

Limited access to healthcare services, particularly in rural areas, significantly affects vaccination rates. Women's access is further constrained by gender-specific barriers, such as lack of transportation, financial constraints, and social norms restricting their mobility¹⁹. The challenges are further compounded by inadequate healthcare infrastructure and limited availability of vaccination services in remote areas. Rural and underserved communities often face significant logistical challenges in accessing healthcare facilities, including long travel distances, poor road conditions, and limited transportation options. Financial barriers, such as the cost of transportation and lost income from taking time off work, further deter individuals from seeking vaccination services. Social norms that restrict women's mobility and prioritise men's health needs exacerbate these challenges, resulting in lower vaccination rates and increased vulnerability to vaccine-preventable diseases.

Strategies to Address Vaccine Hesitancy

Addressing vaccine hesitancy requires a multifaceted approach that considers the diverse factors influencing individuals' decisions. Based on the findings in this study, the following strategies are recommended to mitigate vaccine hesitancy and improve vaccination rates.

Community Engagement

Engaging community leaders and influencers, especially women, is essential for disseminating accurate information and building trust in vaccination programs¹⁸. Community-based interventions that involve both men and women in dialogue and decision-

making processes are critical for addressing vaccine hesitancy. Initiatives such as community health forums, participatory workshops, and grassroots advocacy can foster greater understanding and acceptance of vaccination. Community leaders, respected for their authority and influence, can effectively counter misinformation and promote positive health behaviours. Women's groups and maternal networks can serve as powerful platforms for peer education and support, reinforcing the importance of vaccination and addressing concerns within the community.

Education and Awareness Campaigns

Targeted education and awareness campaigns that address gender-specific concerns and involve both men and women are crucial for increasing vaccine uptake [18]. These campaigns should be culturally sensitive and tailored to the unique needs of different communities. Strategies such as peer education, health talks, and information dissemination through trusted community channels can effectively counter misinformation and promote vaccine acceptance. Educational initiatives should focus on providing clear, accurate, and accessible information about the benefits and safety of vaccines, addressing common misconceptions, and building trust in healthcare systems. Engaging men in these campaigns is particularly important, as their participation and support can influence household decisions and encourage positive health behaviours.

Policy and Program Interventions

Policies that empower women and promote gender equality in healthcare decision-making can have a positive impact on vaccination rates [20]. Developing supportive policies and programmes that prioritise gender inclusion and equity is vital for overcoming barriers to vaccination. Interventions such as providing financial incentives, improving healthcare infrastructure, and ensuring equitable access to

vaccination services can enhance vaccine uptake in LMICs. Policies that promote women's economic empowerment, access to education, and participation in healthcare decisions can address the underlying gender disparities that contribute to vaccine hesitancy. Ensuring that healthcare services are accessible, affordable and culturally appropriate can further support vaccination efforts and protect communities from vaccine-preventable diseases.

Discussion

In this section, the research study interpret and contextualize the findings presented in the previous sections, exploring their implications and relevance to the broader research objectives. The discussion will address the following key points:

Gender-Specific Barriers and Facilitators

The findings of this systematic review underscore the critical need to address gender-specific barriers to vaccination in LMICs. Women, despite their integral role in supporting and advocating for vaccination within households, encounter significant challenges such as limited decision-making power and restricted access to resources. These barriers are often deeply rooted in cultural norms that assign men the primary decision-making authority, even in matters related to healthcare. Consequently, women's efforts to ensure their families are vaccinated are frequently undermined by their lack of autonomy and access to necessary resources.

Men, on the other hand, often hold misconceptions about vaccines and exhibit hesitancy influenced by traditional beliefs and misinformation. Misinformation about vaccine safety and efficacy is a pervasive issue, further compounded by religious and cultural beliefs that may discourage vaccination. Addressing these barriers requires a multifaceted approach that considers the socio-cultural and economic contexts of LMICs. This includes engaging

both men and women in educational initiatives, fostering community support for vaccination, and addressing the underlying cultural norms that perpetuate gender disparities in healthcare decision-making.

Implications for Public Health Policy

The implications for public health policy are significant and far-reaching. To effectively combat vaccine hesitancy in LMICs, policies must consider the intricate gender dynamics within households and communities. This involves promoting interventions that empower women, enhance their decision-making power, and ensure their active participation in healthcare decisions. Empowering women can be achieved through targeted educational programmes that provide them with the knowledge and resources needed to advocate for vaccination.

Equally important is the need to engage men in educational campaigns that address their concerns and misconceptions about vaccines. Public health strategies should be inclusive and participatory, ensuring that both men and women are actively engaged in the health decision-making process. By fostering an environment where both genders are informed and involved, public health initiatives can be more effective in increasing vaccination rates and reducing vaccine hesitancy.

Recommendations for Future Research

Future research should delve deeper into the underlying reasons for gender-specific vaccine hesitancy. Longitudinal studies that track changes in vaccine attitudes and behaviours over time can provide valuable insights into the factors influencing vaccine hesitancy. Intervention-based research is also crucial for evaluating the effectiveness of strategies aimed at addressing gender-related barriers to vaccination.

Additionally, research should consider the intersectionality of gender with other factors such as socioeconomic status, education, and

cultural beliefs. Understanding how these intersecting factors contribute to vaccine hesitancy can inform the development of more targeted and effective interventions. For instance, studies could explore how education levels and economic empowerment influence women's ability to make healthcare decisions and advocate for vaccination. By adopting a holistic approach to research, public health professionals can gain a more comprehensive understanding of the complexities of vaccine hesitancy and develop strategies that are tailored to the specific needs of different communities.

Conclusions

The systematic review clearly shows that gender dynamics play a substantial role in influencing vaccine hesitancy and decision-making within LMICs. Several key factors contribute to this phenomenon. Cultural norms often dictate that men hold the majority of decision-making power within households. This male dominance can lead to lower vaccination rates, particularly when men exhibit skepticism or hesitancy toward vaccines. Women's roles, while crucial as primary caregivers and advocates for their children's health, are often limited by societal expectations and gender-specific constraints.

One significant barrier is misinformation about vaccines. Both men and women in LMICs are susceptible to misinformation, but the impact can be more pronounced for women due to their limited access to accurate health information. This misinformation can originate from various sources, including social media, community networks, and even religious or cultural beliefs that view vaccines with suspicion.

Another critical factor is the limited access to healthcare services, particularly in rural or underserved areas. Women in LMICs face additional challenges, such as restricted mobility and lack of financial independence, which can further hinder their ability to access

vaccination services. These constraints are often compounded by inadequate healthcare infrastructure and resource availability, making it even more difficult for women to obtain necessary vaccinations for themselves and their children.

Despite these challenges, women play an essential role in advocating for vaccination. Their influence is often exercised through informal channels and maternal networks, which can positively affect vaccination uptake. However, their limited decision-making power within the household can sometimes negate their efforts, especially when male decision-makers are hesitant or resistant to vaccination.

In conclusion, the review underscores the importance of addressing gender-specific barriers to improve vaccine uptake in LMICs. By understanding and tackling these barriers, public health initiatives can be more effective in increasing vaccination coverage and protecting communities from vaccine-preventable diseases.

Recommendations

Empowering women in healthcare decision-making is a crucial step toward reducing vaccine hesitancy and improving vaccination rates in LMICs. This can be achieved by implementing policies and programmes that promote women's autonomy and decision-making power within the healthcare system. Women should be provided with the necessary education and resources to enhance their knowledge and confidence in advocating for vaccination. For example, training programmes and workshops can be organised to educate women about the importance of vaccines and how to make informed healthcare decisions. These efforts will not only empower women but also ensure that they are better equipped to support their families' health and well-being.

Engaging men in vaccination programs is equally important, as they often hold significant decision-making power within households. Developing targeted educational campaigns

that address men's concerns and misconceptions about vaccines is essential. These campaigns should be designed to resonate with men and provide them with accurate and reliable information about the benefits and safety of vaccines. Additionally, involving men in community-based vaccination initiatives can promote gender equality in healthcare decision-making. Men can be encouraged to participate in health education sessions and vaccination drives, fostering a more inclusive approach to healthcare.

Improving healthcare access is another critical recommendation for addressing vaccine hesitancy. In many LMICs, access to vaccination services is limited, particularly in rural and underserved areas. Increasing the availability of mobile vaccination services can help bridge this gap by bringing vaccines directly to the communities that need them the most. Furthermore, providing transportation support and financial incentives can reduce the economic barriers that often prevent individuals from accessing vaccination services. By addressing these logistical challenges, healthcare providers can ensure that more people receive the necessary vaccinations.

Culturally sensitive communication strategies are vital for effectively addressing vaccine hesitancy in diverse communities. These strategies should be designed to address the specific concerns and beliefs of different communities, ensuring that the messages resonate with the target audience. Collaborating with community leaders and influencers can enhance the credibility and reach of these communication efforts. Community leaders can play a pivotal role in disseminating accurate information about vaccines and countering misinformation. Healthcare providers can foster greater acceptance of vaccines by leveraging their influence and trust within the community.

Policy interventions play a crucial role in creating an enabling environment for vaccination. Advocating for supportive policies

that prioritize gender inclusion and equity in healthcare is essential. Policymakers should develop and implement programs that address the economic and social barriers to vaccination for women. For instance, policies that provide financial support for vaccination, improve healthcare infrastructure, and ensure equitable access to healthcare services can significantly enhance vaccination rates. Additionally, policies that promote gender equality in healthcare decision-making can empower women and create a more inclusive healthcare system.

In summary, these recommendations highlight the importance of adopting a multi-faceted approach to address vaccine hesitancy. Empowering women, engaging men, improving healthcare access, employing culturally sensitive communication strategies, and implementing supportive policies are all essential components of a comprehensive strategy to increase vaccination rates in LMICs. Public health initiatives can achieve greater success in improving vaccination coverage and

protecting populations from vaccine-preventable diseases by addressing the unique challenges and barriers faced by different communities.

Future Research Directions

Future research should explore the impact of specific gender-sensitive interventions on vaccine acceptance and coverage. Longitudinal studies are needed to track changes in vaccine hesitancy over time and evaluate the effectiveness of targeted strategies. Additionally, research should consider the intersectionality of gender with other factors such as socioeconomic status, education, and cultural beliefs. Public health professionals can gain deeper insights into the complex factors influencing vaccine hesitancy and develop more effective strategies to address these challenges by adopting a comprehensive and inclusive approach to research.

Annexure

Table 1. Description of Studies Included in Systematic Review

Author(s)	Year	Study Design	Country	Focus Area	Key Findings
Ali, H. A., Hartner, A. M., Echeverria-Londono, S., et al.	2022	Systematic Review and Meta-analysis	Various LMICs	Vaccine equity	Highlighted disparities in vaccine distribution and access in LMICs, emphasizing the need for equitable vaccine allocation to improve health outcomes.
Ali, M., & Rehman, H.	2019	Qualitative Study	Various LMICs	Barriers to vaccination	Identified barriers such as misinformation, lack of access, and socio-cultural factors that hinder vaccine uptake in LMICs.
Babalola, S.	2020	Qualitative Study	Sub-Saharan Africa	Gender dynamics and vaccine hesitancy	Examined how gender dynamics influence vaccine hesitancy, with men exhibiting higher levels of hesitancy due to decision-making power.
Bosire, E. N., Cho, A., Kamau, L. W., Bosire, V., & Mendenhall, E.	2023	Qualitative Study	Kenya	COVID-19 vaccination views	Investigated residents' views on COVID-19 vaccination, revealing socio-

					cultural and economic factors influencing vaccine uptake.
Daniel, P., & Kumwenda, J.	2022	Qualitative Study	Malawi	Religious beliefs and vaccine acceptance	Explored the impact of religious beliefs on vaccine acceptance, finding significant resistance among certain religious groups.
Jegede, A. S.	2007	Case Study	Nigeria	Polio vaccination campaign	Investigated the reasons behind the Nigerian boycott of the polio vaccination campaign, identifying cultural and political factors.
Larson, H. J., Coopers, L. Z., Eskola, J., et al.	2015	Systematic Review	Various LMICs	Vaccine confidence gap	Addressed the vaccine confidence gap by analyzing factors that undermine public trust in vaccines.
Larson, H. J., Jarrett, C., Eckersberger, E., et al.	2014	Systematic Review	Various LMICs	Understanding global vaccine hesitancy	Conducted a systematic review to understand vaccine hesitancy from a global perspective, identifying common themes and regional differences.
MacDonald, N. E.	2015	Review		Vaccine hesitancy	Defined vaccine hesitancy and identified its determinants, providing a framework for addressing hesitancy in different contexts.
Merten, S., Hilber, A. M., Biaggi, C., et al.	2015	Meta-Ethnographic Review	Various LMICs	Gender determinants of vaccination status	Synthesized evidence on gender determinants of vaccination status, highlighting the role of gender in vaccine uptake.
Obadare, E., & Akande, T. M.	2021	Cross-Sectional Survey	Nigeria	Maternal influence on child vaccination	Explored the impact of maternal influence on child vaccination, highlighting the role of mothers in promoting vaccine uptake.
Ogunleye, O. O., Basu, D., Mueller, D., et al.	2021	Mixed-Methods Study	Nigeria	COVID-19 pandemic response	Analyzed Nigeria's response to the COVID-19 pandemic, emphasizing the need for improved public health preparedness and socioeconomic responses.
Oliveira, M., Braga, M. F., Bueno, A., et al.	2022	Mixed-Methods Study	Brazil	Protection of vulnerable populations during COVID-19	Examined actions taken to protect vulnerable populations during the COVID-19 pandemic, highlighting the importance of targeted interventions.
Singh, P. K., & Singh, S.	2013	Cross-Sectional Survey	India	Impact of maternal education on child immunization	Found that maternal education significantly influences child immunization rates, emphasizing the importance of educating mothers.

Smith, P. J.	2010	Community -based Study	Kenya	Community engagement t and vaccine uptake	Investigated the role of community engagement in promoting vaccine uptake, highlighting effective strategies for increasing vaccination rates.
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Declaration

Ethics Approval and Consent to Participate

Not applicable

Consent for Publication

Not applicable

Availability of Data and Materials

Not applicable

Competing Interests

The author declare no competing interests.

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Authors' Contributions

Not Applicable

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