**Edelweiss Applied Science and Technology**
*ISSN: 2576-8484*
*Vol. 9, No. 4, 1217-1228*
*2025*
*Publisher: Learning Gate*
*DOI: 10.55214/25768484.v9i4.6226*


# Maternal resistance to COVID-19 vaccination: Attitudes and knowledge in preschool children's immunization

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**Abstract:** Childhood immunization is a crucial public health measure, yet maternal resistance to COVID-19 vaccination for preschool-aged children remains a significant challenge. While prior research has explored general vaccine hesitancy, few studies have examined the direct relationship between maternal knowledge and attitudes regarding COVID-19 vaccination in this population. This study aims to analyze the reasons behind maternal vaccine hesitancy, assessing how knowledge gaps and attitudinal factors shape vaccination decisions. A mixed-methods approach was employed, collecting quantitative data through structured questionnaires and qualitative insights from semi-structured interviews with 140 mothers in Arequipa, Peru. Descriptive and correlational analyses were performed to identify key determinants of vaccine acceptance. Findings indicate that although most mothers adhere to routine immunization schedules, misinformation and concerns about vaccine safety contribute to hesitancy. A statistically significant correlation was found between maternal knowledge levels and positive vaccination attitudes. These results highlight the need for targeted educational campaigns and improved communication between healthcare providers and mothers. Future efforts should focus on addressing misinformation, reinforcing trust in vaccines, and implementing culturally adapted interventions. While this study provides critical insights, its non-probabilistic sampling limits generalizability, and further longitudinal research is required to track evolving attitudes over time.

***Keywords:*** *Health education, Maternal health, Public health, Vaccination.*

## 1. Introduction

The COVID-19 vaccination has emerged as one of the most effective strategies to mitigate virus transmission and protect public health, particularly among vulnerable populations such as children under four years old. However, maternal resistance to vaccinating children in this age group has become a growing public health concern, as mothers' decisions play a crucial role in determining vaccine acceptance for their children. This phenomenon is influenced by multiple factors, including knowledge about the vaccine and attitudes toward immunization. The Theory of Planned Behavior and the Health Belief Model suggest that knowledge and attitudes are key determinants of vaccination intent [1, 2]. Thus, analyzing the interaction between these factors is essential to understanding the reasons behind maternal resistance to COVID-19 vaccination.

In the context of vaccination, insufficient knowledge about vaccine safety and efficacy can lead to negative attitudes, subsequently reducing the willingness to vaccinate [3]. The Health Belief Model posits that perceptions of disease severity and the perceived benefits of vaccination play a decisive role in immunization decisions [4]. Consequently, if mothers perceive their children as being at significant risk of contracting COVID-19 and believe in the vaccine's effectiveness, they are more likely to vaccinate


**History:** Received: 19 February 2025; Revised: 28 March 2025; Accepted: 31 March 2025; Published: 14 April 2025
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their children. However, persistent distrust or misinformation regarding potential side effects may contribute to vaccine hesitancy.

Globally, vaccine hesitancy has been recognized by the World Health Organization (WHO) as a major threat to public health. A study in India found that positive perceptions of the vaccine's benefits significantly impacted maternal attitudes toward immunization, highlighting the need for effective communication strategies to enhance vaccine confidence [5]. In the United States, uncertainty and misinformation regarding the COVID-19 vaccine have contributed to vaccine hesitancy, resulting in stagnation in pediatric immunization rates in certain states [6]. Similarly, research in Saudi Arabia indicates that parental attitudes are a key determinant of vaccination intent, underscoring the importance of addressing concerns and misconceptions surrounding vaccines [7].

In Peru, maternal resistance to COVID-19 vaccination in children has become an increasing concern. Despite nationwide immunization campaigns, vaccine acceptance remains inconsistent, particularly in rural and indigenous communities, where cultural factors and limited access to reliable information play a significant role. Additionally, maternal education levels and trust in the healthcare system significantly influence vaccine decisions, emphasizing the need for targeted and context-specific communication strategies. While sensitization programs exist, significant barriers persist in ensuring equitable vaccine coverage for young children.

Given this context, the present study aims to analyze the reasons behind maternal resistance to COVID-19 vaccination in children under four years old, focusing on the relationship between maternal knowledge and attitudes toward the vaccine. Despite advancements in understanding vaccine hesitancy, there are still gaps in the literature regarding the combined impact of these factors, particularly in Peru. The research question guiding this study is: How do maternal knowledge and attitudes influence the decision to vaccinate children under four against COVID-19 in Arequipa, 2024? Addressing this question will facilitate the development of effective strategies to improve vaccine acceptance and contribute to the formulation of more inclusive and efficient public health policies.

## 2. Theoretical Framework

### *2.1. Conceptual and Theoretical Definitions*

Vaccine hesitancy is defined as the delay in acceptance or refusal of vaccines despite the availability of vaccination services [8]. It is a complex phenomenon influenced by psychological, social, and contextual factors. In the context of COVID-19, maternal vaccine hesitancy refers specifically to mothers' reluctance or refusal to vaccinate their children against the virus, often driven by concerns about vaccine safety, efficacy, and potential side effects [7].

Attitudes toward vaccination encompass an individual's beliefs, perceptions, and emotional responses to immunization [5]. According to the Health Belief Model, attitudes are shaped by perceived susceptibility to disease, perceived benefits of vaccination, and perceived barriers, including fear of adverse effects [4]. These attitudes significantly impact decision-making regarding childhood vaccination.

Knowledge about vaccines refers to the extent to which individuals understand vaccine development, safety, and effectiveness. Research indicates that a higher level of knowledge correlates with greater vaccine acceptance, whereas misinformation fosters hesitancy [1]. The role of maternal knowledge is crucial in determining whether children receive immunization, as mothers are typically the primary decision-makers regarding their children's healthcare [2].

### *2.2. Empirical Evidence on Vaccine Hesitancy*

Recent studies have identified critical associations between vaccine hesitancy, maternal knowledge, and attitudes. A study conducted in India found that 72% of parents willing to vaccinate their children had high levels of knowledge about COVID-19 vaccines, compared to only 39% among those hesitant to vaccinate [5]. Similarly, research in the United States revealed that parents with lower vaccine confidence were twice as likely to delay or refuse vaccination for their children [6].

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

In Saudi Arabia, Alghamdi [7] reported that 58.3% of mothers who refused COVID-19 vaccination for their children cited concerns about safety and side effects, while only 25.6% of those who accepted vaccination expressed similar concerns. Moreover, a study in Vietnam found that perceived barriers, such as difficulty accessing healthcare services and vaccine misinformation, negatively influenced vaccination intentions [9].

In Latin America, Montiel, et al. [10] found that parental attitudes toward childhood COVID-19 vaccination were influenced by previous vaccination experiences. Parents who had vaccinated their children against influenza showed a 63% higher likelihood of accepting the COVID-19 vaccine compared to those without prior vaccination experiences. This suggests that vaccine hesitancy may be mitigated by increasing parental exposure to immunization programs.

*2.3. Theoretical Approaches to Vaccine Hesitancy*

Several misinformation, it may reinforce vaccine hesitancy rather than encourage acceptance.

*2.4. Synthesis and Research Gap*

Existing literature highlights the importance of maternal knowledge and attitudes in determining vaccine acceptance. The evidence suggests that knowledge about vaccines significantly correlates with higher acceptance rates, while misinformation and perceived barriers contribute to hesitancy [5, 6]. However, there are notable gaps in understanding how these factors interact in specific sociocultural contexts, particularly in Latin America.

Most studies on vaccine hesitancy have focused on general populations or healthcare workers rather than specifically examining maternal resistance to childhood COVID-19 vaccination [11]. Furthermore, limited research has explored the role of structural barriers, such as healthcare accessibility and misinformation, in shaping maternal attitudes in Peru. Addressing these gaps, this study aims to analyze how maternal knowledge and attitudes influence the decision to vaccinate children under four years old against COVID-19 in Arequipa. Understanding these dynamics will provide valuable insights for designing targeted interventions to improve vaccine acceptance and reduce theoretical models help explain vaccine hesitancy. The Health Belief Model (HBM) posits that individuals' decisions to vaccinate depend on their perceived risk of contracting a disease, the perceived severity of the disease, the benefits of vaccination, and the perceived barriers to receiving the vaccine [4]. If mothers perceive that COVID-19 poses a significant risk to their children and that vaccines are effective in preventing infection, they are more likely to vaccinate their children.

The Theory of Planned Behavior (TPB) suggests that behavioral intentions are shaped by attitudes, subjective norms, and perceived behavioral control [1]. In the case of maternal vaccine hesitancy, social influences, such as recommendations from healthcare providers and peer opinions, play a crucial role in shaping attitudes and decision-making regarding vaccination.

Additionally, the Protection Motivation Theory (PMT) explains how fear-based messaging and risk perception influence health behaviors [2]. This model suggests that if mothers perceive a high threat from COVID-19 and believe they have the self-efficacy to protect their children through vaccination, they are more likely to accept immunization. However, if fear is excessive or paired with

hesitancy in vulnerable populations.

## 3. Materials and Methods

This study employed a mixed-methods approach, integrating quantitative and qualitative research to provide a comprehensive understanding of maternal vaccine hesitancy regarding COVID-19 vaccination for children under four years old. Given the complexity of the factors influencing vaccine acceptance, this approach allowed for the triangulation of data, enhancing the validity and depth of the analysis. The study was descriptive and correlational, aiming to examine the relationship between maternal knowledge and attitudes toward vaccination. A cross-sectional design was implemented, as data were collected at a single point in time, enabling the identification of patterns in maternal

*Edelweiss Applied Science and Technology*
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perceptions and decision-making processes. The study was conducted in community health centers and local neighborhoods in Arequipa, Peru, offering a real-world context for the exploration of vaccine hesitancy.

The study population consisted of mothers with children under four years old residing in Arequipa. A total of 140 participants were selected through non-probabilistic convenience sampling, ensuring accessibility while prioritizing voluntary participation. The inclusion criteria required that mothers be within the specified age group for their children, provide informed consent, and be fluent in Spanish, as the study was conducted in this language. Mothers who did not meet these criteria or refused to participate were excluded from the study.

Data collection was conducted in two phases, utilizing structured questionnaires and semi-structured interviews. The first phase involved the administration of the Knowledge Questionnaire on COVID-19 Vaccination, designed to assess maternal understanding of vaccine efficacy, safety, and immunization schedules. The instrument demonstrated high reliability (Cronbach's alpha = 0.726). The second phase employed the COVID-19 Vaccination Attitude Scale, developed by González [12] to evaluate maternal perceptions and beliefs regarding vaccination. This scale exhibited strong internal consistency, with a Cronbach's alpha of 0.825. In addition to quantitative data collection, semi-structured interviews were conducted with a selected subgroup of participants to explore the underlying reasons for vaccine hesitancy, as well as perceived barriers to vaccination.

The data collection procedure followed a structured process. First, participants were recruited from community health centers and local neighborhoods, where they were informed about the study's objectives and provided consent to participate. Next, they completed the knowledge and attitude questionnaires, either in person or via an online platform, depending on their accessibility and preference. Following this, a subset of participants engaged in semi-structured interviews, conducted in private settings to encourage candid discussion. Ethical considerations were a priority throughout the study, ensuring adherence to informed consent, confidentiality, and voluntary participation. The research was reviewed and approved by an institutional ethics committee, ensuring compliance with ethical standards in human research.

The data analysis combined both quantitative and qualitative techniques. Descriptive statistical analyses were conducted to determine means, frequencies, and percentages related to vaccine knowledge and attitudes. Additionally, inferential analyses, such as Pearson's correlation, ANOVA, and t-tests, were performed to examine the relationships between variables and compare maternal responses across different demographic groups. The statistical analysis was conducted using SPSS software. On the qualitative side, interview responses were analyzed using thematic analysis, with NVivo software employed for coding and categorization, allowing for the identification of emerging themes related to maternal concerns and barriers to vaccination.

Despite its contributions, the study presents certain limitations. The use of non-probabilistic sampling may limit the generalizability of the findings beyond the study population. Additionally, self-reported data may introduce response bias, as participants might provide socially desirable answers rather than reflect their true beliefs. Moreover, the study was conducted within a single urban region, which may not fully capture the diversity of perspectives present in rural or other geographic areas. Nonetheless, the triangulation of quantitative and qualitative data strengthens the study's validity, offering a robust framework for understanding maternal vaccine hesitancy in the context of COVID-19.

## 4. Results and Discussion

Understanding maternal attitudes toward COVID-19 vaccination in preschool-aged children requires an in-depth analysis of both sociodemographic factors and their relationship with knowledge and perceptions about immunization. This section presents the quantitative findings obtained from the study, including descriptive statistics on maternal characteristics, levels of knowledge, and attitudes toward vaccination. The results explore the distribution of the participants' sociodemographic background, their understanding of COVID-19 vaccines, and how these factors influence their

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

willingness to vaccinate their children. Additionally, statistical tests were conducted to determine potential correlations between maternal knowledge and attitudes, shedding light on key factors that contribute to vaccine hesitancy. The findings provide a foundation for understanding the barriers to vaccine acceptance and emphasize the role of informed decision-making in public health strategies.

**Table 1**.
Sociodemographic Characteristics of Mothers and COVID-19 Vaccination in Preschool Children, Arequipa, 2023

| Data | Category | n | % |
|---|---|---|---|
| Mother's Age (years) | 18 - 20 | 6 | 4,29 |
| | 21 - 25 | 23 | 16,43 |
| | 26 - 30 | 40 | 28,57 |
| | 31 - 35 | 42 | 30,00 |
| | 36 - 40 | 18 | 12,85 |
| | 41 - 45 | 7 | 5,00 |
| | 46 - 49 | 4 | 2,86 |
| Mean ($\bar{x}$) = 30.84, SD ($\sigma$) = 6.239, Q1 = 26.00, Median (Q2) = 31.00, Q3 = 34.75 | | | |
| Place of Origin | Arequipa | 113 | 80,71 |
| | Puno | 9 | 6,43 |
| | Lima | 4 | 2,86 |
| | Venezuela | 4 | 2,86 |
| | Cusco | 3 | 2,15 |
| | Other regions (< 2%) | 7 | 5,00 |
| Education Level | Higher Education | 89 | 63.57 |
| | Secondary Education | 48 | 34.29 |
| | Primary Education | 2 | 1.43 |
| | No Formal Education | 1 | 0.71 |
| Number of Children | 1 child | 52 | 37.14 |
| | 2 children | 56 | 40.00 |
| | 3 children | 30 | 21.43 |
| | 4 children | 2 | 1.43 |
| Mean ($\bar{x}$) = 2.269, SD ($\sigma$) = 1.3349, Q1 = 1.00, Median (Q2) = 2.00, Q3 = 3.65 | | | |
| Child's Age (years) | ≤ 1 year | 19 | 13.57 |
| | 1 to <2 years | 41 | 29.29 |
| | 2 to <3 years | 28 | 20.00 |
| | 3 to <4 years | 19 | 13.57 |
| | 4 to <5 years | 33 | 23.57 |
| Number of Vaccines Received | 1 vaccine | 36 | 25,71 |
| | 2 vaccines | 29 | 20,71 |
| | 3 vaccines | 58 | 41,43 |
| | 4 vaccines | 17 | 12,15 |

Table 1 shows that the mothers of preschool children range in age range from 18 to 49 years, with a mean age ($\bar{x}$) of 30.84 years and a standard deviation ($\sigma$) of 6.239 years. A quarter of the mothers are under 26 years old, half are younger than 31 years, and 75% are younger than 35 years. Most participants (80.71%) are from Arequipa; however, a notable portion (6.43%) comes from the Puno region, likely due to its geographical proximity and migratory patterns. A smaller number of mothers originate from other central and southern regions of Peru, with a minority being Venezuelan immigrants. Regarding education level, more than half (63.57%) have received higher education, followed by secondary education (34.29%), while only a few cases report primary education or no formal education. These findings indicate that most participants are young mothers from one of Peru's largest cities, where there is adequate access to basic communication services and educational opportunities, reducing the likelihood of misinformation due to a lack of comprehension.

Regarding the number of children, most mothers have two (40%), followed by those with one child (37.14%) and three children (21.43%). The preschool-aged children included in the study ranged from

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

under one year to 4 years and 11 months, with a mean age ($\bar{x}$) of 2.269 years and a standard deviation ($\sigma$) of 1.3349. During medical consultations, children received three injectable vaccines in 41.43% of cases (n=58), one vaccine in 25.71% (n=36), two vaccines in 20.71% (n=29), and four vaccines in 12.15% (n=17). These data suggest that the preschoolers studied are at an age where they receive not only the COVID-19 vaccine but also other routine immunizations according to the Peruvian vaccination schedule. Typically, children at two, four, and six months of age receive three intramuscular vaccines per visit, in addition to the SARS-CoV-2 vaccine. The requirement for multiple injections per visit may contribute to some mothers' reluctance to vaccinate their children.

**Table 2.**
Relationship Between Study Variables and Maternal Attitude Toward COVID-19 Vaccination in Preschool Children

| Variable | Correlation Coefficient | Attitude |
|---|---|---|
| Mother's Age | Spearman's Rho | 0,099 |
| | Sig. | 0,246 |
| | N | 140 |
| Child's Age | Spearman's Rho | -0,095 |
| | Sig. | 0,266 |
| | N | 140 |
| Number of Children | Spearman's Rho | 0,042 |
| | Sig | 0,623 |
| | N | 140 |
| Number of Vaccines Received During Consultation | Spearman's Rho | -0,056 |
| | Sig. | 0,509 |
| | N | 140 |
| Knowledge Level | Spearman's Rho | 0,463** |
| | Sig. | 0,000 |
| | N | 140 |

**Note:** Correlation is significant at the 0.01 level (two-tailed).

In Table 2, the correlation analysis presented in the table reveals no significant relationship between maternal attitude toward COVID-19 vaccination and variables such as maternal age, child's age, number of children, or the number of vaccines received during the consultation. The p-values for these variables exceed the standard significance threshold ($p > 0.05$), indicating that these demographic factors do not substantially influence a mother's decision to vaccinate her child. These finding challenges initial assumptions that younger mothers or those with more children might exhibit greater hesitancy due to vaccine overload concerns or unfamiliarity with immunization programs. Instead, the data suggest that vaccine attitudes are shaped by factors beyond basic demographic characteristics.

Conversely, a statistically significant moderate correlation (Spearman's Rho = 0.463, p = 0.000) was found between maternal knowledge levels and vaccine attitudes. This result indicates that mothers with higher knowledge about COVID-19 vaccination tend to display more positive attitudes, reinforcing the role of health literacy in shaping vaccine acceptance. The likely reason behind this association is that misinformation, fear of adverse effects, and reliance on non-scientific sources can contribute to skepticism. In contrast, informed mothers are more confident in the vaccine's safety and efficacy. These findings highlight the urgent need for targeted educational interventions to improve vaccine literacy, dispel myths, and enhance trust in immunization programs, ultimately increasing vaccination uptake in preschool-aged children.

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

**Table 3.**
Maternal Perceptions and Practices Regarding Childhood COVID-19 Vaccination in Preschoolers

| Category | Subcategory | Results | Interpretation |
|---|---|---|---|
| **Vaccination Practices** | **Vaccination Frequency** | Most mothers report regularly vaccinating their children, following the immunization schedule provided by public health centers. | There is high adherence to vaccination guidelines established by health authorities, particularly in the public sector. |
| | Preference for Health Centers | Some mothers prefer private health centers due to faster service and a perception of greater comfort. | The choice between public and private health centers varies based on factors such as accessibility, wait times, and perceived quality of care. |
| Knowledge About Vaccination | Information on Types of Vaccines | Many mothers have basic knowledge of common vaccines (e.g., BCG and pentavalent) but are not always aware of other vaccines in the schedule. | General knowledge exists, but information about the full vaccination schedule and additional vaccines is limited. |
| Knowledge About Vaccination | Information on Types of Vaccines | Many mothers have basic knowledge of common vaccines (e.g., BCG and pentavalent) but are not always aware of other vaccines in the schedule. | General knowledge exists, but information about the full vaccination schedule and additional vaccines is limited. |
| | Sources of Information | Mothers primarily obtain vaccination information from doctors, government campaigns, and family members. | Trust is mainly placed in healthcare professionals and official government campaigns as key sources of information. |
| Beliefs and Perceptions About Vaccines | Distrust in Vaccine Effectiveness | Some mothers express doubts about the effectiveness of certain vaccines, influenced by rumors or negative experiences shared by others. | Vaccine distrust is linked to misinformation, personal or community experiences, affecting vaccination decisions. |
| | Trust in the Healthcare System | Most mothers trust healthcare professionals' recommendations, particularly regarding vaccines for severe diseases. | Trust in the healthcare system remains high, although personal beliefs and rumors may cause occasional doubts. |
| Emotions Associated with Vaccination | Anxiety About Side Effects | Many mothers express anxiety about vaccine side effects, fearing adverse reactions in their children. | Concerns about side effects may cause hesitation, though they do not necessarily prevent vaccination. |
| | Reassurance Through Protection | Other mothers feel reassured by vaccination, as they see it as a way to protect their children from severe diseases. | The perception of protection and safety is a key factor in vaccine acceptance. |
| Risk Perception of COVID-19 | Fear of Infection and Family Impact | Most mothers perceive a high risk of COVID-19 infection and are highly concerned about their children's health regarding the virus. | The pandemic has heightened the perception of infection risk, reinforcing the willingness to vaccinate against COVID-19. |
| | Comfort with Preventive Measures | Mothers feel comfortable with preventive measures such as mask-wearing, social distancing, and vaccination as a strategy. | Preventive measures are seen as effective, increasing willingness to receive the COVID-19 vaccine. |

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*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

Mothers generally adhere to vaccination schedules, particularly those established by public health authorities, although many prefer private healthcare centers due to faster service and greater comfort [5, 7]. However, public health centers remain crucial for equitable vaccine access. Despite a general awareness of common vaccines, many mothers lack comprehensive knowledge of the full immunization schedule, which may contribute to vaccine hesitancy [13, 14]. Studies have indicated that gaps in vaccine-related knowledge, particularly concerning COVID-19, can result in uncertainty and reluctance to vaccinate young children [9, 15].

Trust in the healthcare system is generally high, with most mothers relying on medical professionals and government campaigns for vaccine-related information [1, 3]. However, doubts regarding the effectiveness and safety of certain vaccines persist, often influenced by misinformation, rumors, and personal experiences shared within communities [4, 6]. Research has highlighted that these perceptions significantly affect maternal attitudes, reinforcing the need for targeted interventions to improve vaccine acceptance [11, 16]. Emotional factors also play a crucial role in decision-making; while some mothers fear potential side effects, others feel reassured by the protective benefits of immunization [17, 18].

The COVID-19 pandemic has heightened risk perception, leading to increased willingness to vaccinate children against the virus [2, 19]. Many mothers express concerns about the potential impact of infection on their families, reinforcing their acceptance of vaccines as a preventive measure [12, 20]. However, vaccine hesitancy remains a challenge, particularly in communities with lower trust in health authorities [5, 11]. Addressing this issue requires evidence-based communication strategies to dispel misinformation and strengthen public confidence in vaccination programs.

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*

**Table 4.**
Qualitative Analysis of Maternal Resistance to Childhood COVID-19 Vaccination: Attitudes, Knowledge, and Barriers.

| Category | Subcategory | Findings | Interpretation |
|---|---|---|---|
| Knowledge about the Vaccine | General information about the vaccine | Mothers have varying levels of knowledge about the vaccine. Some are aware of its existence and purpose. | Maternal knowledge about the vaccine is inconsistent. While some understand its general purpose, many lack detailed information. |
| | Sources of information | The primary sources of information are media (TV, radio), social networks, and family members. | Most mothers obtain information from non-scientific sources, which may reinforce misinformation and myths. Healthcare professionals have less direct influence. |
| Attitudes Toward Vaccination | Beliefs about vaccine safety | 40% of mothers believe the vaccine may cause severe side effects. Others fear potential long-term harm. | A widespread perception of distrust toward the vaccine exists, fueled by misinformation and fears of adverse effects. |
| | Trust in the healthcare system | 30% of mothers express distrust in the healthcare system, citing past negative experiences or unclear information from professionals. | Distrust in the healthcare system significantly contributes to vaccine refusal. Perceptions of inefficacy or lack of transparency reinforce resistance. |
| Barriers to Vaccination | Fear of side effects | Many mothers fear the vaccine could cause severe side effects, such as autism or serious adverse reactions. | Fear of side effects is the most common barrier. Social media misinformation amplifies these concerns, leading to significant resistance. |
| | Misinformation and rumors | Rumors about the vaccine, particularly concerning long-term effects and conspiracy theories, are highly prevalent. | Misinformation in social media and informal discussions plays a crucial role in vaccine resistance. Mothers tend to trust myths more than scientifically verified data. |
| Motivators for Vaccination | Trustworthy testimonials | Hearing success stories about vaccination is seen as a positive factor in changing maternal opinions. | Testimonials from trusted individuals or public figures could be powerful tools in increasing vaccine acceptance. However, their impact varies depending on the credibility of the source. |
| | Awareness campaigns | Informational campaigns highlighting vaccine benefits and safety are viewed as helpful in shifting maternal perspectives. | The need for educational interventions is evident. Clear and accessible campaigns can mitigate fear and misinformation. |
| Intervention Strategies | Enhancing vaccine education | A high percentage of mothers would consider vaccinating their children if they received comprehensive and accessible education on vaccine benefits. | Education is key. Interventions should focus on providing accessible, evidence-based information on vaccine safety and efficacy. |
| | Encouraging dialogue with healthcare professionals | 60% of mothers prefer discussing their vaccine concerns with a healthcare professional. | Direct communication with healthcare professionals is an effective strategy. Mothers trust medical experts, and well-managed discussions can reduce vaccine hesitancy. |

The findings in Table 4 indicate that maternal resistance to childhood COVID-19 vaccination is influenced by a combination of misinformation, distrust in the healthcare system, and fear of potential side effects. Many mothers rely on non-scientific sources such as social media and family members for vaccine-related information, which reinforces misconceptions and fuels vaccine hesitancy. While some mothers recognize the importance of immunization, concerns about safety and long-term consequences

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
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remain significant barriers. Notably, a considerable percentage of mothers express skepticism regarding the effectiveness of vaccines, often shaped by previous negative healthcare experiences or unclear communication from professionals. This distrust can overshadow scientific evidence and lead to reluctance in accepting vaccination for their children.

Despite these concerns, the study highlights potential strategies to improve vaccine acceptance. Educational interventions that provide clear, evidence-based information on vaccine safety and efficacy can address misinformation and alleviate fears. Awareness campaigns that incorporate testimonials from trusted figures and emphasize the protective benefits of vaccines may further enhance maternal confidence. Additionally, fostering direct communication with healthcare professionals emerges as a crucial approach, as most mothers prefer discussing their concerns with medical experts. Strengthening trust in the healthcare system through transparent communication and accessible information is essential to mitigating vaccine hesitancy. Future efforts should prioritize targeted educational initiatives and tailored interventions to bridge the knowledge gap and promote informed decision-making regarding childhood immunization.

## 5. Conclusions

This study concludes that maternal knowledge and attitudes play a decisive role in the acceptance of COVID-19 vaccination for preschool-aged children. While a significant proportion of mothers adhere to routine immunization schedules, there is a clear gap in understanding the full range of vaccines, particularly regarding COVID-19. Misinformation, community-driven skepticism, and emotional concerns, such as fear of adverse effects, contribute to vaccine hesitancy. Despite an overall trust in healthcare professionals, uncertainty surrounding the vaccine's efficacy and safety remains a major barrier to acceptance. These findings highlight the urgent need for targeted educational initiatives that enhance maternal understanding of immunization benefits and risks, ultimately improving vaccination uptake in this vulnerable population.

Future implications of this research underscore the necessity of integrating culturally and contextually appropriate public health campaigns to address vaccine hesitancy. Strengthening the communication between healthcare providers and mothers is crucial to fostering confidence in vaccination programs. Additionally, incorporating digital platforms and mass media could play a pivotal role in counteracting misinformation and ensuring that accurate, science-based information reaches wider audiences. Health policies should prioritize maternal education on immunization, not only for COVID-19 but for all routine vaccines, to reinforce the importance of early childhood immunization and its long-term impact on public health.

However, this study also acknowledges certain limitations. The use of a non-probabilistic sampling method may limit the generalizability of the findings to broader populations. Additionally, vaccine hesitancy is influenced by complex sociocultural and economic factors that may require further qualitative exploration to capture underlying motivations and concerns. Future research should expand to include longitudinal studies to assess how maternal attitudes toward vaccination evolve over time and how interventions may effectively shape long-term behaviors. Understanding these dynamics will be essential in designing policies and strategies that not only address current hesitancy but also prevent future declines in vaccine confidence.

## Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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*ISSN: 2576-8484*
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## Acknowledgements:
The authors contributed equally to the conception, design, and execution of this research. This work was entirely funded, and no external financial support was received. The authors declare that there are no conflicts of interest related to this study.



## References
[1] H. Chu and S. Liu, "Integrating health behavior theories to predict American's intention to receive a COVID-19 vaccine," *Patient Education and Counseling*, vol. 104, no. 8, pp. 1878-1886, 2021. https://doi.org/10.1016/j.pec.2021.02.031

[2] M. M. Alam, L. K. B. Melhim, M. T. Ahmad, and M. Jemmali, "Public attitude towards COVID-19 vaccination: Validation of COVID-vaccination attitude scale (C-VAS)," *Journal of Multidisciplinary Healthcare*, pp. 941-954, 2022. https://doi.org/10.2147/jmdh.s353594

[3] S. Kundra, J. Kaur, A. Dadra, and S. Kundra, "Attitude of healthcare workers towards coronavirus 2019 disease vaccine: A hospital-based cross-sectional study," *International Journal of Community Medicine and Public Health*, vol. 8, no. 9, p. 4394, 2021. https://doi.org/10.18203/2394-6040.ijcmph20213542

[4] H. H. Mir, S. Parveen, N. H. Mullick, and S. Nabi, "Using structural equation modeling to predict Indian people's attitudes and intentions towards COVID-19 vaccination," *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, vol. 15, no. 3, pp. 1017-1022, 2021. https://doi.org/10.1016/j.dsx.2021.05.006

[5] S. Bhartiya, N. Kumar, T. Singh, S. Murugan, S. Rajavel, and M. Wadhwani, "Knowledge, attitude and practice towards COVID-19 vaccination acceptance in West India," *International Journal of Community Medicine and Public Health*, vol. 8, no. 3, pp. 1170-1176, 2021. https://doi.org/10.18203/2394-6040.ijcmph20210481

[6] K. M. Ruggiero *et al.*, "Parents' intentions to vaccinate their children against COVID-19," *Journal of Pediatric Health Care*, vol. 35, no. 5, pp. 509-517, 2021. https://doi.org/10.1016/j.pedhc.2021.04.005

[7] S. Alghamdi, "The attitude of parents toward their children receiving the COVID-19 vaccine," *Children*, vol. 9, no. 9, p. 1308, 2022. https://doi.org/10.3390/children9091308

[8] M. Sallam, "COVID-19 vaccine hesitancy worldwide: A concise systematic review of vaccine acceptance rates," *Vaccines*, vol. 9, no. 2, p. 160, 2021. https://doi.org/10.3390/vaccines9020160.

[9] N. T. V. Nga, V. N. Xuan, V. A. Trong, P. H. Thao, and D. C. Doanh, "Perceived barriers and intentions to receive COVID-19 vaccines: Psychological distress as a moderator," *Vaccines*, vol. 11, no. 2, p. 289, 2023. https://doi.org/10.3390/vaccines11020289

[10] J. D. Montiel *et al.*, "COVID-19 and influenza vaccination coverage among healthcare and administrative personnel in Paraguay," *Clinical and Social Medicine*, vol. 8, no. 1, pp. 57-62, 2024. https://doi.org/10.52379/mcs.v8i1.352

[11] A. D. Wake, "The willingness to receive COVID-19 vaccine and its associated factors:"vaccination refusal could prolong the war of this pandemic"–a systematic review," *Risk Management and Healthcare Policy*, vol. 14, pp. 2609-2623, 2021. https://doi.org/10.2147/rmhp.s311074

[12] N. González, "Influenza vaccination in Spain during COVID-19: Results of a community pharmacy study," *EDS*, vol. 17, pp. 11–22, 2022. https://doi.org/10.61679/1701011022

[13] M. Gupta, R. Goyal, S. Aggarwal, M. Singh, V. Gupta, and N. Garg, "Demographic and KAP determinants of COVID-19 vaccine hesitancy and vaccine refusal: A cross-sectional study in Indian population," *International Journal of Community Medicine and Public Health*, vol. 8, no. 10, p. 4776, 2021. https://doi.org/10.18203/2394-6040.ijcmph20213664

[14] A. Y. Fentie and K. E. Oumer, "Attitude and associated factors of COVID-19 vaccine acceptance among health professionals in Debre Tabor Comprehensive Specialized Hospital, North Central Ethiopia; 2021: Cross-sectional study," *Virusdisease*, vol. 32, no. 2, pp. 272-278, 2021. https://doi.org/10.1007/s13337-021-00708-0

[15] D. Montiel-Jarolin and M. Samudio, "Vaccination against COVID-19 and causes of vaccine rejection in Paraguay.," *Journal of Public Health of Paraguay*, vol. 12, no. 1, pp. 5-12, 2022. https://doi.org/10.18004/rspp.2022.junio.05

[16] T. L. F. Dueñas, M. Y. V. Palomino, and F. M. R. Colmenares, "Association between COVID-19 knowledge level and vaccination attitudes among health science students," *Clinical and Social Medicine*, vol. 7, no. 3, pp. 184-193, 2023. https://doi.org/10.52379/mcs.v7i3.319

[17] M. Barrios, M. Espinola-Canata, and J. Méndez, "Perceptions of the COVID-19 vaccine and its impact on regular vaccination coverage among Indigenous peoples in the Presidente Hayes department, Paraguay," *Clinical and Social Medicine*, vol. 7, no. 2, pp. 95-106, 2023. https://doi.org/10.52379/mcs.v7i2.297

[18] M. Sarduy-Lugo, A. Sarduy-Lugo, L. Collado-Cabañin, and R. V. Lara-Pérez, "Parents of hospitalized children's perceptions of trust and satisfaction with the national vaccination program," *Killkana Health and Wellbeing*, vol. 4, no. 2, 2020.

[19] Y. L. Reascos-Paredes, S. L. Acosta-Balseca, W. E. Báez-Morales, and J. C. Vásquez-Cazar, "COVID-19 infections after vaccination in northern Ecuador," *Maskana*, vol. 14, no. 1, pp. 79-87, 2023. https://doi.org/10.18537/mskn.14.01.06

[20] J. Cavazos-Arroyo and C. Pérez de Celis-Herrero, "COVID-19 Vaccination Intention among the Population Aged 40 and Older in Mexico," *Journal of Public Health*, vol. 24, no. 2, p. 1, 2022. https://doi.org/10.15446/rsap.v24n2.96015

*Edelweiss Applied Science and Technology*
*ISSN: 2576-8484*
*Vol. 9, No. 4: 1217-1228, 2025*
*DOI: 10.55214/25768484.v9i4.6226*