

SOCIO-DEMOGRAPHIC FACTORS INFLUENCING PARENTAL KNOWLEDGE OF CHILDHOOD IMMUNIZATION

Tahira Yasmeen^{*1}, Muhammad Azeem Ashraf², Dr. Jan Alam³

^{*1}Assistant Professor, School of Education, Minhaj University Lahore

²Institute of Educational Sciences, Hunan University, Changsha, China

³Assistant Professor, Department of Education, University of Wah

¹tahirayasmeen.edu@mul.edu.pk, ²azeem20037@gmail.com, ³janalam.jk@gmail.com

Corresponding Author: *

Tahira Yasmeen

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ABSTRACT

Parental knowledge about childhood immunization plays a vital role in ensuring timely vaccine uptake and preventing vaccine-preventable diseases. This study aimed to investigate the association between socio-demographic factors and parents' awareness of their children's immunization. A cross-sectional survey was conducted with 150 parents to assess how variables such as gender, educational attainment, and occupation, number of children, residential background, and interaction with vaccinators influence immunization knowledge. The results revealed that parents' knowledge was not significantly related to gender, occupation, or number of children. However, a significant, though non-linear, relationship was found between educational level and residential background. Importantly, direct interaction with vaccinators showed a strong and linear association with higher immunization knowledge. These findings suggest that enhancing communication between healthcare providers and parents, along with tailoring educational programs beyond formal schooling, can improve vaccine awareness. Additionally, targeted interventions addressing urban-rural disparities are necessary to bridge knowledge gaps. This study provides valuable insights for public health strategies aimed at increasing vaccination awareness and uptake.

Keywords: Childhood Immunization, Parental Knowledge, Socio-Demographic Factors, Vaccine Awareness.

INTRODUCTION

It is essential to comprehend how knowledge and demographic characteristics interact when developing policies and interventions, especially in the fields of public health and education. In this context, "knowledge" refers to parents' awareness and comprehension of vaccinations and their significance. Knowledge levels can be greatly impacted by demographic factors such as gender, education, occupation, number of children, residential background, and interactions with medical experts. Examining these connections can assist healthcare providers

and legislators in creating focused plans to raise vaccination rates and public awareness.

Knowledge is regarded as one of the most precious resources for both individuals and society in contemporary societies. It is essential when making decisions, especially when it comes to public health issues. Lack of awareness in this area can result in poor vaccination rates and heightened susceptibility to diseases that can be prevented. Immunization is a crucial part of preventive healthcare. Numerous demographic factors influence the spread and retention of information, thus it's important to carefully

examine their consequences (Stern & Markel, 2005).

Determining if various demographic factors significantly affect parents' understanding of vaccinations is one of the study's main goals.

Parental knowledge about childhood immunization is a critical determinant of vaccine uptake and the prevention of vaccine-preventable diseases worldwide. This knowledge-encompassing awareness of vaccine benefits, schedules, and safety-is influenced by various socio-demographic factors such as education, occupation, gender, number of children, residential background, and interactions with healthcare providers. Understanding how these factors shape parental awareness is essential for developing effective public health policies and targeted interventions.

Extensive research has demonstrated that parents with higher educational attainment and those residing in urban areas tend to have greater immunization knowledge and higher vaccination rates for their children.

Conversely, limited education, rural residency, and restricted access to reliable health information are often linked to vaccine hesitancy and incomplete immunization coverage (Chen & Patel, 2023; Ali, Khan, & Hussain, 2024). Furthermore, direct communication with healthcare professionals plays a pivotal role in enhancing parental understanding and acceptance of vaccines, underscoring the importance of effective health provider engagement (Smith & Lee, 2025). Despite global efforts to increase vaccination coverage, disparities persist across different socio-economic and demographic groups, contributing to uneven protection against preventable diseases.

These disparities highlight the need for tailored educational programs and communication strategies that address the unique challenges faced by diverse populations. For instance, integrating vaccine education into school curricula and adult learning initiatives could be particularly beneficial in communities where formal education levels are low. Similarly, customized outreach efforts targeting rural populations may help bridge the urban-rural knowledge gap. This study aims to investigate the associations between key socio-demographic variables-gender, education, occupation, number of children, residential background, and

interaction with vaccinators-and parental knowledge of childhood immunization. Utilizing the Chi-Square Test of Association, the research seeks to identify significant factors influencing vaccine awareness among parents. The findings are expected to inform more focused and equitable public health strategies, ultimately contributing to improved immunization coverage and child health outcomes.

Significance of the Study

This study is significant because it can help guide intervention and policy initiatives. Educating parents and guardians about the importance and advantages of vaccines is a common component of immunization drives and public health campaigns. However, depending on demographic traits, the efficacy of such programs can differ. Policymakers can develop more focused and effective awareness campaigns by determining which elements have a major impact on knowledge (Wagstaff, Flores, Smitz, Hsu, Chepynoga, & Eozenou, 2018). For example, attempts can be made to include vaccine awareness into school curriculum and adult education programs if it is discovered that education level significantly affects knowledge. Campaigns can be customized to target the particular difficulties faced by rural or urban people if residential background is a significant factor. In a similar vein, healthcare personnel can receive training to improve their communication techniques with parents if their interactions with them are a deciding factor.

Literature Review

Immunizations are essential for shielding young children against diseases that can be prevented and pose a threat to their lives. Immunity against diseases including measles, polio, diphtheria, tuberculosis, and hepatitis—which otherwise have the potential to cause serious illness or even death—is increased by vaccinations. By slowing the spread of infectious diseases, vaccination not only protects the health of individual children but also improves community health as a whole. It greatly reduces healthcare expenses and the strain on medical systems, making it one of the most economical public health initiatives. Children who receive their vaccinations on time are guaranteed to grow up healthy, attend school consistently, and become contributing members

of society. Consequently, creating a safer and healthier future for everybody depends on increasing awareness and guaranteeing that everyone has access to vaccinations (Dempsey, Schaffer, Singer, Butchart, Davis, & Freed, 2011).

Importance of Immunization for Child Safety

One of the best and most certain ways to guarantee a child's safety and long-term health is through immunization. It shields kids from a variety of infectious diseases that used to be widespread and fatal, including diphtheria, whooping cough, polio, and measles. Vaccines lower the chance of serious disease, disability, and even death by assisting the child's immune system in identifying and combating dangerous microorganisms. Children who receive vaccines at the proper age develop robust immunity at a critical juncture in their lives. In addition to helping the vaccinated child, vaccination also helps create "herd immunity," which shields other kids who might not be old enough or physically incapable of getting the shots (Shonkoff, Richter, van der Gaag, Bhutta, 2012).

Immunization is essential for boosting a child's general safety and wellbeing in addition to protecting their health. Children who receive vaccinations have a lower chance of experiencing long-term illness, missing school, or experiencing developmental delays brought on by diseases that can be prevented by vaccination. They can engage in social, recreational, and educational activities with greater assurance and safety thanks to this protection. By preventing epidemics and lowering the need for hospitalization or long-term care, vaccination also lessens the financial and emotional strain on families and healthcare systems. Accordingly, vaccination serves as a basis for each child's safe, healthy, and productive life rather than merely being a medical intervention (Wagstaff, Flores, Hsu, Smitz, Chepynoga, Buismanm, & van Wilgenburg 2018).

Age, income, area of residence, education level, and other demographic factors all have a substantial impact on parental understanding of childhood vaccinations. Higher parental education levels are closely linked to increased awareness and adherence to vaccination schedules, according to a number of studies. Parents with higher levels of education are more likely to trust scientific sources and have better

access to health information, which results in better knowledge and prompt vaccination of their children (Olorunsaiye et al., 2020). Additionally, income is important since families with higher socioeconomic level are more likely to prioritize preventative healthcare services, including as vaccinations, and to be able to pay for transportation to health centers (Adedokun et al., 2017).

Because they have greater access to media, public health initiatives, and healthcare facilities, urban dwellers tend to be better informed than their rural counterparts (Yousafzai et al., 2019). Immunization awareness is also influenced by age and experience; parents who are older or have more children are typically better knowledgeable about vaccination schedules and the dangers of diseases that can be prevented by vaccination (Wysonge et al., 2021). On the other hand, parents who are younger or less experienced might not have had the opportunity to get vital health education, which could have an impact on their children's vaccination coverage. These demographic differences highlight the necessity of focused public health initiatives that take parents' sociodemographic backgrounds into account in order to increase vaccination coverage and awareness. All children, regardless of parental background, can benefit fully from vaccinations if tailored interventions are implemented to close the knowledge gap on immunizations.

One of the most important areas of public health research is the connection between parents' demographic characteristics and their level of vaccination awareness. Parents' knowledge and opinions regarding childhood vaccinations can be greatly influenced by their occupation, number of children, and educational attainment. Decisions pertaining to health are greatly influenced by education in particular. Higher educated parents are typically better informed about the value of vaccinations, when they should be administered, and their advantages (Adeyinka et al., 2009). Compared to people with less education, their children have a higher vaccination coverage as a result of this awareness. Immunization awareness is also influenced by one's occupation. In addition to having more flexible work schedules that enable them to take their kids to immunization clinics, parents in professional or skilled occupations frequently

have better access to health information and services (Rahman et al., 2018). On the other hand, time and accessibility constraints may prevent parents with labor-intensive employment from participating fully in immunization programs (Hossain I, Masood T, Sultan A, Safdar R, Setayesh H, Shimp, 2021).

Immunization awareness and behavior are also influenced by the number of children in a family. According to studies, parents who have fewer children are more aware of their kids' medical requirements, such as when they should get them vaccinated (Streefland et al., 1999). However, families with a large number of children may have time and financial limits, which lowers the chance of timely and comprehensive immunization. Developing focused public health initiatives to increase vaccination coverage requires an understanding of these demographic factors. Gaps in immunization knowledge and practice can be addressed by customizing awareness programs according to parental

education, occupation, and family size (Tahseen SA, Naeem M, Sarwar, 2022).

Conceptual Framework

Guided by the Health Belief Model and Social Cognitive Theory, the conceptual framework for this study posits that parental knowledge of childhood immunization is influenced by a combination of demographic factors (gender, education, occupation, number of children, residence) and social interaction (engagement with vaccinators). Education and residence are hypothesized to have direct effects on knowledge, while interaction with vaccinators is expected to act as a strong cue to action, enhancing awareness regardless of other demographic factors. The number of children and gender are included to test whether experience or social roles contribute significantly to knowledge. The framework suggests that tailored interventions targeting education, residence, and health provider interaction will be most effective in improving parental immunization knowledge.

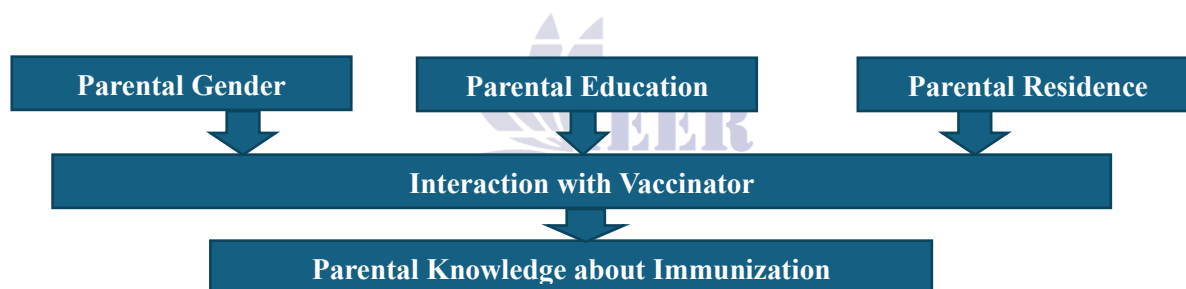


Figure 1. Conceptual Framework of Factors Influencing Parental Knowledge about Immunization

Figure 1 illustrates the conceptual framework of this study. The framework is based on the Health Belief Model and Social Cognitive Theory, and it visually depicts the hypothesized relationships among key variables. Parental demographic factors—including gender, education, occupation, number of children, and residence—are shown as potential influences on parental knowledge about immunization. Additionally, interaction with vaccinators is included as a key social factor, acting as a cue to action that may enhance parental knowledge. The framework suggests that while all these factors may contribute, education, residence, and interaction with vaccinators are expected to have the most substantial impact on immunization awareness. This model underpins the study's quantitative analysis using the chi-square test to

examine the strength and significance of these associations.

Research Hypotheses

The study is based on the following hypotheses:

H₀₁: There is no relationship between Gender and Knowledge of the respondents.

H₀₂: There is no relationship between Qualification and Knowledge of the respondents.

H₀₃: There is no relationship between Occupation and Knowledge of the respondents.

H₀₄: There is no relationship between No. of Child and Knowledge of the respondents.

H₀₅: There is no relationship between Residential Background and Knowledge of the respondents.

H₀₆: There is no relationship between Interaction and Knowledge of the respondents.

Methodology

The Chi-Square Test of Association is used in the study to examine the connection between knowledge levels and demographic factors. The significance level was set at 0.05 and a sample of 150 parents were chosen. A non-parametric statistical test called the Chi-Square Test is used to assess whether two category variables significantly correlate with one another. It aids in

determining if apparent data differences are the result of random variation or a real correlation between variables. Structured surveys were used to measure knowledge levels and gather data on the chosen demographic factors. The statistical significance of the data was then assessed, and p-values were utilized to determine whether the null hypothesis for each element should be accepted or rejected.

Data Analysis

Table 1. Chi-Square Test Results Regarding Association Between Parents' Gender and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	3.366 ^a	4	.499
Likelihood Ratio	3.396	4	.494
Linear Association	.115	1	.735

There is no statistically significant correlation between parents' gender and their level of vaccination knowledge, according to the results of the Chi-Square test. With a degree of freedom (df) of 4, the Pearson Chi-Square value is 3.366, and the significance level (p-value) is 0.499, both of which are higher than the 0.05 threshold. The same conclusion is supported by the likelihood ratio test, which similarly displays a p-value of 0.494. The null hypothesis (Ho), according to which gender has no influence on immunization

knowledge, cannot be rejected because the p-value is greater than 0.05. This implies that parental awareness of vaccinations is comparable for male and female parents. The lack of a linear trend between gender and knowledge is further supported by the linear-by-linear association value (0.115, $p = 0.735$). These results suggest that increasing vaccination knowledge may not require gender-specific treatments

Table 2. Chi-Square Test Results Regarding Association Between Parents' Qualification and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	39.009 ^a	24	.027
Likelihood Ratio	42.381	24	.012
Linear Association	.482	1	.488

The results of a Chi-Square test examining the relationship between parents' vaccination knowledge and their qualifications are shown in Table 2. With 24 degrees of freedom and a significance level (p-value) of 0.027, the Pearson Chi-Square value is 39.009. There is a statistically significant correlation between parents' educational background and their vaccination knowledge, as indicated by the p-value being less than 0.05. Likewise, the relationship's importance is further supported by the

Likelihood Ratio of 42.381 and p-value of 0.012. But with a significance level of 0.488, the linear-by-linear relationship value of 0.482 is not statistically significant. This implies that although knowledge and education level are generally correlated, the connection may not be exactly linear. In conclusion, the findings suggest a considerable relationship between parental education and immunization knowledge, but one that is not always clear-cut or linear.

Table 3. Chi-Square Test Results Regarding Association Between Parents' Qualification and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	9.215 ^a	12	.684
Likelihood Ratio	12.165	12	.433
Linear Association	.217	1	.641

The results of the Chi-Square test evaluating the relationship between parents' vaccination knowledge and their qualifications are displayed in Table 3. With 12 degrees of freedom and a p-value of 0.684, the Pearson Chi-Square value is 9.215. There is no statistically significant correlation between the two variables, according to this high p-value. With a p-value of 0.433 and a likelihood ratio of 12.165, the lack of significance is further supported. Furthermore, there is no discernible linear trend between

parental qualification and immunization knowledge, as indicated by the Linear-by-Linear Association value of 0.217 and p-value of 0.641. All things considered; these findings imply that parents' educational backgrounds have little bearing on their awareness of vaccinations. This table implies that parents' awareness or comprehension of immunization protocols may be influenced more by characteristics other than education, in contrast to earlier data that would have indicated a correlation.

Table 4. Chi-Square Test Results Regarding Association Between Parents' Number of Children and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	4.645 ^a	8	.795
Likelihood Ratio	4.912	8	.767
Linear Association	.176	1	.675

The findings of a Chi-Square test that looked at the relationship between parents' awareness about vaccinations and the number of children they have are shown in Table 4. With eight degrees of freedom and a significance level (p-value) of 0.795, the Pearson Chi-Square value is 4.645. There is no statistically significant correlation between the number of children and the parents' vaccination knowledge, according to this high p-value. Likewise, a p-value of 0.767 and a Likelihood Ratio of 4.912 indicate no

meaningful link. There is also no discernible linear trend in the data, as indicated by the Linear-by-Linear Association value of 0.176 and p-value of 0.675. Overall, the findings imply that parents' understanding of vaccinations is not much impacted by the number of children they have. Parents' perceptions of vaccinations may be more significantly influenced by other factors, such as education, access to medical information, or awareness efforts.

Table 5. Chi-Square Test Results Regarding Association Between Parents' Residence and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	10.914 ^a	4	.028
Likelihood Ratio	13.820	4	.008
Linear Association	1.499	1	.221

The results of the Chi-Square test evaluating the relationship between parents' domicile (rural or urban, for example) and their level of vaccination knowledge are shown in Table 5. With four degrees of freedom and a significance level (p-value) of 0.028, the Pearson Chi-Square value is

10.914. There is a statistically significant correlation between residence and immunization knowledge, as indicated by the p-value being less than 0.05. The link is further supported by the even more significant Likelihood Ratio, which has a value of 13.820 and a p-value of 0.008 as

well. With a p-value of 0.221 and a Linear-by-Linear Association value of 1.499, the association appears to be nonlinear. Overall, the findings show that parents' understanding of vaccinations is strongly influenced by where they reside. This can be a result of disparities between urban and

rural communities' access to healthcare services, health education, and outreach initiatives. The results emphasize the necessity of residential-based, tailored immunization awareness campaigns.

Table 6. Association Between Parents' Interaction with the Vaccinator and Their Knowledge About Immunization

	Value	Degree of freedom	Sig. Level (2-sided)
Pearson Chi-Square	29.401 ^a	16	.021
Likelihood Ratio	24.580	16	.078
Linear Association	5.902	1	.015

The results of the Chi-Square test evaluating the relationship between parents' interactions with the vaccine provider and their vaccination knowledge are displayed in Table 6. With 16 degrees of freedom and a significance level (p-value) of 0.021, the Pearson Chi-Square score is 29.401. Parents' knowledge and interaction with the vacciner are statistically significantly correlated, as indicated by the p-value being less than 0.05. This shows that parents who interact or speak with vaccinators typically know more about vaccinations. With a p-value of 0.078 and a Likelihood Ratio of 24.580, the results show considerable variance depending on the statistical method employed, but they are not statistically significant. Nonetheless, a linear link is supported by the Linear-by-Linear Association value of 5.902 with a significant p-value of 0.015; more interaction could result in greater understanding. All things considered, the findings emphasize how crucial good communication between parents and vaccinators is to raising immunization awareness.

Findings and Discussion

Parents' gender and their level of vaccine knowledge do not significantly correlate ($p = 0.499$), suggesting that parents of both sexes exhibit comparable levels of awareness.

Parents' educational background and their awareness of vaccinations are significantly correlated ($p = 0.027$), indicating that greater education may help parents understand.

The association is not linear ($p = 0.488$), indicating that increased education does not always translate into better knowledge at all levels, even though the overall significance is strong.

Parental qualification and vaccine awareness did not significantly correlate ($p = 0.684$), indicating inconsistent educational effects across sample groups or environments.

Parents' immunization knowledge is not significantly impacted by the number of children they have ($p = 0.795$), suggesting that having more children does not always translate into greater understanding.

The parents' place of residence and their degree of immunization knowledge were shown to be significantly correlated ($p = 0.028$), indicating that awareness levels may be influenced by an urban or rural environment.

The absence of a linear association ($p = 0.221$) suggests that the difference may be influenced by variables other than simply being urban or rural, such as outreach or resources.

Parents' understanding of vaccinations and their interactions with vaccinators are significantly correlated ($p = 0.021$), underscoring the significance of open communication.

Better immunization knowledge is linked to higher interaction with vaccinators, according to a linear trend ($p = 0.015$).

Conclusions:

Gender Equality in Awareness: There is no discernible difference between male and female parents' understanding of vaccinations, indicating that gender-specific interventions might not be required in this situation.

Education Plays a Role, but Not Uniformly: Although educational attainment and vaccine knowledge are strongly correlated, the link varies between educational levels, suggesting that a higher degree alone does not always translate into more awareness.

Residence Affects Knowledge: Parents' knowledge about vaccinations is strongly influenced by where they live, suggesting that local elements like outreach initiatives, information accessibility, and healthcare access may have an impact on awareness levels.

Interaction with Vaccinators Increases Knowledge: There is a clear linear trend indicating that greater interaction results in higher comprehension, and direct involvement with vaccinators is highly linked to enhanced knowledge.

Experience Doesn't Ensure Awareness: Parents' knowledge about vaccinations is not substantially impacted by the number of children they have, indicating that individual parenting experience is not a good predictor of awareness on its own.

Recommendations

The following suggestions are put forth in light of the study's findings:

Health departments and non-governmental organizations should fund community outreach initiatives where vaccinators connect directly with parents through home visits, counseling sessions, and local awareness campaigns, as this greatly enhances parents' understanding.

Since education and immunization knowledge are related, but not always at the same level, awareness campaigns should be created in easily understood formats that appeal to people of different educational backgrounds, particularly those with poor reading levels. Examples of these formats include visual aids, information in the local language, and mobile communications.

Initiatives to raise awareness of vaccinations should be region-specific because residency has a substantial impact on knowledge. Different approaches are needed in urban and rural areas, such as increasing access to healthcare professionals in rural areas and making better use of digital platforms in urban areas.

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