

## Effect of Maternal Literacy on Immunization Completeness in Children Under 2 Years of Age – Karachi, Pakistan

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### ABSTRACT:

**Objective:** To assess the association of different levels of education with complete immunization in children under 2 years of age.

**Study Design and Setting:** The study was cross sectional analytical and was carried by online survey of mothers living in Karachi. The study was conducted through a period of 4 months from May 2021 to August 2021.

**Methodology:** The sample size of 270 mothers was calculated using a 95% Confidence Level and using the Epi Info Application. The data was collected using a closed-ended online questionnaire via Google Forms. Due to the COVID – 19 pandemic, the questionnaires had to be distributed online. The data was analyzed using SPSS V23. The statistical test used was Fisher Exact Test to determine whether or not the relationship between maternal education and immunization rate was significant. .

**Results:** A total of 270 responses were recorded from mothers of various socio-economic statuses. It was observed that as the level of education increased from no formal education to a higher level of education, the percentage of children completely vaccinated increased from 76.9% to 92.7%. Upon statistical testing using Fisher Exact Test, the p-value was found to be 0.017 which is less than the alpha value of 0.05 showing that the relationship between the 2 variables is significant.

**Conclusion:** The study had shown that the children of mothers with a higher level of education were associated with a higher likelihood of being fully vaccinated than children of mothers with a lower level of education.

**Keywords:** Children, Immunization, Literacy, Maternal Education, Vaccination.

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### INTRODUCTION:

When a person is made resistant to an infectious disease usually via the application of a vaccine, it is known as immunization. Currently, around 2-3 million deaths are prevented annually from various diseases by immunization.<sup>1</sup> In 1978, the Expanded Program of Immunization (EPI) was introduced in Pakistan by WHO to ensure protection against life-threatening and vaccine-preventable childhood diseases.<sup>2</sup> A child is said to have received complete basic immunization if he has received the following vaccines at the recommended EPI Schedule: one BCG and one dose of oral polio (2-3 drops) of immunization (given at birth or first clinical encounter), three DPT immunizations (given at approximately 6, 10, 14 weeks after birth) and 2 doses of measles subcutaneously with rubella 9 and 15 months of age.<sup>3</sup> One of the most economical public health strategies to reduce child morbidity and mortality is a complete course of vaccinations against devastating diseases. Vaccinations are an important preventive child health tool as their delay increases the susceptibility window for vaccine-preventable diseases; therefore signifying the importance of understanding its factors and their analysis can improve immunization uptake. These vaccines not only decrease the risk of the

diseases for which they provide protection but also decrease the risk of illness and mortality from other causes.<sup>4</sup>

However, despite four decades since the initiation of the EPI Program, it has come across various problems, such as lack of parental literacy, awareness, and socio-economic discrepancies resulting in significant inconsistency in immunization uptake in different areas of the world with lower coverage among children. These occurrences can however be termed vaccine hesitancy. In Pakistan, 15% of the population under five years of age makes up for 50% of the mortality rate. It also has the third-highest burden of mortality.<sup>5</sup> In 2015, 19.4 million children missed out on basic vaccination around the globe.<sup>6</sup> According to WHO, Pakistan ranks third amongst the countries with the highest number of unvaccinated and under-vaccinated children. Of the 3.8 million infants who did not receive their third dose of the DTP3 vaccine in the region in 2015, 40% of those were in Pakistan.<sup>2</sup> Pakistan Economic Survey 2020-21, mentions Pakistan has a low female adult literacy rate of 46.5% (10). In Sindh 44 percent and in Karachi only Karachi's Central District spotted 81.13 percent female are literate, other districts have less than 50 percent rate. This is the very challenging and worrying situation that in spite of so much immunization efforts, they have failed to achieve national and international standards of Vaccination Uptake. The main and primary reason is the maternal education.

Literacy is one of the key aspects of human resource development of the country. Women, who contribute half of our population have the dubious, distinction of maintaining a lower profile in many social, educational and economic aspects.<sup>12</sup> The female adult literacy rate has been defined as the percentage of the female population that can read and write aged 15 and above.<sup>11</sup> The reasons of female illiteracy are many such as socioeconomic and religious, lack of MCH information source, poverty, lack of awareness, family pressure.<sup>7</sup> Maternal illiteracy is the great challenge for the prevention and promotion of healthy life of our future nation. Unawareness adversely affects the child vaccination status via the capacity to obtain, process and understand basic information on the benefits and risks associated with child vaccination, which, in turn, lead to poor adherence to the recommended vaccination schedule, children develop many communicable diseases which may lead to be fatal. Timely and complete course according to the EPI schedule is the key to protect child from many vulnerable and potentially deadly diseases.<sup>8,9</sup>

Since existing literature regarding how different levels of education influence immunization coverage in children is limited in Karachi, this study aims to fill this gap in literature so that this factor can be given more importance and further focus on maternal literacy can make immunization in children more efficient.

## **METHODOLOGY:**

The present research was a cross-sectional study. The study was approved by the Ethical Review Committee of Bahria University Health Sciences Campus, Karachi (ERC number is 40/2021). It was carried out through online survey. The sample size for this study was calculated from StatCalc sample size calculator tool with 95% confidence level and 5% margin of error. The calculated sample size of the study was 369. Before the start of survey, consent was taken from all the participants. Total number of responses received was 446 and finally the valid number of responses among these was 294. Random sampling technique was applied and each respondent was given equal chance of selection. All mothers which have their children aged at least 24 months and who gave consent were our participants and those who had a child with an age of less than and above the age of 24 months and mothers who did not give consent. were excluded from the study. The web-link of the survey questionnaire was shared by the help of text-based instant messaging (WhatsApp). The study was conducted through a period of 4 months from May 2021 to August 2021. The recruited participants were then identified as incomplete child vaccination and also the determinants associated with level of education were noted. The subjects were asked to complete a 22 structured closed-ended questionnaire, the questionnaire was designed and available in both English and Urdu Languages for the ease of use of the subject. The answers were recorded accordingly to reduce bias in the study. It was designed in an online format using Google Forms. Questions were asked regarding socio-demographic, maternal level of education, immunization status. Data was received in the form of excel spreadsheet, was entered and analyzed by using Statistical Package for Social Sciences (SPSS), version 26. Analysis was carried through descriptive statistics to calculate the frequency and percentages of main variables like age, qualification, infant gender, maternal knowledge of immunization, vaccination card, access to health care facilities, socioeconomic status. Multi-variable analysis was done using the Chi-Square test to assess the association of different levels of education with or without complete immunization in children less than 2 years of age. With all variables, the results were considered as significant when p value was =0.05.

## **RESULTS:**

A total of 270 responses were recorded from mothers of various socio-economic statuses in Karachi. Of the respondents, 10% (27) had no formal education, 14.1% (38) had completed primary school, 25.2% (68) had completed secondary school, and 50.7% had graduated from school (Higher). This made a literacy rate of 75.9%. We've defined the criteria for literacy rate as those who have completed secondary school as they can efficiently read and write. Children of those who had no formal education had an

immunization rate of 74.1%, primary education showed 81.6% and secondary education showed 83.8% and higher education showed an immunization rate of 92.7% showing that as the level of education increased percentage of children vaccinated increased from 74.1% to 92.7%. This can also be seen in Table 1. 87% (235) had completed their child’s immunization under 24 months while 13% had not completed it. 87% (235) had a vaccination card belonging to their child whereas 13% did not have it. 71.9% (194) were educated about vaccines while 28.1% (76) were not. 69.3% (187) knew what childhood immunization under 2 years consisted of while 30.7% (83) did not know. 30.9% (64) of those who were educated about childhood immunization were educated by the hospital, 22.2% (46) by their school, 13.5% (28) by their families, 12.6% (26) by television, 9.7% (20) by literature, and other minor sources have been mentioned in Figure 1. One of the main reasons for not getting their child

employed 4% (12) were unemployed, and 0.7% (2) were students. 94.8% (256) of respondents have access to basic healthcare facilities while 5.2% (14) did not. 82 (30.4%) gave birth in Government Hospital, 17 (6.3%) had a home birth, 3 (1.1%) in Military Hospital, 1(.4%) in Naval Hospital, 167 (61.9%) in Private Hospital. 70.7% (191) strongly agreed that vaccination protects their children from diseases. 22.6% (61) agreed. 5.6% (15) were neutral, 0.7% (2) disagreed, and 0.4% (1) strongly disagreed.

**DISCUSSION:**

Child immunization is a very important method of protection against a range of illnesses such as polio, rabies, measles, and tuberculosis. Hence, the discussion of the factors influencing vaccination coverage among children of age below 24 months and how we can improve and sustain the immunization rate. One such factor found to be a major determinant is maternal education and assessing its effect on complete child immunization has been the main focus of this study.

In our study, the 47% mothers did not get their child vaccinated due to a lack of awareness. Another study conducted in Pakistan also showed that the most common reason for un-vaccination was mothers/caretakers lacking awareness of the need for vaccination (35.3%).<sup>14</sup> Another study from India also revealed that 20.4 % of the unvaccinated population in the urban area of Kirti Nagar was due to the low level of maternal education status.<sup>15</sup> A study from Canada also showed that the main reasons for un-vaccination were fears regarding vaccine safety (56.4%) and philosophical or religious reasons (32.8%).<sup>16</sup>

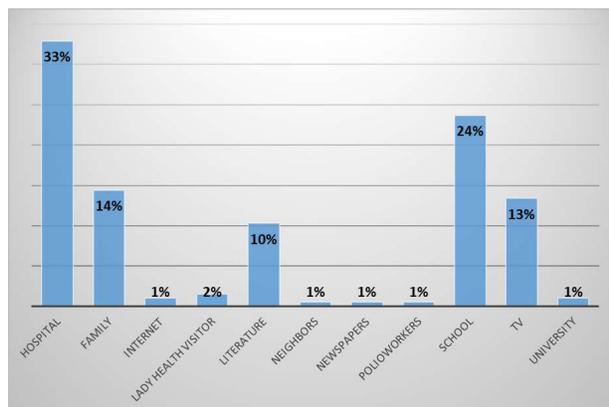
In our study, it could be seen that the major source of knowledge regarding vaccines was the hospital (30.9%) and then the school (22.2%). This is also seen in other studies in Pakistan.<sup>17</sup> Some studies in Pakistan have also shown healthcare workers to be the main source.<sup>18,19</sup> However, in a study in East Asia, media in the forms of television, internet, and radio was a major predictor of increased vaccination.<sup>20</sup> This shows that we should emphasize media more to deliver immunization information more efficiently.

Our studies showed that as education increased from no formal education to a higher level of education (12+), complete immunization in children increased from 74.1% to 92.7%. This pattern has been seen in several developing countries like Pakistan. A similar study conducted in Turkey which is a developing country showed that mothers who completed 8 years of schooling increased the likelihood of receiving the third dose of these vaccines for DPT and Hepatitis by 55% and 92% respectively.<sup>21</sup> In Nepal, the rate of full vaccination uptake showed a clear rise with increasing maternal education from no formal education showing a 67.8% uptake rate to higher education showing a 91.2% uptake rate.<sup>22</sup> Studies from Southern Israel also showed that every year mothers who are not educated, approximately 4-

Table1: Association of child vaccination at different levels of maternal education

		Child complete vaccination		P-Value
		Yes n (%)	NO n(%)	
Mother’s level of Education	No formal education	20(74.1%)	7(25.9%)	0.017
	Primary	31(81.6%)	7(18.4%)	
	Secondary	57(83.8%)	11(16.2%)	
	Higher	127(92.7%)	10(7.3%)	

Figure 1: Information Regarding the Source of knowledge of Mothers of Under Two Children



vaccinated was due to lack of awareness (47%). Other minor reasons for un-vaccination included: Lack of transport, accessibility, and fear of side effects. The statistical test used was Fisher Exact Test. The value of ‘a’ (alpha) was set at 0.05 for significance. Fisher Exact Test gave a “p” value of 0.017 which is less than “a” value of 0.05 showing that the null hypothesis is rejected hence the relationship between maternal education and child immunization is significant. The result can also be seen in Table 1. 74.4% (201) of the respondents were housewives, 15.2% (41) were employed, 5.2% (14) were self-

9% of those mothers delay or skip their children vaccination schedule.<sup>23</sup> On the other hand in Bangladesh, full vaccination coverage increased progressively with greater maternal education.<sup>24</sup>

Another study conducted in Sindh, Pakistan showed that mothers who had an education level of secondary or higher exhibited significant odds ratios (OR, 1.37; 95% CI, 1.04–1.80).<sup>7</sup> A study conducted in Karachi showed there was also a noteworthy association (p-value < .001, Cramer's V= 0.249) found between the level of education and parental perception of vaccination being important for their child.<sup>5</sup> Moreover, In Japan, mothers with a high health knowledge (aOR: 1.337; 95% CI: 1.096–1.631) and high decisional ability (aOR: 1.391; 95% CI: 1.075–1.800) had a higher likelihood to immunize their children.<sup>20</sup> Similar studies conducted in Ethiopia showed that women who had completed their formal education had a 2.45 times greater likelihood to immunize their children as compared to those who had no formal education (OR = 2.45; 95% CI: 1.62–3.72) (25). Furthermore, another study in Nigeria suggested that there is a positive correlation between maternal education and reduction in childhood mortality (PR =1.44; 95% CI: 1.16-1.77).<sup>4</sup> Finally, a meta-analysis of multiple studies in various countries also showed that increasing maternal education increased the overall frequency of vaccination uptake by 57.8% (95% CI: 52.4–63.1) (26).

## CONCLUSION:

The study had shown that the children of mothers with a higher level of education were associated with a higher likelihood of being fully vaccinated than children of mothers with a lower level of education.

### Authors Contributions:

**Usman Saeed:** Literature Review, Data Analysis and Interpretation  
**Asra Saeed:** Literature Review, Data Collection  
**Sandia Matani:** Literature Review, Data Collection  
**Iram Shahzadi:** Literature Review, Data Collection  
**Hooriya Saeed:** Major Data Collection, Minor Literature Review  
**Fareeha Shahid:** Guidance, Supervision, Correspondence

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