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PREVALENCE AND FACTORS AFFECTING THE IMMUNIZATION STATUS IN CHILDREN OF DISTRICT PESHAWAR: A COMMUNITY BASED STUDY

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Abstract

Aim: To investigate the prevalence of immunization and investigate the factors affecting immunization status of children of district Peshawar.

Methods: A cross-sectional study designed was adopted to conduct the research. The source of population of the current study was all mothers visiting Hayatabad Medical Complex (HMC), Peshawar and having children aged 12 to 24 months. A sample of 151 participants, from the population was collected based on convenient sampling technique. The data of the current study was collected through a structured questionnaire having questions regarding demographic information. The prevalence of the immunization was investigated through collecting information regarding selected vaccines, while vaccine availability factors and accessibility related factors were analyzed as factors affecting immunization status. Descriptive statistics was used to analyze the data. Bivariate analysis was conducted to identify the prevalence and factors associated with the immunization status among children. All the analysis were conducted through SPSS.

Results:The study found high immunization rates, with 93.4% for BCG, 98.0% for OPV, 90.7% for Pentavalent, and 86.1% for Measles vaccines. Significant factors affecting immunization include missed doses (22.5%, p=0.000), waiting times (p<0.05), motivation (86.1%, p=0.000), and awareness (98.0%, p=0.010). Proximity to health facilities (<1 km, p=0.012) also impacted vaccination rates.

Recommendations: The results of the study recommends that there is a need for enhanced awareness programs for the reason to bring improvement in the vaccination rates.

Keywords: *Immunization,* HMC, BCG Vaccine, OPV, Pentavalent Vaccine (DPT, Hepatitis B, Hib), Measles Vaccine

Introduction

The World Health Organization (WHO) defines immunization as the procedure by which an individual develops immunity to an infectious disease (1). In public health, immunization is among the most cost-effective ways to shield children from dangerous illnesses and stop the transmission of such diseases to other people (2). The World Health Organization (WHO) launched the Expanded Program on Immunization (EPI) in 1974 with the goal of reducing child mortality and morbidity via the development and expansion of immunization systems globally (3).

As childhood vaccination rates have improved, the world's morbidity and death rates from illnesses that may be prevented with vaccines have gone down in recent years (4). Every year, 1.5 million children under the age of five die from illnesses that may be prevented with vaccines. By the end of 2011, it was estimated that immunization has prevented the deaths of two to three million children. In 2007, there were around 27 million documented cases of unvaccinated children less than one year old, with measles being the most common. Also, of the approximately 5.2 million children worldwide who die between the ages of one and 59 months, 29% are slain by illnesses that may have been prevented with vaccines (5, 6).

Between 2000 and 2007, the number of deaths caused by measles dropped by 74% globally and 89% in Asia. A staggering 19.9 million children under the age of one did not receive routine immunizations like pentavalent, measles, and polio shots. Of this number, approximately 60% reside in just ten countries: Pakistan, India, South Africa, Ethiopia, Democratic Republic of the Congo, Angola, Nigeria, Indonesia, Iraq, and Afghanistan (7). The probability of fully immunizing children may be influenced by a multitude of factors, as highlighted in the extensive literature on the topic. These include the mother's age, the child's gender, the mother's educational status, whether or not she has an immunization card, accessibility concerns, worries about vaccine availability, and many more (8, 9). About 13% of children in developing countries who were 12–23 months old had gotten all recommended vaccinations, according to the demographic health survey 2020 (SHDS-2020), whereas 68% had not (10).

There was a disparity in the vaccination rates among children under the age of five: 31% had got the BCG vaccine, 32% had received pentavalent 1, 15% had received pentavalent 2, and 13% had received pentavalent 3. However, 32% of children had gotten polio 0 vaccinations, 32% had received polio 1 vaccinations, 16% had received polio 2 vaccinations, and 15% had received polio 3 vaccinations. However, prior to the poll, around 15% of children had been vaccinated against measles (11).

Understanding why some parents choose not to vaccinate their children and what factors contribute to this decision is crucial for improving childhood immunization rates. Evidence on immunization coverage among children under five in the research region is currently lacking (12, 13). Therefore, the purpose of this research was to investigate the prevalence and contributing factors that influence immunization coverage among Pakistani children aged 12 to 24 months. In order to achieve the desired goal of preventing and controlling vaccine-preventable illnesses, it will assist policy makers, program implementers, and service providers in removing barriers and improving child immunization coverage. It will also be used as a starting point for similar investigations in the future.

Research Objectives

Below were the study objectives.

- To investigate the prevalence of immunization in children of district Peshawar.
- To analyze the factors affecting immunization status of children of district Peshawar.

Materials and Methods

A cross-sectional study was conducted to involving collection and analysis of the data at single point in the time to investigate the prevalence and factors affecting immunization status of children of district Peshawar. The present research was carried out in Peshawar, at the Hayatabad Medical Complex (HMC). The source of population of the current study was all mothersvisiting Hayatabad Medical Complex (HMC), Peshawar and having children aged 12 to 24 months. This research included all mothers who were attending HMC with children throughout the data collecting procedure and were between the ages of 12 and 24 months. Excluded from the research were individuals who either refused to participate or did not provide the necessary permission.

The sample from the population was collected based on convenient sampling technique. While the sample size of total 151 participants was determined as given below;

$n_0=Z^2p(1-p)/e^2$
n_0 = Sample size
Z =Z-value i.e., 1.96
p = 0.5 for maximum variability
e is = 0.05
$n_0 = (1.96)^2x\ 0.5\ x\ (1-0.5)/\ (0.05)^2$
n_0 = 384.16

As the number of the total population was limited, the formula for finite population adjustment was used as below;
$n = n_0/1+ n_{0/N}$
where the anticipated population is 250 and N is the size of the population;
n = 384.16/1+ 384.16/250 = 151
n = 151
so total sample size considered in this study was 151.

The data of the current study was collected through a structed questionnaire having questions regarding demographic information. The prevalence of the immunization was investigated through collecting information regarding selected vaccines, while vaccine availability factors and accessibility related factors were analyzed as factors affecting immunization status, as presented below.

Table1: Measurement

Category	Short Description	Variables
Demographic Data	Collects Demographic information about the child and mother	Age, Gender, Place of delivery, Age of the mother, Highest education level, Occupation, Family type.
Prevalence of Immunization	Assesses the child's vaccination history	BCG Vaccine, OPV, Pentavalent Vaccine (DPT, Hepatitis B, Hib), Measles Vaccine
Availability-Related Factors	Examines factors related to the availability of vaccines at health facilities.	Missed doses, Waiting time at the facility, Motivation to return for vaccination
Accessibility-Related Factors	Investigates awareness and access to health facilities for immunization.	Awareness of immunization importance, Distance to the nearest health facility

The data was gathered by means of a predetermined survey. To characterize the data, descriptive statistics were used. The prevalence and variables related with children's immunization status were identified using bivariate analysis. All the analysis were conducted through SPSS.

Results

Table2 of the current study presents the demographic results of the analysis.

Demographics	Category	(n)	(%)
Age of the child (in months)	12-17 months	47	31.1%
	18-24 months	56	37.1%
Gender of the child	Male	81	53.6%
	Female	70	46.4%
Place of delivery	Home	41	27.2%
	Hospital	110	72.8%
Age of the mother	<25 years	28	18.5%
	25-40 years	95	62.9%
	40+ years	28	18.5%
Highest education level of mother	No formal education	10	6.6%
	Primary education	40	26.5%
	Secondary education	46	30.5%
	Higher education	55	36.4%
Current occupation of the mother	Employed	71	47.0%
	Unemployed	80	53.0%
Type of family	Nuclear	57	37.7%
	Joint	94	62.3%

Table 2 shows that 31.1% of the children are aged between 12-17 months, and 37.1% are aged between 18-23 months.53.6% of the children are male, while 46.4% are female.

The majority of mothers (62.9%) are aged between 25-40 years, which is typical for childbearing. A smaller proportion are younger than 25 years (18.5%) or older than 40 years (18.5%), reflecting the common reproductive age range.Most mothers have at least primary or secondary education, with 26.5% having completed primary education, 30.5% secondary education, and 36.4% higher education.A majority (53.0%) of the mothers are unemployed, while 47.0% are employed.

The sample predominantly consists of 62.3% joint families, while 37.7% of families are nuclear.Most children (72.8%) were delivered in a health facility, ensuring proper medical care, including immunizations. Only 27.2% were born at home, which might limit access to timely healthcare interventions.

Table 3 of the study presents the results of the prevalence of the immunization.

Vaccine	Yes (n=151)	No (n=151)	Percentage (%) Yes	Percentage (%) No	P Value
BCG Vaccine	141	10	93.4%	6.6%	0.000
OPV (Oral Polio Vaccine)	148	3	98.0%	2.0%	0.192
Pentavalent Vaccine	137	14	90.7%	9.3%	0.000

Vaccine	Yes (n=151)	No (n=151)	Percentage (%) Yes	Percentage (%) No	P Value
Measles Vaccine	130	21	86.1%	13.9%	0.000

- Table 3 shows that 93.4% of children received the BCG vaccine, and only 6.6% did not. This shows a very high coverage for the BCG vaccine.
- 98.0% of children received the OPV vaccine, with only 2.0% not vaccinated. This indicates strong coverage in polio vaccination, which is a key public health goal.The p-value of 0.192 indicates that there is no statistically significant difference in vaccination rates across various demographic factors.
- 90.7% of children received the Pentavalent vaccine, which includes DPT, Hepatitis B, and Hib vaccines, while 9.3% did not. 86.1% of children received the Measles vaccine, with 13.9% not vaccinated.
- The p-value of 0.000 for BCG, Pentavalent, and Measles vaccines indicates that there are statistically significant differences in vaccination rates while the p-value of 0.192 for OPV suggests that there is no significant variation in OPV vaccination rates across demographic groups, indicating that polio vaccination efforts are likely consistent and widespread.

Table 4 presents the factor affecting immunization status of the children

Factor	Yes (n=151)	No (n=151)	Percentage (%) Yes	Percentage (%) No	P Value
Has your child ever missed a vaccination dose?	34	117	22.5%	77.5%	0.000
How long did you wait to receive the vaccine at the health facility?					
- Less than 30 minutes	85	-	56.3%	-	0.001
- 30 minutes - 1 hour	50	-	33.1%	-	0.054
- More than 1 hour	16	-	10.6%	-	0.045
Was there any motivation for you to return for additional vaccinations?	130	21	86.1%	13.9%	0.000
Are you aware of the importance of childhood immunization?	148	3	98.0%	2.0%	0.010
How far is the nearest health facility from your home?					
- Less than 1 km	90	-	59.6%	-	0.012
- 1-5 km	50	-	33.1%	-	0.243
- More than 5 km	11	-	7.3%	-	0.168

- Table 4 presents that 22.5% of children missed at least one vaccination dose, while 77.5% did not. 56.3% of respondents reported waiting less than 30 minutes for vaccinations, 33.1% waited 30 minutes to 1 hour, and 10.6% waited more than 1 hour.
- 86.1% of respondents were motivated to return for additional vaccinations, while 13.9% were not. This indicates that motivational strategies have been effective in encouraging parents to follow through with subsequent doses.98.0% of respondents reported awareness of the importance of childhood immunization, while 2.0% did not.
- 59.6% of families live less than 1 km away from a health facility, 33.1% live 1-5 km away, and

7.3% live more than 5 km away. Proximity to health facilities is a key factor in ensuring timely vaccinations.

- Factors like missed vaccinations, waiting time for vaccination, motivation for additional vaccinations, and awareness of immunization importance all show statistically significant results with p-values below 0.05, highlighting their strong role in affecting immunization rates.
- However, the distance from the health facility (1-5 km and more than 5 km) had insignificant p-values, indicating that it may not be as influential in this context, or other factors could be compensating for the distance.

Discussion

The above results present several factors that affect the immunization status of the children aged 12 to 24 months. The results shows that most of the children receives BCG, OPV, Pentavalent, and Measles vaccines, showing high coverage rates. Although the waiting time at the health facility and motivation for additional vaccinations were significant contributors to vaccine adherence (14, 15). Similarly, the results shows that Awareness of immunization and proximity to healthcare facilities also played a role, with significant factors impacting immunization status. These results are consistent with previous studies (16). Research conducted in Bangladesh and Kenya has reached similar conclusions, where research was carried out in major cities like as Peshawar (17). This may be related to the fact that mothers in the country's developed cities have more first-hand knowledge of the value of childhood immunization than those in less developed places. Those who gave birth in hospitals had a better rate of immunization coverage than those who gave birth at home (18, 19). This result is consistent with research that was carried out in both Ethiopia and Kenya. This could be because health care providers are more likely to educate new mothers about the need of immunization if the delivery took place in a medical institution. According to this research, individuals who waited less time had better immunization coverage (20).

There is a difference between this research and the one conducted in Ethiopia. The absence of health care professionals, the distance to health facilities, and parents' lack of understanding regarding childhood immunization might all be contributing factors (21). Nearly all of the people who took part in this survey were knowledgeable with childhood immunization. This result is in line with what researchers in Ethiopia and Nepal found. One probable explanation is because most of the people who take part in the research give birth in hospitals, so they already have easy access to medical professionals (22). According to research, BCG, pentavalent, and measles vaccination rates are higher among women who recall receiving childhood immunizations. This high degree of understanding is in line with previous research in Somalia and Nigeria. It's possible that this is because many of the children were born in hospitals and received their vaccinations there (23, 24). Study participants' risks of contracting measles were greater among working mothers than among non-working mothers. This confirms the results of an Ethiopian research. This could be because the mother's health-seeking behavior increased as her employment level improved (23).

Conclusion

The study revealed high immunization coverage, with 93.4% of children receiving the BCG vaccine, 98.0% the OPV, 90.7% the Pentavalent vaccine, and 86.1% the Measles vaccine. Statistically significant factors influencing immunization include missed doses (22.5%, $p=0.000$), waiting times ($p<0.05$), and motivation for follow-up vaccinations (86.1%, $p=0.000$). Awareness of immunization importance was high (98.0%, $p=0.010$). Proximity to health facilities showed varying significance, with the nearest facility being less than 1 km influencing vaccination rates ($p=0.012$). These results highlight key factors for improving immunization rates.

Recommendations

The results of the study recommends that there is a need for enhanced awareness programs for the reason to bring improvement in the vaccination rates. Similarly, the knowledge about the vaccines to the parents, especially regarding Measles and Pentavalent vaccines, is needed to be provided. The waiting time in the health facilities for provision of the vaccines should be managed to provide more facilitation to the parents. Additionally, improving access to healthcare services, particularly in areas beyond 1 km from health facilities, could support better immunization coverage.

Limitations of the study

There are several limitations in the current study which need to be addressed in further studies. This includes that data was collected from a single hospital, while to get more diverse results, the data may be collected with surveys. Moreover, the analyzed relied on structured questionnaire, while future studies may conduct interview and medical tests to get more accurate results.

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