Prevalence And Determinants of Missed Childhood Vaccination Among Infants Between 0-23 Months At THQ Shakargarh, Pakistan

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Abstract

Objective: To determine the prevalence and the risk factors of missed immunization among infants between 0-23 months at Shakar Garh, Pakistan.

Material and Method: This is a cross-sectional descriptive-analytical study. The sample of 334 participants was selected through stratified random from the area of Shakarghar. The immunization data was collected through the parents or guardians of the children. The information regarding demographic variables and risk factors was collected through a self-developed questionnaire. The data was entered into SPSS for analysis. Descriptive analysis, Chi-square, and regression analysis were applied to the data.

Results: Our findings showed that the adjusted prevalence of missed immunization is 32%. The prevalence of missed immunization decreased with good knowledge about immunization. A multivariate logistic regression analysis indicated that parents' education, income level, access to TV, radio, and internet, distance from a health care facility, the attitude of health workers, and rural lifestyle were risk factors for missed immunization, $p<0.05$.

Conclusion: Nearly one-quarter of infants in the study area were missed their immunization. Parents' education, income, access to technology, and the attitude of health workers are all important factors in determining partial and un-immunization. So in countries like Pakistan, the health system should focus on increasing health workers' communication skills to reduce vaccine-preventable diseases, especially in low-resource areas.

Keywords: immunization, missed, partial, complete, risk, factor

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Introduction

Immunization is the procedure whereby a individual is ended protected or resilient to an transferable illness, classically by the administration of a vaccine.[1] Childhood immunization is one of the most important public health measures for reducing deaths among children under age of five. As a result, WHO started the Expanded Programme on Immunization (EPI) in May 1974 to combat vaccine preventable diseases (VPD).[2] However, VPD such as diphtheria, tuberculosis, tetanus, pertussis, polio, and measles occurred internationally due to incomplete and non-immunization of children, which still accounts 8.8 million deaths per year in children under 5 years. World Health Organization (WHO) lays tremendous importance on lifelong vaccination. It is the key value of Sustainable Development Goals. The WHO also established Global Vaccine Action Plan in 2012. The strategy intends to avoid millions of deaths globally by raising immunization rates and availability of vaccine by the year 2020. One of its essential aspects is to eliminate polio from the world completely.[3] Vaccines are complex substances that elicit the immunogenic response when given to humans. The first vaccine was produced

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by Edward Jenner in 1796 for the elimination of smallpox. In 1980 smallpox was declared eradicated worldwide.[4] Due to vaccination, immune complex is formed which is a complex network of organs, cells and proteins that defends the body against infection& protecting the body's own cells. The immune system keeps a record of every germ (microbe) it has ever defeated so it can recognize and destroy the microbe quickly. There are two type of immunity, active& passive. Naturally occurring immunity& induced immunity are two different things. A person's vaccination is considered artificial active immunity, whereas passive immunity occurs when antibodies are transferred. On the other hand, natural immunity results in active immunity against infection and passive immunity from the mother's antibodies to the infants.[5]

A child's required vaccines should be administered by the time they turn one, and the shots should be documented on the vaccination card which is handed over to the parents. There are 12 VPD that children are covered. These vaccinations include; polio, TB; whooping cough; diphtheria; tetanus; hepatitis B, measles; Haemophilus; Hepatitis C; and Rota. UNEP's goal is that "every kid" must be vaccinated against the target diseases.[6]

In Pakistan EPI programme was launched in 1978. According to this schedule children were vaccinated against polio, diphtheria, pertussis, tuberculosis, and measles. Later, by the provision of development associates, a numeral of novel vaccines e.g. hepatitis B, haemophilus influenzae type b (Hib) and pneumococcal vaccine (PCV10) were familiarized in 2002, 2009 and 2012, and injectable polio vaccine in 2015. The EPI aims also to protect mothers and newborn against tetanus. The programme also added rotavirus vaccine in 2017, which will prevent the children against diarrhoea.[7] In 1983, the WHO's Expanded Program on Immunization (EPI) Global Advisory Group (GAVI) advised that children be immunized at every opportunity.[8]

Table 1: *Pakistan's EPI vaccination schedule* [9]

Disease	Causative agent	Vaccine	Doses	Age of administration
Childhood TB	Bacteria	BCG	1	Soon after birth
Hepatitis B	Virus	Hep B birth dose	1	Soon after birth
Poliomyelitis	Virus	OPV	4	OPV0:soon after birth OPV1:6 weeks OPV2:10 weeks OPV3:14 weeks
		IPV	I II	IPV-I:14 weeks IPV-II:9 Months
Diphtheria	Bacteria	Pentavalent vaccine (DTP + Hep B + Hib)	3	Penta1:6 weeks Penta2:10 weeks Penta3:14 weeks
Tetanus	Bacteria			
Pertussis	Bacteria			
Hepatitis B	Virus			
Hib pneumonia and meningitis	Bacteria			
Measles and rubella	Virus	Measles and rubella (MR)	2	MR.1:9 months MR.2:15months
Diarrhea due to rotavirus	Virus	Rotavirus	2	Rota1:6 weeks Rota2:10 weeks
Typhoid	Bacteria	Typhoid conjugated vaccine(TCV)	1	9, Months

In 2016, the province of Punjab had eliminated neonatal & maternal tetanus completely. According to the Pakistan Demographic and Health Survey (2012-2013) and Pakistan Social and Living Standards Measurement Survey (2014-2015) EPI coverage is 65 % to 88%. Pakistan ranks third in the world regarding the percentage of children who have not been vaccinated or are under-vaccinated. In report 2015 by WHO stated that over 4 million Pakistani newborns missed their third DTP3 dosage.[10]

VPD account for most baby and children's deaths in low & middle incomes countries. Pakistan is one of them. In countries like Pakistan, several factors influence the vaccination, which are.[11]

1. **Distance/travel conditions/access:** Distance, travel conditions and access to vaccination facilities play significant role in vaccination rates. A study conducted in Nigeria, Kenya & Liberia in which found that distance/access and travel led to 43% decrease in vaccination, while in Nigeria, Kenya and Liberia it was 30%. [12]
2. **Poor health staff motivation, performance/ competence and attitudes:** All these factors led to decrease vaccination.In Uganda 13% mothers treated rudely.[12]
3. **Lack of resources/logistics:** Vaccine shortages, problems with the cold chain &vaccine unavailability all led to partial immunity. Vaccine shortages are typically caused by a lack of funds, storage space, or poor ordering and delivery procedures.[13]
4. **Lack of parental knowledge concerning which children, when, where:** Numerous studies assume that parents would vaccinate their children if they had a comprehensive understanding of vaccine-preventable diseases& the immunization schedule.[14]

5. **Fear of side effects:** Several myths& misunderstandings like sickness of kids, child older than 12 months and the belief that underweight children should not be vaccinated due to the side effects of vaccine. Vaccination to sick child most common erroneous contraindication in numerous studies (e.g., in Kenya, Nigeria, and Pakistan).[15]
6. **Conflicting priorities:** e.g Drive large distances, Long wait for vaccinations, weddings and funerals led to miss their child's vaccinations. The postpartum period is a time when many families refuse to allow their newborns to be vaccinated.[16]

In research published in 2016, 7.73% children never immunized in Pakistan under the age of 5years. This data was taken from 2001–2002 Household Integrated Economic Survey& it was 87.4% in rural areas.[17] In another study conducted in Islamabad in 2016, it was noted that different variables are responsible for partial vaccination in Pakistani. All provinces have different immunization rates. KPK province (including FATA) had a coverage rate 38%, whereas Baluchistan had below 16%. According to reports, immunization rates are highest in Punjab and urban areas. People who don't get their children vaccinated report having a bad experience (24.7 percent) with healthcare facility staff, mistrust (34.1 percent), reporting absence of healthcare facility staff (14.1 percent), fearing the use of dirty syringes (55.3 percent), long periods of waiting (64.7 percent),[18]

In 2019 research was conducted in Sindh, Pakistan, in which factors were examined that influence the timeliness of childhood vaccination. In this research 2013-2014, MCH Program indicator Surveys were used. The participants were 1143. The research showed that 20.8% children were fully immunized on time according to the schedule& it also showed that the immunizations was not time which was varied from measles vaccines to BCG from 2.3% to 89.3 respectively.[19]

Pakistan has a significant vaccine coverage problem. This disparity can potentially be life-threatening to the general public's health. In Pakistan, for children aged 0–23 months, the current study utilized an internationally standardized instrument to determine the prevalence and variables related to missing immunizations. The results of this study will serve as a starting point for developing and executing a facility-level quality improvement program to address the issue of missing vaccinations that have been found thus far. The result of the study can improve immunization service delivery and the gaps in the existing literature by adding valuable knowledge.

Materials and Methods

Cross-sectional descriptive study was conducted at Tehsil Head Quarter (THQ) Hospital Shakar Garh district Narowal from July, 2021 to March 2022. The sample was 334, with the age of 0-23 months. The children above 23 months and who are suffering from chronic illness were excluded, The sample size was calculated using the prevalence of missed childhood vaccination as 31% taken with 5% as margin of error and 95% confidence interval by this formula

$$n = \frac{(Z^2 1 - \propto/2(1-P)}{d^2}$$

Results

Table 1 explains the frequency, percentage, means, and standard deviation of the demographic variables. Table 2 illustrates the chi-square and One-way ANOVA results to compare the groups based on immunization groups. The result was presented as a number (%) for the multiple comparisons, and the Wilcoxon-rank test was applied to check the hypothesis significance.

Discussion

A vaccination schedule must be adhered in order to

Table 2: *Frequency, Percentage, Mean, Standard Deviation of the study variables (N=334)*

Variable	Categories	F(%)	M(SD)
Age (months)	0-6	32(9.6)	18(1.91)
	7-12	134(40.1)	
	13-18	102(30.5)	
	19-23	66(19.8)	
Gender	Male	167(50)	1.5(0.51)
	Female	167(50)	
Child immunization	Unimmunized	46(14))	1.08(.83)
	Fully immunized	228(86)	
	Partial immunized	60(18)	
The nearness of the health facility	<5km	131(39.8)	1.60(.49)
	>5Km	201(60.2)	
Socio-economic status	Lower	134(40)	2.14(.79)
	Middle	116(34.7)	
	Higher	84(25.1)	
Residential area	Urban	201(60.2)	1.62(.45)
	Rural	133(39.8)	

Note: F=frequency, %= percentage, M=Mean, SD=Standard Deviation

Table 2: *Characteristic of subjects according to immunization status (N=334)*

Variables	Categories	FI (228)	MI (106)	p-value
Childbirth	Hospital	228(100)	56(53)	.00
	Home	0	50(47)	.01
Immunization card	No	0	71(66)	.02
	Yes	228(100)	34(44)	0.03
Received vaccines	At birth	228(100)	51(48)	
	6 weeks	228(100)	48(45)	0.01
	10 weeks	228(100)	45(42)	0.01
	14 weeks	228(100)	39(37)	0.01
	9months	228(100)	37(34)	0.00
	15months	228(100)	32(30)	0.02
	23month	228(100)	28(26)	0.01
BCG marks	Yes	228(100)	53(50)	.01
	No	0	53(50)	.00
Why child miss their vaccine	Did not know about vaccine when due		5(4)	0.05
	Did not know where to get the vaccination		-	
	Nobody informed me		-	
	I have no time		20(18)	0.03
	I don't believe in its effectiveness		1(0.09)	
	Against religious belief		10(9)	0.07
	Child was sick		60(57)	0.01
	Don't trust on government			
	The staff was not cooperative		10(9)	0.02
	The staff did not know how to work			0.03
Did you ever refuse about vaccinate the child	Yes		66(62)	.00
	No	228(100)	40(38)	.02
Refusing reason	Vaccine out of stock		15(37)	.01
	Queue was long		15(37)	.01
	Non-cooperative staff		10(9)	.04
The health worker asked for the card	Yes	190(83)	36(34)	0.00
	No	38(17)	72(68)	
Health worker attitude	Poor	30(13)	40(38)	.01
	Average	150(65)	70(66)	.00
	Good	48(19)	20(19)	.02

Note: FI=Fully Immunization, MI= Missed Immunization, p<0.05

avoid illness. The primary focus of the study was on infants under the age of 23 months. At birth, 270 (83%) of the infants were vaccinated on time, which may be due to the required immunization of newborns before they were released from the hospital. Missed vaccinations accounted 17% of all cases in this investigation.[20] Findings of this study were similar to studies from Minjar-Shenkora district (34.4%),55 Gondar city (24.3%), and Addis Ababa (17.7 percent). But the present figure was greater than those from Ethiopia's Debre Markoss and Ghana's Techiman Municipalities, which reported 8.3% and 5.2%, respectively.[21] The gap may be due to children in the current research were from rural areas, whereas in the previous studies, children were from urban areas. The lack of health services in rural areas has been reported to discourage vaccine uptake. The challenges faced in getting to healthcare facilities are important hurdles to completing child immunization. The same thing has been found in Nigeria. It was more likely that mothers in rural regions were impacted by social beliefs, considerable distance & health care facilities, lack of vaccine information lead to inadequate vaccination &non-compliance,[22] The study conducted in Jaddah Saudia Arabia in 2019 it was found that 59.3% lack of vaccination was due to sick child & 21.3% were due to long travelling. In another study conducted in 2017 at King Abdulaziz University Hospital in Jeddah found that the most prevalent cause of delayed vaccination was difficulty getting an appointment (30 %).[23]

In study conducted in Mansoura district Egypt noted that no caregivers refused to immunize the children& 10% delayed immunization was due to deficient information regarding the child may get a disease due to non vaccination 72%, vaccine are necessary to protect the child 91%& vaccine are safe 85%. Uptake of vaccination services is dependent not only on the quality of these services but also on other factors including attitude of the parents & healthcare workers.[24]

Conclusion

The study indicated that incomplete vaccination rates remain above the acceptable threshold. According to mothers, the immunization schedule has been postponed/omitted due to maternal social involvement and illness in the mother and/or child. Because of this, extensive health education and action on the identified fundamental issues are necessary to promote full immunization. Expanding ANC and educating parents on vaccination schedules and the dangers of incomplete immunizations are two of our top recommendations.

Conflict of Interest *None*

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Authors Contribution

MT: Conceptualization of Project
A: Data Collection
A: Literature Search
MT: Statistical Analysis
MT: Drafting, Revision
R: Writing of Manuscript