EXPLORING THE STATUS AND DETERMINANTS OF ROUTINE EPI IMMUNIZATION AMONG CHILDREN IN SOUTHERAN DISTRICT OF PUNJAB

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ABSTRACT

***Objective*:** The objective of this study was to explore the status and demographic determinants of completion rates of routine EPI immunization among children in District Bhakkar.

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted, from April to July 2017, at the District Headquarter Hospital (DHQ) in Bhakkar district.

Material and Methods: Data was collected through non probability convenience sampling. All parents of children between the age of 18 to 24 months visiting the pediatric outpatient department of DHQ Hospital Bhakkar were interviewed. They were asked about the status of vaccination of their children and adherence to routine EPI schedule using a pretested questionnaire. All data were analyzed in SPSS v.20.

Results: A total of 961 respondents agreed to participate in this study. A majority of the children were females and belonged to the rural areas of Bhakkar. A total of 342 (35.59%) children were unvaccinated. Out of these 342 unvaccinated children, a total of 209 children (61.11%) were partially vaccinated while the rest (n=133, 38.89%) had received no vaccination at all.

Conclusion: In Southern Punjab, a high percentage of children was partially or completely unvaccinated. Those children who were females and belonged to rural households were more likely to be unvaccinated than their counterparts. The main barriers to vaccination were unavailability of vaccinators, ignorance of the importance of vaccination, irregularities in documentation and poor administering practices.

Keywords: Children, EPI schedule, Immunization, Pakistan, Vaccination.

INTRODUCTION

In recent decades, immunization programs in low and middle income countries (LMIC) have garnered attention as an effective public health strategy to curb pediatric communicable diseases. Routine immunization prevents illness, disability and mortality from vaccine preventable diseases. Therefore, numerous educational interventions and infrastructure development in these countries have helped improve vaccination seeking attitudes and practices among the general public[1].

Owing to the immunization programs against common pediatric illnesses, a substantial decrease in child mortality has been observed from 12.6 million in 2001 to 6.3 million in 2013[2]. Unfortunately, almost all of these deaths occurred in LMIC that lag behind in achievement of the Millennium Development Goals (MDGs)[2]. It is recommended by the World Health Organization that routine immunization coverage should be at least 90%, while the global rates have stalled at 86%, with basic vaccines inaccessible to large masses[2]. Hence, estimating coverage rates for immunization is a sensitive indicator of the health of a population and the capacity of a health system to deliver basic and essential health services.

Although the national vaccination programs have improved the rates of immunization in Pakistan as well as the other LMIC, satisfactory results are yet to be achieved. Pakistan social and living standards measurement (PSLM) dataset provides useful insights into the pattern of immunization in Pakistan[3]. According to it, the

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Human Opportunity Index to reduce child mortality in Pakistan has significantly increased from 50.4 index points in 2001 to 64.1 in 2011. Moreover, Pakistan's commitment to the achievement of millennium development goals (MDGs) has led to a significant improvement in immunization coverage against measles for children under 5 years of age. Immunization coverage against measles improved from 52.10% of pediatric population to 67.25% in 2012-2013, with Punjab reporting the highest completion rates[3]. Similar trends have been noted for immunization against all other major diseases, with Pakistan requiring at least 17.2 years to achieve the MDG of reducing childhood mortality[3].

Surprisingly, the estimates of immunization coverage rates vary with different data reporting agencies[4]. For instance, the government agencies provide an over estimated completion rates of immunization than independent investigators and agencies[4]. In this context, Khowaja et al survey in the Matiari district revealed that only 75% of the children were fully immunized which was significantly lower than that reported in the administrative reports (85%)[4]. Furthermore, this survey had also suggested disparities in rates of immunization in rural areas and the lower socioeconomic strata of Pakistan[4].

Several studies have explored the factors associated with low coverage rate of immunization in the rural Pakistan. For instance, Khowaja et al., found that parental awareness about the need of subsequent doses of vaccines resulted in a 4 times higher likelihood of complete vaccination coverage than their counterparts[4] and the mothers of unvaccinated children were 12 times more likely to have wrong ideas about the contraindications of vaccines than their counterparts[4]. Greater distances from vaccination centers also yielded significant association with poor vaccination coverage in the Matiari district[4].

In addition to these consumer-level factors, maternal education and empowerment, provision of better infrastructure and political support, involvement of lady health workers in spreading EPI immunization awareness, better training of healthcare and administrative personnel and their strict supervision have also been reported to be plausible predictors of improved vaccination coverage in various districts in Pakistan[1,5–7].

Previous studies report major disparities in provision of resources and immunization coverage rates in under-developed districts of Punjab, Pakistan[3]. Moreover, there is a dearth of data and statistics exploring the coverage rates of immunization and the factors that hinder in achieving MDGs in under-developed districts of Punjab, Pakistan. Therefore, the present study was designed to address this paucity of data in Bhakkar district of Southern Punjab. It has been designed to elucidate a) status of routine EPI immunization among children b) its association with gender and background and c) barriers to effective immunization.

SUBJECTS AND METHODS

It is a cross sectional study that was conducted, from April to July, 2017, at District Headquarter Hospital (DHQ) in Bhakkar district, located in the West of Punjab. A DHQ hospital serves as a source of secondary healthcare, providing health promotion, prevention, curative and advanced diagnostic, inpatient and specialist referral services for associated rural and urban population exceeding 1.6 million[8]. It also provides secondary care to the patients referred by the Basic Health Units, Rural Health Centers, and Tehsil Head Quarter hospitals.

In the present study, data was collected using non-probability convenience sampling. All parents of children between the age of 18 to 24 months visiting the pediatric outpatient department of DHQ Hospital Bhakkar were approached for interview. They were asked about the status of vaccination of their children and adherence to routine EPI schedule. The respondents were interviewed using a preformed questionnaire comprising three sections: a) demographic characteristics of their children b)

status and adherence to vaccination and c) open ended questions exploring misconceptions and practice of vaccination. Minimum sample size required for this study was calculated using a freely available sample size calculator (Raosoft Inc.). We judged a minimum sample size of 612 to be appropriate for this study. This estimate was based on following assumptions: confidence level (99%), population size (1.6 million), response distribution (64%) and a margin of error (5%)[3,8].

The children with unreliable vaccination history were excluded from the study. The status of immunization was also corroborated by cross-examining the child's vaccination card, where available. Prior to starting the survey, the study questionnaire was operationalized and pretested in a pilot study. Moreover, the team of data collectors underwent training in interviewing skills to ensure a good inter-rater reliability. Data was collected regarding all kinds of vaccinations included in the Pakistan's expanded program on immunization (EPI) schedule. The expanded program on immunization (EPI) was initiated in Pakistan in 1978 to curb communicable pediatric illnesses including tuberculosis, poliomyelitis, diphtheria, pertussis, tetanus and measles. It was further expanded by provision of vaccines against hepatitis B, Haemophilus influenzae type b (Hib) and pneumococcal vaccine (PCV10) and inactivated polio vaccine in 2002, 2009, 2012 and 2015 respectively[9]. Immunization is carried out at health facilities, outreach sites and through mobile teams. Additional supplementary activities are undertaken through outreach efforts, such as National Immunization Days. No information regarding oral polio vaccines during additional supplementary and national outreach campaigns was collected during this interview.

Written consent form was signed by all respondents, who were assured anonymity and that only group findings would be reported. Only those respondents were included who had voluntarily agreed to participate in this survey. Ethical approval was sought and granted by the research review committee at the DHQ hospital, Bhakkar district.

All data were analyzed in SPSS v. 20 (IBM, Illinois). Quantitative variables were presented as mean (standard deviation) and categorical variables as frequencies. Thereafter, a series of Chi square tests of association were run to analyze association of gender and background of respondents with their vaccination seeking practices. A *p*-value <0.50 was considered statistically significant.

A thematic analysis for open ended responses was conducted by one of the authors to identify the factors leading to poor access to vaccination, misconceptions and poor practices of vaccinators.

RESULTS

Out of 1156 respondents, a total of 961 respondents agreed to participate in the study, thus, yielding a response rate of 83.13%. A majority of these children (n=638, 66.39%) belonged to rural areas while the rest were from the urban areas (n=323, 33.61%) of the district Bhakkar. A majority of these children were female (n=554, 57.65%) while rest were males (n=407, 42.35%).

A total of 619 (64.41%) were completely vaccinated while 342 (35.59%) children were either partially vaccinated or unvaccinated. Out of these 342 unvaccinated children, a total of 209 children (61.11%) were partially vaccinated while the rest (n=133, 38.89%) had received no vaccination at all. Among the unvaccinated children, a total of 292 (85.38%) respondents cited the unavailability of vaccinator in their area as the reason for incomplete vaccination of their children. While the rest of the parents 50 (14.62%), cited their negligence as its main reason (table-I).

According to Chi square test of association, a higher proportion of children belonging to rural areas (n=288, 45.1%) were incompletely vaccinated than their counterparts from urban areas (n=84, 26.0%). It also revealed that a higher proportion of females were unvaccinated than their male counterparts. Only 28.5% of males were not vaccinated as compared to 39.7% of

females. These results have been presented in table-II.

While responding to the open ended questions, several reasons were cited as a cause of poor vaccination practices. Some respondents believed that only oral drops were sufficient as vaccination and injectable vaccines were not required. A few mentioned instances of dishonesty by the vaccinators, for instance, a respondent mentioned that vaccinators make entries on the vaccination cards without vaccinating the child. A few respondents also mentioned that they could not take their child for vaccination due to their busy schedules at homes. Moreover, several poor practices regarding vaccination by the officials were mentioned by the respondents. A mother mentioned that vaccinators are reluctant to vaccinate the children suffering with fever, diarrhea or weakness. While a few also mentioned that their children received injections at unconventional sites such as the gluteal region.

Table-I: Characteristics of participants included in the survey January to March, 2017 (n=961).

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	407	42.35
	Female	554	57.65
Background	Rural	638	66.39
	Urban	323	33.61
Vaccination status	Completely vaccinated	619	64.41
	Partially vaccinated	209	21.75
	Non-vaccinated	133	13.84
Reason for non-vaccination	Self	50	5.20
	Vaccinators	292	30.39
	Not applicable	619	64.41

Table-II: Association of gender and background of respondents with vaccination status (n= 961).

Characteristic	Subcategory	Vaccination status		Chi-Square	*p*-value
		Vaccinated(%)	Not/vaccinated(%)		
Gender	Male	291 (71.5%)	116 (28.5%)	12.97	<0.001
	Female	334 (60.3%)	220 (39.7%)		
Background	Rural	350 (54.86%)	288 (45.14%)	33.09	<0.001
	Urban	239 (74.0%)	84 (26.0%)		

DISCUSSION

The present study corroborates previous findings of low coverage rates of immunization in a poorly-resourced district of southern punjab. A majority of the respondents cited unavailability of vaccinators in their area as a major reason for incomplete vaccination status of their children. A higher proportion of females and those with a rural background were incompletely vaccinated than their counterparts.

The present analysis revealed that almost 40% of the children presenting at the hospital were unvaccinated. This statistic is considerably higher than the national average rates of completion of immunization reported by the World Health Organization (WHO) and the PSLM. According to the WHO EMRO's report exploring the core indicators for monitoring health situation in the Eastern Mediterranean region, the coverage rates for immunization in Pakistan is unsatisfactory[10]. According to it, the coverage rate for DTP3-containing vaccines is 73% and that of measles vaccine is 68% in Pakistan[10]. These rates were also found to be comparable with Syrian Arab republic (DTP3= 57%, Measles=70%) and Iraq (DTP3= 68%, Measles=71%), and much lower than those reported in countries such as Iran, Afghanistan, Palestine and Saudi Arabia (approximately

100%)[10]. Moreover, the present survey also indicated a lower coverage rate than that reported by the PSLM from 2012 to 2013. It revealed a national coverage rate of immunization against all major diseases in Pakistan to be 67.20%[3]. However, the present results are also corroborated by other cross-sectional surveys in other Pakistani rural settings. For instance, Khowaja et al, reported that 75% of the children in Matiari district were completely vaccinated which was considerably less than that reported in official reports (85%)[4].

The present survey found that a higher proportion of females presenting at the pediatric outpatient department were incompletely vaccinated than their male counterparts. This finding is corroborated by several studies conducted in Southeast Asian countries such as Pakistan and India[11,12]. A large scale survey conducted in Muzaffarabad district reported that female children were 1.7 times more likely to be unvaccinated than their male counterparts[11]. In a similar vein, the analysis of nationally representative District level and household facility surveys in India revealed a greater preponderance for males to be vaccinated than the females[12]. These trends can be explained by the patriarchal fabric and ethos of the Indian culture, where males are usually preferred over females and are considered sole earners and agents of continuation of the family name. This preference for males in the Indo-Pak sub-continent and impact of gender discrimination has profound consequences in various spheres of life. For instance, daughters are less likely to receive timely treatment, equal share in inheritance and educational opportunities[13].

The present analysis also revealed that a higher proportion of children belonging to rural households were unvaccinated than their urban counterparts. Similar findings have been noted in previous surveys conducted in Pakistan and India[11,12]. This finding can be explained by poor maternal literacy rates, lack of awareness and infrastructure and poor implementation strategies that are prevalent in rural households of Pakistan[14,15].

Almost 80% of the respondents in our survey had cited the unavailability of the vaccinators as a cause of poor adherence to immunization schedules in the Bhakkar district. Moreover, the respondents also noted several irregularities in documentation procedures, myths prevalent among the vaccinators and poor administering practices of injectable vaccines. These are novel findings in our study that had not been pointed out by previous surveys conducted by the UNICEF, WHO and government agencies[10]. It carries potential significance in design of future legislations and implementation strategies for the EPI program in the Southern Punjab. Effective educational interventions should be designed for healthcare personnel to alleviate any associated myths, negative attitudes and practices regarding vaccinations. Moreover, effective implementation strategies and surveillance systems should be designed to ensure efficient work flow and complete vaccination of children in different districts[16–18].

The present study has a number of strengths such as a large sample size. However, our study sample was limited to only one DHQ hospital in Southern Punjab, therefore, the results of this study should not be generalized to the whole Pakistani population. This study was interview based that may lead to potential recall bias effecting our inferences drawn from present analyses. Moreover, the cross-sectional design of this study limits inferences related to temporality and causality.

CONCLUSION

In Southern Punjab, a high percentage of children was partially or completely unvaccinated. Those children who were females and belonged to rural households were more likely to be unvaccinated than their counterparts. The main barriers to vaccination were unavailability of vaccinators, ignorance of the importance of vaccination, irregularities in documentation and poor administering practices.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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