Assessment of Complete Coverage of Expanded Program on Immunization in Children at Mayo Hospital Lahore, Pakistan

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ABSTRACT

Background: The primary Goal of the expanded program on immunization (EPI) is to ensure full immunization of children under one year of age to globally eradicate poliomyelitis, tetanus, measles-related deaths and to extend all new vaccines and preventive health interventions to children in all parts of the world. Demographic and health survey 2012-13 showed that in Pakistan complete immunization coverage is very low (54%) to achieve this goal. The objective of this study was to assess any improvement in terms of vaccination coverage in Pakistan in the last 3-4 years.

Material and Methods: This descriptive cross-sectional study was carried out at outpatient department of Pediatric Medicine of Mayo Hospital Lahore from May, 2016 till November, 2016. The non-probability purposive sampling technique was used to include patients after taking informed consent. Demographic details were collected and parents were questioned about different vaccinations received and confirmed through vaccination card. Data analysis was done through SPSS version 20 and results were presented as frequencies and percentages. Chi-square test was applied for association among categorical variables.

Results: Complete coverage of expanded program on immunization was achieved in 86% children. A statistically significant difference was noted between mother's education and immunization coverage of children (*P*-value 0.013).

Conclusion(s): Education of mother and socioeconomic status were significant factors affecting immunization coverage. In order to meet target of 95% immunization coverage rate set by WHO, more awareness should be created among people with low socioeconomic status along with improvement of immunization facilities in these areas.

Key words: Children, Expanded Program on Immunization, Immunization Coverage

Introduction

The Expanded Program on Immunization (EPI) is a World Health Organization (WHO) program with the goal to make vaccines available to all children throughout the world. WHO initiated the EPI in May 1974 with the objective to vaccinate children throughout the world. Ten years later, in 1984, the WHO established a standardized vaccination schedule for the original EPI vaccines: Bacillus

Calmette-Guerin (BCG), diphtheria-pertussis-tetanus (DPT), oral polio, and measles. Increased knowledge of the immunologic factors of disease led to development of new vaccines which were subsequently added to the EPI's list of recommended vaccines: Hepatitis B (Hep B) and Hemophilus influenzae type B (Hib) vaccines (in 2009) and Pentavalent Pneumococcal vaccine (in 2013) in countries with high burden of disease.[1]

The current goals of EPI are to ensure full immunization of children under one year of age to globally eradicate poliomyelitis, reduce tetanus and measles-related deaths. It also encompasses prevision of new vaccines and preventive health interventions to children in all parts of the world.[1,2]

According to the demographic and health survey (PDHS) of 2012-13, overall vaccination status of Pakistan is 54%, which is quiet low.[3] According to WHO, immunization coverage should be at least 95% to provide herd immunity to those individuals who are not immunized. Immunization coverage varies in different regions of Pakistan. It is 64.2% in Peshawar,[4,5] 45% in Karachi[6] and 77.4% in Nurpur Shahan village near Islamabad.[7]

In Bangladesh, demographic and health survey 2014 showed that 84 percent of children aged 12-23 months were fully vaccinated, 14% children were partially vaccinated and only 2% children had not received any vaccinations.[8]

According to Indian National Family Health Survey 2015-16, 62% of children aged 12-23 months received all basic vaccinations, 32% were partially vaccinated and 6% children received no vaccination at all.[9] A study conducted in Angola, a country of south central Africa showed that only 37% children completed the vaccination schedule, while 52% did not receive any vaccination.[10] Full immunization rate in England is 86.2% according to 2016-17 survey.[11] Centers for Disease Control (CDC) statistics of 2017-18 showed that USA is close to WHO target of complete vaccination coverage having immunization rate of near 95%.[12]

As Pakistan Demographic and Health Survey (PDHS) statistics (2012-13) for complete immunization coverage in children are very low as compared to other countries of the world as well as WHO target, the present study was conducted to assess any improvement in terms of vaccination coverage in Pakistan in the last 3-4 years.

Material and Methods

After seeking permission from Institutional Ethics Review Board of Mayo Hospital Lahore, this cross-sectional study was conducted at the outpatient department (OPD) of Pediatric Medicine, Mayo Hospital Lahore from May, 2016 till November, 2016. Children of both genders, from 16 months to 5 years of age, presenting in the OPD for the treatment of various diseases were included in this study. Those children whose vaccination cards were misplaced and parents were unable to recall the vaccination status were excluded from the study.

A total of 300 children were included in the study. Sample size was calculated by using WHO sample size calculator with following values of calculations; 95% confidence level, 5.5% margin of error and expected percentage of complete EPI coverage as 64.2% in children presenting in a tertiary care hospital.[4] These patients were recruited through non-probability, consecutive sampling and informed consent was taken from the parents. Demographic details (name, age, sex, anthropometric measurements, education of mother and income level of families) were collected by treating physicians in OPD on pretested questionnaire. Mothers were divided into two categories based on the level of education; Under Matric and Matric and above. Income level was divided into three categories; low (monthly income less than Rs. 20,000), middle (monthly income Rs. 20,000 to Rs. 60,000) and high (monthly income

more than Rs. 60,000). Parents were asked about different EPI vaccinations like Tuberculosis, Poliomyelitis Tetanus, Measles, Diphtheria, Pertussis (Whooping Cough), Hepatitis B, Hib and Pneumococcal. Number of vaccination shots were confirmed through vaccination card of the child.

Data analysis was done using SPSS version 20. Quantitative variables such as age, height and weight were presented as means and standard deviation. Qualitative variables such as gender and complete EPI coverage were presented as frequencies and percentages. Data was stratified for gender, socioeconomic status and educational status. Chi-square was used to compare the stratified groups. P-value ≤0.05 was considered as statistically significant.

Results

In this study, a total of 300 children were enrolled with a mean age of 36.39 ± 12.39 months and 56% male and 44% female children (Table I). The male-to-female ratio of the patients was 1.27:1. Mean values of height and weight of children, Mother's education and family's income level are shown in Table I. Full EPI coverage was achieved in 86% and not achieved in 14% of children (Table I).

The difference between income level of families and EPI coverage (*P*-value 0.000) as well as between the mother's education and EPI coverage of the children was statistically significant (*P*-value 0.013), while there was no association between gender and EPI coverage in children (*P*-value 0.86) Logistic regression was applied to check the combined effect of effect modifiers on EPI coverage. Three effect modifiers were identified i.e. mother's education, gender of child and income level of families. Among these variables, only mother's education had significant impact on EPI coverage, while the gender of child and income level of families did not show significant impact

(Table II). The final model was: EPI coverage = 19.946 – 0.899 (mother's education).

Table I: Characteristics of children, mother's education and family's income level

Characteristics	Mean ± SD
Age (months)	36.39±12.39
Height (feet)	3.01±0.48
Weight (kg)	13.96±4.88
Variables	**n (%)**
Gender	
Male	168 (56%)
Female	132 (44%)
Mother's Education	
Under Matric	126 (42%)
Matric or above	174 (58%)
Income Level	
Low	165 (55%)
Middle	111 (37%)
High	24 (8%)
Full EPI Coverage	
Yes	258 (86%)
No	42 (14%)

Discussion

Infant and under-five mortality rates in Pakistan are alarmingly high. The most recent data show that out of 1,000 live births, 74 infants and 89 children under five die before their first and fifth birthdays, respectively.[3] A significant proportion of these deaths are preventable by immunizing pregnant mothers and children. Since 1978, the EPI has been responsible for the nationwide immunization of children in Pakistan. In the early phase of the program, less than 2 percent of Pakistani children were fully immunized in 1982. This figure quickly rose to 59 percent in 1984. Another milestone was achieved with the introduction of Gavi support of two new vaccines in the late 1990s and in 2001, the Hep-B and Hib vaccines. In 2008, the program introduced the Pentavalent vaccine, which simplifies the schedule for full vaccination to five visits during the child's first year of life.[13]

In the present study, the EPI coverage was achieved in 86% children which is quite encouraging. Statistically significant difference was noted

Table II: Comparison of EPI coverage in children with gender, mother's education and income levels and logistic regression to check combined effect of factors on EPI coverage

		EPI coverage		Total	*P-value	Logistic regression	
		Yes (%)	No (%)			$B	#P-value
Gender	Male	145 (86.3)	23 (13.7)	168	0.86	-0.03	0.932
	Female	113 (85.6)	19 (14.4)	132			
Mother's Education	Under matric	101 (80.2)	25 (19.8)	126	0.013	-0.89	0.014
	Matric and above	157 (90.2)	17 (9.8)	174			
Income Level	Low	123 (74.5)	42 (25.5)	165	0.000	-19.61	0.995
	Middle	111 (100)	0	111			
	High	24 (100)	0	24			

*P-value of chi-square test; $B: beta value; #P-value for logistic regression; Constant=19.946

between mother's education and EPI coverage of the children (*P*-value 0.013). Our results showed that 165 children belonged to low income level families in which EPI coverage was achieved in 123 cases, 111 children belonged to middle income level families in which EPI coverage was achieved in all cases. Similarly, 24 children belonged to high income level families in which EPI coverage was achieved in all cases.

A study conducted in Peshawar in 2010 showed similar results. The low polio vaccination coverage in Peshawar is mainly due to low awareness among people, poor socioeconomic conditions and poor salaries, insecurity and transport problems faced by the immunization staff.[4]

A study done in Lahore (2011) in labor community showed 59% children received full course of vaccination which is consistent with our results of low immunization coverage (74.5%) among children belonging to low socioeconomic conditions. So, efforts should be intensified to reach poor children living in far off areas.[14]

In a study conducted in Karachi (from 2014-2016), a total of 51.8% children were completely vaccinated, 41.6% were incompletely vaccinated and 6.6% were unvaccinated. These results of complete vaccinations are considerably lower than our study as well as PDHS statistics of 2012-13. The drop-outs

to the subsequent vaccines needs to be controlled immediately to prevent this alarming situation.[15]

A study done in Abbottabad (in 2015-16) reported 84.4% of the children as fully vaccinated with majority of these children having educated mothers. These results are comparable to our study and higher than those of PDHS statistics of 2012-13 which is very motivating indeed.[16]

Studies from other counties also showed similar results to our study. A study in Angola, a south-central African country found that higher level of maternal education would facilitate increased vaccination coverage and low family income lead to behaviors where preventive activities are not considered family priorities.[10]

Likewise, a study conducted in Bangladesh showed that mother's level of education is strongly associated with polio vaccination coverage.[17]

Conclusion

Our study results showed that the EPI coverage was 86% which is encouraging and higher than PDHS statistics of 2012-13. Education of mother and socio-economic status of people are two significant factors that plays an important role in the EPI coverage. In order to meet WHO target of 95% immunization rate, more EPI awareness should be created in people with low socioeconomic status

along with availability of better EPI facilities in such areas.

A c k n o w l e d g m e n t

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