

## Immunization coverage of children according to expanded programme on immunization; where do we stand?

Muhammad Asim Ikram, Aisha Sajid, Faiza Irshad, Sadia Zafar

University Medical & Dental College/Madina Teaching Hospital and Divisional  
Headquarter Hospital Faisalabad, Pakistan

**Objective:** To determine the immunization coverage of individual vaccine according to WHO expanded programme on immunization and determine factors causing hindrance in poorly immunized cases.

**Methodology:** This was cross sectional descriptive study conducted at pediatrics departments of Madinah Teaching Hospital and Divisional Headquarter Hospital, Faisalabad, over a period of one year from May 2012 to April 2013. A total of 1600 parents, who had children between 13 months to 2 years of age visiting the pediatrics outpatient departments, were interviewed. They were inquired about different aspects of awareness regarding EPI, national immunization days (NIDs), source of vaccination and different reasons for not being vaccinated. The data were analyzed by SPSS version 20.

**Results:** Out of 1600 children, 1132 (71%) were enrolled at Madinah Teaching Hospital and 468

(29%) at Divisional Headquarters Hospital, Faisalabad, Pakistan. Fifty eight percent were male and 42% were female. Only 63% children were fully vaccinated according to EPI schedule with individual percentage of 82.4% for BCG, 77.5% for OPV & Pentavalent (3 doses) and 67.3% for Measles (2 doses). Most of the children (716; 44.8%) got vaccinated from mobile teams. The main reasons for unvaccination or incomplete vaccination were unawareness (42.6%) and non-availability of nearby facility (21.5%).

**Conclusion:** The immunization coverage according to EPI is not up to the mark, which can be a major contributory factor towards high Infant and under 5 mortality in Pakistan. More efforts are required to create awareness and availability of vaccination at doorstep of the people. (Rawal Med J 2013;38: 417-421).

**Key words:** Vaccination, expanded programme on immunization (EPI), measles epidemic.

## INTRODUCTION

Expanded programme on immunization (EPI) was launched in 1974 by WHO and UNICEF which aimed at controlling six childhood diseases: tuberculosis, diphtheria, polio, tetanus, pertussis (whooping cough) and measles.<sup>1</sup> Global policies for immunization and establishment of the goal of providing universal immunization for all children by 1990 were established in 1977 and this goal was considered an essential element of the WHO strategy to achieve health for all by 2000.<sup>2</sup> Immunization is the most cost effective intervention, significantly reduces the cost of treating the disease and provides an opportunity of poverty reduction and socioeconomic development of the country.<sup>3,4</sup> Increased knowledge of the immunologic factors of disease led to development

of new vaccines and were added to the EPI's list of recommended vaccines: Hepatitis B (HepB), yellow fever in countries endemic for the disease, rotavirus, pneumococcal conjugate and Haemophilus influenzae meningitis (Hib) conjugate vaccine in countries with high burden of disease.<sup>5</sup>

In 1999, the Global Alliance for Vaccine and Immunization (GAVI) was created with the sole purpose of improving child health in the poorest countries by extending their approach towards EPI. The GAVI had set specific milestones to achieve the EPI goals: that by 2010 all countries should have routine immunization coverage of 90% of their child population, HepB should be introduced in 80% of all countries by 2007 and 50% of the poorest countries should have Hib vaccine by 2005.<sup>6</sup>

Pakistan is a developing country with population of

more than 173 millions,<sup>7</sup> having an estimated Infant Mortality Rate (IMR) of 59/1000 live births and under five mortality rate of 72/1000 live births.<sup>8</sup> These figures are quite high in the region as compared to Bangladesh where IMR is 37/1000 live births and under 5 year mortality is only 42/1000 live births.<sup>8</sup> The EPI in Pakistan protects against eight vaccine-preventable diseases and immunizes children below 23 months of age. During the last decade, EPI performance has been stagnant with only 40–60 percent of children receiving the age-appropriate vaccines. Underachievement of the EPI is due to a combination of factors including inadequate performance in the areas of service delivery, program mismanagement, poor monitoring and evaluation, lack of logistics control, inadequate human resources management and financing, as well as community health-seeking behavior.<sup>9</sup> According to WHO, the number of measles cases in Pakistan increased from 4,000 in 2011 to 14,000 in 2012. This study was conducted to determine the individual vaccine coverage as well as the factors responsible in poorly immunized cases.

## METHODOLOGY

This was a hospital based cross sectional study carried out in the pediatrics departments of Madinah Teaching Hospital in collaboration with the department of Pediatrics, Divisional Headquarters Hospital Faisalabad, Pakistan over a period of one year from May 2012 to April 2013. We interviewed 1600 parents having children between 13 months to 2 years of age who visited the outpatient departments for their illnesses or routine immunization. Informed consent was taken and data was collected regarding age, gender of children, their residence (rural or urban), ethnicity, literacy status and occupation of both parents, awareness regarding EPI, source of information (health personnel, doctors, relatives or media), history of all vaccinations (BCG, Pentavalent 1,2,3, OPV 0,1,2,3 and Measels 1,2), compliance towards national immunization days (NIDs), source of vaccination (Mobile team, Govt. hospital/dispensary, Pvt. Clinic), availability of EPI card and different reasons for not being vaccinated in noncompliant cases.

Each child was examined for BCG scar mark on right deltoid and was labeled as unvaccinated for BCG vaccine if it was not found. Parents were asked about EPI cards, in case of non availability we asked about the age of appropriate vaccination, site of injections (thighs/buttocks/deltoid) and side effects of various vaccines like fever, pain etc. The data were analyzed in SPSS 20.

## RESULTS

Out of 1600 children, 1132 (71%) were enrolled at Madina Teaching Hospital and 468 (29%) were enrolled at Divisional Headquarters Hospital, Faisalabad. Nine hundred thirty (58.1%) were male and 670 (41.9%) were female. Among these 1600 children, 964 (60.2%) belonged to rural areas and 636 (39.8%) belonged to urban population.

**Table 1. Literacy status of parents (n=1600).**

Literacy status	Father	Mother
Illiterate	598 (37.4%)	766 (47.9%)
Primary	426 (26.6%)	392 (24.5%)
Matric	318 (19.9%)	214 (13.4%)
Intermediate	82 (5.1%)	114 (7.1%)
Graduation & above	176 (11.0%)	114 (7.1%)

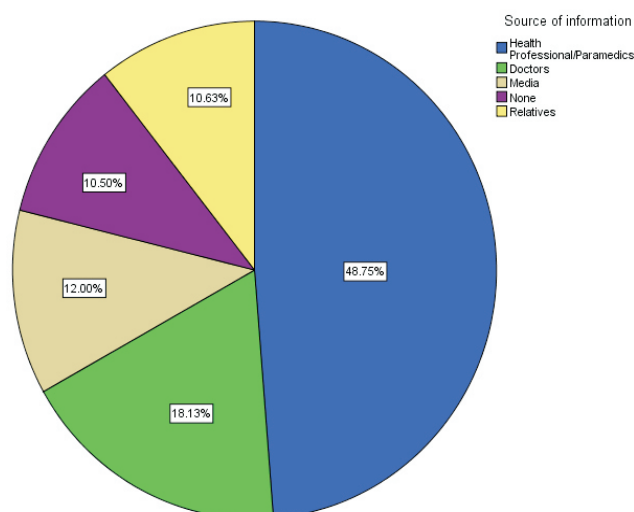
Regarding the ethnic background of these children, 1398 (87.4%) were Punjabi, 150 (9.4%) were Pashtone/Afghani, 42 (2.6%) were Urdu speaking and only 10 (0.6%) were Balouchi. The literacy status of parents is summarized in Table 1.

**Table 2. Immunization coverage of individual vaccines in EPI.**

Vaccine	Done/ Given	Partially Done/ Partially Given	Not Done/ Not Given
BCG	82.4%		17.6%
OPV 0,1,2,3	77.5%	15%	7.5%
Pentavalent 1,2,3	77.5%	15%	7.5%
Measels 1,2	67.3%	23.3%	8.9%

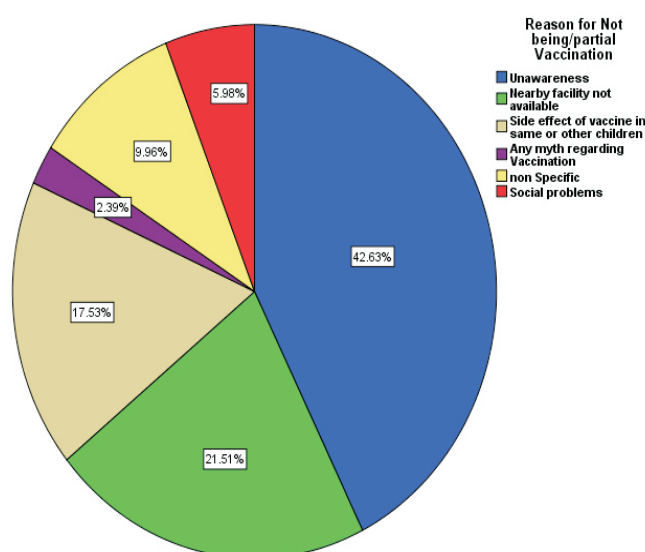
Most of the children belonged to poor socioeconomic class. Fathers of most children were laborer (54%) and mothers were housewives (90.1%). 1458 (91.1%) were aware about the importance of EPI. The source of information regarding EPI is mentioned in Fig 1.

**Fig 1. Source of information regarding awareness of EPI.**



Only 63% children received their complete vaccination according to EPI schedule. No significant difference was found regarding the gender of the children who completed their EPI. Sixty five percent male and 61% female children were fully vaccinated. Sixty seven percent of children who were fully vaccinated belonged to urban area while 62 % belonged to rural areas. The vaccination status of all children included in the study is described in the Table 2.

**Fig 2. Reasons for no vaccination and partial vaccination.**



Fourteen hundred forty two (90.1%) children observed Polio national immunization days. Regarding source of vaccination, 716 (44.8%) received vaccination from mobile teams, 682 (42.6%) from EPI centers and only 24 children (1.5%) were vaccinated at private clinics. Among the vaccinated children, EPI card was available in only 496 (31%) children. The reasons for not being vaccinated or being partially vaccinated are shown in Fig 2.

## DISCUSSION

The EPI in Pakistan was launched in 1978 that targeted six childhood diseases like tuberculosis, poliomyelitis, diphtheria, pertussis, measles and tetanus in order to reduce childhood mortality and morbidity. Immunization against Hepatitis B and Hemophilus Influenza B was introduced later on. The programme also provides vaccination to pregnant women against Tetanus to protect the newborn from Neonatal Tetanus. Recently, Pneumococcal Conjugate vaccine has been included in the EPI schedule to protect children from Pneumonia and Meningitis.<sup>10</sup> Currently, 15% deaths of children under 5 year of age contribute to 50% of overall mortality in comparison to 8-10% in developed countries.<sup>11</sup> According to National Institute of Health Survey 2006-07, the EPI programme provides immunization to approximately 5.1 million children every year. It is estimated that more than 100,000 deaths due to measles, 70,000 cases of neonatal tetanus, and 20,000 paralytic cases of poliomyelitis are being prevented each year in Pakistan due to these vaccines.<sup>12</sup>

According to Pakistan Institute of Legislative Development and Transparency (PILDAT) briefing paper no. 37, published in 2010, EPI targeted to vaccinate 5.9 million children. The immunization coverage in 2009 was, BCG 93%, OPV 86 %, Pentavalent 86%, Measles 85% and TT 55%.<sup>11</sup> In our study, the immunization coverage was 82.4% for BCG, 77.5% for OPV & Pentavalent (3 doses) and 67.3% for Measles (2 doses). Only 63 % of the children had received their complete vaccination according to EPI. Some studies<sup>13,14</sup> have reported that vaccination coverage has reached up to 86% in

Pakistan in 2009. According to Health Minister Punjab, under EPI the coverage of vaccination against various diseases is 57 %, which is very low.<sup>15</sup>

No significance difference regarding gender of the children was observed (65% male and 61% female). National Health Survey showed only 50 % male and 44% female children had completed their EPI schedule.<sup>12</sup> Sidiqui N et al conducted a survey for age appropriate EPI coverage in periurban area of Karachi and reported appropriate vaccine coverage was 44.8% with individual vaccines it was 76% for BCG, 61% for DPT1, 49% for DPT2, 45% for DPT3 and about 27% for Measles.<sup>16</sup> WHO statistics regarding EPI coverage of year 2011 were, BCG 85%, Pentavalent 80%, OPV 75% and Measles 80%.<sup>17</sup> Regarding EPI coverage of the neighboring countries for the year 2011, Bangladesh and Srilanka had done a marvelous job. BCG coverage is 95% in Bangladesh, 87% in India & 99% in Srilanka.<sup>17</sup> For Pentavalent vaccine, this coverage is 96%, 72% and 99% in Bangladesh, India & Srilanka, respectively and Measles (MCV) coverage was 96%, 74% & 99% in above mentioned respective countries.<sup>17</sup>

Pakistan Demographic and Health Survey (PDHS) 2006-2007 stated that, mothers were able to produce health cards for 24 percent of the children.<sup>12</sup> Another Survey reported availability of cards for only 11 percent children (MOH, 2006), whereas the 2005-06 Pakistan Social and Living Standards Measurement Survey (PSLM) showed availability of cards for an exceptionally high proportion (49%) of children (Federal Bureau of Statistics, 2007c).<sup>12</sup> In our study, only 31% of the parents were able to provide vaccination cards.

Immunization coverage studies from Belgium, Bangladesh, Ethiopia and Cambodia have reported various factors associated with poor coverage, like carelessness of either parents or doctors, attitude of physician, lack of identification of target age groups, maternal illiteracy, social problems, low socioeconomic status, lack of parents knowledge regarding immunization, none availability of nearby facility, refusal due to child sickness and other issues.<sup>18-21</sup> According to our study, the main

reason for non vaccination or partial vaccination was unawareness (42.6%) followed by unavailability of the nearby immunization center (21.5%), side effects observed in same or other children (17.5%), different myths regarding vaccination (9.6%) and social problems (5.9%). Some people thought that these vaccines are meant for contraception, others had some false religious believes. Factors such as knowledge, attitude and practices of the parents and patients also known to contribute the success or failure of the immunization programme.<sup>21</sup>

We also inquired about the literacy status of the parents. The parents who had passed Primary examination were considered educated. According to National literacy definition that says "The ability of a person who can read a newspaper or write a single letter in any language" is considered educated. It was noted that 62.6% males and 52.1% females were literate. Pakistan Literacy-Demographic Survey 2009<sup>22</sup> showed that, estimated literacy rate was 68.6% and 40.3% for male and female, respectively with overall literacy rate of 54.9%. Similar figures (male 67%, Female 42%) were reported by PSLM 2006-7.<sup>23</sup>

It was observed in our study that most of the children were not vaccinated against measles. Only 67.3% of the children received 2 doses of measles vaccine. 23.3% only received single dose of measles and in most cases parents were not told about the second dose, which was due after 12 months of age. About 9% children did not get even a single Measles vaccine. This might be a major contributory factor towards this recent measles epidemic in Punjab where 16,620 measles cases up to 8 June 2013 were reported. Out of this, 201 cases emerged recently in the last 24 hours only. Measles on Saturday claimed two more lives, raising the number of deaths to 146 in the province.<sup>24</sup>

## CONCLUSION

In spite of the efforts being made by health department in collaboration with WHO to provide vaccination against life threatening illnesses, the coverage of EPI is not up to the mark. This could be a major contributory factor towards high Infant and under five mortality in Pakistan. Poor immunization



coverage against measles has led to the recent outbreak of measles in Punjab. More efforts should be made by Public and Private sectors, as well as by media, civil society, political and religious leadership to create awareness among the people and availability of vaccination at their door steps.

#### Author contributions:

Conception and design: Muhammad Asim Ikram, Aisha Sajid  
Collection and assembly of data: Muhammad Asim Ikram, Faiza Irshad, Sadia Zafar

Analysis and interpretation of the data: Muhammad Asim Ikram, Aisha Sajid

Drafting of the article: Muhammad Asim Ikram, Aisha Sajid, Faiza Irshad

Critical revision of the article for important intellectual content: Aisha Sajid, Muhammad Asim Ikram, Sadia Zafar, Faiza Irshad

Statistical expertise: Muhammad Asim Ikram, Aisha Sajid

Final approval and guarantor of the article: Muhammad Asim Ikram, Aisha Sajid, Faiza Irshad, Sadia Zafar

**Corresponding author email:** dr\_asim156@yahoo.com, docasim381@gmail.com

**Conflict of Interest:** None declared

Rec. Date: Jun 19, 2013 Accept Date: August 15, 2013

## REFERENCES

- World Health Organization. Immunization, Vaccine and Biologicals. Available from: <http://www.who.int/vaccines&diseases/history.shtml>
- World Health Organization. Immunization services delivery. The Expanded Programme on Immunization. Available from: [www.who.int/immunization\\_delivery/benefits\\_of\\_immunization/en/index.html](http://www.who.int/immunization_delivery/benefits_of_immunization/en/index.html).
- World Health Organization Media Center. Global Alliance for Vaccines and Immunization (GAVI): available from: <http://www.who.int/entity/mediacentre/factsheets/en>. Accessed on 15-04-2013.
- World Health Organization. State of world's Vaccine and Immunization-Geneva:2002.
- Jamison D, Breman J, Measham A, Alleyne G, Claeson M, Evans DB, et al. Disease control Priorities in Developing Countries, Second Edition. 2006, The World Bank Group.
- Hadler S, Cochi S, Bilous J, Cutts F. Vaccination Programs in Developing Countries. Chapter 55: Vaccines, Fourth Edition. 2004, Elsevier Inc
- World Health Organization. Countries>Pakistan. Available from: [www.who.int/Countries/en/](http://www.who.int/Countries/en/)
- World Health Organization. Global health Observatory Data Repository. Available from: [apps.who.int/gho/node.main-Childmortality-2?lang=en](http://apps.who.int/gho/node.main-Childmortality-2?lang=en)
- Health, Nutrition and Population (HNP) Discussion paper. The Expanded Programme On Immunization in Pakistan. Recommendations for improving performance. World Bank, Islamabad, Pakistan, April 2012.
- Qasim M. Pakistan indicators fail to meet expected benchmarks. The News (print edition). 2012 april 22 [cited 2013 March 13]; Available from <http://thenews.com.pk>.
- PILDAT Briefing Paper No 37. Immunization in Pakistan. Pakistan Institute of Legislative Development and Transparency-PILDAT, Islamabad, Pakistan, May 2010.
- Pakistan Demographic and Health Survey 2006-07. National Institute of Population Studies (NIPS) [Pakistan], and Macro International Inc, Islamabad, Pakistan, 2008.
- Loevisohn B, Hong R, Gauri V. Will more inputs improve the delivery of health services? Analysis of district vaccination coverage in Pakistan. Int J Health Plan Manage 2006; 21:45-54.
- Hong R, Benta JE. Effects of extra immunization efforts on routine immunization at district level in Pakistan. East Mediterr Health J 2005;6:245-52.
- Measles in the city: Vaccination in Punjab shamefully low. The Express Tribune (print edition). 2013 april 15 [cited 2013 May 28]; Available from: [tribune.com.pk/story/535685/measles-in-the-city-vaccination-in-punjab-shamefully-low](http://tribune.com.pk/story/535685/measles-in-the-city-vaccination-in-punjab-shamefully-low).
- Sidiqi N, Khan A, Nisar N, Sidiqi AA. Assessment of EPI (Expanded Programme of Immunization) vaccine coverage in peri-urban area. JPMA 2007;57:391-5.
- World Health Organization. Global health Observatory Data Repository. Available from [apps.who.int/gho/node.main.A830?lang=en](http://apps.who.int/gho/node.main.A830?lang=en)
- Velling A, Depoorter A, Van Damme P. Vaccination coverage estimates by EPI cluster sampling survey of children (18-24 months) in Flanders, Belgium. Acta Paediatr 2002; 91: 599-603.
- Rehman M, Islam MA, Mahalanabis D. Mothers' knowledge about vaccine preventable diseases and immunization coverage in a population with a high rate of illiteracy. J Trop Pediatr 1995;41:376-8.
- Gedlu E, Tesemma T. Immunization coverage and identification of problems associated with vaccination delivery in Gondar, Northwest Ethiopia. East Afr Med J 1997;74:239-41.
- Main B, Lower T, James R, Rousel I. Changes in Expanded Program for Immunization coverage for mother and child in krakor, Cambodia 1996-1998. Trop Mod Int Health 2001;6:526-8.
- Pakistan Literacy-Demographics. Available from: [www.indexmundi.com/Pakistan/literacy.html](http://www.indexmundi.com/Pakistan/literacy.html). Assesd on 30/05/2013.
- Pakistan Literacy Rate. Available from: [ilm.com.pk/Pakistan/Pakistan-information/Pakistan-literacy-rate](http://ilm.com.pk/Pakistan/Pakistan-information/Pakistan-literacy-rate). Assesd on 30/05/2013.
- Measles kills two more in Punjab: The News.(web edition). 2013 June 08 [cited 2013 June 17]; Available from: <http://www.thenews.com.pk/article-104368-Measles-kills-two-more-in-Punjab>.