

# Assessment of children immunization pattern in Children Hospital Lahore, Pakistan

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**Abstract:** The basic aim is to assess immunization pattern of children up to 15 months of age. A cross-sectional study was conducted on 100 immunized children in Children hospital Lahore, Pakistan. Single dose 0.05ml to 0.1ml of BCG was recommended at the time of birth. Three doses of 0.5ml of Pneumococcal vaccine was given, coupled with the Penta-valent vaccine was given at 6 week, 10 week and 14 weeks of age. Two doses 0.5ml of measles vaccine was given at 9 & 15 months. Respondent's sex, age and the vaccinated children against diseases were analyzed in the form of percentages and frequency tables through statistical analysis in the software called SPSS version 16.0. Female children immunization against various diseases was less in number. The results concluded that by informing community about the problem of ailment and the real significance of vaccinations, we are able to maintain and develop greater immunization coverage and as a result, more lives of children were saved.

**Keywords:** Children, immunization pattern, children hospital, Lahore.

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## INTRODUCTION

Immunization has remained a great public health success story in which target is to save the lives of millions of children so that they would have opportunity to read, write, play, learn, free from various ailments and lives a healthier longer life (UNICEF, World Health Organization and the World Bank, 2002). Immunization is the process of immunizing or injecting a specific antigen into the body, in which the person is made resistant to various infectious diseases or infections typically by the administration of a vaccine (World Health Organization, 2016). It has frequently validated through research that immunization is one of the most successful medical intervention to prevent diseases (Hall and O'Brien, 1998).

Disease rate of measles, diphtheria, polio and whooping cough (pertussis) have dropped by over 95 per cent by use of vaccines (Gold, 1997). Three million lives per year are saved by immunization worldwide (Hall and O'Brien, 1998).

In 2011, about 83% of infants worldwide were immunized contrary to diphtheria, pertussis and tetanus (UNICEF and World Health Organization, 2012; UNICEF, 2013) (DPT3 vaccine) with the three dosages of the vaccine and are possibly lethal under five year's age children. Penta-valent is a vaccine which combines five different antigens in one injection (given in the left thigh - intra muscularly) and protects children against five killer diseases-diphtheria, whooping cough (pertussis), tetanus, haemophilus influenzae type band hepatitis B (UNICEF, 2004).

Diphtheria is a silent considerable child health dilemma in countries with poor expanded program of immunization (EPI) coverage (World Health Organization, 2015) and is caused by the bacterium *Corynebacterium diphtheria* (Atkinson and William, 2012). Diphtheria as endemic in countries occurs as sporadic or in small outbreak and is mortal in 5 to 10% cases have high incidence of mortality rate in young children (World Health Organization, 2015). In 2013, a total of 4,490 cases of diphtheria worldwide were officially reported that drops down from 97164 cases in 1980 (World Health Organization, 2014). In addition, 3,300 deaths were reported in 2013 that drops down from 8,000 deaths in 1990 (Global Burden of Disease 2013 Mortality and Causes of Death, Collaborators, 2015). It is also believed that approximately one million cases were reported annually before 1980's and mostly occurs in India, Indonesia and Sub-Saharan Africa (World Health Organization, 2006).

Pertussis (whooping cough or 100-day cough) is a transmittable bacterial disease (Carbonetti, 2007), caused by the bacterium *Bordetella pertussis* (Centers for Disease Control and Prevention, 2014). Approximately, 16 million people globally are infected each year (Wang *et al.*, 2014) and the majority recurrent cases were reported in developing countries affecting people of all age groups (Heininger, 2010; Wang *et al.*, 2014).

Nearly, 61,000 deaths were reported in 2013 which drops down from 138,000 deaths in 1990 (Global Burden of Disease 2013 Mortality and Causes of Death, Collaborators, 2015) whereas, almost 0.5% infected children less than one year of age deaths were reported (Centers for Disease Control and Prevention, 2015).

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Tetanus (lockjaw) is caused by bacterium *Clostridium tetani*. Tetanus occurs in all parts of the world but more frequently appears in hot and wet climates where the soil contains a lot of organic matter (Centers for disease control and prevention, 2015). 59,000 deaths were reported in 2013 which drops down from 356,000 in 1990 (Global Burden of Disease 2013 Mortality and Causes of Death, Collaborators, 2015).

*Haemophilus influenzae* type b (HiB) estimates approximately 8.1 million cases of serious HiB diseases and 371,000 deaths be anticipated globally in the year 2000 (Watt *et al.*, 2009).

Hepatitis B is the bacterial disease, occurs due to Hepatitis B virus and directly affects the liver, resulting in one third of the world's population to be infected with it at one point in their lives and includes 240 million to 350 million populations suffering from chronic infections (World Health Organization, 2014, Schilsky, 2013). In addition approximately 129 million new infections were reported in the year 2013 (Global Burden of Disease Study 2013 Collaborators, 2015). More than 750,000 people die of hepatitis B annually (World Health Organization, 2014) and approximately 300,000 people die due to liver cancer (Global Burden of Disease 2013 Mortality and Causes of Death, Collaborators, 2015).

BCG (*Bacillus of Calmette and Guerin*) vaccine is used for the prevention of tuberculosis caused by *mycobacterium tuberculosis* and is given intra dermally in upper part of right deltoid. Based on persuasiveness of active tuberculosis (TB) disease during childhood, special efforts should be taken into account in order to save children, predominantly less than 5 years of age.

Tuberculosis is now rapidly growing as a major public health problem with approximately 8 to 10 million cases and 2–3 million deaths reported every year (Enarson and Murray, 1996). The effectiveness of BCG vaccine in precluding childhood tuberculosis (TB) meningitis or military tuberculosis (TB) exceeding 70% in the areas where BCG vaccine was given at birth (Shapiro *et al.*, 1985; Padungchan *et al.*, 1986; Young and Hershfield, 1986; Tidjani *et al.*, 1986).

Poliovirus causes polio (poliomyelitis), which predominantly affects under 5 years' children. Polio is prevented by polio vaccine. Out of 200 patients of polio, irreversible paralysis occurs in one patient. 5% to 10% children with polio die among those with irreversible paralysis when their breathing muscles become immobilized (World Health Organization, 2014).

Pneumococcal vaccine is administered for the prevention of pneumococcal diseases (pneumonia, meningitis, or blood infection (sepsis) caused by pneumococcus or *Streptococcus pneumonia* (World Health Organization, 538

2012). Pneumococcal disease kills one in three people in its worst forms (Centers for disease control and prevention, 2015).

Globally, pneumonia continues to be the leading cause of death under five years age children. Although the execution of harmless, successful and reasonably priced interventions have declined pneumonia mortality from 4 million in 1981 (Leowski, 1986) to just over 1 million in 2013 (UNICEF, World Health Organization, the World Bank, and United Nations Population Division, 2014; World Health Organization, 2014), pneumonia still silently accounts nearly one-fifth of childhood deaths globally.

Meningitis causes inflammation of the meninges, the covering of the brain and spinal cord (World Health Organization, 2016) affects anybody at any age yet infants, children, adolescents and young adults are characteristically at greater risk of infection (bacterial, viral, or fungal), but it can also be produced by chemical impatience, subarachnoid hemorrhage, tumor and other conditions. The climax infant age group at risk of bacterial meningitis is 6 to 18 months (Edwards *et al.*, 2010; Brouwer *et al.*, 2010; World Health Organization, 2016). Approximately 50% of bacterial meningitis cases were reported less than five years age children.

Sepsis occurs to anyone (babies, young children, elderly people, people with weakened immune systems, chronic illnesses such as malignant cells, acquired immune deficiency syndrome (AIDS), diabetes, kidney and liver disease or suffering from severe burns or wound) at anytime and the major reason for its occurrence is its immune body response which is triggered by an infection (Tintinalli *et al.*, 2011; Deutschman and Tracey, 2014; Centers for Disease Control and Prevention, 2015). The infectivity is most commonly bacterial, but it can also be from fungi, viruses or parasites (Tintinalli *et al.*, 2011).

The common locations for the primary infection include: lungs (such as pneumonia), urinary tract, brain, skin and abdomen (such as appendicitis) (Centers for Disease Control and Prevention, 2015). It can occur even after a minor infection. Sepsis causes millions of deaths globally every year and is the most widespread cause of death in people who have been hospitalized (Deutschman and Tracey, 2014; Dellinger *et al.*, 2008).

The worldwide occurrence of sepsis is anticipated to be 18 million cases per year (Lyle *et al.*, 2014). In the United States, sepsis affects approximately 3 in 1,000 people (Soong and Soni, 2012) and severe sepsis contributes to more than 200,000 deaths every year (Fauci *et al.*, 2009).

Measles is terrifically spreadable respiratory disease caused by measles virus (UNICEF, 2013; World Health Organization, 2015). In 2011, over 90% (UNICEF and

World Health Organization, 2012; UNICEF, 2013) of infants were immunized against measles in 123 countries. Between 2000 and 2011, vaccination resulted in measles death rate dropped by 71% worldwide (World Health Organization, 2015). Symptoms of measles include high-grade fever, cough, running nose and redness all over the body. Measles is prevented by measles vaccine, which is given subcutaneously in the middle of deltoid of left arm. Out of 20 children with measles, one child also suffers with pneumonia. One or two will die out of 1,000 children who get measles (Centers for Disease Control and Prevention, 2015).

## MATERIALS AND METHODS

The assessment on immunization pattern among children up to 15 months of age was carried out in Children hospital Lahore, Pakistan, 2015. It was observed that on daily basis, record of vaccinated children with respective diseases was maintained in hospital register which contained date, name, age, address, vaccination against certain disease, recommended and due dose of vaccine and card number of the child. We take the record from the hospital register of 100 immunized children. For the vaccination of tuberculosis, single dose 0.05ml to 0.1ml of BCG was recommended at the time of birth for all other children. When child was vaccinated with BCG vaccine, a wheal of injection appeared in next 30 minutes. Both Pneumococcal vaccine and Penta-valent vaccine, having three doses of 0.5ml in each was the only vaccine, used against the treatment of above-mentioned diseases. When the child attained 6 week, 10 week and 14 weeks of age, Pneumococcal vaccine was given, coupled with the Penta-valent vaccine. Measles doses were two of which in each dose 0.5ml was given usually at the age of 9 & 15 months. The minimum gap between 1<sup>st</sup> & 2<sup>nd</sup> dose of primary DPT was 4 weeks. However, months elapse between doses does not mean to leave the course whereas, polio drops were given to the children in every due dose.

BCG is given intra dermally in upper part of right deltoid. DPT is given intramuscularly in lateral side of right thigh at the joint of upper one third (1/3) and lower two third (2/3). Hepatitis B vaccine was given intramuscularly in lateral side of left thigh at joint of upper one third (1/3) and lowers two third (2/3). Measles vaccine was given subcutaneously in the middle of deltoid of left arm.

Those children, who were not vaccinated during infancy but still below 5 years of age were vaccinate as follows:

BCG	ONCE
DPT and Polio drops	2 doses at 6 weeks interval and 1 <sup>st</sup> booster 6 months later

## RESULTS

The sample size of respondents was 100 immunized children up to 15 months of age. Respondent's sex distribution was shown in table 1.

Across the gender, table 1 show that about 58% of male children are fully immunized as compared to the 42% of female children, reflecting a sparse illustration among female children. The comprehensive breakdown of coverage for each vaccination also shows a similar trend with less vaccination received by females as compared to male children.

**Table 1:** Respondents sex distribution

Gender	Frequency	Percent
Male	58	58%
Female	42	42%
Total	100	100%

**Table 2:** Respondents age wise distribution

Age of Immunized Children	Total	Gender	
		Male	Female
At birth	47	26	21
6 week old	20	11	09
10 week old	13	08	05
14 week old	10	06	04
9 months old	06	04	02
15 months old	04	03	01

Respondent's age wise distribution was shown in table 2, which was further grouped into male and female proportion.

From the above table, we observed and found that out of total number of vaccinated children from BCG vaccine were 47 while from Pneumococcal and Penta-valent vaccine 43 children were vaccinated and only 10 children were vaccinated from measles vaccine. The results also concluded that frequency of female children towards immunization was less in number as compared to male children, thus reflecting a major drawback in provision of vaccination to the female children. This is the matter of fact that gender disparity is more in those areas where males are given preference over females. As a result, female children are more liable to various diseases, which make their immune system weak, and ultimate it leads them to their death.

## DISCUSSION

As prevention is better than curative action, immunization is the most commonly used measure for preventive health care, reduces hospitalization and treatment costs and have been adopted in order to avoid a disease (Mishra *et al.*, 2004). It is also an indicator of parent's motivation to ensure a child's future welfare. As argued by (Pande and

**Table 3:** Frequency and percentage of respondents vaccinated against different diseases

Vaccination against diseases		Frequency of children vaccinated against diseases	Percentage (%)
Tuberculosis vaccine (BCG) at birth		47	47%
Pneumococcal and Penta-valent vaccine	Pneumococcal -I and Penta- valent-I at 6 week	20	20%
	Pneumococcal -II and Penta-valent - II at 10 week	13	13%
	Pneumococcal -III and Penta-valent -III at 14 week	10	10%
Measles Vaccine	Measles -I at 9 month	06	06%
	Measles-II at 15 month	04	04%
Grand Total		100	100%

Yazbeck, 2003) that parents are more prone to be concerned for preferred male children as compared to unwanted female children, thus neglect can be seen in immunization.

Targeting the children of age 0- 15 months, many studies have considered the sex of the child as one of the key determinant of immunization. These results are consistent with the other studies of South Asia (Mishra *et al.*, 2004; Pande and Yazbeck, 2003). In addition, Pakistan Integrated Household Survey (PIHS) 1991 and Pakistan Demographic Health Survey (PDHS) 1990-1991 and Mahmood and Mahmood (1995) also found that boys are more likely to be immunized than girls in Pakistan. Immunization status is also influenced by birth order of the child (Nath *et al.*, 2007). Elder children had more chances to get immunization than the younger children of their family (Pearce *et al.*, 2008). In addition, girls with higher birth orders and have many sisters face more discrimination in receiving vaccinations (Patra, 2008). Similarly, Corsi *et al.*, (2009) also found that females have considerably lower coverage of immunization for BCG, diphtheria, pertussis, tetanus and measles in the three Indian National Health Family surveys between 1992 and 2006. The present study also establishes results that females with higher birth order and older sister were less likely to be immunized.

Mother's age was also a considerable predictor affecting the child immunization i.e., younger mothers had less chance to immunize their children than the old mothers (Munthali, 2007). Qualitative research study conducted in Karachi, reported comparable causes along with others like forgetting immunization scheduled dates, low quality health care facilities, inaccessibility of government dispensaries and prevailing myths about immunization (Mansuri and Baig, 2003). The research study establishes results that most of the parents had little information about immunization pattern and this correlates with other studies (Siddiqi *et al.*, 2007; Shaikh, 2003; Mansuri and Baig, 2003). The present study also reported that fear from the side effects of vaccination also act as a barrier for vaccination (Tadesse *et al.*, 2009). The results of this

study suggest that there is still some misunderstanding and conflicts concerning immunization among the local population. Some people still correlates immunization as painful and risky intervention that might be hazardous to their child health while others show casual attitude towards importance of vaccination.

Measles is an extremely transmittable and one of the most overwhelming transferable diseases of human being. It was accountable for millions of deaths annually worldwide prior to the preface of measles vaccine.

Notwithstanding the accomplishment of the present measles vaccine in controlling disease in developed countries, the significance of vaccine malfunction has become progressively more noticeable in the developing countries like Pakistan.

The research study shows that measles were more common in males as compared to females. This coincides with a number of reports, that males have more incidences of measles (Ramsay *et al.*, 1997; Godoy *et al.*, 1999) as compared to females (Satpathy and Chakraborty, 1990; Khan *et al.*, 2009; Muhammad *et al.*, 2011). The research study also indicated that children were unprotected against measles and the possible reasons for this were may be scarcity of measles vaccine, gender disparity, spiritual beliefs and uncertain security conditions and they were found similar to the results of other studies (Basheer *et al.*, 2006; Tayil *et al.*, 1998; Kamel, 1993).

### CONCLUSION

The above study concluded that immunization save millions of children of all ages from diphtheria, pertussis, tetanus and measles never the less still more individuals decease due to the inaccessibility of disease preventable preparations. The major goal in our research study is to achieve a world where no one suffers or dies from these diseases. To accomplish our visualization, we depend on collaboration, modernization and education. Updating the community about the encumbrance of disease and the real significance of vaccinations that will

benefit to uphold and improve better vaccination coverage's consequently results in more lives were to be saved.

### Recommendations

- It is important to vaccinate child, right from the birth with a view to protect him from certain infectious diseases otherwise he/she may liable to susceptible diseases right for the birth.
- An information desk of routine immunization must be established separately in children ward of each hospital where the children may be immunized throughout the year instead of particular weeks, designated during the campaign.
- Social & print media must play their role in order to give awareness to parents' regarding importance of vaccination to children within the time frame.
- Door to door, vaccination service must be planned & ensured especially in remote areas
- Special funds must be earmarked for the immunization in each hospital.

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