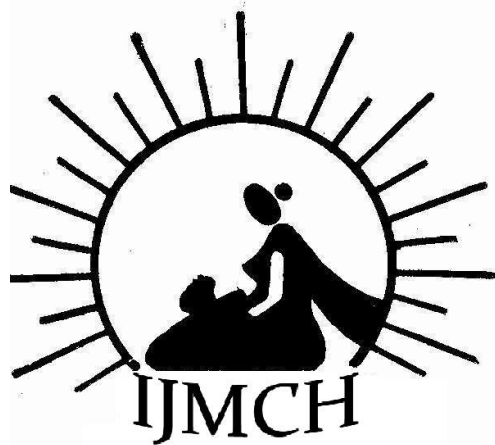


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Infants, in a Health Centre in Mumbai**

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To find out if there is delay in immunisation of infants and determine the factors influencing the vaccination.

## A Facility Based Study on Timely Immunization of the Infants, in a Health Centre in Mumbai

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### **Abstract:**

**Research Question:** To find out if there is delay in immunisation of infants and determine the factors influencing the vaccination

**Settings:** Urban Health Centre in Mumbai

**Study Design:** Cross-sectional observational type of study

**Participants:** 93 infants at the immunisation OPD.

**Methodology:** Mothers with infants attending the immunisation OPD at the urban health centre in a period of one month were interviewed using a structured questionnaire after the child received the vaccination for the day.

**Results:** The immunisation status of 57 (61.3%) boys and 36 (38.7%) girls was assessed. Majority of the infants were more than 44 days (78). Timely (within 7 days of birth) BCG vaccination was received by 83% of the infants. Amongst the 16 infants with delayed BCG immunisation, a delay of more than one month was observed in 6 infants. The delay in BCG vaccination was significantly associated with sex of child and mothers education status. Delay by more than a week for first, second and third dose of oral polio vaccine, trivalent vaccine of diphtheria, pertusis and tetanus, and hepatitis B vaccine was observed in 25%, 25% and 34% respectively. Measles vaccination was delayed in 60% of the infants who were of eligible age.

**Keywords:** *Immunisation delay, Vaccination delay*

### **Introduction:**

Universal Immunisation Programme was launched in 1985, with the aim of achieving 100% vaccination coverage against six vaccine preventable diseases. The vaccines provided are BCG, OPV, DPT, Hepatitis B and Measles. Hepatitis B vaccination has been very recently added to the Immunisation Programme.

Even though vaccines are provided at all the government health care centres free of cost, even at the village level, the immunisation coverage in India is as low as 46% for primary immunisation.<sup>(1)</sup> However even amongst these immunised children there appears to be a delay in vaccination of the child. Studies have shown that delayed and incomplete administration of vaccines increases the risk of vaccine preventable diseases, thereby increasing mortality and morbidity.

The objective of the study was to assess if there is any delay in immunisation of children below one year of age and determine the factors influencing the timeliness of vaccination.

**Materials and Methods:**

**Study Design:** The study design was a cross-sectional observational type of study amongst the Infants attending immunisation OPD at Urban Health Centre. The urban health centre located in Mumbai caters to a population of more than 70000. Such Urban Health Centres located all over Mumbai are responsible for providing preventive and promotive health care services to a defined population.

**Sampling Method:** Purposive Sampling; All mothers whose children were below one year of age and who consented to participate in the study were recruited as study subjects

**Sample Size:** Of the children attending immunisation OPD, 93 mothers expressed their willingness to participate in the research study by responding to the questionnaire

**Data Collection:** A pre-tested structured questionnaire for interviewing mothers and recording the Immunisation status of the infants was used. Data was collected over a period of one month.

**Data analysis:** Frequency, percentages and chi-square tests were used to analyse the data.

**Operational Definition:** Vaccination was considered as delayed if the vaccination of the child took place beyond 7 days of the expected date.

**Observations:****Profile of Mothers and their children**

A total of 93 mothers were respondents to the study questionnaire. The number of infants was also 93, with 57 (61.3%) being male and 36 (38.7%) being females. There were no twins in the study. Infants less than 45 days old constituted 16.1% (15) and remaining 83.9%(78) were more than 45 days old. Ten children were above 10 months of age. The mean age of the children was 3.3 months. About 40% (37) infants were the only child, 45% (42) had another sibling and 15% had two or more siblings

The mean age of Mother is 23.15 years (range is 18-32 years). Majority of the mothers (58.1%) are in the age group of 21-25 years. Only 21 mothers (22.6%) are between 18 to 20 years of age. The mean age of fathers is 25.9 years(range is 18-37 years).

21.5% mothers (20) were illiterate as compared to 50.5%(47) Fathers. Mothers' receiving more than 10 years of schooling was 16.1% as compared to 9.7% fathers. . The educational status of mothers was better than fathers. It is probable that the boys started working at a much younger age and therefore could not attend school. Only 2 of the mothers were into some kind of job whereas the rest were predominantly homemakers.

71 mothers responded that monthly income was less than INR<=10000, 18 mothers said monthly income was more than INR >10000. Only 4 mothers did not respond. The mean monthly income was INR 7244(INR 3000 – 20000).

**BCG Vaccination**

BCG vaccination was received within 7 days of birth in 82.8% of the infants. Of the 16 infants (17.2%) who had delayed BCG immunisation, the delay was more than one month in 6

infants (6.5%). Of these, two infant's vaccination was delayed by 90 days; three infant's by 60 days and one infant by 38 days. In ten infants (10.8%) BCG vaccination was delayed between 8 to 30 days. The delay in BCG vaccination was significantly associated with sex of child ( $p=0.032$ ); and mother's education status ( $p=0.01$ ). (Refer Table 1 and 2).

#### **First dose of OPV, DPT and Hepatitis B vaccination**

79 children were eligible for first dose of OPV, DPT and Hepatitis B vaccination. 13 children (16.5%) received vaccination prior to completing 45 days of age. About six of these children received vaccination a week prior to the schedule date, while 7 of these 13 children (53.8%) received vaccination 7 to 18 days prior to scheduled date.

Twenty children's (25.3%) vaccination was delayed beyond one week to a maximum of 3 months. The first dose of vaccination was delayed in 16.7% of the mothers below 20 years of age as compared to 30% of the mothers between 21-25 years of age. 30% of the illiterate mothers delayed the first dose as compared to 23% amongst those who had received some level of education.

Income levels did not influence the timely uptake of vaccination. Mothers who had three or more children (45.5%) delayed their vaccination as compared to 18.8% mothers who had only one child (6 out of 32). Delayed immunisation of first dose was observed in 20.8% of the male children and 32.3% of the female children. There was no significant association between delay of vaccination and sex of child, age of mother, education of mother, birth order or income levels. However there has been an increase in percentage of delayed vaccination for the first dose as compared to BCG.

#### **Second dose of OPV, DPT and Hepatitis B vaccination**

Of the 57 children eligible for second dose, 14 (24.5%) of the children did not receive immunisation schedule on time. The delay was observed in 41.7% of the infants whose mothers were less than 21 years of age and 21.2% of the infants whose mothers were in the age group between 21-25 years.

Amongst the illiterate mothers, 15.4% had delayed vaccination as compared to 27.3% amongst mothers who received some form of education. Vaccination delay was observed in 27.3% of infants who had one sibling and 22.9% of the infants who had more than one sibling. Vaccination delay for the second dose was observed in 17.6% of the male children (17.6%) and 34.8% of the female children.

#### **Third dose of OPV, DPT and Hepatitis B vaccination**

Eleven (34.4%) of the 32 eligible children received delayed immunisation for the third dose. Amongst these eleven children with delayed immunisation, 4 mothers belonged to the age group less than 21 years, six were in age group of 21-25 years and one above 25 years of age. The delay was more in the children whose mothers were less than 21 years (57.1%) as compared to children whose mothers were 21 years and above.

Three of the 7 illiterate mothers had delayed vaccination (42.9%), whereas only 32% of those receiving some form of education delayed the vaccination schedule. The delay

observed was 41.7% in those children who were first born without sibling and 30% in those who had siblings. The delay was observed in 33.3% of the male children and 35.7% of the female children had delayed vaccination for the third dose.

### **Measles Vaccination**

Measles vaccination was delayed in 6 of the 10 (60%) infants who were of eligible age. The delay in vaccination ranged from 30 to 55 days. Two of the 6 male children and all of the 4 female children received delayed immunisation.

### **Discussion**

The percentage of infants receiving vaccination much beyond their scheduled time, was found to be increasing with each vaccination dose. For BCG, it was only 17.2% infants who received delayed vaccination. For first, second, and third dose of OPV, DPT, HBV vaccine, the percentage of infants whose vaccination was delayed was 25.3%; 24.5% and 34.4%. The maximum delay was observed for measles vaccination (60%).

The younger women, below 21 years of age also representing the first birth order, were more concerned about getting their child vaccinated with BCG and first dose on scheduled time as compared to the older women. However for the second and third dose of the proportion of women below 21 years of age who delayed the vaccination was almost twice the percentage of women above 21 years of age who delayed the vaccination.

Educational status of the mother influences the uptake of timely vaccination. The proportion of illiterate mothers delaying the vaccination was higher than those who had been to school. For BCG vaccination, educational status was found to significantly influence the timely vaccination. Almost 42.9% of the illiterate mothers delayed the third dose of OPV and DPT. In a logistic regression analysis of NFHS 2 data, Nilanjan Patra<sup>(2)</sup> found that educational status influences the uptake of vaccination.

With increasing birth order (>2 births), the proportion with delayed vaccination was 21.4% as compared to 16% with birth order 1 and 2. It appears that the women become more negligent as the birth order increases. Study by Nilanjan Patra<sup>(2)</sup> showed a similar negligent effect after 26 years of age and higher birth orders. Islam et al<sup>(3)</sup> observed in his study that likelihood of vaccination decreases for the mothers' older than 28 years.

Sex of the child seems to be predominant factor affecting the timely vaccination. There has been a delay in vaccination of female children for all vaccines. The proportion of delayed vaccination in female children has increased for each subsequent vaccination. Statistical significant difference was found in delay of BCG vaccine and sex of child. These findings just reiterate the low status that a female child gets in the Indian society. Studies conducted elsewhere in India and Bangladesh<sup>(3,4,5)</sup> showed that neglect of female child does occur.

In spite of immunisation services being available in even the remotest part of the country, the mother may not bring the child for vaccination. This could be due to lack of priority accorded to health status in general, poor status of female child, lack of awareness about

immunisation centre, lack of time etc. Some mother's who had delivered in the rural areas, said that they were not aware about immunisation services in their villages.

There is a need to develop a reminder system for ensuring timely vaccination. A personalised approach with the health care provider reminding the child for immunisation would be an effective approach to reduce the delays in vaccination. However the cost of such an approach would be high as the manpower requirement would be high in this system. A more cost effective approach would be to have an automated voice reminder call system.

In majority of the hospitals, the child receives BCG and OPV vaccination before discharge from the hospital. However in hospitals, which have a few deliveries vaccination programme are carried out once a week or so. Ensuring that the child is vaccinated prior to discharge, even if it means wasting BCG doses could be a policy taken by the hospital.

Wastage could also be minimised if smaller dose or single dose vials are made available, so that a vial is opened even for a vaccinating a single child. The vaccine producing companies could be approached for the feasibility of having a low cost vials with smaller doses.

Continuous follow-up reminders by the various health care providers like the ASHA, ANM, Dais etc. in the field setting to ensure that the child is vaccinated could supplement the above approaches.

The study is a health facility based and therefore misses out the information of infants who are not being brought to the immunisation centre. Since the primary immunisation coverage as per NFHS-3 is as low as 46%, it means that a large number of infants are not being immunised in spite of services being available.

**Conclusions:** Delay in vaccinations increases the risk of exposure to the infection. This is especially more for measles vaccination, which was found delayed in majority of the eligible infants. It is therefore important not only to emphasis on vaccination of the child but also on vaccinating the child at the scheduled age. Using reminder systems like telecommunication with mobile technology, policy of daily vaccination in the hospital, and continuous follow-up and counselling could increase the timely immunisation of children.

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Table 1: Timely BCG Vaccination status of male and female infants

Sex of child	BCG Vaccination on time	BCG Vaccination Delayed	Total
Male	51 (89.5%)	06 (10.5%)	57(100%)
Female	26(72.2%)	10(27.8%)	36(100%)
Total	77(82.8%)	16(17.2%)	93(100%)
<b>Chi square=4.6; p=0.032, Significant</b>			

Table 2: Timely BCG Vaccination status of Infant according to the educational status of the mother

Education Status	BCG Vaccine on time	BCG Delayed	Total
Illiterate	15(75%)	05(25%)	20(100%)
Up to 4 years of education	03(42.9%)	04(57.1%)	07(100%)
5 to 10 years of education	46(90.2%)	05(9.8%)	51(100%)
11 to 15 years of education	13(86.7%)	02(13.3%)	15(100%)
Total	07(82.8%)	16(17.2%)	93(100%)
<b>Chi square=10.81; df=3, p=0.01, Significant</b>			

