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Evaluation of vaccination coverage and Dropout rates among children of age 0-5 years in slums of Amritsar city

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Abstract

Background:- Immunization significantly lowers the morbidity and mortality rates in children by protecting them from Vaccine Preventable Diseases. India has one of the lowest vaccination coverage rates in the world. NFHS-3 revealed that about 43.5% was only fully immunized in India as per National Immunization schedule[1]. The objectives of the study were to assess the under-five immunization coverage amongst the households in slums of Amritsar city.

Method:- It was a community based-Cross-sectional study. Amritsar city has recognized 64 slum areas according to Draft master plan 2011-2031 by PUDAPunjab Urban Development Authority) MOHALI July 2010.These 64 areas were divided into 4 sectors depending upon their location and then from each sector one area was selected randomly by lottery method. Total 1600 houses were surveyed for study ie 400 houses from each sector.

Results:- Out of 1131 (0-5 years) children, 45.19 % were fully immunized, 31.12% were partially immunized and 23.69 % were unimmunized.Fully immunized status among the children of literate mother was higher than illiterate mother. This study revealed higher dropout rate for BCG-Measles (38.5%), DPT1-Measles (33.5%) and DPT1-DPT3 (26.1%) than target cut off of 10%.

Conclusion: Vaccination coverage was quite low as compared to state data which indicates the insufficient services provided in slums. So consistent efforts need to be made in slums so that vaccination coverage can be improved for better survival of children.

Keywords: Immunization, vaccination, 0-5 years children, Slums

Introduction

Growth of cities is always accompanied with growth of slums due to inequitable development and distribution of resources. One of the most enduring physical manifestations of social exclusion in cities is the proliferation of slums and informal settlements. People living in these settlements experience the most deplorable living and environmental conditions, which are characterized by inadequate water supply, miserable conditions of environmental sanitation, breakdown or non-existence of waste disposal arrangements, overcrowded and dilapidated habitation, hazardous location, insecurity of tenure, and vulnerability to serious health risks.

Census of India 2011 defines slum as a compact area of at least 300 populations or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities[3]. About 65.4 million people are living in urban slums in India[4]. Total population of Punjab is 27 million, out of which 37.49% i.e. about 10 million is urban population. In Punjab urban population increased from 33.92 percent in 2001 to 37.49 in 2011. One half (49.12%) of urban population of Punjab is concentrated in four districts namely Amritsar, Ludhiana, Jalandhar and Sahibzada Ajit Singh Nagar. Ludhiana (59.14%) is most urbanized district in Punjab. Ludhiana and Amritsar districts account for one-third (32.72%) of total urban population of the state. Amritsar becomes second metropolitan city of Punjab after Ludhiana[5].

Vaccination is one of the most effective methods of preventing childhood diseases. Globally, it is estimated to avert 2-3 million deaths each year[6]. In 2008 World Health Organization (WHO) estimate about 8.8 millions deaths among children age 0-59 months (under five) globally out of which, nearly 17% of all deaths in children under five were vaccine preventable[7].

In May 1974, WHO officially launched a global Immunization Programme, known as Expanded Programme of Immunization (EPI) for the prevention and control of six major killer diseases of children namely tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles, all over the World[8]. The Government of India on 19th November 1985 renamed EPI programme as “Universal Immunization Programme (UIP)” after modifying the schedule. This programme was expanded to entire country and measles vaccine was added in the schedule of this programme (World Health Organization, 1978). In UIP, focus was shifted from under five to under one year of age and improvement in quality of services. It was recommended to give first dose of TT to the pregnant mother in the first contact and the second dose after one month and BCG and OPV to the newborn as early as possible[9]. Recently some newer vaccines were added in this programme like Pentavalent, IPV and Rotavirus.

Children are vulnerable age group due to immature immune system. On the other hand in India about 44% of children of age 0-3 years are stunted due to chronic malnutrition and 78% are anaemic which further makes the condition worse[1]. One in every ten new-borns does not get chance to live to see their fifth birthday[10]. Despite this fact vaccination coverage is about 43.5 % according to NFHS-3. Surveys on health and living conditions in eight Indian cities observed differences in infant and child mortality rates between slum and non-slum settings for five out of eight cities. The infant mortality rate was almost 18 points higher and the child mortality rate was almost 32 points higher for slum settings. In slums, full immunization coverage was recorded as 2.7% to 18.3% less compared to non-slums[10].
Immunization is one step to cope with mortality and morbidity in children in slums. Keeping this in view this study was formulated with an objective of assessing the immunization coverage in children of age 0-5 years in urban slums of Amritsar city.

Materials and Methods

This was a community based cross-sectional studys conducted in Amritsar slums from 1st January 2012 to 31st December 2012. Amritsar city has recognized 64 slum areas according to Draft master plan 2011-2031 by PUDA MOHALI July 2010[2].These 64 areas were divided into 4 sectors depending upon their location and then from each sector, one area was selected randomly by lottery method. Areas selected were Verka (Majitha Bypass), Mohkumpura , Bangla Basti and Ektanagar. After the selection of areas by random method, the houses present in these areas were enlisted and from each area, 400 houses were surveyed. So in total 1600 houses were surveyed for study.

For assessing the primary vaccination coverage, the following vaccines and schedule available in the "NATIONAL IMMUNIZATION SCHEDULE" were considered:-

- BCG–OPV-0 dose, Hepatitis-0 dose at birth,
- OPV–three doses each at 6, 10 and 14 weeks,
- Hepatitis B (HBV)–three doses each at 6, 10 and 14 weeks,
- DPT–three doses each at 6, 10 and 14 weeks, and
- Measles– single dose 9 to 12 months of age.
- Vitamin A at 9 months and there after every six months till 5 years.

The following definitions were considered to evaluate the outcome of primary childhood vaccination in Amritsar slums:-

- Fully Immunized: A child was considered fully immunized if he/she had received 1dose of BCG, 3 doses of OPV/DPT/Hepatitis -B vaccines and one dose of measles vaccine before 1 year of age.

- Partially Immunized: A child who had missed any one or more doses of recommended vaccines or if received all vaccines, the interval between the 2 doses being more than 4 weeks was taken as partially immunized.

- Un-immunized: Given the grace period of 2 immunization sessions 2 months for BCG, 2 months for DPT/OPV/Hepatitis-B and 1 month for Measles vaccine. An Infant who was not given the due vaccine/ dose even after the grace period was taken as un-immunized.

- Children above the age of one year was taken as fully immunized, if he/she had followed immunization according to National immunization schedule[11].

Dropout rate[11]: Percentage point difference between the vaccines of the maximum and the minimum antigen received, expressed as a percentage of the maximum dose.

- For full immunization dropouts------- (BCG – Measles) X 100 / BCG
- For DPT/ OPV dropouts---------- (DPT1 – DPT3) X 100 / DPT1

The investigator himself conducted the study by house to house visits and filled the household summary form. All the study subjects were fully informed about the purpose of the study. Informed consent was taken from the individuals before conducting the interview. Information was noted from the immunization cards. A scar for BCG vaccine was also observed .For those who had no immunization cards, an enquiry was made from an adult member of the family preferably mother. Study Period: The study spanned over a period of one year from January 2012-december 2012.

Data Analysis: The data collected was compiled, coded, tabulated and analysed by using Microsoft excel and epi info software. Appropriate statistical tests were applied for analysis wherever applicable.

Results

Total 1600 household were surveyed in study. Total no. of people in 1600 household was 7263. Among 1600 households 1285 houses were of migrants from West-Bengal, Uttar-Pradesh, Bihar, Maharashtra, Rajasthan etc. Average family size was 4.5. There were 2359 children of 0-15 years, 1131 children of age group 0-5 years out of which 582(51.4%) males and 549(48.5%) females, among these 316 (28%) were institutional deliveries. (Table 1)

Table-1:- Demographic profile of household studied.

Parameter	Number
Total number of household studied	1600
Total number of individuals in households	7263
Average family size	4.5
Households having Native place not Punjab (Migrant Household)	1285 (80%)
Total number of children 0-15 years of age	2359
Total number of children 0-5 years of age	1131
Total number of Male and Female children 0-5 years of age	M-582(51.4%) F-549 (48.5%)
Institutional deliveries	316 (28%)

Out of 1131 (0-5 years) children 45.19% were fully immunized, 31.12% were partially immunized and 23.69 % were unimmunized. In the children of illiterate mothers, 27.27% were not immunized, 34.32% were partially immunized and 38.41% were fully immunized. In the children of literate mothers, 10.61% were not immunized, 20.41% were partially immunized and 68.98% were fully immunized. Fully immunized status among the children of literate mother is higher than illiterate mother and this difference is statistically significant. (Table-2 &3)

Table 2: Distribution of children according to immunization status from age 0-5 years

Immunization (0-5 yrs)	Frequency	Percent
Unimmunized	268	23.69%
Partially immunized	352	31.12%
Fully immunized	511	45.19%
Total	1131	100.00%

Table 3: Distribution of children age 0-5 years according to immunization status in relation to educational status of mother

	Immunization status						
Educational status of mother	Not immunized (NI)		Partially immunized (PI)		Fully immunized (FI)		Total
	N	%age	N	%age	n	%age	
Illiterate	240	27.27%	302	34.32%	338	38.41%	880
Literate	26	10.61%	50	20.41%	169	68.98%	245

p value 0.000

Out of total 1136 children of age 0-5 years surveyed maximum coverage was seen for BCG 74.4% followed by DPT1- 68% , OPV1- 64%,HepatitisB1 – 58.3%. Coverage for DPT, OPV and Hepatitis-B 2nd and 3rd dose decreased further. Measles 1st dose coverage was 45.71% and only 14.90% children received measles 2nd dose.18.7% of children received vitamin-A 1st dose and coverage of 2nd dose of vitamin –A decreases further to 8.07%. Coverage of DPT booster 1&2 was 19.8%, 9.2% respectively. (Table-4)

Table 4: Distribution of children according to type of vaccine received from age 0-5 years

Vaccine	Total no. of children	Frequency	Percentage
BCG	1131	842	74.40%
DPT 1	1122	772	68.80%
DPT 2	1102	674	61.16%
DPT 3	1071	545	50.88%
OPV 1	1122	704	62.74%
OPV 2	1102	638	57.89%
OPV 3	1071	564	52.66%
Hepatitis 1	1122	655	58.37%
Hepatitis 2	1102	571	51.81%
Hepatitis 3	1071	511	47.71%
Measles 1	1010	462	45.74%
Measles 2	523	78	14.90%
Vitamin-A 1	1010	189	18.70%
Vitamin-A 2	867	70	8.07%
DPT booster 1	851	169	19.85%
DPT booster 2	194	18	9.27%

Vaccine dropout rate percentage for DPT 1st dose to DPT 3rd dose was 26.1%. Dropout rate from BCG highest covered vaccine (74.4%) to lowest covered vaccine up to age of one year, Measles-1(45.7%) was 38.5%. Dropout between DPT 1st dose and Measles1dose was 33.51%. (Table-5)

Table 5: Vaccine drop-out rates (0-5 years)

Vaccine	Coverage of 1st antigen	Coverage of last antigen	Drop-out rate
DPT 1 to DPT 3	68.8%	50.8%	26.1%
DPT1 to Measles1	68.8%	45.7%	33.51%
BCG to Measles 1	74.4%	45.7%	38.5%

Discussion

Proper immunization is believed to be the most cost effective way in preventing childhood morbidity and mortality. Despite various efforts, the immunization coverage is still around 62% (NFHS-4)[12]. In this study 45.1% of children 0-5 years of age were fully immunized, 31.1% of children were partially immunized and 23.6% were unimmunized. Full vaccination coverage in the study area was found to be below the expected level of >80% as targeted by the Government of India (GOI) in its multi-year strategic plan for 2013-17 (MOHFW-GOI 2013)[13]. Similar results found in study conducted in the resettlement colonies of urban slums of Amritsar in 2011 which documented 42.9% of children aged 0-1 year were fully immunized, 27.1 % were partially immunized, and 30% children were unimmunized .[14].

According to NFHS-3 in Punjab 60% and in India 43.5% of children were fully immunized[1,15]. A study in Surat slums, Gujarat, Western India reported lower full immunization coverage (25%) and higher partially or unimmunized coverage (75%) compared to our study (Sharma et al 2009)[16]. Similar to this study, a recent study from Hyderabad, South India also documented lower full immunization coverage (44.1%). The same study reported 32% children aged 12-23 months were partially immunized and 23.9% children did not receive any vaccines [17].

In this study it was found that children of native families were 1.8% more likely to be fully immunized in comparison to migrants. Similar results were found by Gill.k et al in Amritsar slums that children of native families were 2.7% more likely to be fully immunized[14].

In this study literacy of mother was directly related to immunization status of children. Fully immunized status among the children of literate mother (68%) was higher ie 4.6 times higher than illiterate mother (38%) and the difference was statistically significant.(OR between NI/PI & FI- 3.8,p value 0.000)

Verma .N in Lucknow slums found 22.4% of the children who belonged to illiterate mothers were fully immunized, while 40%children of mothers who were educated up to high school level were immunized. The proportion of immunized children increased and unimmunized decreased as we moved from illiterate to those with higher education[18].

Another study in urban slums of Varanasi, India found education was independently associated with complete immunization of the children. Mothers who are secondary or more educated have 1.59 times more probability of having their children immunized than less educated mothers[19].

According to NFHS-3 in Punjab 88% children received BCG, 70% received 3 doses of DPT and 78% received Measles1 and in India 78% received BCG, 55 % received 3 doses of DPT and 58% receives Measles1. In present study although vaccination coverage was better than National data in terms of fully immunized status but in terms of individual vaccine coverage it was less than National data. Also dropout was more than National data. In national data dropout from DPT1 to DPT3 was 27% and from BCG to Measles was 24% according to NFHS-3.[15].

Chaturvedi et al in slums of Kanpur Nagger in 2014 observed similar results as higher dropout rates for BCG-measles (35.46%), and DPT1-DPT3 (25.88%)[20]. A study from similar settings of Mumbai reported a higher dropout rate for BCG-measles (22.7%) and a similar dropout rate for BCG-DPT3 (16.8%), and DPT1-DPT3 (13.3%) vaccines (Pakhare et al 2014)[21]. In the study done in Merrut slums around 42% of children received BCG. There was a considerable drop in the percentage of children who received DPT1 (37.8%) and DPT3 (23.7%).

Similar trend could be seen in case of children who received Polio 1 (33%) and Polio 3 (22%). Only a quarter of the children received measles vaccine (24.3%)[22].

In this study immunization coverage is less and dropout was more than state data which may be due to limited health care facilities in slums, but immunization status was better than National indices in terms of fully immunized status but in terms of individual vaccine coverage and dropout it was worse. Mobile immunization teams visiting the slums monthly for conducting Immunization sessions have possibly played role in better immunization status of children as compared to National data. Also in our study it was found that about 20% children got vaccination from Anganwadi centres.

Conclusion

Vaccination coverage was quite low as compared to state data which indicates the insufficient services provided in slums. So consistent efforts needed in slum population so that immunized coverage could be achieved to desired level.

Regular follow up of children in the vulnerable age group and education of mothers regarding the immunization schedule will go a long way in reducing the dropout rate and ensuring full immunization.

Improvement in the income of the poor, proper health services and quality environment are more important in reducing the morbidity and mortality in slums. Finally politically will ie working toward more equitable socioeconomic system is must for sustainable development.

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