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Assessment of Socio-demographic factors affecting Immunization status of children of age 0-2 years in Slums of Amritsar city

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Abstract

Background: India is a leading producer and exporter of vaccines but it has one of the lowest vaccination coverage rates. India has almost 9.6 million unimmunized children which contribute to more than one-third of the unimmunized children around the world. Further in slums, full immunization coverage was recorded as 2.7% to 18.3% less compared to non-slums. This study was planned to assess the various socio demographic factors which influence the immunization status of children.

Method: It was community based-Cross-sectional study. Amritsar city has recognized 64 slum areas according to Draft master plan 2011-2031 by PUDA(Punjab 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 486 (0-2 years) children, 43.98 % were fully immunized, 34.28% were partially immunized and 21.78 % were unimmunized. Significant positive association was found between vaccination coverage and literacy of father & mother, institutional deliveries, native place and with mother's occupation but no association was found between socioeconomic status, religion, father's occupation in relation to vaccination coverage. In the present study although vaccination coverage was almost approximate to National data in terms of fully immunized status i.e. around 43% children were fully immunized, but in terms of individual vaccine coverage, it was less than National data and State data. Also dropout was more than National data and State data.

Conclusions: Consistent efforts are needed especially in slum population so that immunization coverage could be achieved to desired level. Regular follow up of children in the vulnerable age group and proper tracking system helps in reducing the dropout rate and ensuring full immunization coverage

Keywords: Immunization, 0-2 years children, Slums, Socio-demographic

Introduction

Economic history of many countries reveals a close relationship between industrialization and urbanization. Due to the rapid increase in the number of industries, demand of multi-storeyed buildings and due to other construction work in urban areas, people migrate to these areas in search of better employment. Urbanization generated both opportunities and problems to habitants.

Unplanned urbanization lead to slum formation. Slum means not only “jhuggi-jhompri” or “kaccha-pakka” houses as generally perceived but the vast informal settlements that are quickly becoming the most visible manifestation of urban poverty. Under Section-3 of the Slum Area Improvement and Clearance Act, 1956, slums have been defined as mainly those residential areas where dwellings are in any respect unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and designs of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light, sanitation facilities or any combination of these factors which are detrimental to safety, health and morals.¹

The slum population of India is 65 million which is 17.36% of urban population. In Punjab urban population is 37.49 percent which is above the National percentage of 31.16. In Amritsar about 66 thousand slum households have population of about 3 lakh 29 thousand i.e. about 24.68% of peoples reside in slums in Amritsar.^{2,3}

Living conditions have direct impact on public health. Children are the most vulnerable age group due to immature immune system. Under five mortality and infant mortality rate(IMR) is still very high in our country. Recent data (2015) by UNICEF suggests IMR is 36 and under five IMR is 45.⁴

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.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. In 2008 World Health Organization (WHO) estimates about 5.2 million deaths among children age of 1-59 months globally out of which, nearly 29% of all deaths in children under five were vaccine preventable⁶.

So vaccination is one of the most cost-effective interventions to prevent the suffering that comes from avoidable sickness, disability and death. The benefits of immunization are not restricted to improvements in health and life expectancy but also have social and economic impact at both community and national levels. India has the largest number of births in the world – more than 26 million a year – and also accounts for more than 20 per cent of child mortality worldwide⁷. Under coverage of vaccination plays a major role in morbidity and mortality in children.

Although, India is a leading producer and exporter of vaccines; it has one of the lowest vaccination coverage rates. India has almost 9.6 million unimmunized children which contribute to more than one-third of the unimmunized children around the world.⁸ In India only 43.5 % of children receive a full schedule of vaccination according to NFHS-3.⁹ Nine million immunization sessions are organized each year to target these infants and 30 million pregnant women for routine immunization (RI) in India.⁷ As a result of this between 2005-06 and 2015-16, full immunization coverage in India increased by from 43.5 % to 63.9% but this improvement is still not upto acceptable levels ie minimum 80% coverage to attain herd immunity.^{10,11} Though some improvement has taken place in the past few years, the country still accounts for the largest number of children who are not immunized ie 7.4 million.⁷ In slums, full immunization coverage was recorded as 2.7% to 18.3% less compared to non-slums.⁵ In view of this, the present study was planned to assess immunization status of children

of age 0-2 years in association with socio-demographic factors in slums of Amritsar city.

Materials and Methods

This community based cross-sectional study was 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 2010.¹² 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, we considered the following vaccines and schedule available in the "NATIONAL IMMUNIZATION SCHEDULE".

- 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 schedule¹³.

Dropout rate¹³: 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 households were surveyed in study. Total number 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 486 children of 0-

2years, out of which 227(46.7%) were males and 259(53.3%) were females. (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
Total number of children 0-2 years of age	486
Total number of Male and Female children 0-2 years of age	M-227(46.7%) F-259 (53.3%)

Out of 486 children of age 0-2 years 43.98% were fully immunized, 34.23% were partially immunized and 21.78 % were unimmunized. Vaccine dropout rate percentage for DPT 1st dose to DPT 3rd dose was 23.5%. Dropout rate from

BCG highest covered vaccine (76.45%) to lowest covered vaccine up to age of one year, Measles-1(47.51%) was 37.8%. Dropout between DPT 1st dose and Measles 1st dose was 33.4%. (Table 2&3)

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

Immunization (0-2yrs)	Frequency	Percent
Unimmunized	105	21.78%
Partially immunized	165	34.23%
Fully immunized	212	43.98%
Total	482	100.00%

Table 3: Vaccine drop-out rates (0-2 years)

Vaccine	Coverage of 1 st antigen	Coverage of last antigen	Drop-out rate
DPT 1 to DPT 3	71.40%	54.61%	23.5%
BCG to Measles 1	76.45%	47.51%	37.8%
DPT 1 & Measles1	71.40%	47.61%	33.4%

Out of total 486 children of age 0-2 years surveyed maximum coverage was seen in BCG 76.45% followed by DPT1- 71.40% , OPV1- 64.64%,HepatitisB1 – 58.89%. Coverage of DPT, OPV and Hepatitis-B 2nd and 3rd dose were

decreased further. Measles 1st dose coverage was 47.51% and only 19.71% received vitamin-A 1st dose. Further only 20.52% of children received DPT booster-1. (Table-4)

Table 4: Distribution of children according to type of vaccine received from age 0-2 years

Vaccine	Total no. of children	Frequency	Percentage
BCG	484	370	76.45%
DPT 1	472	337	71.40%
DPT 2	456	285	62.50%
DPT 3	423	231	54.61%
OPV 1	472	305	64.64%
OPV 2	456	267	58.63%
OPV 3	423	229	54.18%
Hepatitis 1	472	277	58.89%
Hepatitis 2	456	216	51.75%
Hepatitis 3	423	200	47.995
Measles 1	362	172	47.51%
Vitamin-A 1	362	71	19.71%
DPT booster 1	229	47	20.52%

On assessing various socio-demographic factors it was found that immunization status of boys was better than that of girls as 48% of boys and 40% of girls were fully immunized but the difference was not statistically significant. Literacy of father, literacy of mother, native place and place of delivery were found to be positively associated with vaccination coverage. Among children of nonworking women (unemployed mothers) 52.4%

were fully immunized than of working women (employed mothers) 25.8% and the difference was statistically significant. Vaccination coverage was increased with the increase in the number of family members and this increase was statistically significant. No significant association found between socioeconomic status, religion and father's occupation and birth order in relation to vaccination coverage.

Table 5:- Distribution of children of age 0-2 years according to immunization status in relation to various socio-demographic factors

Socio-demographic characteristics	Fully immunized	Partially immunized & unimmunized	X^2	p value
Sex of child				
Male	108(48%)	117(52%)	2.4	.1
Female	104(40%)	153(60%)		
Birth order				
1	104(47.2%)	116(52.7%)	3.5	.32
2	60(38%)	98(62%)		
3	31(45.5%)	37(54.4%)		
4	17(47.2%)	19(52.7%)		
Total family members				
3	61(42%)	84(58%)	9.6	.022
4	41(46%)	48(53.9%)		
5	24(50%)	24(50%)		
6	33(67.3%)	16(32.6%)		

Mother education				
Illiterate	105(42.5%)	142(57.5%)	11.05	.0008
literate	54 (64.2%)	30 (35.8%)		
Father education				
Illiterate	68(35.4%)	124(64.6%)	29	.00005
literate	91(66.4%)	46 (33.6%)		
Mother occupation				
Unemployed	141(52.4%)	128(47.6%)	12.4	.00042
Employed	16 (25.8%)	46 (74.2%)		
Father occupation				
Unskilled	128(46.7%)	146(53.3%)	1.4	.22
Semiskilled	27 (57.4%)	20 (42.6%)		
Native place				
Migrant	113(42%)	156(58%)	20	.00005
Non-migrant	48 (75%)	16(25%)		
Place of delivery				
Home			11	.0009
Institutional	111(38.1%) 103(53.9%)	180(61.9%) 88 (46.1%)		

Discussion

The National Family Health Surveys (NFHS) report for fully vaccinated children between 12 and 23 months of age had showed consistent improvement .But it varies widely across region, states, districts and strata's of the society depending upon socio-economic factors and availability of health care.⁵

NFHS-3 reported fully immunized coverage in Punjab was 60.1% while at national level coverage was 43.5%.^{9,10} This difference of coverage indicates comparatively better health services in Punjab. But coverage in Punjab is still lower than acceptable level to attain herd immunity i.e minimum 80% coverage of vaccines or target set by Government of India under Universal Immunization Programme (UIP) aiming at least 85% coverage of infants with 3 doses each of DPT and OPV and 1 dose each of BCG and measles vaccine.¹³

In the present study it was found that out of 486 children of age 0-2 years 43.98% were fully immunized, 34.23% were partially immunized and 21.78 % were unimmunized. In our study vaccination coverage was lower than State data may be due to limited health care facilities in urban slums and due to some other social factors. Similar results were found in a 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 (Gill et al 2011).¹⁵ Similar finding by B.Joya in Mumbai slum area Kaula Bandar that only 29% of children were fully vaccinated as compared to 69.8% of children in Mumbai as whole.¹⁶ Another study in 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 (Kulkarni et al 2014).¹⁷

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.^{9,10} In the present study although vaccination coverage was almost approximate to National data in terms of fully immunized status i.e. around 43% children were fully immunized, but in terms of individual vaccine coverage it was less than National data and State data. Also dropout was more than National data and State data. In National data dropout from DPT1 to DPT3 was 27% and from BCG to Measles was 24% according to NFHS-3¹⁰ but in our study it was 23.5% and 37.8% respectively. 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%).¹⁸ Less coverage in terms of individual vaccine was may be due to insufficient/lack of health care facilities in slums like sub centre, Urban Primary Health Care centres etc. High dropout rate indicates the system inability to hold on to the child once registered, the reason behind it is that most of vaccination done in these areas was by monthly camps by The Health Department of Punjab. Moreover in camp approach the effective role of community health workers does not reach up to sustainable level.

Present study reveals that fully immunized status among male child was slightly more than female child but this difference was not statistically significant. Similar results were found by different studies in India viz. Sharma B in Mumbai slums,¹⁹ Gill.k in Amritsar slums.¹⁵ Devasenapathy N in urban poor settlements of Delhi found that girl to boy complete immunization coverage ratio was .78.²⁰ On the basis of the NFHS-3 data, Singh P.K showed that gender inequity in vaccination was high in the Indian states of Punjab (0.83), Delhi (0.83), Haryana (0.90), Bihar (0.88) and Uttar Pradesh (0.92).²¹

No significant association was found between birth order of children and vaccination coverage. But various studies found inverse relation between vaccination coverage and birth order viz. Sharma B in Mumbai, Kulkarni and Chavan in

Mumbai slums.^{17,19} NFHS 3 found consistently negative relationship between vaccination coverage and birth order for all vaccinations.

In our study it was found that with the increase in number of family member's i.e if we move from nuclear to joint family, the vaccination coverage improves and it was statistically significant. Goyal S et al. also found in his study that vaccination coverage was more in children of joint and three generations families as compared to nuclear families.²²

Strong association was found between institutional deliveries and vaccination coverage. Various studies in India had also observed the same fact.^{11,23,24}

In our study it was found that children of native families were more likely to be fully immunized in comparison to migrants and it was statistically significant. Devasenapathy N in urban poor settlements of Delhi found the children of families who were living for more than 10 years in Delhi were more likely to be fully immunized than those who were living less than 10 years.²⁰

There was significant association found between both mother and father literacy in relation to vaccination coverage, fully immunized status among the children of literate mother was 64.2% and literate fathers was 66.4%. NFHS 3 also reveals that only 26 percent of children of mothers with no education are fully vaccinated while 75 percent of children of mothers who have completed 12 or more years of education are fully vaccinated, and the percentage vaccinated rises steadily with increasing levels of education. Various studies in India had also observed the same fact.^{11,19}

In our study no significant association was found between the father's occupation in relation to completion of immunization status of children. Malkar.R also observed similar finding in Beed district Maharashtra.¹¹

In the present study significantly higher proportion of children of unemployed mother's i.e.52.4% were fully immunized than that of employed mothers (25.8%).

In children of employed mothers vaccination coverage was less because 99% of mothers were working as house maid, rag pickers, beggars, daily wager etc and hence might be finding difficult to get the immunization done on some fixed date.

No significant association was found between socioeconomic status, religion and father's occupation in relation to vaccination coverage because about 96% families belonged to lower and upper lower class, 90% families belonged to Hindu community and 93% fathers of children were engaged in unskilled work.

Conclusion

Consistent efforts are needed especially in slum population so that immunization coverage could be achieved to desired level. Regular follow up of children in the vulnerable age group and proper tracking system helps in reducing the dropout rate and ensuring full immunization coverage.

Finally 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 be working toward more equitable socioeconomic system is must for sustainable development. With the improvement of the socioeconomic status of family's socio demographic indicators directly related with immunization coverage also improved.

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