Research Article

Factors affecting the vaccination coverage of children under five years in central India

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Abstract

Background: Despite a dramatic reduction in disease burden of vaccine-preventable diseases through childhood immunization, vaccine coverage is not satisfactory even in urban slums. We need considerable efforts to ensure adequate vaccine coverage to control morbidity and mortality. **Objective:** To assess the immunization coverage in an urban slum area and determine various socio-demographic factors affecting the vaccination coverage. **Material and Methods:** It is a cross sectional random sample study. Parents of children upto the age of 5 years were interviewed at their homes and vaccination centers. Total 1514 cases were included in this study. **Results:** Approximately 58.9% of the children were fully vaccinated, 23% children were partially vaccinated and 18.2% children were unvaccinated. The full vaccination rate increased with lower birth order, education level of the parents, socioeconomic status of family and hospital delivery. **Conclusion:** Children from higher economic or educational groups had better vaccination coverage. Not known of exact date of vaccination is most important factor for poor vaccination coverage. Lack of time, distance and nobody at home were the other factors having negative impact.

Keywords: Vaccination, Socioeconomic Status, Coverage

Introduction

Survival is the biggest challenge for children younger than five years old, especially for those under one year This become more challenging again, if children belong to underprivileged sectors especially slums. Immunization is definitely one of the most effective and cost effective ways of protecting the health of infants and children worldwide against few most lethal and debilitating diseases. Immunization is one of the greatest public health achievements of 20th century, but for effective immunization effect, population coverage levels of particular vaccine should be between 90 to 95% [2]. Despite tremendous advances in economic, technological and medical field in recent years, the burden of vaccine-preventable diseases remains unacceptably high in underdeveloped and developing countries [3].

Roughly 3 million children die each year of vaccine preventable diseases (VPDs) with a disproportionate number of these children residing in developing countries [4]. World Health Organization has started the "Expande d Programme of Immunization" (EPI) globally in 1974. India was one of the first few countries to adopt this programme. In India EPI was started in 1978. To increase the coverage and focus on upto one year of age, the UIP was introduced by the Government of India in 1985-86 to cover at least 85 per cent of the infants against the six vaccine-preventable diseases by 1990 [4]. It was hoped that by end of 20th century, the coverage of children for vaccination against these six vaccine preventable diseases would reach 100 per cent. Since its inception, life of millions of children have been saved. Although India has had remarkable success in immunization coverage, a gap still exists between urban and rural areas, literate and illiterate, upper and lower socioeconomic status, home delivery and hospital delivery etc. Even if national immunization coverage levels are sufficiently high to block disease transmission, pockets of susceptibility may act as potential reservoirs of infection [6]. It is therefore essential to know those pockets and take necessary action to fulfill the vaccine coverage gap. Thus present study was under taken to assess the immunization coverage and various socio-demographic factors affecting the urban slum population of Bhopal (MP), India.

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Aim and Objective

1. To study the vaccination status of children under five years in urban slums of Bhopal
2. To study the influence of age, sex, religion, socio-economic status, parental literacy, parental occupation, family size, birth order of child, place of delivery and availability of vaccination cord on vaccination status.
3. To study of attitudes, beliefs, myths and awareness regarding child vaccination
4. To study the PPI (Pulse Polio Immunization) during the study period and effect of PPI on routine vaccination.

Material and Methods

This is cross sectional random sample survey study. It is conducted between May 1999 to June 2000 in one urban slums of Bhopal city. Parents of children upto 5 years of age were included in the study. Parents were interviewed after proper explanation about the nature of study. Information was tactfully obtained and recorded on the special proforma. Interview were conducted at their homes booth of PPI. Help of local aganwadi workers were taken for the confirmation of vaccination while visiting those areas covered by ICDS.

Details were closely confirmed by observation and cross questioning. Parents were interrogated thoroughly about their attitudes towards immunization. Every effort was made to elicit an answer from the parents. Those who have not given vaccination to their children were asked for reason for failure to give vaccine, they were advocated for immunization and directed to nearest aganwadi or hospital.

Results

Table No: 01: Distribution different parameters of children (n=1514)

Age distribution		Birth order distribution		Vaccination status			
Age (Months)	**Total (%)**	**Birth Order**	**Total (%)**	**Status**	**Male**	**Female**	**Total**
00-06	153 (10.1)	1st	506(33.4)	No of children	838 (55.3)	676 (44.6)	1514(100)
06-12	158 (10.4)	2nd	417(31.1)	Vaccinated	494 (58.9)	400 (59.2)	894 (59.1)
13-24	297 (19.6)	3rd	281(18.6)	Partially vaccinated	263 (31.3)	179 (26.5)	442 (29.2)
25-36	295 (19.5)	4th	141(09.3)	Unvaccinated	81 (09.6)	97 (14.4)	178 (11.8)
37-48	281 (18.6)	≥5th	115(07.6)				
49-60	330 (21.8)	-	-				
Total	**1514**	**Total**	**1514**				

Table No-1 depicts that majority of children belong to age group 13-60 months in both groups. First and second birth order cover 64.5% children. 59.1% children were fully vaccinated, where 11.8% children were unvaccinated.

Table No-02 : Vaccination Coverage & Drop Out Percentage (n=1514)

Vaccines	No of children vaccinated				No of children missing	Drop Out %	
	Male	Female	Total	%		From n=1514	From previous dose
BCG+ Hepatitis B + OPV-0	757	579	1336	88.24	178	11.76	11.76
DPT + Hepatitis B + OPV(1st)	650	549	1199	79.19	315	20.80	10.41
DPT + Hepatitis B + OPV (2nd)	622	512	1134	74.90	380	25.09	05.42
DPT + Hepatitis B + OPV (3rd)	586	462	1048	69.22	466	30.77	07.58
Measles	494	400	894	59.05	620	40.95	14.69
DPT + OPV (Booster-1)	307	248	555	36.66	959	63.34	37.91
DPT + OPV (Booster-2)	138	107	245	16.18	1269	83.81	55.85

Table No: 02 shows that 88.24% children were vaccinated for BCG, Hepatitis B and OPV, where only 59.05% children were vaccinated for measles. By age of second booster (DPT & OPV) 83.81% children were missing.

Table No-03 : Reasons for non-vaccination (Among partially vaccinated & unvaccinated children)

S. No	Reasons for non-vaccination (n=623)	Total	%	Reason for vaccination (n=1563)*	Total	%
01	Lack of knowledge – A. About vaccination B. About place C. About time	(348) 278 38 32	(55.8) 44.6 06.1 05.1	Prevent illness	981	62.8
02	Time not available	145	23.3	Good for child	174	11.1
03	Postpone for further date	32	05.1	Prevent disabilities	167	10.7
04	Fear & doubt	31	05.0	Prevent death	39	02.5
05	Child illness	23	03.7	Other reasons	17	01.1
06	Place of vaccination far away	13	02.1	Not known	185	11.8
07	Other reasons**	31	04.9			

*Some of respondent given more than one reason

**Parental illness (10), wrong idea about when child should vaccinated (5), no faith in vaccination (9), rumors/religious factors (3), vaccinator not present (3), vaccines not available (1).

Table No: 03 depicts, lack of knowledge of vaccines, place and time was the biggest factors (in 55.8% cases) for partially and non-vaccination. Time problem was the second most cause with 23.3% cases. Fear and childhood illness were also contribute significantly with 5.1% and 5%.

Table No-04 : Relationship between parental education and vaccination coverage (n=1514)

Paternal literacy	**Vaccinated (%)**	**Partially vaccinated**	**Unvaccinated (%)**	**Maternal literacy**	**Vaccinated (%)**	**Partially vaccinated**	**Unvaccinated (%)**
Illiterate	271 (30.3)	191 (43.2)	76 (42.7)	Illiterate	377 (42.2)	165 (37.3)	98 (55.1)
Primary	187 (20.9)	156 (35.3)	78 (43.8)	Primary	207 (23.2)	147 (33.2)	58 (32.6)
Middle	198 (22.1)	48 (10.8)	10 (05.6)	Middle	143 (15.9)	77 (17.4)	19 (10.7)
High. Sec.	155 (17.3)	41 (09.3)	11 (06.2)	High. Sec.	134 (14.9)	37 (08.4)	03 (01.7)
Graduate	83 (08.4)	06 (01.3)	03 (01.7)	Graduate	33 (03.7)	16 (03.6)	00 (00.0)
Illiterate	271 (30.3)	191 (43.2)	76 (42.7)	Illiterate	377 (42.2)	165 (37.3)	98 (55.1)
Literate	623 (69.7)	251 (56.8)	102 (57.3)	Literate	544 (60.8)	277 (62.7)	80 (44.9)
Total	**894**	**442**	**178**	**Total**	**894**	**442**	**178**

Table No: 04 shows that in vaccinated children, 69.7% fathers and 60.8% mothers were literate, where as in unvaccinated group 42.7% father and 55.1% mothers were illiterate. Only 1.7% children of graduate fathers were unvaccinated, whereas non of children of graduate mother was unvaccinated.

Table No-05 : Relationship between parental occupation and vaccination coverage

Paternal occupation	**Vaccinated (%)**	**Partially vaccinated**	**Unvaccinated (%)**	**Maternal occupation**	**Vaccinated (%)**	**Partially vaccinated**	**Unvaccinated (%)**
Govt Service	145 (16.2)	27 (06.1)	21 (11.8)	Govt Service	16 (01.9)	05 (01.1)	00 (00.0)
Business	138 (15.4)	25 (05.6)	03 (01.7)	Laborer	174 (19.5)	70 (15.8)	107(60.1)
Laborer	421 (47.1)	342(77.4)	105(58.9)	Others	15 (01.7)	01 (00.2)	01 (00.6)
Others	190 (21.2)	48 (10.8)	49 (27.5)	House wife	689 (77.1)	366(82.8)	70 (39.3)
Total	**894**	**442**	**178**	**Total**	**894**	**442**	**178**

Table No: 05 depicts that in fully vaccinated group 47.1% children belong to laborer class family. In unvaccinated category 58.9% fathers and 60.1% mothers were laborer. 11.8% unvaccinated children belong to government services family. 77.1% vaccinated children's mothers were house wife.

Table No-06 : Relationship between birth order & family size and vaccination coverage

Birth order	Vaccinated (%)	Partially vaccinated	Unvaccinated (%)	Family size	Vaccinated (%)	Partially vaccinated	Unvaccinated (%)
1	403 (45.1)	103 (23.3)	53 (29.7)	3 to 5	504 (56.4)	210 (47.5)	49 (27.5)
2	252 (25.5)	133 (30.1)	35 (19.6)	6 to 8	303 (33.9)	207 (46.8)	87 (48.9)
3	143 (15.9)	81 (18.3)	31 (17.4)	9 to 11	77 (08.6)	23 (05.2)	33 (18.5)
4	47 (05.3)	56 (12.7)	21 (11.8)	12 to 14	08 (00.9)	02 (00.5)	05 (02.8)
>4	49 (05.5)	69 (15.6)	38 (21.3)	>14	02 (00.2)	00 (00.0)	04 (02.2)
Total	**894**	**442**	**178**	**Total**	**894**	**442**	**178**

Table No: 06 shows that 45.1% and 25.5% vaccinated children belong to birth order first and second. Similar 29.7%, 19.6% and 21.3% unvaccinated children belong to birth order 1st , 2nd and 5th or more. Family size is also have great impact of vaccination coverage. 56.4% vaccinated children have 3-5 family members, whereas 33.9% have 6-8 family members. In partially vaccinated category 47.5% children have 3-5 family members. In un-vaccinated category 48.9% children belong to 6-8 member family size.

Table No-07 : Relationship between place of delivery & Vaccination card and vaccination status

Place of delivery	Vaccinated (%)	Partially vaccinated	Unvaccinated (%)	Vaccination card	Vaccinated (%)	Partially vaccinated	Unvaccinated (%)
Govt Hospital	484 (54.1)	213 (48.2)	75 (42.1)	Yes	578 (64.7)	248 (56.1)	85 (47.7)
Private Hospital	153 (17.1)	26 (05.9)	10 (05.6)	No	316 (35.3)	194 (43.9)	93 (52.3)
Home	257 (28.8)	203 (25.9)	93 (52.2)				
Total	**894**	**442**	**178**	**Total**	**894**	**442**	**178**

Table No: 07 Shows that 54.1% vaccinated children delivered in government hospital where 28.8% delivered in home. Whereas 52.2% unvaccinated children delivered at homes. 42.1% unvaccinated children also born in government hospital. Only 5.6% children, who were born in private hospital unvaccinated. 64.7% vaccinated children have vaccination card where 52.3% unvaccinated children don't have vaccination card.

Table No-08 : Relationship between socioeconomic status and vaccination coverage

Socioeconomic Class	Vaccinated	Partially Vaccinated	Unvaccinated
I	21 (02.3)	05 (01.1)	02 (01.1)
II	260 (29.1)	133 (30.1)	33 (18.5)
III	262 (29.3)	88 (19.9)	35 (19.7)
IV	351 (39.3)	216 (48.8)	108 (60.7)
Total	**894**	**442**	**178**

X^2 value=5.75 P<0.05- Just significant

Table No:08 depicts that 39.3% vaccinated children belong to class IV socioeconomic status where as 29.3% and 29.1% belong to class III and class II socioeconomic status. 60.7% unvaccinated children belong to class IV and only 1.1% unvaccinated children were class I socioeconomic status.

Discussion

Immunization coverage gradually improving since last two decades, but age appropriate coverage is still less than 50%. There is lot of factors that influence the acceptance of vaccination coverage in under five years of age. In our study though 55.3% children were male and 44.6% were female, but both were almost equally vaccinated (58.9% male Vs 59.2% female). This indicates gradually increasing awareness regarding

vaccine preventable diseases and decrease in gender discrimination in society. Corsi et al (2009) in their study found that, girls were found to have significantly lower immunization coverage ($p<0.001$) than boys for BCG, DPT, and measles [7]. In India, gender inequalities persist in most states. Male dominant Indian culture mainly responsible for this gender inequalities. Compare to global population of unvaccinated children (20%), only 11.8% study population were unvaccinated for BCG [8].

With increasing age, numbers of drop out babies were increased and by DPT-3, 30.7% and by 2nd DPT booster 83.81% children were lost. Ignorance, lack of knowledge regarding vaccination, place and time is biggest reason (55.8%) for non-vaccination, followed by shortage of time.

Basel PL et al (2012) also conclude high dropout rate (78.6%) for BCG and measles vaccines. Female children were more likely to dropout than male. About 70% of children drop out were from labor class, and/or illiterate families [10]. But nowadays, because of proper tracking system and timely reminder facilities, drop out cases are decreased dramatically. Coverage with the third dose of DTP vaccine (DTP3) by age 12 months is a key indicator of immunization program performance. Estimated global DTP3 coverage has remained at 83%–84% since 2009, with estimated 2013 coverage at 84% [9].

Best part of gradually increasing vaccination coverage is that, parents of poor socioeconomic status, now understanding that, these vaccines are important to prevent diseases. The results from our study, confirmed that maternal education has great impact on acceptance of complete vaccination. In unvaccinated category, 55.1% mothers and 42.7% fathers are illiterate, which is consistent with findings from other studies [11,12]. Increase maternal knowledge regarding vaccination again increase acceptance for vaccination coverage [13]. Availability of a vaccination card showed a strong relationship with correct and complete vaccination status. Availability of the vaccination card, encourage mothers to complete the vaccination and avoid dropout. Acceptance of full vaccination coverage is also depends on women's, education, occupation and antenatal care. Women who are in job are usually more aware of health of their kids and other family members.

Conclusions

Despite the increase in healthcare services and various health programs in India, full immunization coverage for children younger than five is currently still highly inadequate. Satisfactory coverage is possible with holistic approach only. Increasing the health care centers in rural and slums, women education, small family norms, proper antenatal care, media promotion and political willpower are different steps that can increase vaccination coverage. Steps for improvement should focus on reducing the dropout rate from BCG to measles, measles to DPT Booster-1 and DPT Booster-1 to DPT-Booster-2.

Conclusion

Survival is a big challenge for children younger than five years old, especially for those under one year. Immunization is the one of the most effective ways of protecting the health of children against some of the most lethal diseases. Despite the increase in healthcare services and various health programs in India, full immunization coverage for children younger than five is currently still highly inadequate.

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