

Immunization status of infants residing in an urban community of North Karnataka, India

Shobha Ram Bhandari¹, Vijaya A. Naik², Ashwini B. Narasannavar²
and Bijendra Banjade^{3*}

¹District Coordinator, Nepal Public Health and Education Group (NEPHEG), Kathmandu, Nepal,

²Department of Public Health, J.N. Medical College, KLE University, Nehru Nagar, Belagavi-590010 Karnataka, India and ³Monitoring and Evaluation Officer, Group for Technical Assistance (GTA), Thadodhunga, Jhamsikhel, Lalitpur, Kathmandu, Nepal

Abstract: *Background and Objectives:* Immunization is proven cost effective intervention to reduce the child morbidity and mortality. Immunization is the cost-effective intervention which provides protection to infants and children. The objectives of study were to assess the immunization coverage and factors associated with utilization of immunization of 12-23 months children. *Methodology:* This cross-sectional study was conducted in an urban area of Belgaum city, Karnataka with a sample size of 370. Pre-designed and pre-tested questionnaire was used to elicit the required information. *Result:* It was found that 79.5% were fully immunized, 20.5% were partially immunized and no children were found unimmunized. Immunization status of children was significantly associated with mother's educational level ($p < 0.05$) and socioeconomic class ($p < 0.001$). *Conclusion:* As the immunization coverage of children was found still low then expected level of coverage prescribed by the Government, there is need of adequate health education proper training, motivation, better monitoring, supervision and strengthening of services to ensure adequate coverage for all doses of vaccine.

Keywords: Vaccine, Children, Dropouts, Immunization Status, Coverage Evaluation.

Introduction

Immunization is the cost-effective intervention which provides protection to infants and children by providing immunity early in life, before they are exposed to life threatening diseases, like measles, whooping cough (pertussis) and polio [1]. Every child deserves the opportunity to enjoy a healthy, successful life, and immunization is one of the best tools that can turn that opportunity into a reality" [2]. Nearly three million children die every year of vaccine-preventable diseases with significant number of children residing in developing countries [3]. As per WHO recent estimation almost 34 million children are partially immunized and 98% of them are living in developing countries. About 25% of the under-five mortality is due to vaccine-preventable diseases [4]. All the vaccines under the routine immunization programme are provided free of cost. However the current level of coverage of fully immunized children under the national immunization programme is only 61.1% (the coverage evaluation survey by UNICEF 2009)

which is much less than the desired goal of achieving 85% coverage. According to NFHS-3 only 43.5% of infants in India are fully immunized. In subsequent years, the goal of Universal Immunization Coverage (UIP) was raised to ensure 100% coverage of all eligible children with one dose of BCG, three doses of DPT and OPV and one dose of the measles vaccine [5].

Although from the above data it is seen that the immunization coverage in Karnataka is higher than the overall coverage of India, there is limited gains in desired goal of universal immunization coverage. Hence the present study was carried out to find out possible barriers that hampers the progress in immunization coverage.

Material and Methods

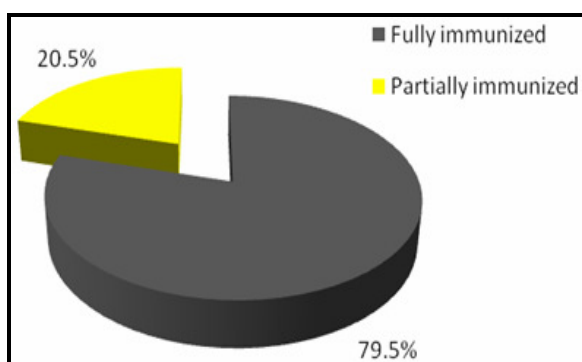
This is a cross-sectional study conducted in Ram Nagar Urban Health Center area of Belgaum of North Karnataka from Jan- Sept.

2014. All 370 children 12-23 months were included in the study Children who were infected with HIV were excluded. Data was collected regarding socio-demographic status, routine immunization and reason for non immunization from the consented mothers of eligible children, using pretested predesigned question by the investigator himself. Data entry and analysis was made by using Statistical Package for Social Science (SPSS) software (Version 20.0). Percentage was calculated and Chi square test was applied for establishing association.

Results

In this study 171(46.2%) were males and 199 (53.8%) were females with a male to female sex ratio being 1:1.6. Among them majority (68.8%) belonged to Muslim religions followed by Hindus (29.7%) and Christians (1.9%). Almost 50% of the participants belonged to joint family, 47.8% to Nuclear family and 1.6% belonged to extended family. 1.1% children belonged to class II, followed by class III (26.8%), Class IV (67.6%) and Class V (4.6%) [2]. 37.3% of fathers had studied up to secondary level whereas 40.5% of the mothers had studied Primary level of education. Almost 45% of fathers were businessman and majority of mothers were house wives. All the mothers had maintained the immunization cards of their children. Out of 370 children 294(79.5%) were fully immunized and 76(20.5%) were partially immunized. In this study no child was found un-immunized. (Graph no.1) The reasons for partial immunization were children illness at the time of immunization in 81.7% followed by 11.8% who had postponed no specific reasons, 2.6% were unaware of 2nd and 3rd dose of vaccine and 3.9% due to fear of side effects.

Graph-1: Immunization status of children



The immunization status of the individual vaccine received was; all 370 was received single dose of BCG vaccine, With regards to OPV only 309(83.5%) had received zero dose of OPV, all had received OPV1 dose, 353(95.4%) had received OPV2 and 341(92.2%) had received OPV3. Similarly 337(91.1%), 326(88.1%), 300(81.1%) of the children had received DPT1, DPT2, DPT3 as respectively. In the context of HepB vaccine 176(47.6%) had received HepB0 dose, 262(70.8%) had received HepB1, 231(62.4%) had received HepB2 and 216(58.4%) had received HepB3 dose. In the study it was also found that only 294(79.5%) had received measles vaccine and 263(71.1%) had taken the 1st dose of Vitamin A along with measles (Table no.1).

Immunization status	Given		Not given		Total (n)
	No	%	No	%	
BCG	370	100	0	0	370
OPV0	309	83.5	61	16.5	370
OPV1	370	100	0	0	370
OPV2	353	95.4	17	4.6	370
OPV3	341	92.2	29	7.8	370
DPT1	337	91.1	33	8.9	370
DPT2	326	88.1	44	11.9	370
DPT3	300	81.1	70	18.9	370
He Bo	176	47.6	194	52.4	370
HepB1	262	70.8	108	29.2	370
HepB2	231	62.4	139	37.6	370
HepB3	216	58.4	154	41.6	370
Measles	294	79.5	76	20.5	370
Vitamin A	263	71.1	107	28.9	370

Statistically significant association was found between educational status of mothers and immunization status of children (Table no.2).

Table-2: Association between the mother’s educational status and immunization status of children

Educational status	Immunization status					
	Fully Immunized		Partially immunized		Total	
	No	%	No	%	No	%
Illiterate	23	92	2	8	25	100
Primary	108	72	42	28	150	100
Secondary	83	80.6	20	19.4	103	100
PUC	69	85.2	12	14.8	81	100
Graduation	11	100	-	-	11	100
Total	294	79.5	76	20.5	370	100

$\chi^2 = 12.073, df = 4, p = 0.017$

Table-3: Association between immunization status and types of family

Immunization status	Nuclear		Joint/Extended	
	No	%	No	%
Fully Immunized	138	78	156	80.8
Partially immunized	39	22	37	19.2
Total	177	100	193	100

$\chi^2 = 4.070, df=2, p=0.131$

The percentage of children fully immunized was highest (80.8%) in Joint family where as it was 78% in Nuclear families. 22% of children from Nuclear and 18.2% from Joint families were partially immunized. The difference observed was not statistically significant. (p=0.13) (Tab-3)

Table-4: Association between socio-economic status of family and immunization status of children

Socio-economic status	Immunization status					
	Fully Immunized		Partially immunized		Total	
	No	%	No	%	No	%
High (I, II)	12	100	-	-	12	100
Middle (III, IV)	275	81.1	64	18.9	339	100
Low (V)	7	36.8	12	63.2	19	100
Total	294	79.5	76	20.5	370	100

$\chi^2 = 24.819, df = 2, p < 0.001$

100% children of high class(I, II), 81.1% children of middle class(III, IV) and only 36.8% children of lower class(V) family were fully immunized. Similarly highest i.e. 63.2% children were partially immunized in lower class family, 18.9% children in middle class and no children were partially immunized in high class family. The result showed that the association between socio-economic status and immunization status was highly significant. (p<0.001) (Table no.4)

In the present study the drop-out rates of 4.6%, 3.3% and 11.8% between the 1st and 2nd dose of OPV, DPT and HB was respectively observed. Similarly 3.4%, 7.9%, 6.5% of drop-out rates were found between 2nd and 3rd doses of OPV, DPT and HB. 7.8%, 10.9% and 11.8% drop out rate between 1st and 3rd dose of OPV, DPT and HB were observed in the study respectively.

Discussion

Immunization is one of the cost-effective interventions for controlling and eliminating life-threatening infectious diseases and to reduce the child mortality and morbidity.

In our study among 370 children of age 12-23 months, 46.2% were males and 53.8% were females with male to female ratio of 1:1.6. The study findings was similar to studies conducted in Kenya and Burkin Faso where the female children were more than male children [6-7]. Where as in the studies conducted in West Bangal, Andhra Pradesh, Gujarat, Maharashtra and Madhya Pradesh

boys were more than girls [8-12]. In the present study majority (68.4%) of participants were Muslims and most of the participant belonged to class III and IV Socio-economic status (table no.3). Similar study was conducted by Sanou.A.et al at Burkina Faso showed that majority (65.4%) of children were Muslims [7]. Other studies conducted in Andhra Pradesh, Maharashtra, Delhi, Madhya Pradesh and Uttar Pradesh Hindus were more than Muslims [9, 12-14]. In our study almost fifty percent of children belonged to joint family. As against this, Delhi study had more number of children from nuclear family [13].

The study reveals that out of 370 children of 12-23 months 79.5% were fully immunized and 20.5% were partially immunized, and no child was found unimmunized. According to NFHS3 in Karnataka only 55% of children were fully immunized [5]. Similar studies conducted in Maharashtra and Odisha showed no child was unimmunized but the result showed less number of children in that study were fully immunized and partially immunized as compared to our study [11, 14]. Similar study conducted in Bangalore Karnataka showed 78% fully immunized and 22% partially immunized [15]. Other study conducted in Jam Nagar and Uttar Pradesh showed that full immunization was more than that of our study [14, 16-17]. Other studies conducted in Chandigarh, Madhya Pradesh and Bareilly City showed higher proportion of children were fully immunized [1, 12]. Poor coverage of DPT vaccination is because of side effect like fever and local pain.

It was observed that 100% children were vaccinated with BCG, although 91.1% were immunized with 3 doses of OPV, only 70.7% were immunized with 3 doses of DPT and 79.5% of children were vaccinated with Measles. Poor coverage of DPT vaccination is because of side effect like fever and local pain. Although the coverage of vaccination for 3 doses have been >90% with measles, it has been only 79%. This could be perhaps because of the laxity on the part of health workers and also the parents. According to NFHS3 in Karnataka coverage for BCG, OPV3, DPT3, Measles and Vitamin A was 87%, 73%, 74%, 72% and 22% respectively which is lower than that of our study. Recent evaluation survey conducted in India in Oct 2013 by WHO-UNICEF showed BCG (87%), OPV3 (70%),

DPT3 (72%) HepB3 (70%) [4]. Our coverage rates were much higher than the study conducted by in Andrapradesh, Jamnagar city, Madhya Pradesh, Bareilly and Uttar Pradesh [1,9,12,14,16]. However the Study conducted in Maharashtra and Gujarat reported lower levels of coverage for BCG and OPV1, higher levels of coverage for OPV2, OPV3 DPT1< DPT2, DPT3 and measles as compare to our study [10-11].

In our study drop-out rates for OPV1 to OPV2, OPV2 to OPV3, OPV1 to OPV3, DPT1 to DPT2, DPT2 to DPT3 and DPT1 to DPT3 was observed as 4.6%, 3.4%, 7.8% and 3.3%, 7.9% respectively. This result is much lower than the study conducted in Lucknow, Bareilly city, Uttar Pradesh [1,14,18]. But the drop-out rate was higher in our study than the study conducted by Sheth J.K et al in Gujarat [10]. Another study conducted by Gupta P.K et al showed lower drop-out rates for DPT1 to DPT3 and similar drop-out rates for OPV1 to OPV3 our study [11].

Fully immunized children were found to be more among Hindus (89%) as compared to Muslims (74.7%). Similar findings were showed in the studies conducted in East India, Maharashtra, South Delhi, Madhya Pradesh, Bareilly city, and Uttar Pradesh [1, 11-14, 19]. No significant association was found between immunization status of children and types of family in our study ($p=0.13$) which is similar to the study conducted by Kar.M et al in south Delhi ($p>0.1$) [13]. In our study it was found that all the children of high socio-economic class(II) were fully immunized, 81.1% fully immunized children were from middle class(III,IV) and only 36.8% children of low economic class(V) were fully immunized.

This result showed that there is significant association between immunization status of children and socio-economic status of family ($p<0.001$). Parents of lower socio-economic status are likely to be illiterate and ignorant about the importance of full immunization. Most of them are on daily wages and do not have time to take child for immunization. A study conducted by Nath B et al in Lucknow showed similar findings as our study [18]. Another study conducted by Ray SS et al in

Eastern India, and Chaudhary V et al in Bareilly city India ($P>0.5$) showed no significant association between immunization status and socio-economic status [1, 19].

Father education did not have any association with immunization status, whereas mother's education had significant association. This could be because mothers are the care takers of the child and their awareness will have an influence on all the matters related to child health. These findings of association of mother's education status and immunization coverage are similar to the study conducted by Dalal.A et al in Goa ($p<0.05$), Ray.S.S et al in Eastern India ($p=0.0002$) and Nath.B et al in lucknow [18-20]. As against this study conducted by Singh. A et al in Utter Pradesh there was no significant association between educational status of mother and immunization status of child [14].

Conclusion

As the immunization coverage of 12-23 months children was found still lower than expected level of coverage prescribed by the Government. Literacy status of mother and socio-economic status of family was found significantly associated with immunization status of children. Lack of motivation and obstacles were found as major reason for partial immunization of children. Thus, there is a need of adequate health education, proper training, motivation, better monitoring, supervision and strengthening of services to increase the coverage.

Acknowledgement

We thank the head of the institution for this support and Medical officer of Ram Nagar Urban Health Center.

References

1. Chaudhary V, Kumar R, Agarwal VK, Joshi HS, Sharma M. Evaluation of Primary immunization coverage in an urban area of Bareilly city using Cluster Sampling Technique. *NJIRM* 2010; 1(4):10-15.
2. Finding the final fifth Inequalities in immunization. London, UK: *Save the Children*. 2012; 41. URL: <http://www.savethechildren.org.uk/sites/default/files/docs/Finding-the-Final-Fifth.pdf>
3. Sharma S. Immunization coverage in India. Working paper series no. E/283/2007. URL:<http://www.iegindia.org/workpap/wp283.pdf>. (Assessed on Nov 2013)
4. WHO. Vaccine-preventable diseases: monitoring system. New York: *WHO* 2013; URL: http://en.wikipedia.org/wiki/Vaccine-preventable_diseases (Assessed on Dec 2014)
5. Key indicator of Karnataka. *NFHS-3. Child Health*. 2005; 6:223-66. URL: <http://www.rchiips.org/nfhs/pdf/Karnataka.pdf>. (Assessed on 02-10-2013)
6. Maina LC, Karanji S, Kombich J. Immunization coverage and its Determinants among children aged 12-23 months in an urban area of Kenia. URL: <http://www.panafrican-medjournal.com/content/article/14/3/full/> (Assessed on 03-04-213)
7. Sanou A, Seraphin Simboro S, Kouyaté B, Dugas M, Graham J, Bibeau G. Assessment of factors associated with complete immunization coverage in children aged 12-23 months: a cross-sectional study in Nouna district, Burkina Faso. *BMC International Health and Human Rights* 2009; 9:1-15.
8. Manna PK, Chatterjee K, De D, Ghosh D. Child immunization coverage of some rural belt in relation to socio-economic factors of Jalpaiguri and Darjeeling District of West. *Bengal J Life Sci* 2009; 1(2):91-95.
9. Sreedhar M, Lavanya KM, Nageswara RV. Primary Immunization Status of Slums of Guntur Town, Andhra Pradesh, India. *National Journal of Medical and Dental Research*, 2013; 1(2):9-13.
10. Sheth JK, Trivedi KN, Mehta JB, Oza UN. Assessments of vaccine coverage by 30 cluster Sampling technique in rural Gandhinagar. *Gujarat. National Journal of Community Medicine* 2012; 3(3):456-501.
11. Gupta PK, Pore P, Patil U. Evaluation of immunization coverage in the rural area of Pune, Maharashtra, using the 30 cluster sampling technique. *J Fam Med Primary Care* 2013; 2:50-54.
12. Yadhav R, Sing P. Immunization status of children and mother in the state of Madhya Pradesh. *Indian J Community Med* 2004; 29(4):147-147
13. Kar et al. primary immunization status of children in slum areas of south Delhi- The challenge of reaching urban poor. *Indian journal of community medicine* 2001; 24(3):151-154.
14. Singh CM, Kaushik A, Jain PK et.al. Immunization coverage in Etowah: a border district of Uttar Pradesh. *Indian journal of community health*, 2012; 24(4): 134-139.
15. Punith K, Lalitha K, Suman G, Pradeep BS, Jayanth Kumar K. Evaluation of Primary Immunization Coverage of Infants Under Universal Immunization Programme in an Urban Area of Bangalore City Using Cluster Sampling and Lot Quality Assurance Sampling Techniques. *Indian Journal of Community Medicine* 2008; 33(3):151-55.
16. Yadav S, Mangal S, Padhiyar N, Mehta JP, Yadav BS. Evaluation of Immunization Coverage in Urban

- Slums of Jamnagar City. *Indian Journal of Community Medicine* 2006; 31(4):300.
17. Abrol A, Galhotra A, Agarwal N, Bala A, Goel N. Immunization Status In A Slum In Chandigarh (U.T) India: A Perspective To Enhance The Service. *The Internet Journal of Health*. 2008; 8(2):1-3.
 18. Nath B, Singh JV, Awasthi S, Bhushan V, Kumar V, Singh SK. A study on determinants of immunization coverage among 12-23 months old children in urban slums of Lucknow district. *India. Indian J Med Sci* 2007; 61:598-606.
 19. Ray SS, Patra L, Giri AK. Coverage evaluation of primary immunization and the associated determinants in an urban slum of Eastern India. *IJRRMS* 2013; 3(2): 35-37.
 20. Dalal A. Immunization Status of Children in Goa. *Indian Pediatrics* 2005; 42: 401-02.

*All correspondences to: Mr. Bijendra Banjade, Monitoring and Evaluation Officer, Group for Technical Assistance (GTA), Thadodhunga, Jhhamsikhel, Lalitpur, Kathmandu, Nepal. E-mail: bjn.bjd@gmail.com