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Assessment of Immunization Status among Children aged 12-23 months, at an Urban Slum Area of Jagdalpur City, Bastar

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Abstract :

Introduction : Urban slums are high risk areas vulnerable for communicable diseases transmission, including paediatric age group communicable diseases such as T.B., Diphtheria, Pertussis, Tetanus, Measles and Poliomyelitis. The condition is much dire in Chhattisgarh where immunization coverage is below 59%. The majority population of present study area is either residing in slum or tribal areas. Immunization can reduce the incidence of vaccine preventable diseases by 95% in developing countries. **Objective :** 1. To assess the immunization status.2.To identify the predictors of partial and unimmunized status. **Method :** Present study was carried out in urban slums of Jagdalpur city. A coverage evaluation survey was done among children aged 12 - 23 month, using W.H.O. 30 cluster survey methodology. **Results :** On data analysis, it was observed that 55.1% children were fully immunized and 30.7% were partially immunized. Predictor factors were found to be significantly associated with unimmunized and partially immunized status of children. Dropout rates for measles compared to BCG & DPT1 were 11.8% and 2.1% respectively. **Conclusions :** Though immunization has been core component of human rights, present study observed many newborns are deprived of the immediate right they ought to get just after birth and also observed dropout rate which shows need of effective surveillance and tracking system.

Key words : Immunization, Urban & Slum, Dropout rate, Predictors

Introduction :

Immunizations have reduced the incidence of vaccine-preventable diseases by 95% for every pediatric vaccine recommended for routine use before 1990. Moreover is a highly cost effective way of improving survival in children in developing countries. [1,2]

Despite global commitment, approximately 27 million infants worldwide were unimmunized against common childhood diseases and 2-3 million children died [3] of vaccine preventable diseases in 2007. In India condition is no different, as every 20th child is unable to celebrate his/her 5th birthday. According to the National Family Health Survey (NFHS-3), in India, only 44% off children aged 1-2 years have received the basic package of immunization which further improved to 61% (DLHS-3). This endeavor is still much less than the desired goal of achieving 85% coverage. [4]

The condition is much dire in the "Empowered Action Groups (EAG)" states like Chhattisgarh, where immunization coverage is well below 59% and condition further compromised with geographical inaccessible areas like tribal belt and mushrooming slum areas. [5] Slums are high-risk areas vulnerable for communicable disease transmission and about 25% of the Indian urban poor currently live in slums. Maternal and child health indicators among slum people show that their health is 2-3 times worse than those of people living in other urban areas. [6]

The carved out state has 37% of tribal population [4] with dual problem of ignorance and lack of quality health facilities. Dearth of evidences from the area regarding immunization coverage reduces the opportunity to take formative decisions. Hence the present study was planned to assess the immunization status and to identify the predictors of partial and non immunization.

Method :

Present cross sectional study was carried out in Jagdalpur city which is under field practice area of Department of Community Medicine, Government Medical College, Jagdalpur. A coverage evaluation survey was done from October 2013 to February 2014 among children aged 12-23 months in the urban slums of Jagdalpur city, using the WHO 30-cluster survey methodology. [7] Clusters were selected with probability proportional to the survey estimate of the community population size, by sampling frame of the 42 wards. [8] A totals of seven children aged 12 to 23 months were interviewed from each cluster.

Although the sampling unit was the individual subject, the sampling was conducted at the household level. The subjects were chosen by selecting a household and every eligible subject in the household was included in the sample. Only those respondents who were residing in the area for the last 6 months or more were included in the study. After taking informed consent from parent or caregiver pre-tested structured questionnaire was used to elicit the information. Information was collected on the various socio-demographic factors. Institutional ethical clearance was obtained before initiating the study.

Selection of Clusters :

A list of all the 42 wards with their population was procured and arranged in cumulative frequency. A cluster interval of 2984 was obtained by dividing the total population by 30 (No. of clusters). To obtain the first random number, a random number less than the cluster interval was generated with the help of random number tables which came out to be 387. The first cluster having a cumulative frequency equal to or more than 387 was picked up as the first cluster and subsequent clusters were selected by adding the cluster interval (2984), that is, (387+2984=3371). The cluster having a cumulative frequency equal to or more than 3371 was the second cluster. Thus, in this manner, 30 clusters were selected. Since clusters are selected with probability proportional to estimated size, households are selected with approximately equal (but unknown) probability, an all eligible children in a household are selected, the overall probability of any child being selected is roughly equal, and the design is approximately self-weighting (no weighting is needed in the analysis), i.e. each child in Jagdalpur had the same chance of being sampled.

A random direction was chosen from the midpoint of the settlement and a dwelling was chosen at random among those along the line from the centre to the edge of the community. Starting from this first household in each cluster, interviewers moved from house to house in a predetermined manner, stopping at every house until a minimum of seven children of the appropriate age were found for each cluster. All children in the household in the age range 12-23 months were included and the mother or caregiver interviewed. In the case of multi-dwelling households, all dwellings were visited. If, at the final house, there were more children than required, they were nonetheless included in the sample.

The method used for determination of the vaccination status was the vaccination card and the recall method. The primary respondent was the mother of the child; and in case of her absence, the father acted as the next respondent. In case of absence of both of them, an adult in the household who remained with the child for most of the time or had taken the child for immunization on at least one occasion was interviewed. The child was considered as fully immunized if he/she had received one dose each of BCG and measles and three doses each of DPT and polio (excluding Polio 0 dose) by his/her first birthday. Those who had missed any one vaccine out of the six primary vaccines were described as partially immunized, and those children who had not received any vaccine up to 12 months of age were defined as unimmunized. [9] The Overall dropout rate was the percentage point difference between the vaccines of the maximum and the minimum antigen received, expressed as a percentage of the maximum dose.

Statistical analysis was done by using the software SPSS 18. A p-value of <0.05 was considered significant. Bivariate analysis and multinomial logistic regression analyses were performed with immunization status as the dependent variable and the risk factors as independent variables. Multinomial logistic regression analysis was used because it attempts to remove the confounding effect of the independent variables on each other and thus finds out the independent association of each independent variable with the dependent one.

Table 1: Immunization coverage with background characteristics*

Variable		Unimmunized	Partial Immunization	Complete Immunization	P-Value
Sex	Male	16(13.3)	36(30.0)	68(56.7)	0.86
	Female	16(15.2)	33(31.4)	56(53.3)	
Age of Mother	<20	0	05(83.3)	03(16.7)	0.03
	20-24	06(10.7)	18(32.1)	32(57.1)	
	25-29	10(10.8)	27(29.0)	56(60.2)	
	>30	16(23.5)	19(28.0)	33(48.5)	
Mother Occupation	Labourer	02(17)	06(50)	04(33)	0.739
	Homemaker	27(13.7)	59(30.0)	111(56.3)	
	Business	01(12.5)	02(25.5)	05(62.5)	
	Others	02(25)	02(25)	04(50)	
Type of Family	Joint	15(11.5)	32(24.6)	83(63.8)	0.008
	Nuclear	17(17.9)	37(38.9)	41(43.2)	
Ration Card	Antodayee/BPL	21(32.8)	15(23.4)	28(43.8)	0.001
	APL	11(6.8)	54(33.5)	96(59.6)	
ANC Care	Not Received	04(40)	04(40)	02(20)	0.004
	Partial Care	03(18.8)	09(56.3)	04(25)	
	Complete Care	25(12.6)	56(28.1)	118(59.3)	
Place of Delivery	Home	09(24.3)	12(32.4)	16	0.003
	Government	16(13.2)	46(38)	59(48.8)	
	Private/Other	07(10.4)	11(16.4)	49(73.1)	
Birth Order	1	09(9.7)	30(32.2)	54(58.1)	0.013
	2	15(16.0)	30(32)	49(52)	
	3	02(7.7)	07(27)	17(65.3)	
	≥ 4	06(50)	02(17.5)	04(33.5)	
Immunization	Present	24(12.4)	57(29.5)	112(58.1)	0.05

*Figures in the parenthesis shows percentages

Results:

In the 30 clusters, a total of 1585 households were surveyed to assess primary immunization coverage. A total of 225 children, aged 12 to 23 months were included of which 53.3% were males and 46.7% were females. It was found that 55.1% children were fully immunized against all the six vaccine preventable diseases & 30.7% were partially immunized. Regarding individual vaccine coverage in children, the coverage was highest for BCG (95.67%) and lowest for measles (84.4%), and for DPT3, OPV3, and HBV3, it was 86.2%, 86.2% and 60.0% respectively. On bivariate analysis, factors like mother's age, type of family, ration card, ANC care obtained, place of delivery, birth order and presence of immunization card were found to be significantly associated with unimmunization & partially immunized status of children (Table-1).

Table 2: Dropout rates according to vaccines among vaccines in Jagdalpur City

Vaccines		Drop Out (%)
DPT/OPV	I - II	4.9
	II - III	5.0
	I - III	8.9
DPT-3 - Measles		2.1
BCG - Measles		11.8

A consistent decline in coverage rate from the first to the third dose was observed in DPT and OPV. Combined dropout rate for both DPT and OPV from the first to the third dose was 4.9 and 8.9%, respectively. The dropout rates for measles compared to BCG and DPT3 were 11.8 and 2.1%, respectively (Table-2)

Table 3: Multinomial Logistic Regression analysis of predictors of Partial and Unimmunized status of Children

Predictor	Immunization Status	β coefficient	Odds Ratio	Class Interval	P-value
Age of Mother (20-24=0, <20=1, 25-29=2, >30=3)	Partial Immunized	0.323	1.57	0.83-2.2	0.210
	Unimmunized	0.245	1.56	0.53-1.14	0.211
Type of Family (Nuclear=0, Joint=1)	Partial Immunized	0.227	0.221	0.4-3.2	0.638
	Unimmunized	0.693	4.52	1.1-3.8	0.034
Ration Card (APL(Above Poverty Line)=0, BPL(Below Poverty Line) /Antodayee=1)	Partial Immunized	-0.793	15.7	0.36-0.67	0.000
	Unimmunized	0.176	1.14	0.86-1.7	0.286
Antenatal Women (Complete=0, Partial=1, Not received any=2)	Partial Immunized	-0.783	2.5	0.17-1.2	0.118
	Unimmunized	-0.849	4.3	0.19-0.95	0.038
Place of Delivery (Govt=0, Home=1, Pvt/Other=2)	Partial Immunized	-0.645	3.6	0.27-1.01	0.05
	Unimmunized	-0.358	2.1	4.3-1.14	0.152
Birth Order (1st=0, 2nd=1, 3rd=2, ≥4=3)	Partial Immunized	0.247	1.3	0.84-1.94	0.248
	Unimmunized	0.028	0.02	0.71-1.49	0.882

To find out the significant independent predictors of partial immunization of the child, multinomial logistic regression analysis was done, which revealed that ration card families (Antodayee families) and place of delivery (Home) as significant. Whereas for unimmunization type of family (Joint Family), ANC care obtained found to be significant predictors (Table-3).

Table 4 : Incidence of Morbidities among children in last 15 days*

Immunization Status	ARI		Diarrhoea		Fever	
	Male	Female	Male	Female	Male	Female
Unimmunized	02(6.6)	30(93.4)	11(34.4)	21(65.6)	07(28)	25(72)
Partial Immunization	20(28.9)	49(71.1)	42(69.8)	27(30.2)	24(34.8)	45(65.2)
Complete Immunization	23(18.6)	101(81.4)	38(30.4)	86(69.6)	32(25.8)	92(74.2)

*Figures in the parenthesis shows percentages

When we observed incidence of diarrhoea found to be significantly associated with partial immunization status ($p<0.05$) whereas other morbidities (ARI & Fever) though they were higher among unimmunized and partially immunized children but found to be non significant (Table-4).

Discussion :

"30" clusters survey is proven tool to evaluate immunization coverage within shortest duration. Moreover it's cheap and cost-effective. Present study was conducted in the tribal belt of Chhattisgarh, where we observed complete immunization coverage of 55.1% among 12-23 months of children. This finding is comparable to the Coverage Evaluation Survey (CES) observations which identify coverage of 59% in the area but still lag far behind national goal. The coverage of BCG was higher (95.6%) than in the NFHS-3 for Chhattisgarh [4] (85%) and DLHS-3 [10] (94.8%). The higher coverage of BCG might be because of more institutional deliveries and the study area being near to the city. Similar to BCG, the coverage of OPV3, DPT3 and measles was also higher in the present study than in the NFHS-3 for Chhattisgarh and comparable with DLHS-3. The coverage for all vaccinations was found to be increased over a period of time, indicating a move toward universal immunization. A disturbing fact in the immunization process is dropout rate, which was observed 8.9% for DPT I to DPT III. Whereas overall dropout rate was 11.8% which is far less than observation by Sharma et. al. [11] at the slum area of Surat city. However, these studies had used a different methodology instead of the WHO 30-cluster survey methodology and thus had different results. Gupta et. al. documented 11.1% of the dropout rate in a '30' cluster survey in the urban slum area of Pune which is comparable to the present study findings. [12] The problem of dropout has different program-related implications as compared to the unimmunized group. It reflects lacunae in the health system and the opportunities missed.

In our study we identified important predictors of unimmunization to be family type and ANC care obtained to the mother. A joint family was four times at risk of having an unimmunized child because the decision of many family members for immunization like father, mother in law and care giver at home as compared to the nuclear family in which decision is less for unimmunization. These findings are consistent with those of Kar et. al.[13]

Similarly for partial immunization coverage, home deliveries and children from BPL families were found to be significant predictors. Children born at homes were found to be 3 times more prone for partial immunization as compared to the institutional deliveries. This particularly enlightens the cultural practices in the state where home deliveries are one of the highest in the country. Mothers, who deliver at home may be non-users of health services in general and have to be targeted for utilization of health services. Present study identified presence of the high birth order as independent predictors of unimmunization which are consistent with Nath et. al. [14]

Limitations :

The authors tried best to minimize the recall bias by confirming and reconfirming the immunization status by enquiring about the various aspects of the vaccine, such as name, site and age of administration; but as it is with any other study, it could not be totally eliminated. The authors could

also not study the inadequacies related to the health care delivery, cultural & behavioural aspect which have also been found to be responsible for the low immunization coverage, due to the paucity of resources and time.

Conclusion :

Though immunization has been core component of human rights still present study observed many newborns are deprived of the immediate right they ought to get just after birth. We identified substantial drop out rate which shows need of effective surveillance and tracking system. As technological advances opening new innovations its opportunity to introduce multivalent vaccines in the routine immunization program.

Urban slum population is disadvantaged with lack of public health care facilities, social amenities & poor environmental conditions. Hence it's pre-requisite to identify the pockets of compromised and inaccessible areas and should be addressed. Further factors identified as poor ANC care, home deliveries and high birth rate can be minimized through maternal tracking system once she registered for pregnancy and should be continued till completion of her family. A female in the family should be linked with family health as 'F to F Approach - Female to Family'.

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References :

1. WHO and UNICEF. Global immunization vision and strategy. World Health organization, 2005.

   www.who.int/vaccines-documents / DocsPDF05 / GIVS_Final_EN.pdf.

2. Centre for Disease control and prevention. Impact of vaccines universally recommended for children: United States, 1990-98. MMWR Morb Mortal Weekly Rep. 1999; 48:243-8.

3. Centre for Disease control and prevention (CDC) (2010). Global routine vaccination coverage 2009. Morbidity and Mortality Weekly Report 59: 1367-71.

4. National Family Health Survey, 2005-2006 (NHFS-3). www.nfhsindia.org/pdf/RJ.pdf.

5. Unicef coverage Evaluation survey, 2009 National Fact Sheet, Available from: http: // www.unicef.org / india / National_Fact_Sheet_CES_2009.pdf. Accessed on December 18, 2011.

6. Rao BT, Thakur JS. Vulnerability assessment in slums of union territory, Chandigarh, Indian J Community Med 2007;32(3); 189-91.

7. Henderson RH, Sundaresan T. Cluster sampling to assess immunization coverage: A review of experience with a simplied sample method. Bull World Health Organ 1982;60:253-60.

8. Probability Proportional to size, cluster sampling. CDC. Available from:http://www.cdc.gov/cogh/descd/modules/Minimodules /PPS/page02.htm.

9. Evaluate Service Coverage, Ministry of Health & Family Welfare, Government of India, New Delhi; 1992.

10. International Institute of Population Sciences and Ministry of Health and Family Welfare, District Level Household and Facility Survey, 2007-08.

11. Sharma R, Desai VK, Kavishvar A. Assessment of immunization status in the slums of Surat by 15 clusters multi indicators cluster survey technique. Indian J Community Med, 2009;34:152-5.

12. 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;2:50-4.

13. Kar M, Reddaiah VP, Kant S. Primary Immunization Status of Children In Slum Areas of South Delhi: The Challenge of Reaching Urban Poor. Indian J Community Med 2001;26:151-4.

14. 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, Indian J Med Sci Nov 2001; 61(11): 598-606.