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Primary immunization coverage in lower socioeconomic strata in Telangana – Perceptions & pitfalls Perceptions & Pitfalls in Primary Immunization Coverage

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Abstract

To improve primary immunization coverage, it becomes necessary to understand the various issues which can impede its effective implementation

Objective: This study was undertaken to analyze the extent of primary immunization coverage and the factors influencing its implementation in children of 12-23 months of age belonging to low socioeconomic strata.

Materials and Method: This cross sectional community based observational study was undertaken in urban health centers and rural primary health centers on population belonging low socioeconomic strata. A structured questionnaire and immunization cards were used to obtain the incidence of primary immunization coverage and the factors affecting its implementation in children in urban slums of Hyderabad and rural areas of Telangana state over a period of one year. The data thus obtained was statistically analyzed.

Results: Of the population studied, 81.8% were completely immunized, 17.6% partially immunized and 0.6% were non-immunized with no gender inequity observed. The children of lower birth order and those from joint families had a significantly better immunization coverage. Children from schedule caste and of Hindu community tended to have more complete immunization coverage. Gender of the household head did not significantly affect immunization coverage. Literacy levels of the caretakers, media exposure and OP reminders served to significantly improve primary immunization coverage. Parental preoccupation with livelihood was the commonest cause of delayed immunization. While ill health was most frequently the cause of partial or non immunization, of concern was the fear of pain /other adverse events following vaccination as well as non availability of a health centre close by.

Conclusion: The primary immunization coverage is deficient in one fifth of the socioeconomically deprived population. Focusing on improving parental awareness from media and other literacy programmes as well as reminders by healthcare workers during interactions will play a vital role in improving primary immunization coverage in our infants.

Introduction

Inducing immunity against a specific disease referred to as Immunization involves providing protection passively through the administration of antibodies or actively by administering a vaccine or toxoid to stimulate the immune system to produce a prolonged immune response.[(1)] Immunization programmes carried out by international as well as national agencies have contributed vastly to reduction in the incidence of vaccine preventable diseases. In a survey conducted in 2013, an estimated 21.8 million infants worldwide were not reached with routine immunization services, of who nearly half lived in 3 countries: India, Nigeria, and Pakistan. Estimated number of all deaths in children under five (0-59 months) in 2013 was 8.8 million. Nearly 17% of all deaths in children under five are vaccine preventable.[(2)]

The success of an immunization program in any country depends largely on local demographics, socioeconomic factors, cultural issues as well as national policies. A successful immunization program is of particular relevance to India, as the country contributes to one fifth of global under-five mortality with a significant number of deaths attributable to vaccine-preventable diseases. While substantial progress has been achieved in India with wider use of vaccines resulting in prevention of several diseases, a lot remains to be done and in some situations, progress has not been sustained.[(2-3)]

Estimates from the 2009 Coverage Evaluation Survey (CES 2009) indicate that only 61% of children aged 12–23 months were fully vaccinated (received BCG, measles, and 3 doses of DPT and polio vaccines), and 7.6% had received no vaccinations at all. Given an annual birth cohort of 26.6 million, and an under 5-year child mortality rate of 59/1000, this result in over 9.5 million under-immunized children each year.[(4)]

In order to achieve universal immunization coverage against vaccine preventable diseases, it becomes necessary to understand the various issues which have till now impeded its effective implementation. This study was therefore undertaken to analyze the immunization coverage and the factors affecting primary immunization coverage in children of 12-23months of age in urban slums of Hyderabad and rural areas of Telangana state.

Aim of this study was to estimate the immunization coverage in the socioeconomically vulnerable children from 12-23 months of age in and around Hyderabad district. Further the factors influencing primary immunization coverage in the said population were analyzed with an aim to understand the parental perceptions and logistic considerations influencing primary immunization coverage in this section of

community residing in urban slums and rural areas of Telangana state.

Materials and Method

The study was conducted at an urban health center catering to slums of Hyderabad and a village of Mehboobnagar district. It was a cross sectional community based observational study. The population covered was of children aged 12-23 months of age and was restricted to children who belonged to the lower socioeconomic strata viz. Revised kuppuswamy scale of 2016.[5]

The study was conducted over a period of one year between May 2015 to April 2016. The data was collected based on standard questionnaire and from information in immunization cards. The questionnaire also comprised background data covering the demographic, social, and economic status other than the detailed information of vaccines provided and the reasons for partial, delay or non-compliance of vaccination. The results thus obtained were categorized into three groups viz *Completely Immunized* (children who received one dose each of BCG and measles, and three doses each of DPT and polio by his/her first birthday), *Partially Immunized* (those who had missed any one vaccine out of the six primary vaccines), and *Non–Immunized* (children who had not received any vaccine up to the 12 months of age). To verify the information obtained by the interview, the respondents were asked to produce immunization card if they had any. In the case of non-availability of the card, the information regarding the administration of vaccines was recorded on the basis of the respondent's (mother) memory. The data obtained was analyzed using simple proportion, percentage and Chi-square test in the EPI info statistical software.

Statistical Analysis: Simple proportion, percentage and Chi-square test were used to summarize the data and EPI info statistical software for analysis. The results were categorized into three groups of Completely, Partially, and Non-immunized children. The selector predictor variables were gender, birth order, residence (rural, urban), mother's education level, religion, caste, mother's knowledge on immunization, media exposure, socioeconomic status, type of family (nuclear/joint), household head (male/female), education of household head, vaccination status enquiry during OPD visit by health professionals and caretakers awareness of the vaccine preventable diseases. Significant Sample Size was calculated using the formula $Z^2P(1-P)/e^2$ for prevalence studies.[6]

Results and Analysis

This study was conducted over a period of one year from May 2015 to April 2016 in Telangana state in children residing in urban slums (Harasapenta) of Hyderabad and rural areas (Nagar Kurnool village, Mehboobnagar district). A total of 500 subjects aged 12-23 months of age were enrolled and data collected in the proforma. These children belonged to the lower socioeconomic strata. The pre-structured proforma was used to record the data derived from interviewing the primary caretaker of the infant at the urban health center and primary health center. The local language was used by the interviewer in order to maximize accuracy and ease of obtaining information. The immunization / health record card when available was used to check the accuracy of the data obtained from the interview. The data thus obtained over a period of one year was collated on an excel sheet and analyzed.

1. **Incidence:** Of the 500 children enrolled in the study, 409(81.8%) were completely immunized, 88(17.6%) were partially immunized and 3(0.6%) were not provided any immunization (Fig. 1).

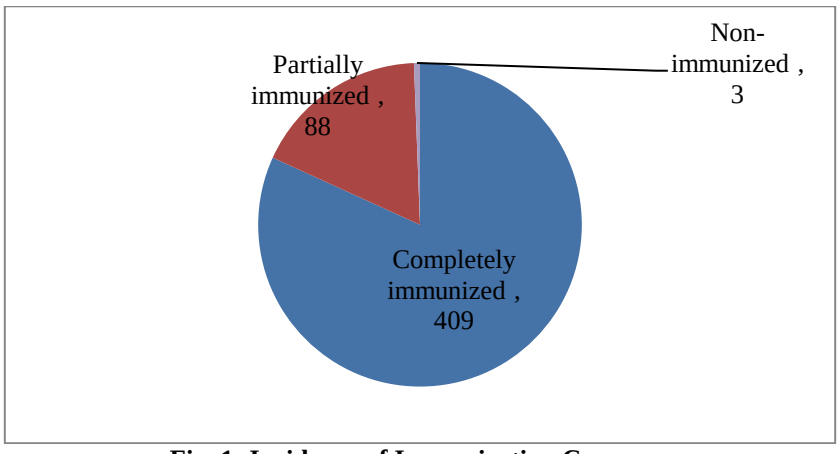

Fig. 1: Incidence of Immunization Coverage

2. **Gender vs Immunization Coverage:**
   a. Gender Distribution: Of the total study population, 267(53%) were boys and 233(47%) were girls. There was no statistically significant difference in gender wise distribution in the study (p=0.228) as shown in Fig. 2.

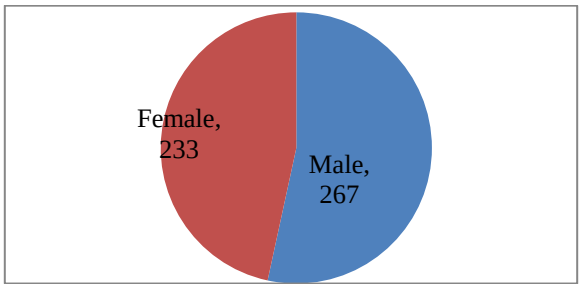

Fig. 2: Gender Distribution
(Chi-square=0.3938; p=0.5320)

b. Gender-Wise Immunization Coverage: Out of 500 children enrolled in the study, they were further categorized gender-wise into completely immunized, partially immunized and non-immunized groups as shown in Table 1. There was no statistically significant difference in gender-wise incidence among completely, partially and non immunized groups of children. (p=0.9)

Table 1: Immunization Coverage- Gender Wise

	Male		Female		Total
	n	%	n	%	
Completely immunized	218	44	191	38	409
Partially immunized	48	10	40	8	88
Non immunized	1	0	2	0	3
Total					500

(p=0.9)

3. **Birth Order vs Immunization Coverage:** The incidence of extent of immunization coverage in children depending on the birth order was studied. It was observed that 393(79%) children were of birth order 1 & 2 and 107(21%) children were of birth order 3 and above. The immunization coverage in lower birth order was found to be more complete than in those children of birth order >2 the difference reaching levels of statistical significance (p-value is.004964) as shown in Table 2.

Table 2: Birth Order vs Immunization Coverage

Birth Order	1 and 2		>2		Total
	n	%	n	%	
Completely immunized	333	85	76	72	409
Partially immunized	58	14	30	28	88
Non immunized	2	1	1	0	3
Total	393	100	117	100	500

(Chi-square statistic = 10.6113, p = 0.0049)

4. **Religion vs Immunization Coverage:** On analyzing as per religion it was observed that Hindus comprised 350(70%), Muslims 136(27%) and Christians only 14(3%) as shown in Table 3. The immunization coverage was complete in the Christian population. However, they formed a very small proportion of the study population. Complete immunization coverage was seen in 83.4% of the Hindu population as compared to 75.7% among Muslims. This increased incidence of complete immunization in the Hindu population reached levels of statistical significance (p = 0.01).

Table 3: Religion vs Immunization Coverage

Religion	Hindu		Muslim		Christian	
	n	%	n	%	n	%
Completely immunized	292	83.00	103	75.00	14	100.00
Partially immunized	57	16.20	31	23.00	0	0.00
Non-immunized	1	0.80	2	2.00	0	0.00
Total	350	100	136	100	14	100

(Chi square = 12.9, p = 0.01)

5. **Caste vs Immunization Coverage:** Out of the 500 children studied 275(55%) belonged to BC, SC 145(29%), ST were 44(8.8%) and OC 36(7%). On analyzing complete immunization coverage as per caste, it was seen to

be 90.3% in SC, 86% in OC, 77.8% in BC and 75% in ST as shown in Table 4. Thus the best immunization coverage appeared to be in the SC group having reached the levels of statistical significance (Chi square = 14.6, p = 0.02).

Table 4: Caste vs Immunization Coverage

Caste	BC		SC		ST		OC	
	n	%	n	%	n	%	n	%
Completely immunized	214	77.8	131	90.3	33	75	31	86
Partially immunized	59	21.4	13	8.9	11	25	5	14
Non-immunized	2	0.7	1	0.8	0	0	0	0
Total	275	100	145	100	44	100	36	100

(Chi square = 14.6, p = 0.02)

6. **Family Type vs Immunization Coverage:** Of the study population, 261(52%) belonged to nuclear families and 239(48%) were from joint families (Table 5). It was observed that more children from joint families achieved full primary immunization coverage as compared to those from nuclear families. This increased incidence of complete immunization coverage in children from joint families reached levels of statistical significance (p = 0.03).

Table 5: Family Type vs Immunization Coverage

Family Type	Nuclear		Joint		Total
	n	%	n	%	
Completely immunized	202	77	207	87	409
Partially immunized	57	22	31	12	88
Non immunized	2	1	1	1	3
Total	261	100	239	100	500

(Chi-square statistic = 7.1221, p = 0.03)

7. **Household Head Gender vs Immunization Coverage:** In the population studied, 75% of children belonged to families with male household head and 25% to those with a female head of family. Children from families with male household head had a marginally better complete immunization coverage than those belonging to families with female head. However this difference did not reach levels of statistical significance. (p = 0.93)
8. **Education Level of Household Head vs Immunization Coverage:** It was observed that 300(60%) household heads were literate and 200(40%) were illiterate. There was no significant difference in the extent of primary immunization in children belonging to families with literate vs illiterate household heads. Thus the education status of the household head did not influence the immunization coverage status of the child. (p=0.152536)
9. **Media Exposure vs Immunization Coverage:** The caretakers were interviewed about their awareness on the immunization needs of their children. The source of information, whether from television, movies, radio, newspaper, relatives and health care workers was noted. It was observed that 448(90%) mothers had prior exposure to information from media and 52(10%) mothers did not. The complete immunization coverage was found to be 84.5% among mothers who had media exposure as compared to 57.7% mothers who did not have access to media information. Further it was seen that incomplete or non vaccination of children was observed in only 15.5% of mothers who were exposed to media information as compared to 42.3% of those whose mothers did not have access to media information (Table 6). The difference between the two groups reached levels of high statistical significance (Chi-square = 28.6667, p< 0.00001). Thus it suggests that media information campaigns play a very significant role in improving immunization coverage.

Table 6: Media Exposure vs Immunization Coverage

Media Exposure	Yes		No		Total
	n	%	n	%	
Completely immunized	379	84.5	30	57.7	409
Partially immunized	68	15.2	20	38.5	88
Non immunized	1	0.3	2	3.8	3
Total	448	100	52	100	500

(Chi-square = 28.6667, p < 0.00001)

10. **Vaccination reminder at OPD vs Immunization Coverage:** Of the mothers interviewed, 173 (34.6%) were reminded while 327(65.4%) mothers were not told about vaccination schedule of their child on routine prior OPD visits (Table 7). The complete immunization coverage was observed to be 88.4% among those children whose mothers received an OPD reminder vs 78.2% among those children where mothers were not reminded. However, the incidence of incomplete/no immunization was 11.6% in mothers who received an OPD reminder as opposed to 22.8% when no reminder was provided(p=0.008). Thus it appears that a check on the vaccination status and reminder about immunization schedule during routine OP visits plays a significant role in ensuring complete primary immunization coverage.

Table 7: Vaccination Reminder at OPD vs Immunization Coverage

Vaccination Reminder	Yes		No		Total
	n	%	n	%	
Completely immunized	153	88	256	78	409
Partially immunized	20	12	68	21	88
Non immunized	0	0	3	1	3
Total	173	100	327	100	500

(Chi-square = 6.8784, p = 0.008)

11. **Reasons for delay in Complete Immunization:** In case there was a delay in the provision of primary vaccinations to the child, the family was interviewed to ascertain the likely cause for the delay in immunization. The reasons provided are shown in Fig. 3. Of the population studied, the commonest cause of delayed complete immunization was due to ill health, followed by parental preoccupation with job, migration, lack of awareness and forgot due vaccination date in that order.

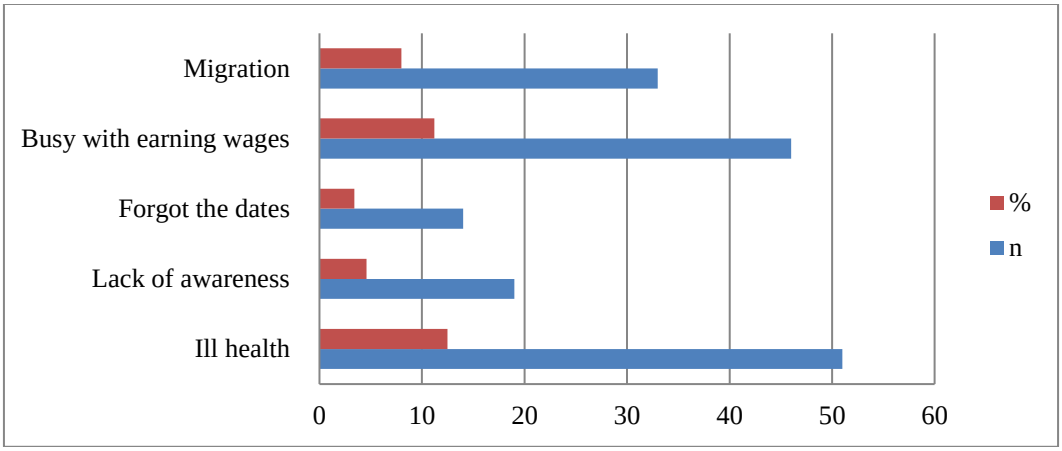

Fig. 3: Reasons for delay in complete immunization

12. **Reasons for Partial Immunization/Non Immunisation:** If a baby had received partial immunization coverage or had not been vaccinated, the family was interviewed to ascertain the likely cause for the same. The reasons stated are shown in Fig. 4. Of the population studied, reason for partial/non immunization included ill health, migration, preoccupation with job, lack of awareness, misconception of pain & adverse effects caused by vaccination and only 4.5% stated that health facilities were not available in that order.

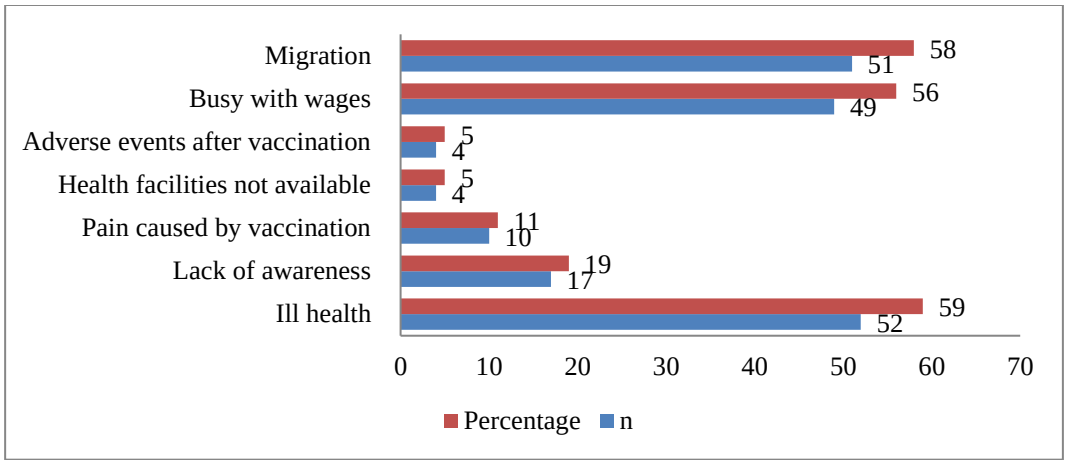

Fig. 4: Reasons for Partial/Non Immunization

Discussion

This study was conducted as questionnaire based survey in the community in Telangana state in urban slums of Hyderabad (Harasapenta) and rural areas (Nagarkurnool village, Mehaboobnagar district) during the period of one year from May 2015 to April 2016 in which a structured, preformed questionnaire was used to collect the data obtained from the interview conducted by the researcher. A total of 500 children aged 12-23 months were enrolled in the study. Complete immunization coverage was 81.8% as opposed to partial immunization coverage of 17.6%. This data reveals higher rates of complete immunization coverage when compared to NFHS-4(2015-16) which is 65%.[7] However, as the study was carried out in limited pockets of urban and rural areas, it may not be an accurate assessment of overall immunization coverage in the state.

Our study reveals no gender difference in degree of immunization coverage. This observation is in variance with the study done by Daniel J Corsi et. al. who found the immunization coverage of girls to be significantly lower than boys ($p<0.001$).[8] Gender inequity which was not observed in our study could reflect changing trends with improved education. It could also suggest socio-demographic variance. This study reveals higher complete immunization coverage in lower birth orders viz 1st and 2nd as compared to higher birth orders viz 3rd and more which reached levels of statistical significance. This is similar to findings in previous studies by Jorgen Lauridsen and Jalandhar Pradhan which states that the risk of not being fully immunized is 35% higher for children of birth order 3 or more.[9]

We observed that Hindus had better complete immunization status as compared to the Muslims and Christians. This difference reached levels of statistical significance (chi square=12.24; p=0.015). This finding is in concordance with the study by Patra et. al.[10] However, this study was conducted in an area which had a significantly larger Hindu population as compared to other religions. Hence, its interpretation may not be very significant. Also community wise immunization coverage included in our study revealed higher complete immunization coverage in children belonging to SC followed by general community. In the children from ST and other reserve communities, the complete immunization coverage incidence was much lower. These observations were not in concordance with Ashlesha Datar et.al who reported that that a child born in an SC/ST household was 3.0 percentage points more likely to have no cover for non-polio vaccines when compared to a child born in a non-SC/ST family.[10] However, Patra et al. reported an increased incidence in complete immunization coverage in the children belonging to the SC & general communities which is similar to our findings.[11] These differences in immunization coverage according to caste observed in various studies could be related to demographic factors.

It was further observed that the complete immunization coverage was greater in joint families than nuclear families which had a greater partial immunization coverage rate. Gender and education of household heads further seemed to impact the immunization coverage in our study. It was observed that children in families with male and literate household head had better immunization coverage. The result however did not reach levels of statistical significance. Similar observation was made by Nilanjan Patra.[11] It stands to reason that more educated decision maker of the family would ensure better immunization coverage of the children.

In our study, it was observed that media exposure was associated with better complete immunization coverage. This factor reached levels of high statistical significance. Similar findings are made in previous studies by Nilajan Patra.[11] It was observed that reminder for vaccination was associated with higher vaccination coverage. This difference was statistically highly significant. This finding highlights the need of reiterating the vaccination schedule to the clientele at all OP/IP interactions. Thus the knowledge about

vaccines and their importance in preventing diseases in parents can improve the complete immunization rates.

In our study, the commonest cause of delay in vaccination was livelihood preoccupation followed by ill-health, migration, lack of awareness and forgetfulness. The reasons for partial immunization in were ill health, busy with their livelihood, migration, lack of awareness, pain caused by vaccination, adverse events after vaccination and non-availability of health facilities. There was increasing rate of partial immunization with increasing age of the child, and similar trends are shown by many earlier studies.[12]

Conclusions

This study was undertaken to analyze the primary immunization coverage and the issues influencing its implementation in children aged 12-23 months of lower socio economic strata residing in urban slums of Hyderabad and rural areas of Telangana state. The complete immunization coverage in our study was 81.8% with a partial immunization rate of 17.6% with no gender inequity. The children of lower birth order and those from joint families had better immunization coverage. Children from SC and of Hindu community tended to have more complete immunization coverage. Gender of the household head did not significantly affect immunization coverage. Literacy levels, media exposure and OP reminders served to significantly improve primary immunization coverage. While parental preoccupation with livelihood was the commonest cause of delayed immunization, ill health was most frequently the cause of partial or non immunization. Focusing on improved parental awareness from media and other literacy programmes as well as reminders by healthcare workers during interactions will play a vital role in improving primary immunization coverage in our infants.

Key Points

1. The incidence of complete immunization was 81.8% with a partial immunization rate of 17.6% with no gender inequity.
2. Children from joint families, of lower birth orders, literate household head, Hindu community and SC tended to have better complete immunization coverage.
3. Parents who received information from media exposure or on reminders while interacting with health professionals tended to ensure complete immunization provision to their children.
4. The commonest cause of delay in vaccination was livelihood preoccupation followed by ill-health, migration, lack of awareness and forgetfulness. The reasons for partial immunization were ill health, livelihood preoccupation, migration, lack of awareness, pain caused by vaccination, adverse events after vaccination and non-availability of health facilities.
5. Hence, improving parental perceptions, clearing their misgivings and providing reminders would be vital tools in ensuring complete primary immunization coverage.

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