

# To Assess the Immunization Coverage of Children Aged 12-23 Months in Rural, Tribal and Urban Areas in East Godavari District After Launching Mission Indradhanush

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## ABSTRACT

**Introduction:** Immunization brought a new era in the public health care system, impending millions of fatalities in young children every year. To accelerate immunization coverage, Mission Indradhanush was launched by Ministry of Health and Family Welfare in 2014. Mission Indradhanush aimed to improve the immunization coverage from 65% in 2014 to 90% in a five-year period. Newer vaccines like pentavalent, rotavirus and fIPV vaccines were sequentially introduced through this program. Intensified Mission Indradhanush was launched in 2017 to further increase the full immunization coverage. **Objective:** The present study was done for a period of 18 months in 2 urban areas, 2 rural areas and 2 tribal areas of East Godavari district of Andhra Pradesh to know the primary immunization coverage, coverage of newer vaccines, assess the knowledge of mothers on routine vaccination with a special focus on newer vaccines and the reasons for delay or dropouts in vaccination in children aged 12-23 months after launching Mission Indradhanush.

**Results:** 85.5% children in urban areas, 91.7% children in rural areas and 91% children in tribal areas were completely immunized. There is statistically significant difference in immunization coverage with respect to literacy of mothers, availability of vaccination cards, place of delivery and socio-economic status. The main reason for high dropout rate of newer vaccines was non availability of vaccine.

**Conclusion:** This study showed that Mission Indradhanush was successful in improving the primary immunization coverage in this area to a major extent.

**Keywords :** Immunization, Mission Indradhanush

coverage from 65% in 2014 to 90% in a five-year period. The aim of this campaign is to immunize all children under the age of 2 years and pregnant women against eight vaccine-preventable diseases. Later, Intensified Mission Indradhanush (IMI) was launched in 2017 to further increase the immunization coverage. Under IMI, greater focus was given to urban areas, which was one of the gaps of Mission Indradhanush.<sup>6</sup>

Very few studies are done on primary immunization coverage after launching Mission Indradhanush. This study was undertaken to evaluate the primary immunization coverage and the coverage of newer vaccines after launching MI and also to know the awareness about newer vaccines among the mothers and the reasons for delay or dropouts in vaccination.

## MATERIAL AND METHODS

It was a community-based cross-sectional observational study over a period of 18 months (Jan 2019 to June 2020). Children in the age group of 12-23 months in 2 urban health centres of Kakinada, 2 rural sub centres of Kovvada and Peddada, 2 tribal Sub centres of Jaddangi and Maredumalli in East Godavari district were included in the study.

### Inclusion criteria

Children in the age group of 12-23 months were enrolled in the study to assess the primary immunization coverage.

### Exclusion criteria

Mother's who did not give consent to participate in the study were excluded from the study.

A total of 173 children from urban areas, 146 children from rural areas, and 123 children from tribal areas were included in the study. A predesigned proforma was used to collect the information. The socio demographic characteristics like

## INTRODUCTION

Immunization is one of the major milestones in the history of public health care system bringing about an impressive decline in mortality from various fatal vaccine-preventable diseases like diphtheria, measles, neonatal tetanus, pertussis, and poliomyelitis.<sup>1-3</sup>

According to NFHS -4, full immunization coverage was increased to 62% from 2005-06 to 2015-16. This percentage increase was more in rural areas (from 39% to 61%) than in urban areas (from 58% to 64%).<sup>4</sup> The most effective immunization campaign introduced in recent times, gaining popularity, is Mission Indradhanush (MI). It was launched on 25<sup>th</sup> December 2014 by the Government of India in partnership with the World Health Organization.<sup>5</sup>

Mission Indradhanush aimed to improve the immunization

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**How to cite this article:** Padma KJ, Vijayalakshmi V, Madhavi N, Raju MS, Raghavi JL. To assess the immunization coverage of children aged 12-23 months in rural, tribal and urban areas in East Godavari District after launching mission Indradhanush. International Journal of Contemporary Medical Research 2022;9(4):D1-D6.



maternal age, parity, literacy status, type of family were noted. The details of immunization of enrolled children were recorded from the information given by mothers or immunization cards or from registers maintained by the ANMs at the time of visit. The reasons for delay or dropouts in vaccination , awareness of mothers about vaccines like rotavirus vaccine, IPV vaccine, pentavalent vaccine, OPV and BCG were noted.

Mission Indradhanush's definition for immunization was used to categorize the children as completely immunized or partially immunized or not immunized.

**Complete Immunization:** Any child who has received one dose each of BCG and MR, three doses each of Pentavalent vaccine and Polio (excluding 0 dose OPV) by two years of age.

**Partial Immunization:** Any child who has received at least one dose of vaccination but did not complete all the required doses by two years of age.

**No Immunization:** If a child has not received even a single dose of any vaccine by two years of age.

**STATISTICAL ANALYSIS**

Data entry was done in MS-EXCEL 2019. Statistical package for social sciences (SPSS 23) version was used for data analysis. Significance was tested by applying the chi-square test, wherever necessary and a p-value <0.05 is considered

significant.

**RESULTS**

Out of total of 442 children surveyed,85.5% children in urban areas,91.7% children in rural areas and,91% children in tribal areas were completely immunized. There is no statistically significant difference in immunization coverage among these three areas but compared to rural and tribal areas; full immunization coverage was less in urban slums.

The coverage of BCG in urban, rural and tribal areas was 98.8%,100% and,97.5%, respectively. The coverage of zero dose of OPV in urban, rural and tribal areas was 100% in all the areas.All 3 doses of OPV were received by 98.2% ,98.6% and 99%of children of urban, rural and tribal areas.95.9% ,95.2% and 95% children in urban, rural and tribal areas

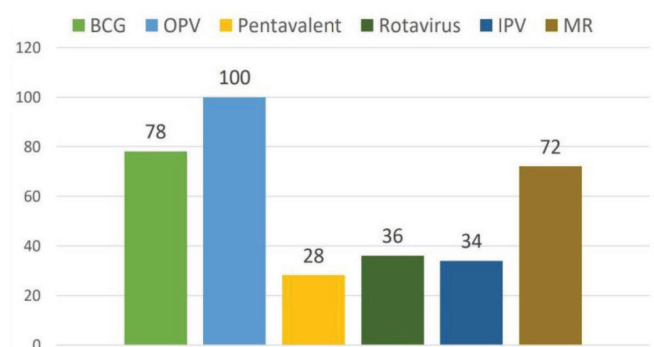


Figure-1: Shows the reasons for delay or dropout of vaccination.

	Completely Immunized	Partially Immunized	No of children	p -value
Urban	148(85.5%)	25(14.5%)	173	0.14
Rural	134(91.7%)	12(8.3%)	146	
Tribal	112(91%)	11(9%)	123	
Total	394(89%)	48(11%)	442	

Table-1: Immunization status of Urban, Rural and Tribal Children

		Completely Immunized	Partially Immunized	No.of children	p value
Gender	Male	213(89.4%)	25(10.6%)	238	0.14
	Female	181(88.7%)	23(11.3%)	204	
Literacy	Literate	275(92.5%)	22(7.5%)	297	0.0008
	Illiterate	119(82%)	26(18%)	145	
Parity	Primi	227(92.3%)	19(7.7%)	246	0.017
	Multi	167(85.2%)	29(14.8%)	196	
Type of family	Nuclear	277(88.7%)	35(11.3%)	312	0.42
	Joint	117(90%)	13(10%)	130	
Place of Delivery	Government Hospital	309(88.5%)	40(11.5%)	349	0.00011
	Private Hospital	79(96.34%)	3(3.66%)	82	
	Home Delivery	6(54.54%)	5(45.45%)	11	
Vaccination card	Yes	393(93.8%)	26(6.2%)	419	0.000017
	No	16(69.56%)	7(30.43%)	23	
Socio-economic status	Class 1	5(83.3%)	1(6.6%)	6	0.0001
	Class 2	24(96%)	3(4%)	27	
	Class 3	87(97.75%)	2(2.25%)	89	
	Class 4	225(88.58%)	29(11.42%)	254	
	Class 5	51(75%)	17(25%)	68	

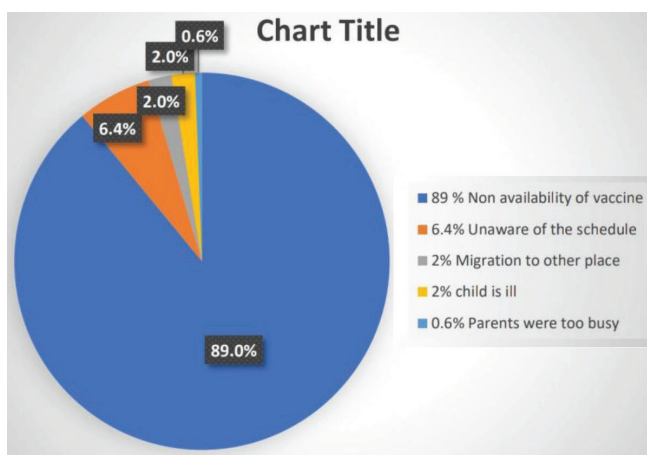
Table-2: Immunization status vs Demographic features

	Urban (N=173)	Rural(N=146)	Tribal (N=123)
BCG	171(98.8%)	146(100%)	120((97.5%)
Zero dose OPV	173(100%)	146(100%)	123(100%)
3 Doses OPV	170(98.2%)	144(98.6%)	122(99%)
3 Doses pentavalent	166(95.9%)	139(95.2%)	117(95%)
MR	161(94.79%)	141(96.57%)	115(93.5%)
2 Doses IPV	126(73%)	118(80.8%)	91(74%)
3 Doses rotavirus	112(64.7%)	103(70.5%)	82(66.6%)

**Table-3:** Coverage of Individual vaccines

Vaccine	Immunization status	Urban N=173	Rural N=146	Tribal N=123	P-value
IPV	Completely immunized	126(73%)	118(80.8%)	91(74%)	0.2983
	Partially Immunized	31(17.9%)	19(13%)	17(13.8%)	
	Not immunized	16(9.1%)	9(6.2%)	15(12.2%)	
Rotavirus	Completely immunized	112(64.73%)	103(70.5%)	82(66.6%)	0.7811
	Partially Immunized	51(29.5%)	35(24%)	32(26%)	
	Not immunized	10(5.77%)	8(5.5%)	9(7.4%)	

**Table-4:** Coverage of Rotavirus and IPV vaccines



**Figure-2:**

received all the 3 doses of Pentavalent vaccine.94.79% ,96.57% and 93.5 % children in urban,rural and tribal areas received MR vaccine.73%,80.8% and 74% children in urban, rural and tribal areas received 2 doses of IPV.3 doses of Rotavirus vaccine was given to 64.7%,70.5% and 66.6% in urban , rural and tribal areas.

The difference in IPV vaccine coverage (completely immunized for IPV ) and Rotavirus vaccine coverage (completely immunized for Rotavirus vaccine) in urban, rural and tribal areas was not statistically significant with a p-value of 0.2983 and 0.7811 respectively.

Non-availability of vaccine particularly for Rotavirus and IPV vaccines was cited as the main reason in 89% cases. Other causes were unaware of the vaccination schedule (4%),migration to other places(2%),child is ill(2%), parents were too busy(6%).

Figure 2 shows the awareness regarding vaccines among mother’s which is highest for polio vaccine (100%), followed by BCG (78%), MR (72%), IPV (34%), Rotavirus (36%) and the least for Pentavalent vaccine(28%).

## DISCUSSION

Immunization has significantly reduced the under-five mortality rate; Health ministry data shows that in 1990, 3.3 million children below the age of five years died. This fell to 1.2 million in 2015.<sup>7</sup>

In the present study, primary immunization coverage is 89%, which is higher than the national immunization coverage of 62%, according to the NFHS-4 (2015-16)<sup>4</sup> survey.

Singh et al.,<sup>8</sup> from Bihar and Datta A et al.<sup>9</sup> from Tripura reported full immunization coverage in 90.85% and 91.67% of children, respectively, in their studies. However, in other studies like Vohra et al.<sup>10</sup> from Lucknow and Goyal S et al.<sup>11</sup> from Haryana, only 62.7% and 73.1% of children respectively were fully immunized.

In this study, complete immunization coverage in children from rural areas was high (91.7%) as compared to urban (85.5%) and tribal (91%) areas, but there is no statistically significant difference in full immunization coverage among these areas in the present study. However, in a study done by Aparna et al. (ICMR: STS,2018- 06226).<sup>12</sup> in Andhra Pradesh, full Immunization coverage in urban, rural and, tribal areas was 87%,100% and,92.7% respectively, which was statistically significant.

Vohra et al.<sup>10</sup> from Lucknow reported that 68.9% of children from rural areas were fully immunized as compared to 56.4% of children from urban areas. Gupta et al.<sup>13</sup> from Pune, Maharashtra, reported that 86.67% of children were fully immunized in a rural area, which is similar to the present study (91.7%).

A study by Salgar et al.<sup>14</sup> of Srikakulam, Andhra Pradesh, reported that 85.7% of children from urban slums were completely immunized, which is similar to the present study. However, Devasenapathy N et al.<sup>15</sup> from Delhi and M.M Angadi et al.<sup>16</sup> from Bijapur city, Karnataka, reported only 46.7% and 34.48% immunization coverage from urban slums.The less coverage in urban slums could be due to lack

of education of mothers and less number of health workers per population in urban slums.

Studies done to assess the immunization coverage in tribal areas are very few. In the present study, primary immunization coverage in tribal children was 91%. Immunization coverage of tribal children in the 2014 ICMR – STS project was reported as 85%.<sup>17</sup> Varma et al.<sup>18</sup> from the tribal area of Andhra Pradesh reported complete immunization in 63.3% of children, while Zafer A et al.<sup>19</sup> from Udaipur have reported complete immunization in only 21.42% of tribal children. Parmar R et al.<sup>20</sup> from tribal Narmada district of Gujarat and Khargekar NC et al.,<sup>21</sup> from a tribal area, Parol, Thane district, reported full immunization in 77.7% and 71.1% of children respectively.

Among the sociodemographic variables, literacy of mothers, availability of vaccination cards, institutional delivery, socio-economic status had statistically significant effect on full immunization coverage. In the present study, the immunization coverage of male and female children was 89.4% and 88.7%, respectively. There was no statistically significant gender difference in the study, which is in contrast to the studies done by Goyal S et al.<sup>11</sup> and AM Kadri et al.,<sup>22</sup> who reported that coverage was better in male children.

The immunization coverage of children of literate mothers was significantly higher than the children of illiterate mothers (92.5% vs 82%), which is comparable to the studies by Devasenapathy N et al.<sup>15</sup> and Dalal et al.<sup>23</sup> Educated mothers had better knowledge and awareness about importance of vaccination.

Full immunization coverage was better among institutional deliveries compared to home delivery, (88.5% vs 54.5%) This is similar to studies done by Khargekar NC et al.<sup>21</sup> in a tribal area, Parol, Thane district and, Nath et al.<sup>24</sup> in urban slums of Lucknow. Institutional deliveries ensure that babies are vaccinated before discharge from the hospital and mothers are counselled about vaccination schedule.

The availability of vaccination cards significantly affected full immunization coverage. In the present study, full immunization coverage was better in children with vaccination card when compared to those with no card, (93.8% vs. 69.56%) similar to a study done by Seror et al.<sup>25</sup> Vaccination cards are a critical tool in ensuring that a child receives all recommended vaccinations on schedule.

In the present study, full immunization coverage was better in children with higher socioeconomic status compared to lower socioeconomic status. Similar results were obtained in studies done by Vohra et al.<sup>10</sup> and Anjan Datta et al.<sup>9</sup> According to the NHFS -4 survey, vaccination coverage is 70% in children from households in the highest wealth quintile, compared with 53 percent of children from households in the lowest wealth quintile.<sup>4</sup>

The BCG vaccine coverage in urban, rural, and tribal areas was 98.8%, 100% and, 97.5%, respectively. The coverage of zero dose of OPV was 100% in all three areas. The coverage of BCG and Zero dose of OPV were very good as the majority of the deliveries were institutional. The coverage of the BCG vaccine was 87.6% in the study by Vohra et al.<sup>10</sup>

and 99.21% in the study by Singh et al.<sup>8</sup> The coverage of zero dose of OPV was only 78.7% in a study by Vohra et al.,<sup>10</sup> and Pragti Chhabra et al.<sup>26</sup> reported only 13% coverage of zero doses of OPV in urbanized villages of Delhi.

The overall coverage of 3 doses of OPV in urban, rural and, tribal areas was 98.2%, 98.6% and, 99%, respectively, in the present study. It is similar to the study done by Aparna et al. (2018-06226)<sup>12</sup> in Andhra Pradesh.

The coverage of 3 doses of pentavalent vaccine in urban, rural and tribal areas in the present study was 95.9%, 95.2%, and 95%. The overall coverage was 95.36%. Studies prior to the launch of Mission Indradhanush by Varsha C et al.<sup>27</sup> and A.M.Khadri et al.<sup>22</sup> reported the coverage of DPT-3 as 65.7% and 79.7%, respectively. Singh et al.<sup>8</sup> and Goyal S et al.,<sup>11</sup> in their studies done after the launch of Mission Indradhanush, reported increased coverage of Pentavalent vaccine of 96.16% and 95.9%, respectively. This improvement may be due to intensification of the program to identify the partially and unimmunized children and by providing them catch-up vaccination.

In the present study, the coverage of MR vaccine in urban, rural, and tribal areas was 94.8%, 96.57% and, 93.5%, respectively. The coverage of the MR vaccine is better in the present study compared to national coverage of 81%, according to NFHS-4. Singh et al.<sup>26</sup> reported 92.52% coverage of MR vaccine while Vohra et al.<sup>10</sup> (62.2%) and Devasenapathy N et al.<sup>15</sup> (59.8%) reported less coverage in their studies.

Newer vaccines like the Rotavirus vaccine and fractional IPV were introduced in UIP in a phased manner throughout the country. Rotavirus and IPV vaccines were started in 2017 in this region.

Three doses of Rotavirus vaccine coverage were 64.7% in urban, 70.5% in rural and, 66.6% in tribal areas in this study. A significant number of children did not receive even a single dose of the Rotavirus vaccine. (5.77% in urban, 5.5% in rural, and 7.4% in tribal areas.) Many of the children were only partially immunized. This may be because initially, the Rotavac vaccine was issued as ten-dose vials. Since there is no open vial policy for the vaccine, the peripheral centres withheld vaccination until they had a minimum of seven infants before opening a new vial. In the initial period of the project, coverage was, therefore, low in the target age group. This was subsequently addressed by issuing five dose vials and recommending immunization irrespective of the number of children.<sup>28</sup>

In the present study, coverage of 2 doses of IPV vaccine was 73% in urban, 80.8% in rural and, 74% in tribal areas.

The most common reason for partial or no immunization of IPV is the non-availability of vaccines.

The main reason for delay or dropout of immunization was non-availability of the vaccine in 89% of cases, particularly for Rotavirus and IPV vaccines. Other reasons cited for dropout or delay in immunization were unawareness about the vaccination schedule (6.4%), migration to other places (2%), illness of child (2%), and parents are too busy (0.6%).

Most common reason for delay /dropout in other studies was unavailability of the child on the day of vaccination (Singh et al)<sup>8</sup> unawareness of need to return for the second and third dose of vaccine, illness of the child (Anjan Datta et al)<sup>9</sup>, unaware of the need for immunization (Naveen C Khargekar et al)<sup>21</sup>, lack of awareness ( Parmar et al)<sup>20</sup>

The consolidated Intensified Mission Indradhanush report states that the reasons for non-vaccination are lack of awareness (45%), apprehension about adverse events (24%), vaccine resistance (reluctance to receive the vaccine for reasons other than fear of adverse effects) (11%), child traveling (8%), and program-related gaps (4%).<sup>11</sup>

In the present study, 100% of mothers were aware of OPV, 78% were aware of BCG, and 72% were aware of MR.

Awareness among mothers regarding newer vaccines was very less.

It was only 28% for Pentavalent, 34% for IPV, and 36% for Rotavirus vaccines. They had better awareness about OPV (100%), BCG (78%), MR (72%). This is similar to a study done by Nafila et al.,<sup>29</sup> which showed that 100% of mothers were aware of the polio vaccine while 94% were aware of the BCG vaccine, and 60% for measles. In contrast a study done by Rachna Kapoor et al.<sup>30</sup> at Ahmedabad found less awareness for OPV (85%), BCG (35%), Measles (40%), Tetanus (45%) and for others, it was 30%. Mukherjee R et al.<sup>31</sup> from Delhi reported that only 18.3% of the participants were aware that newer vaccines had been introduced into the program.

According to NFHS-4, only 65% of children in Andhra Pradesh received all basic vaccinations, which is slightly higher than the country's coverage of 62% but far less than the target of 90% FIC by 2020.<sup>32</sup>

MI is mostly successful in improving overall primary immunization coverage of vulnerable children, which is evident from the results of the present study and also various other studies. However, the immunization coverage of urban slums is still suboptimal as compared to immunization coverage of rural and tribal areas.

So through IMI, unserved/low coverage pockets in sub-center or urban areas, villages/areas with three or more consecutive missed routine immunization sessions, urban slums with migratory populations are being given special focus.

Periodic surveys at regular intervals in low coverage areas and implementation of Mission Indradhanush in these areas should be given top priority to achieve SDG (Sustainable Development Goals) of immunization coverage of 100% by 2030.<sup>6</sup>

## CONCLUSIONS

The overall coverage of primary immunization in urban, rural, and tribal areas in the present study is high (89%), probably due to intensification of routine immunization and catch-up immunization of partially and unimmunized children by activities under MI (Mission Indradhanush).

The reason for dropouts or delay in vaccination in this study is mostly the non-availability of vaccines, particularly rotavirus and IPV.

Lack of knowledge regarding newer vaccines in our study did not affect the coverage of primary immunization. However, this lack of knowledge may affect the coverage of newer vaccines unless there is good monitoring of the wide availability of newer vaccines.

Some lacunae like less coverage in urban areas, lack of awareness on newer vaccines, and their schedule can be overcome by IEC activities through mass media and by giving one to one information at every immunization visit.

Mobile applications like IAP immunize INDIA, NHP INDRADHANUSH can be better utilized by health workers to send reminders and decrease the delay or dropout rates in immunization.

Government should also ensure regular availability of all logistics including vaccines to avoid even a small number of dropouts due non availability of vaccines.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 25-02-2022; **Accepted:** 28-03-2022; **Published:** 30-04-2022