International Journal of Community Medicine and Public Health
Ingudam D et al. Int J Community Med Public Health. 2020 May;7(5):1799-1806
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20201984

Original Research Article

Coverage evaluation of the universal immunization program in Imphal-East district of Manipur: a cross-sectional study

Dayananda Ingudam, Heisnam Kulabidhu Singh*, Longjam Usharani Devi

Department of Community Medicine, Jawaharlal Nehru Institute of Medical Sciences, Imphal, Manipur, India

Received: 12 February 2020
Revised: 18 March 2020
Accepted: 19 March 2020

***Correspondence:**
Dr. Heisnam Kulabidhu Singh,
E-mail: editorasj16@gmail.com

ABSTRACT

Background: For the state of Manipur, the evaluated coverage among children as per NFHS-2, NFHS-3 and NFHS-4 were 42.3%, 46.8% and 65.9% respectively. But with the introduction of Mission Indradhanush in December 2014 which aimed in achieving the full immunization coverage to all eligible children over the next five years through special catch-up drives might have helped in improving the coverage. Hence, some improvement is expected by now. To ascertain the current status, the study was taken up. The current study was conducted to evaluate the primary vaccination coverage among children aged 12-23 months. The study also aimed to determine any association between important background characteristics with the vaccination status.
Methods: A cross-sectional study was conducted in Imphal East District, Manipur during May 2017 to April 2020 among mothers having 12-23 months old children. 1,309 eligible study-women were selected by using multi-stage sampling technique. Data on their background characteristics, immunization status of the children and vaccination-related details were collected by using a pre-tested interview schedule.
Results: The full immunization rate among children was found to be 93%. There was significant association between the immunization status and important background characteristics like place of delivery, order of birth, family income and mother's educational status.
Conclusions: Present study indicated that the full immunization coverage of the district was higher than the national and regional coverage findings. Place of delivery, order of birth, family income and mothers' low educational status were found to be significantly associated with full immunization coverage.

Keywords: Coverage evaluation, Fully immunized, Oral polio vaccine, Pentavalent vaccine

INTRODUCTION

Immunization program is one the key intervention programs for protection of children from vaccine preventable diseases. Globally, it saves 2-3 million lives each year and plays a central role in ending preventable child deaths. But nearly one in five infants misses out on the basic vaccine.[1] Low immunization levels among poor and marginalized children compromises gains made in all other areas of maternal and child health. Over 1.5 million children die annually from diseases that can be prevented by vaccines and 19.5 million children are not receiving the most basic vaccines leaving them vulnerable to dangerous diseases.[1]

Routine immunization (RI) is one of the most cost effective health investments a country can make. The immunization program in India is one of the largest immunization programs in the world and a major public health intervention program in the country.[2] Immunization program in India was introduced in 1978 as Expanded Program of Immunization (EPI) and later

changed to Universal Immunization Program (UIP) in 1985, which is now one of the key areas under the National Rural Health Mission (NRHM) since 2005.[3]

Some of the initiatives undertaken by the government of India under NRHM (2005) to strengthen the immunization program are: introduction of auto-disable (AD) syringes and hub cutters, financial support for alternate vaccine delivery to session sites from the last vaccine storage point, mobility support to state and district immunization officers and other supervisory staffs, alternate vaccinators for sessions in urban slums and under-served areas including vacant sub-centres, mobilization of children and pregnant women by ASHAs, preparing micro-plans for SCs, Primary Health Centres/Community Health Centres (PHCs/CHCs) and districts, quarterly RI review meetings at state, district and block levels, training of Health Workers (HWs), Medical Officers (MOs), Cold chain and data handlers, Computer assistants for every district and at state, decentralized printing of recording, reporting and monitoring tools, injection safety, strengthening cold chain maintenance and expansion and strengthening vaccine delivery from state to district and to the PHC/CHC.[2]

UIP targets to vaccinate nearly 27 million newborn each year with all primary doses and additionally about 100 million children aged 1-5 years with booster doses, For this more than 90 lakh immunization sessions are conducted annually.[3] The Government of India, under UIP is providing vaccination free of cost against twelve vaccine preventable diseases, of which eight are provided across the country (Diphtheria, Pertussis, Tetanus, Polio, Measles, BCG, Hepatitis B and *Hemophilus influenza* type B), four are provided in the selected states/endemic districts against *Rotavirus*, *Rubella*, *Pneumococcal pneumonia* and Japanese encephalitis.[3]

Over the years various strategies have been made to make vaccines universally available, including to the most hard-to-reach and vulnerable population but the change in the coverage level never reached up-to the desired level. The country figure for the full immunization rates in the years 1992-93,1998-99, 2005-06 and 2015-16 as reported by National family Health Survey (NFHS) reports were 35.5%, 42%, 43.5% and 62% respectively. For the state of Manipur, the evaluated figures as per NFHS-2, NFHS-3 and NFHS-4 were 42.3%, 46.8% and 65.9% respectively.[4-6] The figures show an increasing trend, but are still unsatisfactory.

But after the Govt. of India declared 2012-13 to be the period of intensification in child immunization, with a focus given to remote and often inaccessible rural areas, urban slums and migrant and mobiles communities and subsequently, the introduction of mission Indradhanush in December 2014 which aimed in achieving the full immunization coverage to all eligible children over the next five years through special catch-up drives might have helped in improving the coverage.[7] Hence, some improvement is expected by now. To ascertain the current status, it was felt necessary to take up a coverage evaluation study.

Imphal East district being a part and parcel of the state capital of Manipur, other districts of the state especially the hilly district might not have fared better under the program. Hence, Imphal East district was selected as the study area for the current study.

The objectives of the study were to evaluate the primary vaccination coverage among children aged between 12-23 months and to determine any association between important background characteristics with the vaccination status.

METHODS

A descriptive cross-sectional, community-based study was conducted in Imphal East District of Manipur during the period May 2017 to April 2020. The study population comprised of mothers who had children aged 12-23 months with the exclusion of those mothers who were not willing to participate and also who could not be contacted on the day of visit.

Sample size calculation

All the eligible mothers in the selected wards/villages were included. Considering the full immunized rate of 54.1% (DLHS-4 Report) and considering a Precision value of 95% with a 5% allowance of error. The sample size calculated was 1,308.

Sampling method

First, all the CHC/PHCs/UPHCs of Imphal East were selected. This was followed by selection of one sub-center each from the selected CHC/PHCs/UPHCs by lottery method. Then one village/ward from each of the selected SCs was selected by the same method. Lastly, all ASHAs and eligible mothers from the selected villages were included (universal sampling) in the study.

Data collection

The collection of data was done by means of pre-tested semi-structured interview schedule

Study tools

Interview schedule for eligible mothers regarding residence, education, occupation, family income, sex and order of child, place of delivery, distance from the nearest health facility, availability of immunization card, immunization status and detailed reason for not immunized.

Operational definitions

Fully immunized: A child aged between 12-23 months who has received one dose of BCG, three doses of DPT/Pentavalent, three doses of OPV, one dose of measles and three doses of Hepatitis-B/Pentavalent vaccine.

Data analysis

Data collected were entered first in Microsoft excel sheet and then transported to Statistical Package for the Social Sciences (SPSSv22). Descriptive statistics were used for primary immunization coverage by using percentages, Mean, Mode and standard deviation.

Analytical tests were used for determining any association between important background characteristics with the vaccination status by using Chi-square. P-values of <0.05 was considered as statistically significant.

RESULTS

A total of 1,309 eligible mothers were interviewed and data on immunization status of their children were collected. Important background characteristics were also gathered from them in order to see the association with the vaccination status. The immunization coverage of the study participants was found to be 93% (1,217). The immunization card was available in 92.9%. The drop-out rate for BCG-measles was 3.3% whereas the drop-out rate for penta 1 to penta 3 was 0.99%.

Table 1: The backgroung socio-demographic characteristics of the study-subjects.

Characteristics	Fully immunized N (%)	Not fully immunized N (%)
Mother's occupation		
Home-maker	771 (91.8)	69 (8.2)
Self-employed	359 (94.7)	20 (5.3)
Pvt./Govt. employee	87 (96.7)	3 (3.3)
Gender		
Male	641 (93.3)	46 (6.7)
Female	576 (92.6)	46 (7.4)
Order of birth		
First	576 (95.7)	26 (4.3)
Second	446 (95.1)	23 (4.9)
Third or above	195 (81.9)	43 (18.1)
Place of delivery		
Domicilliary	24 (82.8)	5 (17.2)
Institutional	1193 (93.2)	87 (6.8)
Type of residence		
Urban	229 (93.1)	17 (6.9)
Rural	988 (92.9)	75 (7.1)
Distance from facility		
≤1 km	794 (93.7)	53 (6.3)
>1 km	423 (91.6)	39 (8.4)

Majority of the completely immunized group belongs to Pvt./Govt. employee group (87; 96.7%) followed by self-employed (359; 94.7%) and home-maker (771; 91.8) respectively. As per gender, birth order and place of delivery, the proportion of completely immunized male children was 641 (93.3%), among the first order birth was 576 (95.7%) and among the institutional delivery group was 1193 (93.2%) respectively. The proportion of completely immunized children was found to be more in urban areas (229; 93.1%) as compared to that of rural areas. The immunization coverage was also found to be higher if the distance from the health facility was ≤1 km (794; 93.7%) (Table 1).

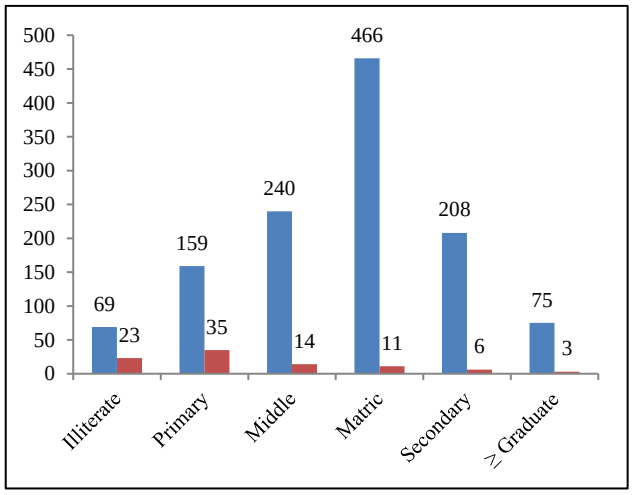

Figure 1: Distribution of mothers having fully immunized children by educational status.

As per mother's education status, the proportion of fully immunized children were found to be more in matric group (466; 97.7%) which was followed by secondary group (208; 97.2%), graduate or above (75; 96.2%), middle class (240; 94.5%), primary class (159; 82.0%) and illiterate group (69; 75%) respectively (Figure 1).

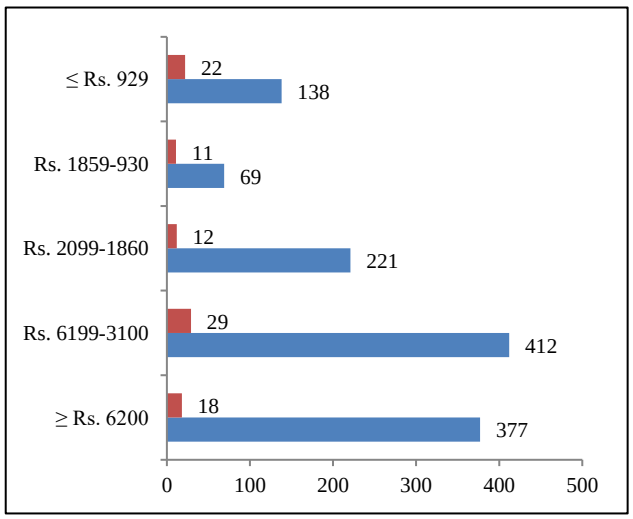

Figure 2: Distribution of full immunization status by family income.

As per family income, the proportion of completely immunized children was found to be more in the ≥Rs. 6200 income group (377; 95.4%) which was followed by Rs. 2099-1860 group (221; 94.8%), Rs. 6199-3100 group (412; 93.4%) and Rs. 1859-930 (69; 86.2%) and ≤Rs. 929 (138; 86.2%) respectively (Figure 2).

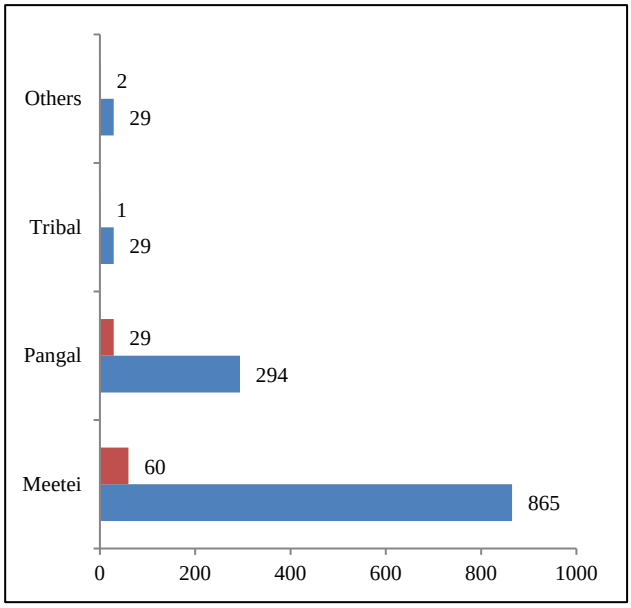

Figure 3: Distribution of full immunization status by type of community.

Although the proportion of tribal was found to have more number of completely immunized children (29; 96.7%) the number of participants were the least as compared to the rest of the community (Figure 3).

The overall coverage of BCG (1302; 99.5%) and first dose of Hepatitis, Penta and OPV (1291; 98.5%) were found to be quite high as compared to the rest. The maximum number of children left out for vaccination in the study population was seen with measles vaccine (50; 3.8%) followed by that of hepatitis, Penta and OPV third dose (20; 1.5%), hepatitis, Penta, OPV second dose (18; 1.4%) and with hepatitis, Penta, OPV third dose (7; 0.5%) respectively. And seven of them did not have any idea about BCG vaccination status (Table 2).

On being asked about the reasons for not being vaccinated or partially immunized to the eligible mother, majority of them (55; 4.20%)) responded that their children were not feeling well, thirty (2.3%) said their children were sick and referred to doctor, inconvenient timing was responded by two (0.2%) of them and 27 responded in different ways, such as their work would be disturbed if their children were vaccinated, some of them had some misunderstanding on MR vaccine and others felt it was not that important (Figure 4).

Table 2: Immunization status of the different eligible children participate in the study.

Characteristics	Frequency	Percentage
Availability of immunization card		
Yes	1216	92.9
No	93	7.1
BCG*		
Yes	1302	99.5
Not know	7	0.5
Hepatitis B1/Penta 1/OPV 1**		
Yes	1302	99.5
No	7	0.5
Hepatitis B2/Penta 2/OPV 2		
Yes	1291	98.6
No	18	1.4
Hepatitis B3/Penta 3/OPV 3		
Yes	1289	98.5
No	20	1.5
Measles 1		
Yes	1259	96.2
No	50	3.8

*BCG: Bacillus Calmette-Guerin, OPV**: Oral Polio Vaccine

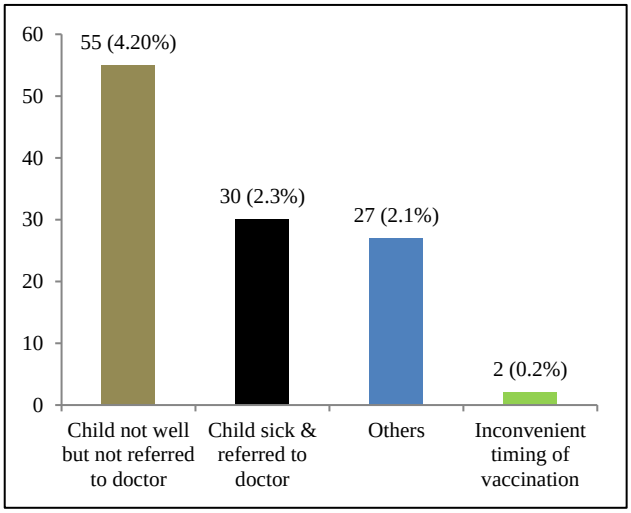

Figure 4: Distribution of the reasons for not being fully immunized.

Mother's educational status, family income, order of birth and place of delivery were found to be significantly associated with immunization status, i.e. increase in mother's education, family income, lower order of birth and delivery in institution were found to have higher immunization coverage (Table 3).

The immunization coverage were found to be higher in those mothers who were employed, male child being, urban resident, nearer the facility and those having immunization card but the differences were found to be insignificant (Table 4).

Table 3: Association between some selected characteristics and immunization status.

Characteristics	Variables	Immunization status		P value
		Fully immunized (n=1217); N (%)	Not fully immunized (n=92); N (%)	
Mother's educational status	Illiterate	69 (75.0)	23 (25.0)	0.000
	Primary	159 (82.0)	35 (18.0)	
	Middle	240 (94.5)	14 (5.5)	
	Matric	466 (97.7)	11 (2.3)	
	Secondary	208 (97.2)	6 (2.8)	
	≥Graduate	75 (96.2)	3 (3.8)	
Family income	≥Rs. 6200	337 (95.4)	18 (4.6)	0.00
	Rs. 6199-3100	412 (93.4)	29 (6.6)	
	Rs. 2099-1860	221 (94.8)	12 (5.2)	
	Rs. 1859-930	69 (86.2)	11 (13.8)	
	≤Rs. 929	138 (86.2)	22 (13.8)	
Order of birth	First	576 (95.7)	26 (4.3)	0.001
	Second	446 (95.1)	23 (4.9)	
	Third or above	195 (81.9%)	43 (18.1)	
Place of delivery	Domiciliary	24 (82.8)	5 (17.2)	0.03
	Institutional	1193 (93.2)	87 (6.8)	

Table 4: Association between selected characteristics and immunization status.

Characteristics	Variables	Immunization status		P value
		Fully immunized (N=1217); N (%)	Not fully immunized (N=92); N (%)	
Mother's occupational status	Home-maker	771 (91.8)	69 (8.2)	0.065
	Self-employed	359 (94.7)	20 (5.3)	
	Pvt./Govt. employee	87 (96.7)	3 (3.3)	
Gender	Male	641 (93.3)	46 (6.7)	0.621
	Female	576 (92.6)	46 (7.4)	
Place of resident	Urban	229 (93.1)	17 (6.9)	0.936
	Rural	988 (92.9)	75 (7.1)	
Distance from the facility	< 1 Km	794 (93.7)	53 (6.3)	0.140
	1-<5 Km	423 (91.6)	39 (8.4)	
Immunization card	Yes	1133 (93.2)	83 (6.8)	0.300
	No	84 (90.3)	9 (9.7)	

DISCUSSION

The current study finding of full immunization rate was 93% which was much higher than that reported in National Family Health Survey-4 (72%) and District Level Household Survey-4 (54%).[6] This indicates the efficiency of the services provided at the health centres and outreach area in conducting immunization sessions regularly according to the schedule. Campaigns like Mission Indradhanush and Measles Rubella campaign also help in improving the immunization coverage in the country.

The coverage of BCG and Measles vaccination noted in the present study was 99.5% and 96.2% respectively. This finding is almost similar to that reported in NFHS-4 as 95.9% and 81% while in DLHS-4 it was 85.5% and 69%.[6]

The percentage of fully immunised as reported by Gupta et al, Malkar et al, Murugesan et al were 86.67%, 78.57% and 76% respectively.[8-10] Lesser coverage percentage of fully immunized was reported by Herliana et al (31.5%) and Muhammad et al (61.9%).[11,12] This might be because of differences in the study setting, study period and also the nature of implementing the program between different states.

In a similar study, Punith et al have reported the overall BCG coverage as 98.68%, DPT and OPV (94.73%) each and measles (92.11%).[13] Similar findings were also reported by Murugesan et al as BCG coverage (100%), DPT and OPV (97.3%) each and measles (92.11%).[10] In a

study by Muhammad et al BCG coverage was 91.7% and OPV 0 dose (91.5%) while Vohra et al have reported BCG coverage as 87.6%, DPT1 (83.1%), DPT2 (81.1%), DPT3 (75.8%), OPV 0 dose (78.7%), OPV1 (83.5%), OPV2 (81.1%), OPV3 (76%).[12,14] The present study findings are comparable to this findings.

The reasons for not being fully immunized as reported by the eligible mother in the present study were that their children were not feeling well (4.20%), 2.3% said their children were sick and referred to doctor, inconvenient timing was reported by two of them (0.2%) while twenty-seven (2.1%) of them reported in a different way such as their work will be disturbed if their children were vaccinated. Some had misunderstanding on MR vaccine and others felt it is not that important whereas in the study conducted by Murugesan et al lack of information was reported by 30%, lack of motivation by 10%, some reported obstacles such as place too far by 10%, mother too busy and having family problem by 10%, child was ill by 15% and long waiting time by 5%.[10]

Gupta et al and Swami et al have found the main single reason for partial immunization was inconvenient timing of immunization.[8,15] In most of the places immunization was usually done in the morning when most of the parents went to the field or for work. Hence this time was possibly inconvenient for immunization for parents as this was their work time and they could not afford to lose their daily wages.

Other studies conducted by Muhammad et al, Ray et al and Ughade et al found that the fear of side effect was the most common reason for partial immunization.[12,16,17] All these difference could be because of difference in socio-demographic characteristics, knowledge level and study setting.

In the present study, the determinants which showed statistically significant association with the immunization coverage of the children were mother's educational status (p=0.00), family income (p=0.00), order of birth (p=0.00), place of delivery (p=0.03) while the association was not significant even though the coverage was found to be increased for mother's occupation (p=0.06), gender (p=0.62), place of resident (p=0.93), distance from the health facility (p=0.14) and type of community (p=0.30).

In a similar study, it was observed by Malkar et al that the determinants such as place of residence (p=0.001), religion (p=0.00) and father's education status (p=0.00) were associated with immunization coverage. There was no statistically significant association with type of family (p=0.221) and mother's educational status (p=0.16).[9] This might be due to different in the study setting areas and different in socio-demography. In a study conducted by Vohra et al the determinants which showed statistically significant association with the immunization status of the children were the place of residence (p=0.001), religion (p=0.00), father's education (p=0.00) and father's occupation (p=0.00). Source of information regarding immunization (p=0.00), number of antenatal visits (p=0.00), the place of immunization (p=0.011) and availability of vaccination card (p=0.001) also had a statistically significant association with the immunization status.[14] The reasons for this could be due to differences in the socio-demographic characteristics.

In a study conducted by Chabbra et al in urbanized villages of Delhi it was found that mother's education, place of birth and presence of immunization card to be statistically significant determinants of higher immunization coverage.[18] Singh et al in a study in Bihar showed that immunization coverage was higher in urban areas for male children and literate mother. Both parents literacy status also had a significant influence on immunization level of the children.[19] Subbiah et al found the association with immunization to be significant with their economic status (p=0.2), and maternal age (p=0.03).[20] Similarly, Muhammad et al found statistical significant relationship between knowledge and level of education (p=0.005) and age (p=0.002) with immunization coverage.[12]

Malkar et al observed no significant difference between immunization status of boys and girls.[9] This fact is contrary to the general observation that many a times female children are neglected for their health care especially in developing countries like India. Same as gender of child, completion of immunization was found independent from the type of family to which the child belongs.

Immunization of Hindu children was more often found to be completed than that of Muslim children. The significant level could not be documented for other religions because of their smaller number in sample population. Various socio-economic, cultural, behavioural and other such factors of different religious group in the study area might have been responsible for this significant influence of religion on completion of immunization. This finding was also documented by Dalal et al.[21]

Children of literate parents were found to have more chance of completing their immunization. In this respect, mother's education was more strongly associated than father's education. As far as level of education of parents is considered, mother's educational level was considered important in bringing about a significant association with immunization status of their children. This fact highlights the role of female literacy and female education for the utilization of child health services.

Limitations

Information on child's immunization was collected from either the health card or the mother's recall of vaccinations and hence, those mothers of children who did not have the vaccination recorded on the health card

might be more tempted to report a vaccination for their children introducing a potential subjective bias and over-estimation of immunization coverage.

Information on immunization and certain socio-demographic characteristics was collected simul-taneously; therefore, it may be difficult to establish a causal relationship between these characteristics and child immunization status.

CONCLUSION

Present study indicated that the full immunization coverage of the district was higher than the national and regional coverage. Place of delivery, order of birth, family income, mothers' low educational status were found to be significant features influencing to achieving full immunization coverage. Thus, it is very important to give more emphasis on these issues in order to improve the immunization coverage. Strengthening outreach services, community engagement, improving health seeking behaviour and jointly working with local health agents are recommended to improve the immunization coverage performance.

ACKNOWLEDGEMENTS

We are very grateful to District immunization officer of Imphal East, staffs of Rural Health Mission and Medical officer in-charge of health centers in Imphal East for their cooperation and support. We also sincerely appreciate the study participants for their cooperation during data collection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee, JNIMS, Imphal. Verbal informed consent from the participating eligible mothers was also obtained

REFERENCES

1. Immunization programme UNICEF. Available at: https://www.Unicef.org> immunization. Accessed on 23 March 2019.
2. Immunization Handbook for Medical Officers (2017): Ministry of Health and Family Welfare, Govt. of India. Available at: http://mohfw.gov.in>basic page> immunization. Accessed on 22 March 2019.
3. Immunization handbook for health workers. Ministry of Health and Family Welfare Govt. of India; 2018.
4. International Institute for Population Sciences, Mumbai. National fact Sheet, National Family Health Survey-2 (1998-1999) Report. Ministry of Health and Family Welfare, Govt. of India.
5. International Institute for Population Sciences and Macrointernational, Mumbai. National Fact sheet, National Family Health Survey-3 (2005-06) Report. Ministry of Health and Family Welfare, Govt. of India.
6. International Institute for Population Sciences and Macrointernational, Mumbai. National Fact Sheet, National Family Survey-4 (2015- 20) Report. Ministry of Health and family Welfare, Govt. of India.
7. Travasso C. "Mission Indradhanush" targets India's unvaccinated children. BMJ. 2015;350:h1688.
8. 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.
9. Malkar VR, Khadilakar H, Lakde RN, Joge US, Choudhari SG. Assessment of sociodemographic factors affecting immunization status of children in age group of 12-23 months in a rural area. Indian Medical Gazette. 2013:164-9.
10. Murugesan D, Ramasubramanian R. A study on immunization coverage of 12-23 months children in urban areas of Kanchipuram district, Tamil Nadu. Int J Community Med Public Health. 2017;4(11):4096-100.
11. Herliana P, Douiri A. Determinants of immunization coverage of children aged 12-59 months in Indonesia: a cross-sectional study. BMJ Open 2017;7(12):e015790.
12. Muhammad A, Soliman SM, Ahmed AI. Factors Affecting Vaccination Coverage among Children Under Five Years at Kumbotso Local Government Kano State Nigeria. IOSR J Nurs Health Sci. 2017;6(4):1-8.
13. Punith K, Lalitha K, Suman G, Pradeep BS, Jayanta Kumar K. Evaluation of primary immunization coverage of infants under universal immunization program in an urban area of Bangalore city using cluster sampling and lot quality assurance sampling techniques. Indian J Community Med. 2008;33:151-5.
14. Vohra R, Bhardwaj P, Srivastava JP, Gupta P, Vohra A. Immunization coverage and its determinants among 12-23 months old children of Lucknow. Muller J Medical Sci Res. 2013;4:90-5.
15. Swami HM, Thakur JS, Bhatia SP, Bhatia V, Bhan VK. Coverage evaluation survey of pulse polio immunization in chandigarh. Indian J Community Med. 2000;25(2):83.
16. Ughade SN, Zodpey SP, Desh pande SG, Jain D. Factors responsible for delayed immunization among children under 5 years of age. J Indian Med Assoc. 2000;98:4-5.
17. Ray SK, Dasgupta S, Dobe M, Biswas R, Mehta P, Baishya AC. IPHA. An evaluation of routine immunization coverage in some district of West Bengal and Assam. Indian J Public Health 2004;48:82-7.
18. Chhabra P, Nair P, Gupta A, Sandhir M, Kannan AT. Immunization urbanized villages of Delhi. Indian J Pediatr. 2007;74(2):131-4.

19. Singh P, Yadav RJ. Immunization status of children in BIMARU states. Indian J Pediatr. 2001;68(6):495-500.
20. Subbiah P, Rajagopal A, Chavada VK, Vasudevan KP. A retrospective study on timeliness of vaccination among children aged 0-23 months in a rural area of Pondicherry. Int J Community Med Public Health. 2019;6(5):2127-32.
21. Dalal A, Silveira MP. Immunization status of children in Goa. Indian J Pediatr. 2005;42:401-2.
22. Nayak MS, Naidu SA, Madhavi BD, Sreegiri S. Assessment of immunization coverage among children of 12-23 months age group in the field practice area of Andhra Medical College, Visakhapatnam, Andhra Pradesh. IOSR J Dent Med Sci. 2015;14(7):6-9.

Cite this article as: Ingudam D, Singh HK, Devi LU. Coverage evaluation of the universal immunization program in Imphal-east district of Manipur: a cross-sectional study. Int J Community Med Public Health 2020;7:1799-806.