ORIGINAL ARTICLE

Factors associated with Immunisation coverage in children of migrant brick kiln workers in selected districts of Bihar, India

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Abstract

Brick kiln workers are unskilled labourers and keep migrating from one place to another leading to non/partial immunization of their children. The study was conducted to estimate the prevalence of full immunisation among the children of mother living in brick kiln and to assess the factors associated with incomplete or non-immunisation. **Methods**: The study was conducted using stratified cluster sampling technique in different brick kilns of four districts of Bihar. **Results**: Out of 332 children the prevalence of full immunization was 55.43% and partial immunization was 37.65% while 6.92 % children were not immunized at all. The most common reason for non/partial immunization was lack of awareness about importance of immunization (37.2%) followed by no information of nearest place of vaccination (33.1%). **Conclusion**: The routine immunization coverage has increased but it is still low among migrant brick kiln workers.

Keywords

Brick kiln; Migrants; Non-immunization; Partial Immunization; Bihar

Introduction

Universal Immunisation Programme (U.I.P.) in India is one of the largest public health programmes in the world in terms of various factors such as quantities of vaccine used, number of beneficiaries, number of immunisation session organised, geographical spread, and diversity of areas covered. However, there are certain sections of the society such as migrant population who do not receive the full benefits of this public health facility, and hence, there may be significant mortality due to vaccine preventable diseases among them. It is estimated that a high proportion of children living in developing countries die every year due to vaccine preventable diseases (VPD)s out of total mortality of nearly 3 million at the global level. (1,2)

Millennium Development Goal – 4 was aimed to achieve a reduction of two-third of under-five mortality rate (U5MR) by the year 2015. (3,4,5)

The Expanded Programme on Immunization (EPI) was launched in 1974 which subsequently helped in increasing immunization coverage from merely 5% to 84% for Diptheria, Tetanus and Pertusis (DPT3) in 2013. (6) Immunization programme has a great impact on reducing morbidity and mortality among children thus averting 2 to 3 million deaths yearly at the global level and preventing illness and disability from vaccine preventable diseases. (7,8)

However, due to certain socio-cultural and geographical factors, the immunization programme failed to cover all the potential children. It is estimated that nearly 22.6 million children have not been covered by the routine immunization programme (9, 10).

A brick kiln is a place where bricks are made, and a large number of seasonal migrant workers come to work during the dry season. Hundreds of such families work in brick kilns in Bihar, coming from other states like Jharkhand, West Bengal and Assam. These migrant workers family keep on moving from one place to another in search of livelihood. As a result, their children often miss routine immunization. The general health services are designed to cater to the native population of a particular area. However, there are gross inequities in the healthcare delivery between the native population and the migrants. The only ad-hoc approach is followed for seasonal migrants.

Low income and uncertainties of jobs at these brick kilns compel the parents to change their job very frequently from one place to other. Relocating residence could be a possible reason for lack of immunization among these children. (11,12). Low income also causes malnutrition among these children. Hence these factors could lead children of brick kilns workers at high risk for vaccine preventable diseases.

All the health workers involved in the routine immunization programme are assigned stipulated areas for the immunization of children living in those designated geographical areas. Consequently, children belonging to urban slums and migrants such as brick-kiln workers are not usually covered in routine immunization leading to a low proportion of immunization coverage among them. (13)

In order to improve proper immunization among all children including migrants in remote accessible areas and urban slums, the Year 2012 was declared as “the year of intensification of routine immunization” a campaign-like strategy of Government of India. (14,15)

Lack of awareness about immunization, session sites and lack of faith in the health workers were important reasons for not giving immunization. (16)

Aims & Objectives

This study was conducted to estimate the prevalence of full immunisation among the children of mothers living in brick kiln and to assess the factors associated with incomplete or non-immunisation.

Material & Methods

The study was a population based cross sectional study conducted in four districts (Patna, Nalanda, Bhojpur and Vaishali) of Bihar for a period of one year. The sample size calculated was 234 using the formula N = (Zα)2 P Q/L2, where Zα for 5% α error is 1.96, prevalence of full immunization among children i.e.0.30 (based on findings of Anand S et al) that the level of full immunization among migrant children was 30%. (17) Stratified cluster sampling technique was adopted for the selection of brick kiln hence to allow for the design effect a multiplication factor of 1.5 was used. Thus, the final sample size came out to be 350 children.

The study was conducted in 4 districts of Bihar which are Patna, Vaishali, Bhojpur and Nalanda. District wise list of the total brick kiln was obtained from the Labour Department, Government of Bihar for preparing a sampling frame. Each selected district was taken as a stratum and within each stratum appropriate number of primary selection unit i.e. brick kilns were selected as per the proportional allocation. The brick kiln was taken as a cluster. From each cluster, a minimum 6-7 eligible children were obtained. We took 5 children from each cluster so the desired number of the brick kiln was 350/5 i.e. 70. So, a total of 70 clusters were taken for the study.

A cross sectional survey of 350 migrant children (12-23 months old) was conducted. Demographic, socioeconomic, migration history and immunisation status of the children of 12-23 months were elicited from mother using a pretested semi structured questionnaire. The immunisation status of the child was determined from the immunisation card and in its absence; the mother’s recall was taken as a confirmation of a vaccine (including the number of doses for each).

Operational definitions:

Full Immunization: If the child has received BCG, three doses of DPT/Pentavalent vaccine, OPV and Measles (or JE) by 1 year of age were considered fully vaccinated.

Non-Immunization: Failure of a child to receive even a single dose of the vaccines listed above by 1 year of age was considered non immunized.

Partial Immunization: Children who have received vaccine doses between non immunization and full immunization.

Statistical analysis

Out of 350 children surveyed, 18 children were excluded due to lack of complete information. Hence total data of 332 children were analysed. Statistical analysis was performed using Stata Version 10 (StataCorp, Texas, USA). A cluster analysis module of Stata was used after declaring data as a cluster data. Bivariate analysis was performed using chi-square test for the factors/variables related to non-immunisation. Logistic regression analysis was performed taking those variables having crude odds ratio with a p-value equal to 0.10 for modelling non immunisation.

Ethical clearance: The study was approved by institutional ethical committee of AIIMS Patna. Informed verbal consent was obtained from each participant before interviewing them.

Results

We analysed data of 332 children for their socio-economic status, immunization status and various reasons for

non/partial immunization. Around 54% of children were selected from the brick kiln of Patna district, followed by Vaishali (20.5%), Nalanda (16.9%) and Bhojpur (9.0%). The male children outnumbered female (52.7% Vs 47.3%). Most study subjects were Hindu (96.1%). Most of the children belonged to SC/ST (94.0%) category followed by other backward castes (3.3%) and others (2.7%). Most of the mothers (87.7%) and fathers were illiterate (78.3%). 62% of the children belonged to below poverty line. (18) Most of them had birth order first (33.4%) followed by second (33.1%). Among migrant's brick kiln worker 62.6% were migrated from Jharkhand & West Bengal. (Table 1)

Status of Immunization

Immunization card was available to only 16.3% children BCG coverage was 93%. The coverage of DPT/Pentavalent 1st dose was (85.5%) while DPT/Pentavalent 2nddose was (78.9%) and DPT/Pentavalent 3rd dose was (69.6%). The coverage of measles 1st dose was 55.4%. The prevalence of full immunization was 55.43% and partial immunization was 37.65% while 6.92 % of children were not immunized at all. The coverage of full immunization was maximum in Bhojpur (63.3%) followed by Patna (59%), Nalanda (55.4%) and Vaishali (42.6%). The prevalence of non-immunization was maximum in Patna (8.98%) followed by Nalanda (7.14%) and Vaishali (2.94%). (Table2)

Reasons for Non-immunization or Incomplete immunization

The most common reason for non/partial immunization was lack of awareness about the importance of immunization (37.2%) followed by no information of the nearest place of vaccination (33.1%) and travelling of child with family (18.9%). Around 74% parents had no information about the timing of visit for the next vaccination. (Table 3)

Gender, mother literacy and father literacy had no significant association with non-immunization status in the present study. The birth order of child showed association more towards non-immunization status as the 95% confidence interval was found to be more than a null association (p=0.07). The odds of children who were non-immunized with birth order 2 or less was 1.51 in comparison to children with birth order more than 2. Knowledge about the timing of the next vaccination showed a negative and significant association with non-immunization status with an odd's ratio of 0.49 (p=0.0074). Children of family living below the poverty line had a high risk of non-immunization in comparison to children with above poverty line with an odd's ratio of 2.1 (95%CI: 1.29-3.42;p=0.0015).(Table 4)

Logistic regression model showed that factors like birth order less than or equal to 2 (adjusted OR=1.47 (95%CI:0.91-2.38);p=0.057) and economic status below poverty line (adjusted OR=2.13(1.32-3.35;p=0.002) were found to be associated with high risk of non-immunization whereas knowledge about timing of next visit was found to be associated with low risk of non-immunization (adjusted OR=0.57 (0.34-0.91;p=0.0011).(Table 5)

Discussion

Socio-demographic characteristics

The male children outnumbered female (52.7% Vs 47.3%) which is similar to the population structure of India. Mostly the families of Scheduled caste and Scheduled tribe were involved as brick kiln workers and around 95% of them had literacy level below 8th standard, in which most of them were illiterate. Most of them were from neighbouring state i.e. Jharkhand. Lower literacy status and higher poverty level lead them to migrate to a neighbouring state and working as a manual labourer in brick kilns.

Status of Immunisation

In the recently concluded National Family Health Survey (NFHS) - 4 the total coverage of BCG vaccination was 91.7% and the coverage of full immunization was 61.7%. The present study shows the BCG coverage as 93.1% which is almost similar to NFHS-4 findings, but the full immunization coverage is 55.4% which is lower than NFHS-4 findings (19). This difference may be attributed due to the migrant nature of brick kiln worker and poor immunization coverage at brick kiln places. A study conducted on migrants and brick kiln worker found that around 80% children were either partially immunized or not immunized at all (16). The proportion of non-immunized children in their study was 5.2% which is almost similar to the present study (6.9%). A study reported around 77% brick kiln children in Kolkata city were partially immunized (20). BCG to measles dropout rate in the present study was 38% which is similar to a study reported among migrant workers of Haridwar district (21).

Reasons for Non-immunisation or Incomplete immunisation

Lack of awareness of the need for immunization, awareness but no knowledge that were to go for immunization and travelling during the scheduled time for vaccination was the most common cause for non-immunization and incomplete immunization. A lower level of literacy status among migrant brick kiln workers leads to low awareness among them. Low awareness level regarding benefits of immunization was one of the main reasons for non/partial immunization similar to studies conducted in a migratory population of Bhopal District. (17, 21) Nearly 88 % of the mothers and 78% of the fathers were illiterate, similar to a study conducted among migrant brick kiln workers of Pune and was found to be a significant factor for non/partial immunization of the children. (16)

The migrant workers were not aware regarding the time of next immunisation and the immunisation centres as it was a new place for them. Few of brick kiln was included in the microplan of routine immunisation but the majority

of them were not a part of immunisation microplan. The migrant workers revealed that they got only pulse polio immunisation on a regular basis.

Association of Immunisation with various socio-demographic characteristics

The birth order of child shows just a significant association with immunization status in bivariate analysis. The possible explanation of this observation could be that as the number of children increases, the knowledge of mother about child immunization and its importance also increases, which eventually leads to better immunization coverage amongst children with birth order more than two. Advance age of mother had been reported as a positive factor for full immunisation of children as reported by various studies. (22, 23). This could be due to greater maturity, increased awareness level and social networking among mothers. Knowledge about timing of next vaccination shows a positive and significant association with immunization status. The children with above poverty line had better immunization status in comparison to children with below poverty line.

Limitations of the study: Immunization cards were present with very few families, so the immunisation status was ascertained based on history and mother recalled. This may lead to recall bias.

Conclusion

The routine immunization coverage has increased but it is still low among migrant brick kiln workers and this reflects that the migrant population was not reached by the routine government health care delivery system.

Recommendation

There need of specialized efforts to reach out health care delivery services for marginalized population.

Limitation of the study

Immunization cards were present with very few families, so the immunization status was ascertained based on history and mother recalled. This may lead to recall bias

Relevance of the study

The study reveals the gross inequities in the accessibility of immunization services between the native population and the migrant population.

Authors Contribution

PK: conception and design of study, data collection, analysis and manuscript preparation; AR: analysis and interpretation of study findings; DK: data collection, data analysis and drafting the manuscript; SP, CMS & NA: Revising the Manuscript for important intellectual content.

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References

1. Kane M, Lasher H. "The case for childhood immunization".Children's Vaccine Program at Path. Seattle, WA. 2002; Occasional paper, No.5.
2. Datar A, Mukherji A, & Sood N. Health Infrastructure and Immunization coverage in rural India. Indian J Med Res 125, January 2007, pp 31-42 .
3. World Health Organisation. MDG 4: reducing child mortality. 2013. http://www. who.int/topics/millennium_development_goals/child_mortality/en/[Accessed on 30th January 2017].
4. United Nations Development Programme. Available at: http://www.undp.org/content/india/[Accessed on 4th February 2017].
5. Legesse E. and Dechasa W. An assessment of child immunization coverage and its determinants in Sinana District, Southeast Ethiopia. BMC Pediatrics, 2015; 15-31. DOI 10.1186/s12887-015-0345-4.
6. World Health Organisation (WHO). Global immunization data. 2014. http://www. who.int/immunization/monitoring_surveillance/global_immunization_data.pdf[Accessed on 30th January 2017].
7. World Health Organisation (WHO). Immunisation. 2014. http://www.who.int/topics/ immunization/en/[Accessed on 30th January 2017].
8. Mavimbe J, Braa J, Bjune G. Assessing immunization data quality from routine reports in Mozambique. BMC Public Health 2005;5:108.
9. World Health Organisation. Immunisation coverage. 2014. http://www.who.int/ mediacentre/factsheets/fs378/en/ [Accessed on 30th January 2017].
10. Awoh AB, Plugge E. Immunisation coverage in rural–urban migrant children in low and middle-income countries (LMICs): a systematic review and meta-analysis. J Epidemiol Community Health 2016;70:305–311. doi:10.1136/jech-2015-205652
11. Annual Report (2008), Ministry of Health and Family Welfare (MoHFW), Govt. of India. Available at:http://mohfw.nic.in/WriteReadData/l892s/9457038092 AnnualReporthealth.pdf.[Accessed on 30th January 2017].
12. Borhade A. Migrants'(Denied) access to health care in India. UNESCO-UNICEF National Workshop on Internal Migration and Human Development in India. Workshop Compendium, Vol. II: Workshop Papers.
13. Goel S, Bali S, Singh A. Impact of a Short Term Intervention on Health Care Outreach to a Marginal Population in Rural North India. The Internet Journal of Health. 2007; 5 (2).
14. Vashishtha VM, Kumar P. 50 years of immunization in India: Progress and future. Indian Pediatr 2013; 50:111-118.
15. Dutta R, Dekal P, Jain T, Jeyapal DR, Sivakumar K, Ramachandran A. Primary immunization coverage among Migrant children in the age group of 12 to 23 months in Sriperumbudur Taluk, Kanchipuram District. Indian J Comm Health. 2017; 29, 1: 114-117.
16. Vaidya VM, Hanumante NM, JoshiAM, Mahajan S. Immunization Status of Under five children in Migrants from Periurban Areas of Pune. Natl J Community Med 2013;4(3): 457-460.
17. Anand S, Verma P, Sinha U, Mahawar P. Evaluation of primary immunization coverage in migratory versus non-migratory labour population of urban area in Bhopal city.Pediatriconcall journal. 2014; 11(2).
18. http://timesofindia.indiatimes.com/india/New-poverty-line-Rs-32-in-villages-Rs-47-in-cities/articleshow/37920441.cms
19. National family health survey (NFHS 4) 2015-16. State Fact Sheet Bihar - District Level Household & Facility Survey. rchiips.org/nfhs/pdf/NFHS4/BR_FactSheet.pdf. [Accessed on 30th January 2017].
20. Biswas T , Mandal PK , Samarendra. Assessment of Health, Nutrition and Immunisation status amongst under -5 children in migratory brick klin population of periurban Kolkata, India .Sudanese journal of public health,January 2011; 6(1): 7-13

21. Nath L, Kaur P, Tripathi S. Evaluation of the universal immunization program and challenges in coverage of migrant children in Haridwar, Uttarakhand, India. Indian J Community Med 2015;40:239-45.
22. Kusuma YS, Kumari R, Pandav CS, Gupta SK. Migration and immunization: determinants of childhood immunization uptake among socioeconomically disadvantaged migrants in Delhi, India Tropical Medicine and International Health 2010; 15(11): 1326–1332
23. Antai D (2010) Migration and Child Immunization in Nigeria: individual- and community-level contexts. BMC Public Health 10:116.

Tables

TABLE 1 GENERAL SOCIO-DEMOGRAPHIC PROFILE OF STUDY SUBJECTS (N=332)

Variable	Proportion with 95 % CI
Gender	
Male	175 [52.7,47.3-58.1]
Female	157 [47.3,41.9-52.7]
Religion	
Hindu	319 [96.1,94-98.2]
Others	13 [3.9,1.8-6]
Caste	
General	9 [2.7,1-4.4]
Other Backward Class (OBC)	11 [3.3,1.4-5.2]
Scheduled caste/tribe (SC/ST)	312 [94,91.4-96.6]
Mother's education	
Illiterate	291 [87.7,84.2-91.2]
Primary	18 [5.4,3-7.8]
Middle	15 [4.5,2.3-6.7]
High school and above	8 [2.4,0.8-4]
Father's education	
Illiterate	260 [78.3,73.9-82.7]
Primary	38 [11.4,8-14.8]
Middle	23 [6.9,4.2-9.6]
High school and above	11 [3.3,1.4-5.2]
Socio-economic status	
Above poverty line	126 [38,32.8-43.2]
Below poverty line	206 [62,56.8-67.2]
Birth order of index child	
1st	111 [33.4,28.3-38.5]
2nd	110 [33.1,28-38.2]
3rd	61 [18.4,14.2-22.6]
4th	24 [7.3,4.5-10.1]
5th and above	26 [7.8,4.9-10.7]
District	
Patna	178 [53.6,48.2-59]
Vaishali	68 [20.5,16.2-24.8]
Nalanda	56 [16.9,12.9-20.9]
Bhojpur	30 [9,5.9-12.1]
Place from where migrated	
Jharkhand/ West Bengal	208 [62.6,57.4-67.8]
Other part of Bihar	88 [26.5,21.8-31.2]
Local	36 [10.9,7.5-14.3]

TABLE 2 IMMUNIZATION STATUS OF STUDY SUBJECTS (N = 332)

Variable	N [Percentage with 95% CI]
Immunization card	
Available	54, [16.3, 12.3-20.3]
Not available	278, [83.7, 79.7-87.7]
Vaccines Coverage	
BCG	93.1 [90.4-95.8]
DPT/Pentavalent and OPV1st dose	85.5 [81.7-89.3]
DPT/Pentavalent and OPV 2nd dose	78.9 [74.5-83.3]
DPT/Pentavalent and OPV 3rd dose	69.6 [64.7-74.5]
Measles 1st dose	55.4 [50.1-60.7]

Immunization status Coverage	
Fully immunized	55.43 [50.1-60.8]
Partially immunized	37.65 [32.4-42.9]
Non immunized	6.92 [4.2-9.7]

TABLE 3 REASONS FOR NON/INCOMPLETE IMMUNIZATION AMONG STUDY SUBJECTS (N = 148)

Reasons	N [Percentage with 95% CI]
Reason for non/incomplete immunization (n=148)	55 [37.1,29.3-44.9]
Not aware of need for	49 [33.1,25.5-40.7]
Aware but not know where and when to go	
Child was sick	3 [2.1, 0.2-4.4]
Fear of adverse effects following immunization	4 [2.7,0.1-5.3]
Child was travelling	28 [18.9,12.6-25.2]
Other	9 [6.1,2.2-10]
Timing of visit for next vaccination	
Yes	87 [26.2,19.1-33.3]
No	245 [73.8,66.7-80.9]

TABLE 4 BIVARIATE ANALYSIS OF VARIABLES ASSOCIATED WITH IMMUNIZATION (N = 332)

	Not/partially immunized	Fully immunized	Crude OR (95% CI	Mantel-Hanszel P-value (one-sided)
Gender				
Male	76	99	0.906 (0.57 – 1.43)	0.656
Female	72	85		
Birth order				
2 or less	106	115	1.51 (0.93 – 2.49)	0.07
More than 2	42	69		
Mother literacy				
Illiterate	132	159	1.297 (0.63 – 2.71)	0.447
Literate	16	25		
Father literacy				
Illiterate	118	142	1.16 (0.66 – 2.05)	0.574
Literate	30	42		
Knowledge about timing of next vaccination				
Yes	30	57	0.49 (0.28 – 0.85)	0.0074
No	118	127		
Below Poverty Line				
Yes	105	100	2.13 (1.29 – 3.42)	0.0015
No	42	84		

TABLE 5 VARIABLES RELATED TO IMMUNIZATION USING A LOGISTIC REGRESSION MODEL (N = 332)

Variables	Adjusted ORs	95% CI	P-value
Birth order less than equal to 2	1.47	0.91 – 2.38	0.057
Below Poverty Line	2.13	1.32 – 3.35	0.002
Knowledge about timing of next vaccination	0.57	0.34 – 0.91	0.0011
*LR chi-square at 3 d.f.= 17.54, P-value= 0.0005			