

Original Research Article

Prevalence of vaccine hesitancy and its associated factors in an urban area of West Bengal, India

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ABSTRACT

Background: Vaccine hesitancy is delay in acceptance or refusal of vaccines despite availability of vaccine services. This study was conducted to find out the prevalence and factors associated and contributing to vaccine hesitancy for childhood vaccinations in Rajpur-Sonarpur municipality of south 24 parganas, India.

Methods: A cross-sectional study was done among 352 children aged 0-59 months. Hesitancy to all childhood vaccination including the birth doses were observed. By simple random sampling ward no 8 was selected among the 37 wards of Rajpur-Sonarpur municipality. All the vaccination center of ward no 8 on various vaccination days were covered from July 2019- December 2019. Data were collected at these vaccination centers by interviewing parents /associates of the children. Validated version of vaccine hesitancy survey questionnaire by the World Health Organization was used.

Results: Vaccine hesitancy was present among 103 (29%) parents/relatives /associates of children. Delay was more common for measles and the booster doses of other vaccines. Reluctance to vaccinate was the most common reason (26.2%) for vaccine hesitancy. About 15(15.4%) parents reported to be unaware or confused of when to vaccinate their children. Improper counselling by health care givers, illness or irritability of the child were other causes.

Conclusions: To avoid delay in vaccination weekly vaccination days were recommended. Community level campaigning and home visit of those eligible children to generate awareness about vaccination and to avoid reluctance in parents/associates of children were suggested.

Keywords: Vaccine hesitancy, Childhood vaccination, Vaccine delay

INTRODUCTION

Vaccination is an important public health issue. It has become a developing focus of attention and concern over the years.¹⁻³ Vaccine hesitancy is defined as delay in acceptance or refusal of vaccines despite availability of vaccination services [The World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on immunization].⁴ It is complex and context specific, varying across geographies and vaccine types. Vaccine hesitancy occurs along a continuous sequence between full acceptance and complete refusal of all vaccines, i.e.,

when there is acceptance of some and delay or refusal of some of the recommended vaccines. It is influenced by factors such as complacency, convenience, and confidence.⁴ It is obvious that vaccine hesitancy is directly proportional with the risks of vaccine preventable diseases outbreak. To determine the prevalence of vaccine hesitancy in a country or area an overall understanding of the extent and position of the problem is required.⁵

Any country should incorporate a plan to measure the vaccine hesitancy in their routine immunisation

programme to have an effective immunisation practice. Countries should arrange for proper resources to support vaccine uptake. Training and education of health care workers are needed to combat vaccine hesitant behaviour among them.⁵ Childhood vaccination coverage of urban areas (76.2%) in West Bengal is less than total (79.5%) and rural (80.8%) coverage according to DLHS-4.⁶ Different logistics and manpower for immunisation have been the issues of concern for public health specialists.^{7,8}

The latent issue of vaccine hesitancy leading to vaccine delays and refusals has not been widely discussed particularly in the Indian scenario. Despite all the evidences regarding the beneficial effects of vaccines, vaccination uptake has not been up to the mark across the globe in different sociocultural and socio demographic groups.

METHODS

The study was a community based observational, cross-sectional study. It was done in ward no 8 of Rajpur-Sonarpur municipality, South 24 parganas, West Bengal. All the vaccination center of ward no 8 on various vaccination days were covered. 0-59 months' children attending these vaccination center were taken as study population.

Study period was from July 2019- December 2019.

Study design

A cross-sectional study (after complete enumeration of all the children of all the vaccination centers of ward no 8 in the mentioned time period) was done among 352 children, aged 0-59 months' children. Hesitancy to all childhood vaccination including the birth doses were observed. By simple random sampling Rajpur-Sonarpur municipality was selected among 12 municipalities of South 24 parganas district of West Bengal and by the same method ward no 8 was selected among the 37 wards of Rajpur-Sonarpur municipality. All the vaccination center of ward no 8 on various vaccination days were covered from July 2019-December 2019.

Data was collected at these vaccination centers by interviewing parents/associates of the children. They were explained properly about the issue. Consent was also taken before interviewing. Validated version of vaccine hesitancy survey questionnaire originally developed by the World Health Organization Strategic Advisory Group of Experts working group on vaccine hesitancy was used.⁴ Associated and contributory factors of vaccine hesitancy were analysed after completion of data collection. In this study refusal to the specific vaccines were also observed.

The children were enlisted through the MCP card (mother and child protection card) as a continuation process of antenatal care of the mother. The children outside this MCP card coverage were tracked by house to house visit

by health care workers. The children who attended the vaccination center for the first time were also tracked if they were absent on a vaccination scheduled by telephonic conversation and house to house visit. The vaccination card or MCP card was repeatedly checked if they were absent on the day of vaccination or if they told that they had given vaccination outside or at any private center. The data was analysed with suitable statistical techniques.

Study tools: Validated version of vaccine hesitancy survey questionnaire originally developed by the World Health Organization Strategic Advisory Group of Experts working group on vaccine hesitancy was used.⁴

Study variables: Vaccination status, type of family, gender of the child, education of the mother, socioeconomic status, birth order, attitude towards vaccination were the study variables.

Case definition: Vaccine hesitancy according to World Health Organization (WHO) refers to delay in acceptance or refusal of vaccines despite availability of vaccine services.⁴

Inclusion criteria

All the children attending the various vaccination centers of ward no 8 were taken and data were collected at these vaccination centers by interviewing parents/associates of the children.

Exclusion criteria

Parents/associates of the children who had not given the consent were excluded from the study.

Institutional ethical clearance also was taken from Ethical committee of KPC Medical College, Kolkata.

RESULTS

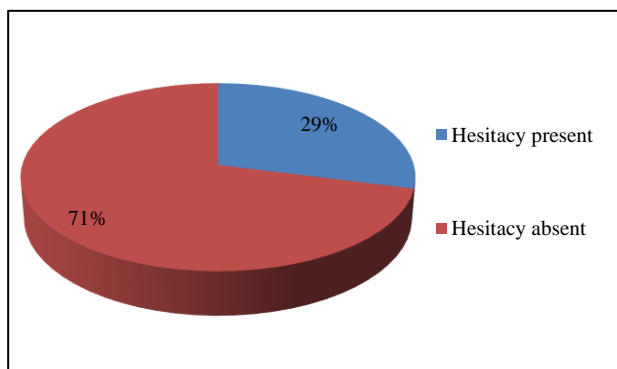
All 352 children's parents/associates who had given consent were selected for study. Majority of the study subjects were females (56.8%), belonging to nuclear families (50.9%), first birth order (58.3%), and from lower socioeconomic status (56.3%). About 61.7% of the mothers had secondary level of education (Table 1).

Vaccine hesitancy was also found related with nuclear and joint family. Among the study population 50.9% was from the nuclear family and rest were from joint family. Among the nuclear families 57% were hesitant and it was more than the joint family. In this study 61.7% of mothers/associates of children had education more or equal to secondary level. Mothers having more education were less hesitant (21.7%), whereas mothers having less education were more hesitant (29.6%). When we considered the gender of the children we observed that hesitancy was more in case of female than male.

Table 1: Predictors of vaccine hesitancy.

Predictors of vaccine hesitancy (n=352)			
Variable	Vaccine hesitancy		Total
Type of family	Present	Absent	
Nuclear	57 (31.9%)	122 (68.1%)	179 (50.9%)
Joint	46 (26.6%)	127 (73.4%)	173 (49.1%)
Child gender			
Female	77 (38.5%)	123 (61.5%)	200 (56.8%)
Male	44 (28.9%)	108 (71.05%)	152 (43.2%)
Education of mother			
≥class x	47 (21.7%)	170 (78.3%)	217 (61.7%)
<class x	40 (29.6%)	95 (70.4%)	135 (38.3%)
Socioeconomic status			
Class IV, V	40 (26%)	114 (74%)	154 (43.7%)
Class I, II, III	70 (35.4%)	128 (64.6%)	198 (56.3%)
Birth order			
First	60 (29.3%)	145 (70.7%)	205 (58.3%)
Second or higher	54 (36.8%)	93 (63.2%)	147 (41.7%)
Attitude toward vaccination			
Unfavourable	48 (65.7%)	25 (34.3%)	73 (20.8%)
Favourable	44 (15.8%)	235 (84.2%)	279 (79.2%)

#Socioeconomic status was measured according to modified BG Prasad scale using All India Consumer Price index of April 2016. Class I, Per capita income ≥INR 6186; Class II, INR 3093-6185; Class III, INR 1856-3092; Class IV, INR 928-1855; Class V, <INR 927

**Figure 1: Prevalence of vaccine hesitancy**

Around 38.5% female children were found hesitant. In case of male children it was 28.9%.

Vaccine hesitancy was present among 103 (29%) (Figure 1) parents/relatives/associates of children. Majority (79.2%) of parents believed that vaccines can protect children from serious diseases and they should vaccinate their children with all the recommended vaccines. Delay was more common for measles and the booster doses of other vaccines. Reluctance to vaccinate was the most common reason (26.2%) for vaccine hesitancy. About 15(15.4%) parents reported to be unaware or confused of when to vaccinate their children. They were not explained properly by health care providers regarding dates of vaccination. Parents were also reluctant to hear about the dates.

Table 2: Causes of vaccine hesitancy (n=103).

Reasons for hesitancy	Frequency (%)
Reluctant	27 (26.2)
Forgets date of vaccination	7 (6.7)
Unaware/not explained /no reliable information	15 (15.4)
Irritable/sickness of child	14 (14.4)
Lack of caregiver/illness or pregnancy of mother	12 (11.6)
Being away from home	3 (3)
Household problem/burden of other children	7 (6.7)
Discouragement from family/felt unnecessary	7 (7)
Lack of trust/fear of vaccination	5 (4.8)
Others (multiple response, cost, time constraint, work load)	6 (5.82)

About 14.0% of the children were sick or irritable. Lack of caregiver in some centers was found. In some cases mothers were sick or pregnant. These causes comprise about 11.6% of total hesitant. About 6.5% of total hesitant forgot dates of vaccination and another 6.5% was busy in household problems or with some health issues of other children. Around 3.1% was away from the home on the days of vaccination. Vaccination felt unnecessary or there were some amount of discouragement by the other family members by 7% of total hesitant persons. We also

found that some of the parents or associates of children had fear of vaccination or didn't have trust on it.

Multiple responses for a single question were given by some hesitant. Some were unable to attend the vaccination center due to their job pattern or work scheduled. Some respondents were unable to attend the vaccination due to the specific time scheduled of vaccination. These causes were in the group of others causes of vaccine hesitancy, and was about 5% of total hesitant (Table 2).

In this study the analysis of the hesitancy in specific vaccines was also done. Delay found in case of BCG around 4.8%. In OPV0 and Hepatitis B birth dose it was 4% and 4.8% respectively. In OPV first, second and third doses delay was found in 4.2% cases. In case of pentavalent first, second and third doses it was 4.8% and in rotavirus first, second and third doses delay was around 4.4%. In all these observations maximum delay were in first doses. Attending immunization center for the first time, minimum after 6 weeks of birth might be the cause of this. During the analysis of booster doses we found that 17.6% had delay in taking DPT booster dose and 16.8% had delay in receiving OPV booster dose. In case of measles vaccine we had found that in first dose only 8% had caused delay but the delay was about 18.2% in case of 2nd dose. The delay was about 12.4% in Japanese encephalitis vaccination. As all the primary doses were complete within nine months the gap period is higher from the primary dose to booster doses. This might be the

contributing factor for the delay of vaccination. Some misinformation or misunderstanding about JE vaccination like convulsion in children, sudden unconsciousness etc. may be the factor for delay of this vaccine.

We also observed refusal or reluctance of parents/ associates of children in this study. In BCG and OPV0 it was 0.5% and 1.2%. It was very low as maximum delivery was institutional and these doses were given as a birth dose. Refusal of hepatitis B birth dose was 1.4%. It was slightly higher due to less supply of this hepatitis B vaccines. According to some respondents they were asked to buy it in spite of giving free vaccination in case of institutional delivery. Refusal of OPV, pentavalent were 6.5% and 6.7%. In this we had calculated the all three doses of these two vaccines. We had found that refusal was more in case of third doses. Repeated intramuscular injections and uncomfortable sensation and crying of the children and after vaccination fever, in the gapping of four weeks for first second and third doses might be the cause of this. In case of measles the refusal rate was 11.2%. For the second dose of measles it was 24.4%. The gapping between these two doses might be the cause of refusal including reluctance. Refusal of OPV booster and DPT booster was 6.4% and 20.6% (Table 3). The cause of higher refusal of DPT might be the fever and painful intramuscular vaccination. The refusal of JE was around 21.1%. The misconception or wrong information about JE vaccination like convulsion, sudden unconsciousness, etc. might be the main causes.

Table 3: Vaccination status and vaccine hesitancy among beneficiaries (n=352).

Vaccine	Total events	Vaccine hesitancy		
		Absent		Present
		No delay	Delayed	Refusal/reluctant
BCG	352	333 (94.7%)	17 (4.8%)	2 (0.5%)
OPV₀	352	333 (94.8%)	14 (4%)	5 (1.2%)
Hepatitis B (birth dose)	352	332 (94.6%)	14 (4%)	6 (1.4%)
OPV₁, OPV₂, OPV₃	1010	902 (89.3%)	42 (4.2%)	66 (6.5%)
Pentavalent (1, 2, 3)	890	788 (88.5%)	43 (4.8%)	59 (6.7%)
Rotavirus	672	639 (95.1%)	30 (4.4%)	3 (0.5%)
IPV	672	604 (89.9%)	20 (3%)	48 (7.1%)
MR	290	235 (80.7%)	23 (8%)	32 (11.3%)
Vitamin A	242	237 (98%)	5 (2%)	-
JE	262	175 (66.5%)	32 (12.4%)	55 (21.1%)
MR and JE Booster	255	147 (57.4%)	46 (18.2%)	62 (24.4%)
DPT Booster	190	118 (61.1%)	33 (17.6%)	39 (20.6%)
OPV Booster	212	163 (76.8%)	36 (16.8%)	13 (6.4%)

DISCUSSION

In this study we have adopted WHO definition of vaccine hesitancy, which stands between the process of unquestioning acceptance and refusal of all vaccines.³ Dasgupta et al shows vaccine hesitancy in 83% of study

population of a slum of siliguri. But in this study as the population was an urban one maximum respondent were non hesitant.⁹ Attitudes and behaviours of parents regarding vaccination are comprised of five groups, unquestioning acceptance, cautious acceptance, hesitance, selective vaccinator, and refusal of all vaccines.¹⁰

According to national surveys immunization coverage of West Bengal has improved from 64.3% in 2005-2006 to 84.4% in 2015-2016.¹¹ But this data reflects only the gross coverage of vaccines and it is unable to determine the delay or hesitancy or refusal of vaccines. In the present study most of the caregivers were convinced about the timely vaccination (71%), and they were willing to vaccinate their children with proper vaccines. According to Barman et al only 17% had gone for the recommended doses of vaccination on time where month specific vaccination rate was 16.4% but non month specific full immunisation coverage was 75.9%. In the present study we also observed that girls were more hesitant than boys and second birth order child were more hesitant than first order. It was against the observation of Barman et al study.¹² Clark et al showed there was wide variation in timely vaccination coverage in 45 lower/middle income countries.¹³

A significant association was found between nuclear family and vaccine hesitancy. In the family where mother was the only caregiver it might cause delay in vaccination, also reluctance to take for vaccination due to household or other job, was there. Sometimes the problem is aggravated if the mother was sick, pregnant or she had to take care of other children. In traditional settings of India, the joint family structure had an added advantage of additional caregivers, where chances of getting timely vaccination increase due to other parents of the family taking care, even if the mother was working. Lauridsen et al and Sharma et al were also informative.¹⁴ In this study, parents with higher socio economic status showed a higher percentage of vaccine hesitancy. It was against the observation of Barman et al and Sharma et al studies where hesitancy was more in lower socio economic groups.¹⁵ According to these studies higher educational status of mother was related to lower hesitancy and higher immunisation coverage. In the present study this is also justified. Educated mothers remember dates of vaccination properly, understand the importance of timely vaccination and interact more freely with the health workers. Naeem et al also described this pattern of result.¹⁶ Vaccines in India are supplied free of costs in all government facilities. In the study, parents who were economically better, however, visited private facilities such as pediatricians' clinics, private nursing homes where they had to pay for vaccines as well as for the services. If on the scheduled vaccination day or week, there was not enough money, they tend to be vaccine complacent and delay or might miss doses of costly vaccines such as pentavalent, rotavirus.

In the present study we also observed that girls were more hesitant than boys and second birth order child were more hesitant than first order. Corsi et al and Mathew et al support this observation.^{17,18} Beneficiaries in this study used to take their vaccination from various centre like govt. sub centre, municipality vaccination centre, vaccination centre of NGO (Institute of Indian Mother and Child/IIMC). Mothers/associates of children were

confused where to vaccinate the children if they missed a vaccination date of a particular vaccine. According to Patel et al in Gujarat, about 19.8% of infants received their first dose of vaccine after 2½ months of age.¹⁹

Information about newer vaccines and its necessity were not properly told to the mothers/associates of children by the health care workers. This created a sense of apprehension and fear in mothers about the newer vaccines. The misconception or wrong information about JE vaccination like convulsion, sudden unconsciousness, lack of proper knowledge about JE vaccine etc. might be the main causes of JE vaccine hesitancy. According to Freed et al more than half of the mothers/associates of children were concerned regarding serious adverse effects and question the safety of newer vaccines.²⁰

In the study of Gust et al maximum proportion of mothers/associates of children who changed their minds of delaying or not getting vaccinated had given the cause of lesser information or assurance by health care providers.²¹ In this study reluctance to vaccinate the child was the main cause of hesitancy. Vaccination like Pentavalent (1-3), OPV0, OPV1-3, are in quick succession, but booster doses of DPT, OPV, MR all are scheduled after a long gap. This was the main reason for more reluctance in case of booster doses with forgetfulness being another cause, resulting in hesitancy. Mandal et al, Singh et al and Manjunath et al described forgetfulness, laziness, lack of awareness the other causes of vaccine hesitancy.²²⁻²⁴

A larger proportion of mother depended on the doctors or health care providers and followed their instructions. This was a main cause for less trust on service providers or vaccinators. Social behaviour of mothers like frequently traveling between husband's home and father's home during postnatal period is a major obstacle. It is obvious that mothers staying in fathers' home will miss the reminder of vaccination from health care workers who only register the deliveries of daughter in law to avoid the duplication of birth registration. Patel et al study supports this.²⁴ This study was done in immunisation centers. Vaccine delay is a part of vaccine hesitancy. Vaccine delay was easy to identify in these centres by cross checking the vaccination card. Refusal/reluctance to the vaccines were difficult to detect. A large number of beneficiaries/children were registered as the continuation of their mothers' antenatal registration and check-up. The newer children other than this group were tracked by house to house visit, which was done by respective health workers in their respective areas. Among the total children, if someone was absent in an immunisation day, they were tracked by telephonic conversation or by house to house visit. If someone told that they had taken the particular vaccine from outside or private chamber, it was taken as a non hesitant after verifying the vaccination card.

This study has a limitation. It was conducted only in ward number 8 of Rajpur-Sonarpur municipality of South 24 Parganas. The responses given by parents or associates of the children may vary according to level of education and comprehension of them. They may not disclose every details of families.

CONCLUSION

In this study we had found that majority of parents/associates of children are non hesitant, but a significant number found hesitant also. Reluctance of parents/associates of children was the main cause for hesitancy. Improper counselling by health care givers was one of the cause. Illness or irritability of the child, forgetting dates, lack of awareness, lack of caregiver in home, sickness or pregnancy of mother, mother being away from home, household problem or problems of other children, discouragement by family, not feeling necessary to vaccinate, lack of trust or fear of vaccination were the other causes of hesitancy. Vaccine hesitancy was also found due to scepticism against newer vaccines. Concerns about adverse events and the opinion of vaccines against uncommon diseases are not required were the causes of newer vaccine hesitancy. It was also observed that vaccine hesitancy is inversely proportional to attitudes towards vaccines.

Recommendations

To avoid delay in vaccination (like measles or booster doses) weekly vaccination days were recommended. Community level campaigning and home visit of those eligible children to generate awareness about vaccination and to avoid reluctance in parents/associates of children were suggested. Active community participation before introduction of newer vaccines, to minimize any anxieties in the minds of the parents is very important. Health care givers or vaccinators were advised to council the parents/associates of children properly about the next date of the vaccination and its necessity and to do home visit or to trace over telephone if absence found on the vaccination days. So providing health promotional messages like generating awareness among the community and ensuring their participation is the only way to decrease vaccine hesitancy by appropriate IEC strategies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Black S, Rappuoli R. A crisis of public confidence in vaccines. *Sci Transl Med*. 2010;2:61.
- Leask J. Target the fence-sitters. *Nature*. 2011;473:443-5.
- Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012. *Vaccine*. 2014;32:2150-9.
- World Health Organization. Department of Immunization, Vaccines and Biologicals (IVB). SAGE October 2014. Geneva: World Health Organization; 2014. Available from: https://www.who.int/immunization/sage/meetings/2014/october/Yellow-bookSAGE2014_final.pdf?ua=1. Accessed on 20 January 2020.
- The SAGE Working Group. Summary WHO SAGE. Conclusions and Recommendations on Vaccine Hesitancy. Available from: http://www.who.int/immunization/programmes_systems/summary_of_sage_vaccinehesitancy_2pager.pdf?ua=1. Accessed on 22 January 2020.
- Ministry of Health and Family Welfare. District Level Household and Facility Survey-4; West Bengal Factsheet (2012-13). Mumbai, India: International Institute for Population Science; 2012-13. Available from: <http://www.rchiips.org>. Accessed on 20 January 2020.
- Madhavi Y, Puliye JM, Mathew JL, Raghuram N, Phadke A, Shiva M, et al. Evidence-based national vaccine policy. *Indian J Med Res*. 2010;131:617-28.
- Thakrar DV, Kanabar BR, Patel UV, Kadri AM, Oza JR, Mitra AH. Assessment of facilities for routine immunization at urban health centres of Rajkot city, Gujarat, India, November 2014. *Sch J Appl Med Sci*. 2016;4:3208-12.
- Dasgupta P, Bhattacharjee S, Mukherjee A, Dasgupta S. Vaccine hesitancy for childhood vaccinations in slum areas of Siliguri, India. *Indian J Public Health*. 2018;62:253-8.
- Leask J, Kinnersley P, Jackson C, Cheater F, Bedford H, Rowles G, et al. Communicating with parents about vaccination: A framework for health professionals. *BMC Pediatr*. 2012;12:154.
- Ministry of Health and Family Welfare, Government of India. National Family Health Survey 2015-16: State Fact Sheet West Bengal. Mumbai (India): International Institute for Population Science; 2016. Available from: http://rchiips.org/NFHS/pdf/NFHS4/WB_FactSheet.pdf.
- Barman D, Dutta A. Access and barriers to immunization in West Bengal, India: Quality matters. *J Health Popul Nutr*. 2013;31:510-22.
- Clark A, Sanderson C. Timing of children's vaccinations in 45 low-income and middle-income countries: An analysis of survey data. *Lancet* 2009;373:1543-9.
- Lauridsen J, Pradhan J. Socio-economic inequality of immunization coverage in India. *Health Econ Rev*. 2011;1:11.
- Sharma S. Socioeconomic factors of full immunization coverage in India. *World J Vaccines*. 2013;3:102-10.

16. Naeem M, Adil M, Abbas SH, Khan MZ, Naz SM, Khan A, et al. Coverage and causes of missed oral polio vaccine in urban and rural areas of Peshawar. *J Ayub Med Coll Abbottabad*. 2011;23:98-102.
17. Corsi DJ, Bassani DG, Kumar R, Awasthi S, Jotkar R, Kaur N, et al. Gender inequity and age-appropriate immunization coverage in India from 1992 to 2006. *BMC Int Health Hum Rights*. 2009;9(1):S3.
18. Mathew JL. Inequity in childhood immunization in India: A systematic review. *Indian Pediatr*. 2012;49:203-23.
19. Patel TA, Pandit NB. Why infants miss vaccination during routine immunization sessions? Study in a rural area of Anand district, Gujarat. *Indian J Public Health*. 2011;55:321-3.
20. Freed GL, Clark SJ, Butchart AT, Singer DC, Davis MM. Parental vaccine safety concerns in 2009. *Pediatrics*. 2010;125:654-9.
21. Gust D, Brown C, Sheedy K, Hibbs B, Weaver D, Nowak G, et al. Immunization attitudes and beliefs among parents: Beyond a dichotomous perspective. *Am J Health Behav*. 2005;29:81-92.
22. Mandal NK, Sinhamahapatra B, Sinha N, Mukhopadhyay DK, Das R, Biswas AB. Child immunization and vitamin A supplementation in the district of Bankura, West Bengal. *Int J Med Public Health*. 2011;1:22-6.
23. Singh P, Yadav RJ. Immunization coverage in Bihar. *Indian Pediatr*. 1998;35:156-60.
24. Manjunath U, Pareek RP. Maternal knowledge and perceptions about the routine immunization programme- A study in a semiurban area in Rajasthan. *Indian J Med Sci*. 2003;57:1.

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