



Original Article:

Exploring the Causes of Low Immunization Status in School Going Children

Madhuri Inamdar, Assistant Professor, Department of Community Medicine,
Saurabh Piparsania, Senior Resident, Department of Pediatrics,
Savita Inamdar, Professor Emeritus, Department of Pediatrics,
Kuldeep Singh, Professor and Head, Department of Pediatrics,
Sri Aurobindo Institute of Medical Sciences, Indore-452003, Madhya Pradesh, India.

Address for Correspondence:

Dr. Madhuri Inamdar,
22/10, Yeshwant Niwas Road,
Indore - 452003,
Madhya Pradesh, India.
E-mail: madhuriinamdar@hotmail.com

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Abstract: Background: Although a definitive immunization program has been advocated for children in our country, the immunization coverage is far from satisfactory. There is paucity of survey studies related to immunization pattern.

Objective: This study has been undertaken to explore the social and attitudinal factors with parents resulting into adverse immunization. **Material and Methods:** The study was school based cross-sectional study conducted in 50 schools of Indore district selected by random sampling from three groups. Information was collected from parents by providing pre-tested questionnaire. **Result:** Association of parent's literacy and socioeconomic status with successful immunization could be established. Overall coverage rate with vaccines was poor in school going girls as compared to the boys; proving thereby that gender discrimination exists putting girls in disadvantageous position. **Conclusion:** It can be expected that the immunization status of school children will improve if identified risk factors such as parental education, socioeconomic status, awareness status are improved and attitudinal gender discrimination is curbed.

Key Words: Immunization status; Gender discrimination; Parental education; Adolescent immunization

Introduction:

Protection through immunization against vaccine preventable diseases, disabilities and death is the birth right of every child. Vaccines remain one of the most cost-effective public health initiatives.¹ A lot of progress has been made globally as far as protection against six vaccine preventable diseases is concerned; yet the coverage against VPDs remains far from complete. Recent estimates suggest that approximately 34 million children are not completely immunized with almost 98 per cent of them residing in developing countries.² Vaccination coverage in India is also far from complete despite a longstanding commitment to universal coverage. A recent evaluation of VPD coverage in India found that 18 million children did not receive any coverage in 2001-2002.³

Immunization is one of the best indicators to evaluate the available health services. It is also one of the most cost-effective interventions to prevent a series of major illnesses, particularly in environments where children are undernourished and die from vaccine preventable diseases.

Given the extensive social benefits of immunization, any inequities in the knowledge, attitude and practices that leave out large sections of the most deprived populations are a cause for serious policy concern. There is evidence of inequalities in immunization in India, despite the fact that childhood immunization has been an important part of maternal and child health services since the 1940s.⁴

Because of increased accessibility of healthcare services in both urban and rural areas, an increase was expected in the utilization of the services; however, studies reveal low utilization of healthcare services including MCH service by different segments of the society.⁵ The current scenario depicts that only 44% of infants in India are fully immunized (NFHS III),⁶ which is much less than the desired goal of achieving 85% coverage. Globally about 20% of children remain unimmunized. The unimmunized may be difficult to reach or may belong to groups who traditionally do not use healthcare services. These groups are frequently low in literacy skills, so may not respond well to conventional methods of communication and health education, and may live in severely underprivileged conditions in remote areas or urban slums.

It has been found that a child with high birth order, belonging to an orthodox family, those residing in rural areas, children with illiterate parents and coming from low socioeconomic status and those from high household size had significantly low immunization coverage as compared to children from opposite groups. A number of studies have drawn attention to the problem of discrimination against the female child and few studies have shown that immunization coverage of female children is far lower than that of male.

In spite of enthusiastic universal immunization program, we know that the number of beneficiaries during school age is not up to the mark, as the school age is still a neglected area. The causes as to why immunization is not up to the mark need to be found. The possibilities need to be discussed:

- Is there lack of awareness among parents regarding immunization? Can parental educational status be responsible for low immunization status?
- Are vaccines not affordable by the parents, particularly newer vaccines and optional vaccines?

- The fact that vaccination is not part of school health program. Should it be made part of school health program?
- Are we interested in vaccination beyond infancy?
- Is immunization coverage better in male children as compared to female of the same age group?

In order to get answers to the above questions, it is important to know the exact status of immunization beyond infancy i.e. in the school age and during adolescence.

Materials and Methods

Indore is the largest city and commercial capital of the Indian state of Madhya Pradesh,⁷ covering an area of 3,398 Km². The total population in 2001 was reported to be 2,465,827.⁸ Males constitute 1,289,352 of the population and females 1,176,475. As per 2001 census, the city of Indore has an average literacy rate of 75.15%, higher than the national average of 59.5%.

Study Place:

As Indore is a modern city of Madhya Pradesh with diverse social characteristics, this survey was conducted in the school going children attending government, private and public schools to determine the immunization status and also to identify the social and attitudinal causes (such as socioeconomic status, educational status of parents and gender discriminative attitude of the family) resulting in lower immunization rates. The study was carried out in the MR-10, Vijay Nagar and Palasia area (an urbanized locality) of the Indore district. There were about 90 government schools, 30 private and 18 public schools in the area. The schools are categorized accordingly:

Government School: The term “government school” refers to government-funded schools that are run by the government but does not include the government-aided schools that are privately managed.

Private schools: Government-aided schools that are privately managed.

Public schools: The “public schools” referred to in the rest of this study include recognized schools that charge fees and do not receive any financial support from the government and are managed privately.

Sample Size and Sampling Technique:

It was a school based cross-sectional study conducted in 50 schools, which were selected randomly from 3 groups.

Inclusion criteria: All the children going to school, falling between 5-16 years of age were included in the study.

Exclusion criteria: All the children not coming within the age range were excluded from the study.

The schools covered included:

- Government schools =30
- Private Schools =10
- Public schools =10

A total of 5010 children in the age group of 5-16 years (2024 children from government, 1541 children from private and 1445 children from public schools) were included in the study.

Data Collection Technique and Tools:

Data collection was carried out from November 2008 - August 2009.

Information was collected by providing pre-tested proforma and questionnaire to the students of each selected school.

Proforma contained the questions related to the preliminary information about the child viz. name, age, sex, religion and class. Proforma also included parents name, their educational status, occupation, annual income, total family members, and

information regarding the immunization status of these children (vaccines covered under UIP, EPI and IAP).

Fully filled proforma were collected and analyzed. Incomplete or partially filled proforma were excluded from analysis.

Data Analysis:

As the study was school based including children in the age group of 5-16 years, parental recall and their response to the immunization status of children in the proforma was relied upon. Some schools, in particular, public and private schools and some parents who had immunization cards available with them were relied upon.

Criteria for full, partial and no immunization:

Full Immunization: A child was considered fully immunized if vaccinated against BCG, 3 doses of OPV and DPT and 1 dose of measles during infancy and first boosters of OPV and DPT as recommended in UIP.

Partial Immunization: A child was labeled as partially immunized if he/she had missed any one of the vaccines recommended in UIP.

Unimmunized: A child was labeled as unimmunized if he/she had not taken any of the vaccines.

The socioeconomic status of the parents was determined using modified Kuppuswamy’s scale. The influence of parental education and socioeconomic status on immunization status of school children (male and female) was determined. After data collection data was analyzed using SPSS 17 Software Package and Windows Excel Sheet. P value was generated, and a P value of < 0.05 was taken as significant and P value > 0.05 was taken as non-significant.

Observations and Results:

Table 1 is depicting the association of literacy status of fathers of studied subjects with immunization status of boys and girls belonging to different categories of schools. It can be observed from Table 1 that immunization coverage was higher in males as compared to females in each group, suggesting existence of gender discrimination. A highly significant association is noticed between father’s literacy and immunization status of their children (p-Value <0.0001). In general, the immunization status was proportionately better in children whose fathers were educated.

Father’s education	Male (n;%)	Female (n;%)	Total (n;%)
Illiterate	108; 66.67%	54; 33.33%	162; 100%
Primary	510; 79.19%	134; 20.81%	644; 100%
High school	411; 62.37	248; 37.63%	659; 100%
Graduate	407; 55.15%	331; 44.85%	738; 100%
Postgraduate	296; 57.14%	222; 42.86	518; 100%
Total	1732;63.65%	989; 36.35%	2721; 100%

As in Table 2, a highly significant association between mother’s literacy and immunization status of their children is observed (p-Value <0.0001), suggesting maternal literacy has appreciable effect on nullifying gender bias. Only 24.46% of female children were fully immunized as compared to 75.54% of male children when mothers were illiterate. The immunization of female children increased as the education of mother increased. None of the postgraduate mother had unimmunized child, girl or a boy.

Mother’s education	Male (n; %)	Female (n;%)	Total (n;%)
Illiterate	176; 75.54%	57; 24.46%	233; 100%
Primary	476; 62.88%	281; 37.12%	757; 100%
High school	539; 69.46%	237; 30.54%	776; 100%
Graduate	386; 54.37	324; 45.63%	710; 100%
Postgraduate	155; 63.27	90; 36.73%	245; 100%
Total	1732; 63.65%	989; 36.35	2721; 100%

In the present study, full immunization coverage was highest for children belonging to high socioeconomic class 1020 (37.49%) followed by children belonging to lower class 971 (35.68%) and then middle class 730 (26.83%). Also in each class immunization coverage was higher in males as compared to females suggesting possible gender bias. The probability value of less than 0.0001 suggests a highly significant association between parent's socioeconomic status and gender bias.

Table 3: Association of Socioeconomic status of parents with immunization

Socioeconomic class	Male (n;%)	Female (n;%)	Total (n;%)
Upper	591; 57.94%	429; 42.06%	1020; 100%
Middle	454; 62.19%	276; 37.81%	730; 100%
Lower	687; 70.75%	284; 29.25%	971; 100%
Total	1732; 63.65%	989; 36.35%	2721; 100%

In the present study, p value was significant (<.05) for most of the vaccines included in national immunization schedule suggesting preference is being given to the male child. However, p value was not significant (>.05) for BCG and Measles vaccine. For the administration of optional (recommended) vaccine no significant gender bias is observed (p-Value >.05) except for varicella and pneumococcal vaccine.

Table 4: Coverage of Individual vaccine and gender bias

Vaccines	Immunization Status		p-value
	Male	Female	
BCG	51.1%	33.7%	>.05
DPT	44.0%	31.1%	<.001
OPV	54.9%	39.0%	<.001
Measles	47.4%	31.6%	>.05
MMR	36.0%	20.0%	<.001
Tetanus	26.0%	18.8%	<.001
Typhoid	22.7%	14.7%	>.05
Hepatitis-B	32.3%	19.8%	<.01
Hepatitis-A	2.9%	2.0%	>.05
HIB	3.7%	2.2%	>.05
Varicella	7.4%	3.7%	<.002
Pneumococcal	2.0%	.5%	<.001
Rubella	#	1.9	*

Vaccine not administered.

*No statistics computed because rubella vaccine is a constant

Discussion:

In the present study, the total number of children included were 5010 of which 3025 (60.4%) were male and 1985 (39.6%) were female. Overall 28.84% (Total 1445; Male-856, Female-589) children belonged to high socio-economic class, whereas 30.76% (Total 1541; Male-901, Female-640) and 40.4% (Total 2024; Male-1268, Female-756) children belonged to middle and low socio-economic class respectively.

In the age group of 5-16 years, 34.6% male and 19.7% female (total-54.3%) children were fully vaccinated, while 22.8% male and 19.3% female (total-42.1%) children were partially immunized and 3% male and .6% female (total-3.6%) were non-immunized. Similar study was done in M.P. by Yadav RJ, Singh P in the year 2004 showing 60.8% of children as fully immunized and 9.6% as non-immunized.⁹ National statistics (NFHS III) reflects fully immunized children as 40% in Madhya Pradesh as compared to national coverage of fully vaccinated children of 44%.⁶

In the present study, on comparing two genders, 34.6% males were fully immunized as against only 19.7% of females. These figures are lower than a study done in slums of Surat.¹⁰ However gender discrimination is obvious with preference to male school children in comparison to school girls

Among 54.30% of fully immunized children 27.12% (Total 738; Male-407, Female-331) belonged to father who were

graduate followed by 24.22% (Total 659; Male-411, Female-248), 23.67% (Total 644; Male-510, Female-134) and 19.03% (Total 518; Male-296, Female-222) children belonged to fathers with education level of high school, primary school and post graduate respectively. Lowest number i.e. 5.95% (Total 162; Male-108, Female-54) children belonged to fathers who were illiterate.(Table 1) A highly significant association is noticed between father's literacy and immunization status of their children (p-Value <0.0001). Immunization status improved with father's literacy.

Likewise 28.52% (Total-776; Male-539, Female-237) of the fully immunized children belonged to mothers with education up to high school, while 27.82% (Total-757; Male-476, Female-281), 26.09% (Total-710; Male-386, Female-324) and 9.0% (Total-245; Male-155, Female-90) children belonged to mothers with education level up to primary school, graduate and post graduate respectively. Lowest number 8.56% (Total-233; Male-176, Female-57) of fully immunized children belonged to mothers who were illiterate. (Table 2) Significant discrimination against female children was noticed where mothers were either illiterate or had education up to high school. This shows that the literacy status of mothers as against their level of awareness is an important factor for determining the immunization status of their children.

In our study none of the graduate or post graduate mother had any unimmunized child. This is in accordance to a study conducted at Goa,¹¹ where none of the graduate mothers had an unimmunized or partially immunized child. In MP, 80.2% of the graduate mothers had their children fully immunized.⁹

On analyzing the influence of socioeconomic status on immunization; the maximum gender bias towards female children as compared to male children is observed in low socioeconomic class (Female-29.25%, Male-70.75%) followed by middle socioeconomic class and minimum in children belonging to upper socioeconomic class (Female-42.06%; Male-57.94%).(Table 3) This may be due to the fact that people with higher socioeconomic status are economically well off and thus, have the resources to pay for the private services. There is also a possibility that with the improvement in socioeconomic and educational status, the awareness about various private facilities increases and also the satisfaction with primary health care facilities decreases. Most of the studies found that gender bias does exist in favor of boys as compared to girls.

The findings of low immunization coverage in females as compared to male is due to the discrimination against female as also stated in a study done by Vinit Sharma and Anuragini Sharma.¹² They also stated that the higher immunization rates in male children is because they get more importance. The coverage rates for males were higher than female children in Jamnagar,¹³ and a higher number of females were unimmunized in Goa.¹¹ Similar sex bias was seen in the study done on immunization coverage in urban area of Uttar Pradesh by Nirupam S, Chandra R, and Shrivastava VK.¹⁴ The reason for this gender bias in our study was the thinking of most of the respondents (29.3%) that the male child will become bread earner in the future and so needs to be protected and 22.3% respondents felt that financial reason could be the cause for this gender inequality.

Coverage for OPV, DPT and MMR were high for male children. All differences were significant (P< 0.01). However, there was no significant difference in the coverage of BCG and Measles (p>.05). (Table 4) This could be attributed to the fact that most of the deliveries are institutionalized and as BCG is the first vaccine to be administered, most of them get their children immunized with the vaccines and if not, they at least acquired the knowledge about it. However, beyond infancy the awareness

and the interest of the community decreases, particularly in the school age group, depriving children from the benefits of other available vaccines. Hence, the counseling and awareness program needs to be stressed from healthcare system.

Most of the respondents were unaware of the optional vaccines, their usefulness and the time of administration, as a result many children are exposed to some preventable diseases. It was also observed that the mothers with a higher level of education preferred to get their children vaccinated (routine immunization, optional vaccines and the administration of rubella vaccine) at a secondary health care facility or a private facility. However no significant difference was observed for the administration of most of the optional vaccines. This could be attributed to the fact that these vaccines are afforded only by children belonging to high socioeconomic class where gender bias is less and affordability as well as awareness regarding vaccination is very high.

Conclusion:

1. Although immunization coverage has increased substantially in general in recent years, a sizable proportion of children are not being immunized. The study identified significant association of parental education, socioeconomic status of the parents and gender discrimination along with unawareness of the parents as main reasons for low immunization coverage. Gender discrimination was responsible for further lowering of immunization coverage in girls. It can be expected that more stress on identified risk factors in the study will indirectly help in improving the immunization coverage.
2. In the last few decades there is an advent of many new vaccines in the private Indian market. However, most of these vaccines are at present accessible only to those who can afford to pay for them causing social inequality among children belonging to the underprivileged sections of the society.
3. Present day vaccination programme framed by government of India emphasize six vaccine preventable diseases during first year of life and pulse polio programme. There is a lack of stimulus for boosters, optional vaccines and low understanding that pulse polio is additional to the regular immunization programme. Community need to be educated and made aware of the facts.
4. This study provides us an important insight into the existing level of awareness among the people and the areas that need attention:
 - Definite gender bias exists.
 - Literacy and socioeconomic status of the parents has appreciable impact on immunization.
 - Lack of knowledge and interest in adolescent vaccination

Recommendations:

Following are the recommendations from the present study:

1. As immunization remains one of the most cost-effective health interventions, more awareness in public and more responsible attitude of healthcare system is needed. The health education should be emphasized to enhance respondent's knowledge about the complete immunization program. Also gaps regarding the knowledge about correct age of administration, dosage, type of vaccination and difference between regular immunization and pulse polio programme should be filled along with the improvement in the literacy status of the mothers. This would require appropriate

information dissemination, aggressive campaigning and family involvement, which are crucial to the success of such program.

2. Immunization program has to be incorporated in school health programme. Further there is a need for coverage of dropouts and a systematic inclusion of adolescent immunization programme.
3. Social science surveys can show which subgroups of the population are not getting immunized and why. Once this is known, special activities can be planned to immunize the missed children. Rapid assessment methods are presently under development for this. Reaching such groups with immunization services require innovative approaches.
4. Future parents need to be educated and made aware of the preventive science including immunization. Social awareness about gender equality needs attention. Gender discrimination has to be curbed and status of girl child requires improvement.

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