



Original Research Article

Vaccine hesitancy for childhood vaccinations in urban slums of Bengaluru rural district, Karnataka

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ABSTRACT

Background: Throughout the globe, vaccines have saved countless lives, improved health and wellbeing. Vaccine hesitancy at the individual and community level risks the public health consequences of vaccine-preventable disease outbreaks.

Objective: 1. To find out the proportion of vaccine hesitancy 2. To determine the factors contributing to vaccine hesitancy for childhood vaccinations in urban slums of Bengaluru Rural District, Karnataka.

Methodology: A community based cross sectional study was carried out in 8 urban slums of Bengaluru Rural District from August 2019 to September 2020. Children aged 0-59 months were primary subjects and mothers / primary caregivers of children 0-59 months were secondary study subjects. Data Collection was done using a predesigned, pretested questionnaire and by reviewing immunization cards. Data analysis was done using SPSS version 20. The association between Vaccine hesitancy and predictor variables was tested by using chi –square test.

Results: Vaccine hesitancy was present among 75% of the mothers / primary care givers. Main Reasons for Vaccine hesitancy reported were fear of vaccination side effects, sickness of child, unaware of availability of vaccines, felt unnecessary to get child vaccinated, The present study reported delay in vaccination for the birth dose of BCG (66%), Hepatitis B (40%); OPV (9%). Vaccine hesitancy was found to be more in nuclear families, low socio-economic class, in female children, birth order of 3 or higher, among mothers who had primary education and are homemakers. This difference was found to be statistically significant. Among the characteristics of children, the gender of the child and birth order was found to be significantly associated with vaccine hesitancy.

Conclusion: One of the major reasons found in this study for Vaccine hesitancy was concern regarding safety. Therefore vaccination programmes and policies have to feature strong community engagement strategies to increase awareness about the vaccines and remove fears.

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1. Introduction

Throughout the globe, vaccines have saved countless lives, improved health and wellbeing. Several vaccine preventable diseases could be eliminated, and some may be eradicated, if vaccines are used broadly in communities. However, high vaccine uptake rates must be achieved to prevent the morbidity, mortality associated with vaccine preventable diseases and their complications. If the high vaccine uptake rates needed for herd immunity are to be achieved and

sustained, individual and community hesitation to vaccines must be better understood and addressed.

The World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on Immunization has defined Vaccine hesitancy as “delay in acceptance or refusal of vaccination despite the availability of vaccination services”. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines and is influenced by factors such as complacency, convenience, confidence.¹ Many research to date have shown that the reasons for and expressions of vaccine hesitancy are highly

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varied.²⁻⁵

Vaccine hesitancy at the individual and community level risks the public health consequences of vaccine-preventable disease outbreaks. Over the years, vaccine hesitancy has become a growing focus of attention and concern.⁶⁻⁸ Till now the issue of vaccine hesitancy has not been widely addressed in the Indian urban slums context. Addressing this aspect of vaccination will help the policymakers to undertake appropriate measures to improve vaccine acceptance, coverage and reach desired national targets.

2. Objective

1. To find out the proportion of vaccine hesitancy for childhood vaccinations in urban slums of Bengaluru Rural District, Karnataka.
2. To determine the factors contributing to vaccine hesitancy for childhood vaccinations in urban slums of Bengaluru Rural District, Karnataka.

3. Methodology

3.1. Study design

Community based cross-sectional study.

3.2. Study area

Urban slums belonging to urban field practice area (Urban Health and Training Centre) of a Medical College in Bengaluru District, Karnataka.

3.3. Study period

8 months (August 2019 to September 2020).

3.4. Study subjects

Children aged 0-59 months, whose family residing in the study area for the past 12 months were the primary study subjects. Mothers / primary caregivers of children 0-59 months residing in the study area for the past 12 months were the secondary study subjects from whom data was collected.

3.5. Exclusion criteria

Mothers/Primary caregivers not consent for the study, those without immunization / MCH card.

3.6. Sampling

The urban field practice area covers around 11 urban slums, out of these 8 urban slums was selected by simple random sampling using computer generated random number table.

As per the family folders / records maintained at UHTC and Anganwadi centres, the list of children aged 0-59 months residing in the 8 selected urban slums was

made. All the mothers / primary caregivers of children aged 0-59 months residing in the 8 selected urban slums who consent for the study and possess immunization / MCH card were considered for the study. In case of the absence of mother/primary care giver, refusal to respond, not possessing immunization / MCH card was considered as non-responder.

3.7. Data collection

After obtaining Institutional Ethical Committee clearance, informed consent from the study subjects, the study was carried out in the study area. The households with children 0-59 months were identified. On reaching the selected household, the family was explained about the purpose of the study and assured about confidentiality and anonymity of the information given by mother/primary caregiver.

Data collection was done by interviewing the mother/primary caregiver using a predesigned, pretested questionnaire especially designed for the study and reviewing immunization cards of the children. The questionnaire consisted of details of socio demographic characteristics of the family, immunization status related variables, questions based on vaccine hesitancy survey questions: version 1.0 developed by the SAGE working group on vaccine hesitancy.¹

Vaccine- specific events for each child were calculated based on his/her age and those which were available at the respective facilities. The proportion of delay, refusal/reluctance, and no delay was thus calculated for individual vaccines based on the total vaccine- specific events

3.8. Operational definitions

3.8.1. Vaccine delay

Any dose received beyond 24hrs for birth dose of Hepatitis B, any doses received beyond 14 days of expected date was considered as delay for other vaccines. Expected date for a particular dose of vaccine was calculated as per the date of birth recorded in immunization card.

3.8.2. Vaccine refusal/reluctance

Refusal / reluctance to any dose of a vaccine, resulting in the child not receiving the dose despite the availability of vaccination services.

3.8.3. Vaccine hesitancy

Considered to be present if there was any refusal / reluctance or delay for any of the recommended vaccine dose of the child as per his/her age.

Regarding the reasons for vaccine hesitancy, an open ended question was included. The responses to vaccine hesitancy attitude statements regarding childhood vaccination ranges from 1(strongly disagree) to 5(strongly agree).

3.9. Statistical analysis

Data analyzed using SPSS Version 20.0. Descriptive statistics data expressed in percentages and proportions. The association between vaccine hesitancy and predictor variables was tested by using Chi-square test. For the test, p-value <0.05 was considered as significant.

4. Results

Of 225 children in the age group of 0-5 years, 218 participated in the study. In 5 cases, mother / primary care giver of the child did not possess the immunization card and 2 of the families refused to respond. [Response rate: 97%]. Secondary Subjects: Mothers 158(72%); Primary Care Giver 60 (28%)

Mean Age of Children: 25.4±16.8 months.

Table 1: Baseline characteristics

| | |
|------------------------------|----------|
| Type of Family | |
| Nuclear | 144(66%) |
| Joint | 74(34%) |
| Socio Economic Status | |
| I | - |
| II | 24(11%) |
| III | 25(11%) |
| IV | 94(43%) |
| V | 75(35%) |
| Child Gender | |
| Male | 117(54%) |
| Female | 101(46%) |
| Birth Order | |
| 1 st | 102(47%) |
| 2 nd | 84(38%) |
| 3 rd or higher | 32(15%) |
| Age of Mother | |
| 20 – 25 | 101(46%) |
| 26 – 30 | 95(44%) |
| 31 - 35 | 22(10%) |
| Education of Mother | |
| Primary | 144(66%) |
| Secondary | 44(20%) |
| Tertiary | 30(14%) |
| Occupation of Mother | |
| Home maker | 124(57%) |
| Unskilled | 54(25%) |
| Skilled | 40(18%) |

Table 2 shows the responses of the mother/primary care giver to vaccine hesitancy questions. It is noteworthy that there is a tendency of suspicion towards newer vaccines, concerns about adverse events following vaccination and a feeling that vaccines are not necessary for diseases that are not common.

Vaccine hesitancy was present in 164(75%) mothers/primary care giver.

Main reasons for vaccine hesitancy reported were fear of vaccination side effects, sickness of child, unaware of availability of vaccines, felt unnecessary to get child vaccinated, not able to remember the date for immunization, lack of trust on health care workers.[Figure 1]

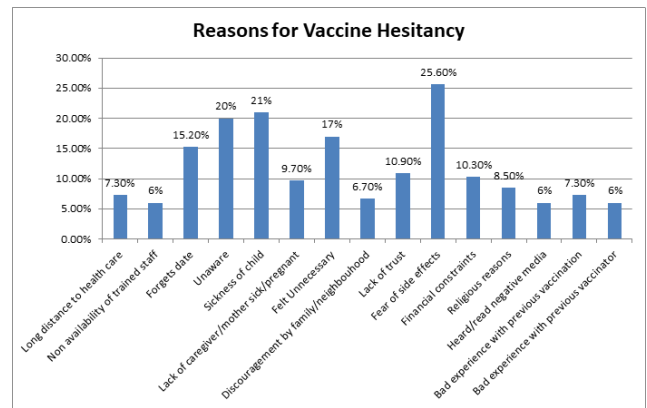


Fig. 1: Reasons for vaccine hesitancy

Vaccine hesitancy was found to be more in nuclear families, low socio economic class, in female children, birth order of 3 or higher, among mothers who had primary education and are homemakers [Table 4].

5. Discussion

The proportion of vaccine hesitancy and factors contributing to vaccine hesitancy has been systematically documented in this study. Vaccine hesitancy was present among 75% of the mothers / primary care givers. Clark and Sanderson⁹ have found that there is wide variation in timeliness of vaccine coverage within and between 45 low and middle-income countries.

The present study reported delay in vaccination for the birth dose of BCG (66%), Hepatitis B (40%); OPV (9%). In a study conducted by Patel and Pandit¹⁰ in Gujarat, about 19.8% of infants received their first dose of vaccine after 2½ months of age. Delay was more common for the primary doses than for the booster doses. Injectable vaccination at quick succession (6, 10, and 14 weeks) makes the child irritable, making the caregivers more reluctant. For the booster doses and Measles Rubella, on the other hand, there is a greater time span of 9–12 months and 16–24 months.

Main Reasons for Vaccine hesitancy reported were fear of vaccination side effects, sickness of child, unaware of composition / availability of vaccines /vaccine preventable diseases, felt unnecessary to get child vaccinated, not able to remember the date for immunization, lack of trust on health care workers

The cause of these findings probably lies in the lack of knowledge among parents about the exact composition of the vaccine and, therefore, against what diseases this vaccination protects their children. At times, parents do not

Table 2: Core vaccine hesitancy questions

| Core Vaccine hesitancy questions | Yes | No |
|--|----------|----------|
| Do you believe that vaccines can protect children from serious disease? | 148(68%) | 70(32%) |
| Do you think that most parents like you have their children vaccinated with all the recommended vaccines? | 112(51%) | 106(49%) |
| Have you ever been reluctant or hesitated to get a vaccination for your child? | 138(63%) | 80(37%) |
| Have you ever refused a vaccination for your child? | 124(57%) | 94(43%) |
| Do you think that it is difficult for some ethnic/ religious groups in your community to get vaccination for their children? If yes, is it because | 58(35%) | 106(65%) |
| a) They choose not to vaccinate? | 33(57%) | |
| b) They do not feel welcome at the health service? | 17(30%) | |
| c) Health services don't reach them? | 8(13%) | |
| Have you ever heard or received negative information about vaccination? | 48 (22%) | 170(78%) |
| If yes, did you still take your child to get vaccinated after you heard the negative information? | 27 (56%) | 21 (44%) |
| Do leaders (religious/political/teachers, health care workers) in your community support vaccines for infants and children? | 178(82%) | 40 (18%) |

Table 3: Vaccine hesitancy for individual vaccines based on the total vaccine-specific events

| Vaccine | Total Events | Vaccine Hesitancy | | |
|---------------------------|--------------|-------------------|----------|-------------------|
| | | Absent | Present | |
| | | | Delay | Refusal/Reluctant |
| BCG | 218 | 70(32%) | 143(66%) | 5(2%) |
| Hepatitis B | 218 | 88(40%) | 100(46%) | 30(14%) |
| OPV -0 | 218 | 20(9%) | 138(63%) | 60(28%) |
| OPV-1,2,3 | 594 | 286(48%) | 188(32%) | 120(20%) |
| Pentavalent -1,2,3 | 594 | 302(51%) | 194(33%) | 98(16%) |
| Rotavirus -1,2,3 | 594 | 388(65%) | 140(24%) | 66(11%) |
| IPV -1,2 | 366 | 212(58%) | 100(27%) | 54(15%) |
| MR – 1 st Dose | 188 | 148(79%) | 38(20%) | 2(1%) |
| Vitamin A | 188 | 138(73%) | 45(24%) | 5(3%) |
| DPT Booster | 128 | 78(61%) | 38(30%) | 12(9%) |
| OPV Booster | 128 | 65(51%) | 48(38%) | 15(11%) |
| MR – 2 nd Dose | 128 | 80(63%) | 45(35%) | 3(2%) |
| Vitamin A | 128 | 75(59%) | 50(39%) | 3(2%) |

perceive vulnerability of their child or severity of disease to affect the child, so they do not insist health care workers for administering vaccination. This could be due to their lack of information or possession of inaccurate information.

There are a number of reasons parents give to justify their decision to not immunize their children. First, parents are concerned about frequent vaccination schedules, which might result in 'immune overload' in their children, eventually weakening their children's immune system. Second, parents often fear that the adverse effects (rash, swelling, pain, etc.) associated with vaccines are more harmful than the diseases they are designed to eliminate. Third, they desire that their children develop natural immunity to diseases rather than have it artificially induced in their body.

The inherent migratory and temporary nature of the slum population makes delay and hesitancy even more prominent. The social behavior of mothers frequently traveling between husband's home and father's home during postnatal period is a major obstacle. It is likely that mothers staying at father's home will miss reminders from the health workers who only register deliveries of daughters-in-law in the family to avoid duplication of birth registration.

Another important reason for vaccine hesitancy is parent's relationship with healthcare workers. Parents tend to be hyper-vigilant in relation to children safety, especially when health care workers fail to address their misconceptions. Parents also question the information received from health care workers and are reluctant to act on their advice due to lack of trust.

Table 4: Factors influencing vaccine hesitancy

| Variable | Vaccine Hesitancy | | Total | Chi square value |
|-----------------------------|-------------------|---------|-------|--|
| | Present | Absent | | |
| Type of Family | | | | $X^2 = 4.3993$ |
| Nuclear | 102(71%) | 42(29%) | 144 | df = 1 |
| Joint | 62(84%) | 12(16%) | 74 | P = 0.0035954 |
| | 164 | 54 | 218 | (Significant at p < 0.05) |
| SE Status | | | | $X^2 = 28.0108$ |
| II,III | 20(41%) | 29(59%) | 49 | df = 1 |
| IV,V | 144(85%) | 25(15%) | 169 | P = 0.0001 (Significant at p < 0.05) |
| | 164 | 54 | 218 | |
| Child Gender | | | | $X^2 = 14.2993$ |
| Male | 76(65%) | 41(35%) | 117 | df = 1 |
| Female | 88(87%) | 13(13%) | 101 | P = 0.000156 |
| | 164 | 54 | 218 | (Significant at p < 0.05) |
| Birth Order | | | | $X^2 = 37.8397$ |
| 1 st | 72(71%) | 30(29%) | 102 | df = 2 |
| 2 nd | 64(76%) | 20(24%) | 84 | P = 0.00001 (Significant at p < 0.05) |
| 3 rd or higher | 28(88%) | 4(12%) | 32 | |
| | 164 | 54 | 218 | |
| Age of Mother | | | | $X^2 = 3.6872$ |
| 20 – 25 | 82(81%) | 19(19%) | 101 | df = 2 |
| 26 – 30 | 66(69%) | 29(31%) | 95 | P = 0.158245 (not Significant at p < 0.05) |
| 31 – 35 | 16(73%) | 6(27%) | 22 | |
| | 164 | 54 | 218 | |
| Education of Mother | | | | $X^2 = 14.012$ |
| Primary | 119(83%) | 25(17%) | 144 | df = 2 |
| Secondary | 29(66%) | 15(34%) | 44 | P = 0.000906 |
| Higher Secondary | 16(53%) | 14(47%) | 30 | (Significant at p < 0.05) |
| | 164 | 54 | 218 | |
| Occupation of Mother | | | | $X^2 = 22.5158$ |
| Homemaker | 108(87%) | 16(13%) | 124 | df = 2 |
| Unskilled | 34(63%) | 20(37%) | 54 | P = 0.000013 |
| Skilled | 22(55%) | 18(45%) | 40 | (Significant at p < 0.05) |

Lack of orientation of health workers on how to develop InterPersonal Communication skills and cultivate relationships with influential sections of community affects their counseling skills and in responding to queries.

Health workers are required to mobilize the community, interact and counsel them. Not all health workers have the skill and competency, which might be barrier for effective implementation of immunization programme.

The sources of information on vaccination have multiplied, the amount of information received has grown and the frequency and speed with which it comes has created confusion. Social media have distorted the vaccination scenario. The net result is vaccine hesitancy. There's a lot of negative, discouraging, and sometimes quite frightening material about immunization

In the present study, statistically significant association was found between nuclear family and vaccine hesitancy. In case the mother is the only caregiver, it results in delays, reluctance to take for vaccination due to household or other job. Often the problem is aggravated if the

mother is sick, pregnant or she has to take care of other children. In traditional settings in India, the joint family structure has an added advantage of additional caregivers, where chances of getting timely vaccinated increase due to other parents of the household taking care, even if the mother is working. Higher educational status of mothers has been associated with better immunization coverage similar to other previous studies conducted in India^{11,12} and neighboring countries.¹³ Educated mothers are more likely to remember dates, understand the importance of timely vaccination and interact more freely with health workers.

In the present study, lower SES showed a higher likelihood of vaccine hesitancy in similarity to observations by previous authors.^{12,14}

Among the characteristics of children, the gender of the child and birth order was found to be significantly associated with vaccine hesitancy in the present study. This is similar to findings from some of earlier studies.^{15,16}

Table 5: Vaccine hesitancy among mothers / primary care givers

| Statements | Strongly Disagree | Disagree | Neither Agree nor disagree | Agree | Strongly Agree |
|--|-------------------|----------|----------------------------|-------|----------------|
| Childhood vaccines are important for child's health. | 0 | 3 | 23 | 145 | 50 |
| Childhood vaccines are effective. | 0 | 11 | 42 | 141 | 24 |
| Having a child vaccinated is important for the health of others in the community. | 2 | 38 | 40 | 132 | 6 |
| All childhood vaccines offered by the government program in the community are beneficial | 3 | 39 | 40 | 128 | 8 |
| New vaccines carry more risks than older vaccines | 8 | 25 | 85 | 98 | 2 |
| The information I receive about vaccines from the vaccine program are reliable and trustworthy | 2 | 32 | 40 | 138 | 6 |
| Getting vaccines is a good way to protect my child/children from disease | 0 | 4 | 24 | 135 | 55 |
| Generally, I do what the doctor or health care provider recommends about vaccines for my child/Children. | 0 | 31 | 20 | 155 | 12 |
| I am concerned about serious adverse effects of vaccines | 0 | 3 | 36 | 169 | 10 |
| My child does not need vaccines for diseases that are not common anymore. | 3 | 18 | 105 | 70 | 22 |

6. Conclusion

One of the major reasons found in this study for Vaccine hesitancy was concern regarding safety. Therefore vaccination programmes and policies have to feature strong community engagement strategies to increase awareness about the vaccines and remove fears.

The role of health professionals is crucial in sustaining the success of vaccination programmes. It is necessary to improve their knowledge about vaccination and stimulate them to promote vaccination practices. Capacity Strengthening of health care workers can be done in at least two ways. One, the conventional way, is to train them periodically and upgrade their skills by providing technology or new content. The second is to complement their capacity with additional human resources and improving their skills for communicating with vaccine-hesitant parents and educating on ways to counter arguments regarding vaccines at a level that parents will understand.

Adverse events following immunization, a critical component of immunization programme, should be carefully handled because parents weigh the risk of AEFI with vaccination against the risk of not immunizing a child. Provision of sustained grants to promote highest

standard of medical research on adverse events following vaccination can help combat vaccine hesitancy. Physicians and public health professionals must inform parents not only about changes to vaccine schedules but also why these new recommendations are being adopted so as to provide an opportunity for newly arising concerns to be discussed. Effective implementation of national surveillance programme of adverse events following immunisation is of prime importance for building evidence about vaccine safety and assuring the public that continuous monitoring is in place to help assessing any suspicion of safety issue.

Effective use of mother child protection card to be made by health care workers with reference to creating awareness among mothers on importance and immunization schedule. Even if there is a change of facilities, health care workers must ensure timely completion of remaining doses. In case of institutional deliveries, all health facilities, even if nongovernmental, should provide birth doses and inform mothers regarding subsequent doses. Mobile-based vaccine reminders can be widely used to address delays.

7. Source of Funding

None.

8. Conflict of Interest

The authors declare that there is no conflict of interest.

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