

**Study on Identification of Determinants of Childhood Immunization Uptake in the Urban Slum  
Population of Nadiad city of District Kheda, Gujarat**

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**ABSTRACT**

**Background**

*The National Population Policy (NPP 2000) aimed to immunize all the children against 6 common childhood diseases namely, Tuberculosis, Tetanus, Diphtheria, Pertussis, Measles and Polio by 2010. Universal immunization of children against these six vaccine preventable diseases is crucial to reducing infant and child mortality. The primary objective of the study was to determine the immunization coverage, reasons of non immunization and the determinants of immunization uptake in the urban slums of Nadiad city, Kheda district, Gujarat.*

**Methodology**

*It was a cross-sectional study. Selection of respondents was done at random with a sample size of 462 women who had children between 12-23 months. Survey data were collected by questionnaire followed by Univariate and Bivariate analysis*

**Results**

*The overall complete immunization status of the children in the urban slums of Nadiad is 72%, with 20% being partially unimmunized and 8% being immunized. 81% mothers had immunization card with them. 91% of children aged 12-23 months had received Bacillus Calmette Guerin (BCG) vaccine, 76% had received 3 doses of Oral Polio Vaccine (OPV) 77% had received 3 doses of DPT (Diphtheria, Pertussis and Tetanus) 78% had received measles and 75% had received Vitamin A. The drop out between BCG and Measles was noticed about 14%, for OPV 3 is 11% and DPT3 is 9%. The factors like the place of delivery, parents' education, father's occupation, the caste of family were closely associated with the immunization status of the children. It was found that 28% of the children were either partially immunized or non-immunized. Three major reasons cited by the mothers were "Unaware of need of*

*immunization" (31%), "Unaware of need to return for 2<sup>nd</sup> and 3<sup>rd</sup> dose" (20%) and "No faith in Immunization (16%).*

**Conclusion**

*It was revealed from the study that 28% of the children in the urban slums of Nadiad city are not fully immunized and demographic and socioeconomic factors such as literacy, place of delivery, occupation, caste does affect immunization of the child. To increase the immunization coverage the reasons of non immunization should be taken into account by the government and program implementing body*

**Keywords:** Determinants, Gujarat, Immunization, Nadiad.

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**INTRODUCTION**

Immunization is vital in achieving the Millennium Development Goals (MDG's) especially to reduce deaths among children under five years old (MDG 4) by preventing more than 2.5 million child deaths a year<sup>[1]</sup>. Immunization improves health outcomes of the children by warding off the diseases as well as subsequent complications such as under nutrition, blindness and encephalitis. This in turn enhances children's capacity for educational attainment, cognitive and physical development and fulfilling social roles<sup>[2]</sup>. Despite these benefits, childhood vaccine uptake rates remain suboptimal (<95%) and remains the most common cause of childhood mortality with an estimated three million deaths each year<sup>[1, 3]</sup>. As per National Family Health Survey-3, 44 percent of the infants in India are fully immunized which is lower than the desired goal of achieving 85 percent coverage<sup>[4]</sup>. Immunization uptake is associated with various system based factors such as access to healthcare, density of health workers<sup>[5]</sup>, availability of safe needles and syringes and community related factors like knowledge and attitude of mothers<sup>[6,7]</sup>, ethnicity of family<sup>[8]</sup> etc

Assessing the immunization coverage helps in evaluation of progress of the programme and in improvisation of service delivery.<sup>[9]</sup> In addition to this, assessment provides evidence whether substantial progress is made towards achieving immunization targets. To achieve targets information about reasons for non immunization is essential. This community based information of immunization coverage and reasons for non-immunization are required to increase the coverage, implement interventions for control and elimination of vaccine preventable diseases in high risk areas. This in turn can guide health managers to determine priorities in their localities and plan interventions for improving the immunization coverage.

Based on this background the objective of the present study was to determine the immunization coverage and reasons for non vaccination and the factors that influence the immunization uptake in the urban slums of the study area. The main objectives of the study were (i) to find out the status of childhood immunization (12-23 months) in the urban slum population of Nadiad city of district Kheda. (ii) to identify the factors associated with immunization uptake in the children. (iii) to find out the causes of non immunization among the children in Nadiad city. The main findings from the study revolved around the demographic and socioeconomic factors that were associated with the immunization uptake such as mother's and father's education, father's occupation, caste and place of delivery.

## **MATERIALS AND METHODS**

### **Study Design**

The study was a community based cross sectional descriptive study. The study involved interviewing the mothers having a child in the age group 12 to 23 months to obtain maternal characteristics and immunization history. It was carried out from February- April 2012 by administering semi structured questionnaire.

### **Study Area**

The research area is located in the Kheda district of Gujarat State. The study was carried out in Nadiad city which is the administrative center of Kheda District .According to the provisional reports of Census India the population of Nadiad in 2011 is 2,18,150 of which males are 1,12,381 and females are 1,05,769. The total urban slum population of Nadiad is 67217 which constitutes of about 31 percent of the total population of Nadiad city. Nadiad has 31 slum areas and one district hospital and one functional urban health center and five urban sub centers. There is a network of 30 community based workers and five female health workers with one urban health officer catering mainly to the slum population (population under study) and also facilitating the vaccination services. According to DLHS 3<sup>[10]</sup> the percentage of fully immunized children (12-23 months) in Gujarat is 54.9 percent and in Kheda it is 54.1 percent which indicates certain gap between the national target and immunization coverage rate in the study.

Nadiad city is the administrative center of Kheda District situated in the state of Gujarat. Nadiad city has a total of thirty one slum areas that were covered in the current study. (Detailed list of slums in Annexure -1)

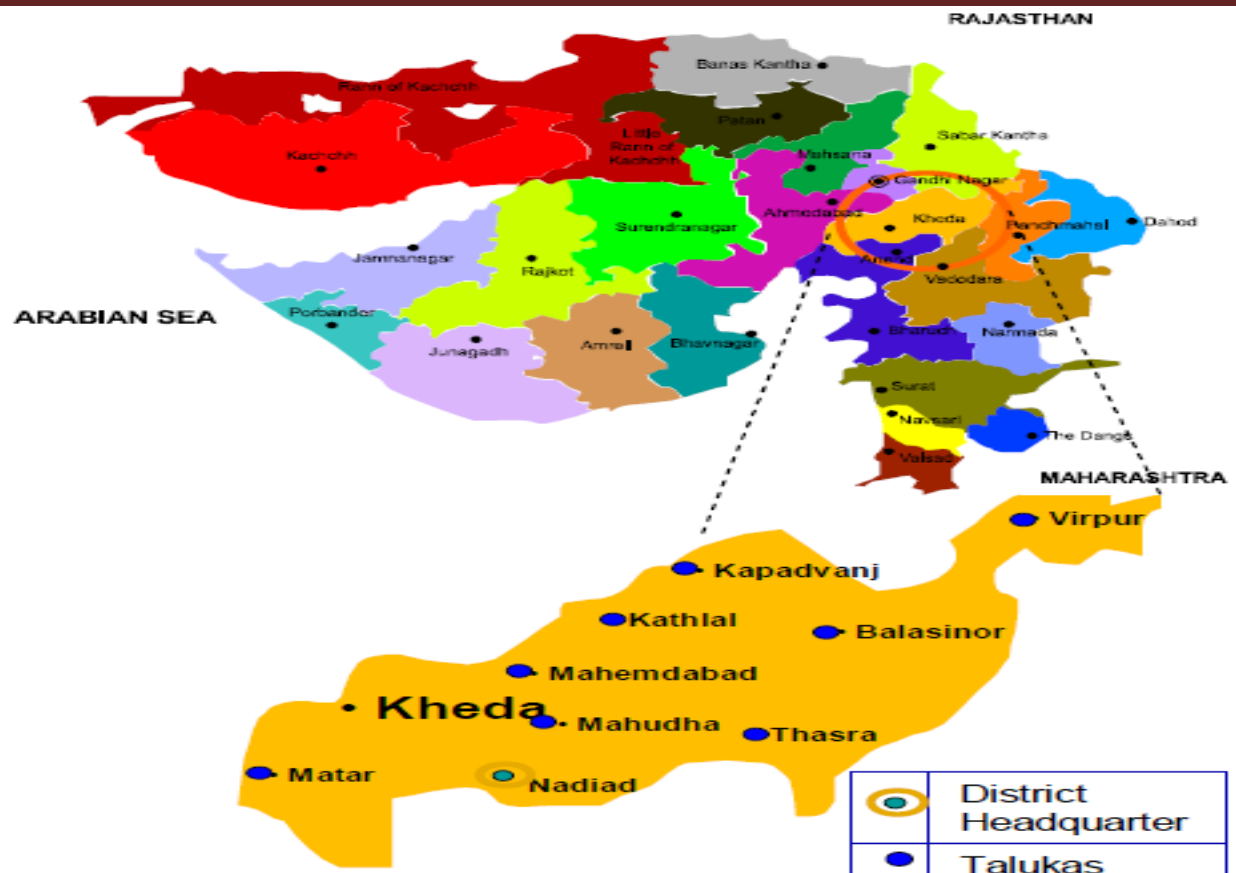


Figure 1- Map of District Kheda

(Source <http://www.slideshare.net/ourvibrantgujarat/kheda-6077479>)

### Selection of Respondents

The mothers who had children of 12-23 months of age were interviewed and only those households were interviewed which had eligible children. The total sample size for the study was 462 from 31 slums of Nadiad city.

### Methods of Data Collection

Demographic and socio-economic details, migration history, the status of immunization received by the child 2 years of age were elicited through semi structured questionnaire. The immunization status of the child was determined from the immunization card, and in the absence of immunization cards, mothers were asked to recall whether the child had received different vaccines (including the number of doses for each) as well as reception of vitamin A supplements. The various variables considered for the study

were age of the child in completed months, age of the mother, education of the mother and father, occupation of the mother and father, caste, religion, place of delivery and availability of Mamta card.

According to the guidelines by World Health Organization, operational definitions for immunization coverage are as follows. <sup>[11]</sup>

Full Immunization – A child who has received three doses of DPT and OPV each, and one dose of BCG and Measles each.

Partial Immunization- A child who missed any one or more of the above doses

No Immunization- A child who did not receive even a single dose of any vaccine

Dropout Rate: =  $\text{DPT1 coverage} - \text{DPT3 coverage} / \text{DPT1 coverage} \times 100$

Left out Rate =  $\text{Children eligible for DPT1} - \text{Children receiving DPT1} / \text{Children eligible for DPT1} \times 100$

### **Data Analysis**

The completed survey forms analyzed using Univariate and Bivariate analysis in SPSS 12.0 software (SPSS Inc, Chicago, IL, USA). Chi square test was conducted to explore the association between maternal characteristics, other variables and completion of immunization. Data cleaning was carried out to ensure accuracy and completeness of the data.

## **RESULTS AND DISCUSSIONS**

### **Demographic Characteristics of the study population**

In total, 462 mothers were interviewed having children between 12-23 months. Table 1 illustrates the demographic characteristics of the study population. The mean age of mothers interviewed was 26 years. The mean age of mother at the time of marriage was 20 years. At the National level, the mean age at marriage for female in the year 2011 was 21.2 years and varies with 20.7 years in rural areas and 22.7 years in urban areas <sup>[12]</sup>. The National Family Health Survey 3 <sup>[4]</sup> carried out in twenty-nine states highlights that 47 percent of women currently aged 20-24 years were married before the age of eighteen years, with 56.2 percent in rural areas and 29.3 percent in urban areas. Increase in age at marriage among women in South Asia especially in Bangladesh, India and Nepal has been recognized as a vital issue. <sup>[13]</sup> Worldwide there are 60 million women of the aged 20-24 who are married before the age of 18 years. Of these women around 50 percent of them live in South Asia <sup>[14]</sup>. There are compelling reasons as to why under age marriage needs to be addressed. Early marriages could lead to ill health and maternal mortality as there are chances that women are less likely to be informed about reproductive

matters. It may also reduce the ability of the women to take independent decisions. Domestic Violence cases are reported high among women who marry early compared to those who marry late.<sup>[15]</sup>

In the current study the mean age of mother at the first child was 21.9 years. This coincides with the NFHS -3 data which states that the median age of the women at the first birth in urban areas is 20.9 years. Age at marriage has implications on the fertility of the mother. An increase in the age of marriage reduces the child bearing years. The current study shows a similar scenario where the age at marriage is above 18 years, yet the gap between the mean age at marriage and first child has reduced. The other implication of early first child could be lower awareness regarding contraceptive use.<sup>[12]</sup> Data of 36 Demographic and Health Surveys (DHS) and World Fertility Surveys show that average relative risk of under five mortality is 46 percent higher for children born to under 18 mothers and 13 percent higher

<b>Table 1- Demographic Profile of Parents (N=462)</b>	
Mean age of the Mother (in years)	25.79
Mean age at marriage (in years)	20.01
Mean age at first child (in years)	21.92
Average family size	4.61
<b>General Characteristics</b>	<b>Percentage (%)</b>
<b>Education level of the Mother</b>	
Illiterate	30.4
Primary school(7 <sup>th</sup> Std)	32.8
Secondary school(7 <sup>th</sup> to 12 <sup>th</sup> )	32.4
College(Graduation)	4.3
<b>Education level of the Father</b>	
Illiterate	18
Primary school(7 <sup>th</sup> Std)	29.3
Secondary school(7 <sup>th</sup> to 12 <sup>th</sup> )	45.2
College(Graduation)	7.4
<b>Religion</b>	
Hindu	90
Muslim	8.3
Sikh	0.2
Others	1.5
<b>Caste</b>	
Open	34.6
SC	34.1
ST	15.2
OBC	16.1

for children born to mothers aged 18-19 in comparison to children of mothers aged 20-34 years.<sup>[16]</sup>

Education plays a very important role in the context of women's health. In the current study the highest educational attainment of the mother was primary school (33 percent) and of the father was secondary school (45 percent). Though considerable proportions of mothers were having basic education, 30 percent of them were illiterate. Various studies have shown that the literacy rate among the mothers in urban slums varies from 34.7 percent to 60 percent <sup>[17-20]</sup>. Generally women with proper educational status have better health, live in healthier environments and have healthier children compared to women with little or no education. <sup>[21]</sup>

Migration is a choice phenomenon that is influenced by many factors such as socio-economic, demographic and cultural factors. <sup>[22]</sup> In case of women, the common driver for internal migration in India is marriage <sup>[23]</sup> The study showed that 90 percent of the women interviewed belonged to the study area and 10 percent had migrated from nearby states such as Rajasthan, Punjab etc. The major reasons cited for migration were marriage and labour opportunities. Women who migrate due to marriage also participate in labour market. The domestic maid industry in cities is a rapidly growing sector that employs women majority of whom are rural to urban migrants <sup>[23]</sup>.

<b>Table 2- Socio Economic Profile (N=462)</b>	
<b>Characteristics</b>	<b>No</b>
<b>Type of family</b>	<b>Percentage of households (%)</b>
Nuclear	57.2
Joint	42.8
<b>Occupation of Mother</b>	<b>Percentage of households (%)</b>
Daily Labourer	12.2
Self employed	4.8
Government job	1.5
Housewife	80.9
Others	0.7
<b>Occupation of Father</b>	<b>Percentage of households (%)</b>
Daily Labourer	66.1
Farmer	1.7
Self employed	21.3
Government job	2.4
Unemployed	0.4
Others	8.0
<b>Type of Ownership of the household</b>	<b>Percentage of households (%)</b>
Own	83
Rented	17
<b>Average monthly income of the household</b>	Rs 3022/-
<b>Households with BPL card</b>	58.5
<b>Average monthly expenditure of the household</b>	Rs 2940/-



**Socio Economic Profile of the study population**

Socio-economic status of slum dwellers can be characterized mainly by low income group with vulnerable physical infrastructure, nonexistent solid waste disposal system and dilapidated living conditions. Income, expenditure and education can affect the food security and consumption patterns in the slums.<sup>[24]</sup>

Standard of living is measured directly with family income<sup>[25]</sup>. The study found that the average monthly income of the households interviewed was Rs 3022/- that could suffice their average monthly expenditure of Rs. 2940/-. The gap of the income and expenditure was less reveals the economic deprivation among them which reflects their quality of life

Mostly the incomes of the slum dwellers are low for formally regulated markets to provide them with any kind of permanent housing. They solve their own issues by building their own dwellings or by building informal accommodation.<sup>[26]</sup> Yet in the current study it was found that majority of the household were self owned (83 percent) and only 17 percent are on rent. According to the slum statistics of Census 2011, 70 percent of the households in slum are self owned and 26.3 percent are rented.

The employment status is a basic measure of the economic soundness of the households. The current study highlights that 66 percent of the fathers were daily wage earners and only 0.4 percent were unemployed. In case of the women of the household 80.5 percent were housewives and 12.2 percent were daily wage earners. The domination of informal services such as petty business (Footpath vendor, hawker etc.) day labor, rickshaw pulling, labor in construction buildings small job service etc among the marginalized vulnerable community reflects the uncertainty of income on their part.

The above scenario re-affirms that there is a concentration of the poor in the slums, as majority of them belong to lower socio-economic class, are illiterate or poorly educated and engaged in lowly paid jobs. Like patterns in larger cities women have migrated to the city with the hope of better means of livelihood or due to marriage.

**Immunization status of the children in the study population**

In total data pertaining to 462 children in the age of 12-23 months were collected. The total male children were 246 (53.25 percent) and female children were 216 (46.75 percent). Immunization

coverage in the study area for each vaccine is presented in Table 3. The immunization of children against six serious but preventable diseases namely, Tuberculosis, Diphtheria, Pertussis, Tetanus, Poliomyelitis and Measles is the main component of the child survival programme. Children who received BCG, three doses of DPT and polio (excluding polio 0) and measles are considered to be fully vaccinated. The study shows that about 72 percent of the children were fully immunized, 21 percent were partially immunized and 7 percent were not immunized which is less than the desired goal of achieving 85% coverage <sup>[4]</sup>. NFHS-3 reports that only 54.7 percent of the urban children are fully vaccinated. Similar findings were seen in the study by Yadav et al <sup>[27]</sup> where the percentage of fully immunized children was 73.3 percent, 23.8 percent were partially immunized and 2.8 percent were unimmunized. Similar level of immunization coverage have been documented in various studies such as Kadri et al. <sup>[28]</sup> Khokhar et al. <sup>[29]</sup> and Kar et al. <sup>[30]</sup> in urban slums of Ahmadabad and Delhi city, respectively.

<b>Table 3- Immunization coverage in the study population</b>		
<b>Key indicators</b>	<b>Frequency (n/N)</b>	<b>Percentage (%)</b>
Availability of Vaccine/Mamta Card	378	81.8
Institutional birth (public)	237	44.2
Institutional birth (private)	204	51.3
Children (12-23 months) fully immunized (BCG, 3 doses of DPT, 3 doses of Polio and 1 dose of measles )	331	71.6
Partially Immunized	96	20.8
Non Immunized	35	7.6
Children (12-23 months) who have received BCG	424	91.1
Children (12-23 months) who have received 3 doses of polio vaccine	351	76.3
Children (12-23 months) who have received 3 doses of DPT vaccine	358	77.4
Children (12-23 months) who have received measles vaccine	365	78.5
Children (12-23 months) who have received at least one dose of Vit. A	351	75.4
BCG - Measles Dropout rate	59	14%
DPT 1st Dose	399	86.4
DPT 2 <sup>nd</sup> Dose	375	81.2
DPT 3rd Dose	360	77.9
DPT 1-3 Dropout rate	39	11%

One of the important thrusts of the Reproductive and Child Health Programme is to encourage institutional deliveries with proper hygienic conditions under the supervision of trained health professionals. The provision of delivery services in the government health institutions as well as private facilities is one of the components of the RCH programme. The study shows that approximately 95% deliveries were institutional out of 51% deliveries took place in private institutions and 44 at government institution and 4% deliveries were conducted at home. Institutional delivery ensures that the new born is administered the BCG vaccine and OPV at birth

Immunization coverage in the study was confirmed by documentary evidence (Mamta Card). Retention of the vaccine card provides the immunization details of a child if documented meticulously and correctly. It reduces the likelihood of recall bias in the study as well as gives a holistic picture of the health service provision to the beneficiaries in government and private institutions. In the present study the retention rate of the Mamta card (immunization card) was 81.8%. It can be implied that the immunization coverage was better in case of the children who had their immunization cards available and mothers were probably well motivated and must have understood the importance of maintaining such records for follow up purpose. Similar results were shown in studies conducted by Kulkarni et al<sup>[31]</sup> in which immunization cards were available with 87.78% of the mothers of children aged between 12 and 23 months. Similarly the studies conducted by Tapare et al<sup>[32]</sup> and Kadri et al<sup>[28]</sup> showed that 81.25% and 88.4% of the mothers possessed the immunization card with them. The study also showed that about 14% did have the card but had lost it and 4% did not have the card. This is evident from National Family Health Survey 3 survey results that only 12.22% of the mothers did not have the immunization cards with them.

Tuberculosis (TB) continues to be a major public health problem around the world. According to World Health Organization (WHO) estimates the incidences of TB will continue to increase due to varied reasons such as low compliance with TB treatment, multidrug resistant strains, migration etc<sup>[33]</sup>. A preventive measure to combat this disease is administration of Bacillus Calmette Guerin vaccine (BCG) to the newborns at the time of birth. The present study shows that 91 percent of the children were given BCG but 9 percent are still deprived of the dosage and not prevented against Tuberculosis. The coverage is comparatively higher than NFHS -3 where the BCG coverage in urban areas is 86.9 percent.

Polio eradication strategy is of utmost importance not only at national level but at regional and district levels as well. Routine oral Polio vaccine (OPV) coverage reduces the incidence of polio and makes eradication feasible.<sup>[34]</sup> In the present study 76.3 percent of the children received all the three doses of OPV. This may imply that uniform immunization coverage is not maintained and may result into pockets of non immunized children building up that can favor the spread of the virus.

Diphtheria and Pertussis are bacterial infections and their transmission is influenced overcrowding and poor socioeconomic conditions. The best preventive measure against these infections is immunization. The vaccine is administered in three doses in childhood as part of the trivalent DPT vaccine in national immunization programmes.<sup>[35]</sup> The study shows that 77 percent of children did receive all the three doses of DPT vaccine while 23 percent of the children did not receive complete protection against the 3 dreadful diseases (Diphtheria, Pertussis and Tetanus).

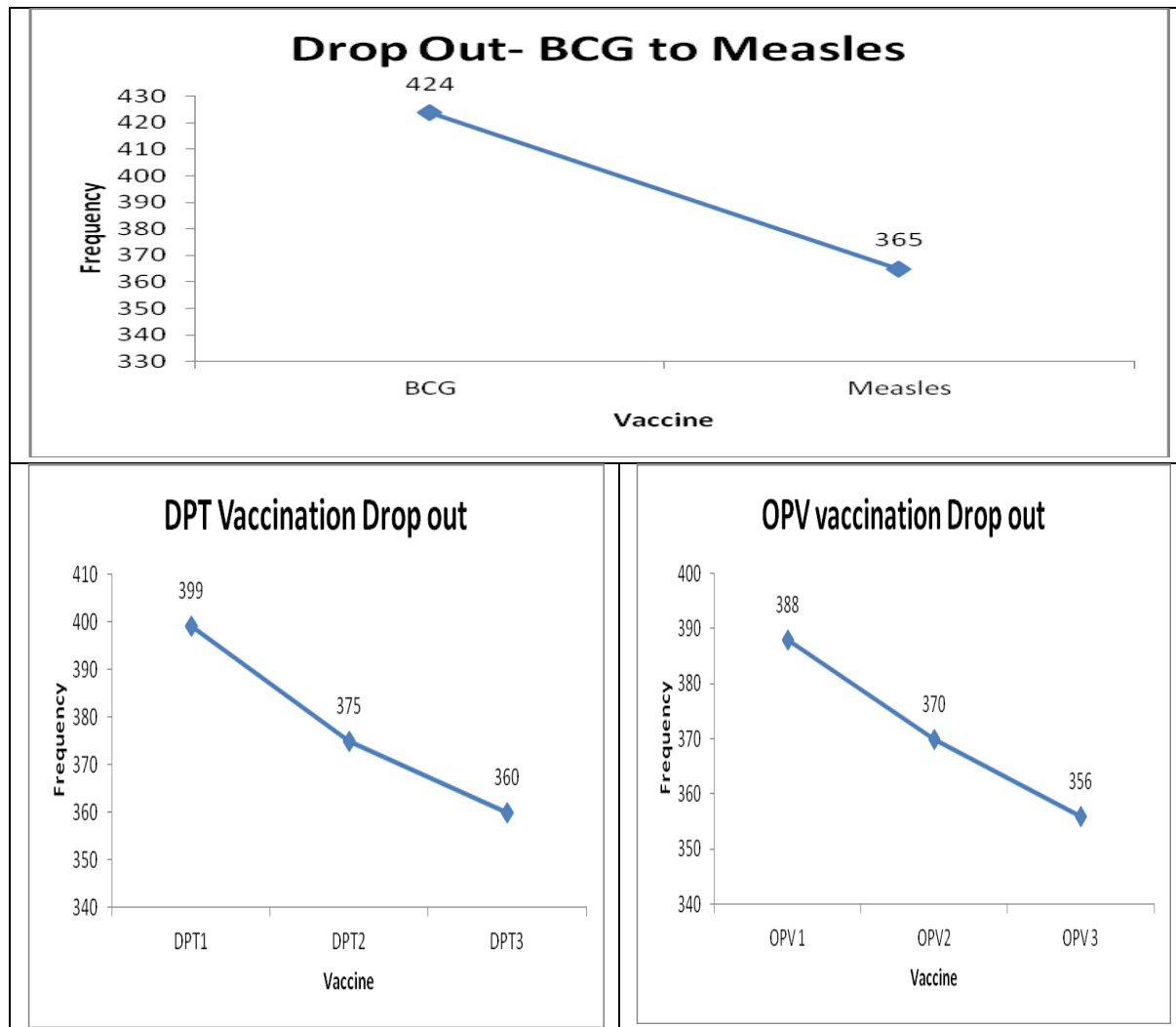
Measles is a highly contagious viral infection, mainly transmitted by droplets or direct contact with nasal or throat secretions of infected persons. Majority of the infants are vulnerable to measles by the age of 6-9 months.<sup>[35]</sup> In case of large unimmunized populations or crowded settings measles epidemics may occur every 2-3 years. Therefore, it is extremely important to take preventive measures against this infection. In the current study 78 percent of the children had received the measles vaccine but about 22 percent are still left to receive the vaccine.

Although Vitamin A dosage is not included in routine immunization schedule in India, it still has utmost importance. Vitamin A deficiency is one of the most common nutritional deficiency disorders in the world that affects more than 250 children worldwide.<sup>[36]</sup> In the current study 75 percent of the children have received vitamin A dosage.

Overall immunization coverage in the urban slums of Nadiad is good but still it has pockets of non immunization. To achieve 100 percent immunization coverage the gaps in the service delivery along with the reasons of non immunization by community need to be elicited. The following sections show the dropout rate in vaccination and explore the reasons of non immunization.

### Drop out in vaccination

A key indicator used for improving and increasing the immunization coverage it to monitor the dropout rate. With the decrease in dropout rate the immunization coverage increases. Dropout rates are the determinants of the strength of the health system demonstrating its potential to reach children with the third dose in a series. In the current study the dropout rate in case of DPT vaccine stands at 11 percent i.e. dropout of children from DPT 1 to DPT 3, while the dropout rate from BCG vaccine to Measles is 14 percent which coincides with Coverage Evaluation Survey (CES) 2009<sup>[37]</sup> that is 13 percent and 15 percent respectively. (Figure 2) The analysis also showed that the drop out from OPV 1 to OPV 3 was 9 percent. The dropout rate could indicate the inability of the system to hold on to the child once he/she is registered. It could also point towards the migrant nature of the urban population.

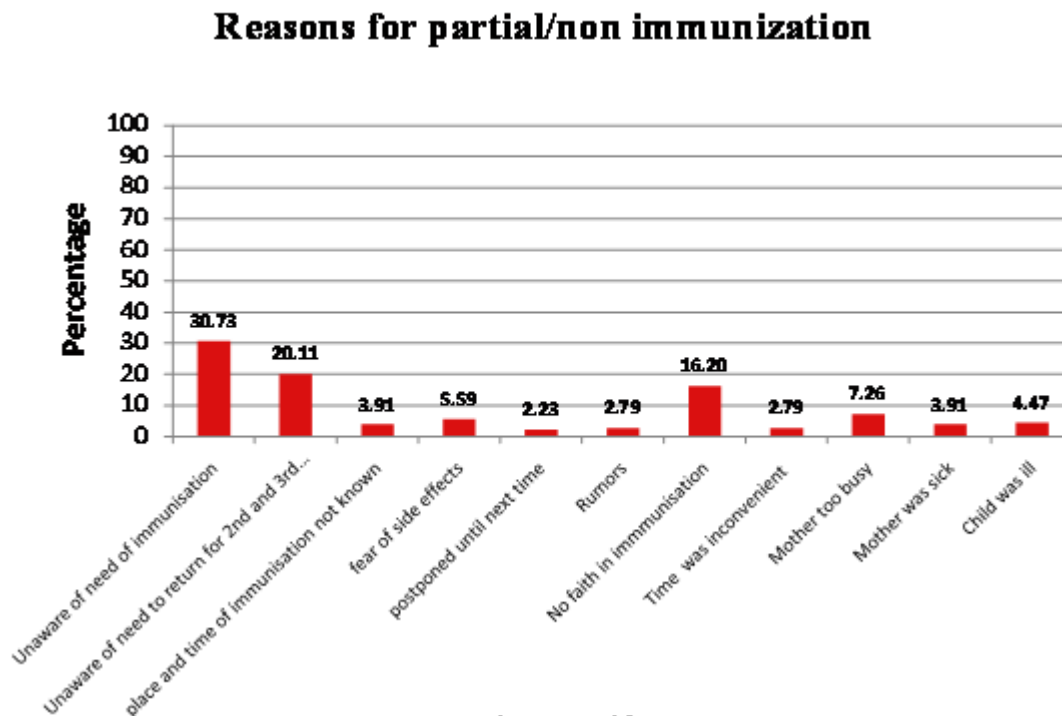


**Figure 2- Immunization Drop Out**

A study conducted by Basel et al in Nepal revealed that female children were more likely to drop out compared to male children. The various factors that influenced the drop out were occupation of the parents, educational status of the mother and gender of the children.<sup>[38]</sup> This could imply that steps for improvement should focus on the identification and improvement of bottlenecks and gaps that could help in reducing the dropout rate from BCG to measles and DPT-1 to measles.

### Reasons for not completing immunization

The study showed that 30 percent of the children were either partially immunized or non-immunized. Therefore, it was extremely important to understand the reasons for this failure so as to draft interventions accordingly. The various reasons cited by the mothers are shown in Figure 3.



**Figure 3- Reasons for partial/non immunization**

Three major reasons found for the failure were “Unaware of need of immunization”(31 percent), “Unaware of need to return for 2<sup>nd</sup> and 3<sup>rd</sup> dose”(20 percent) and “No faith in Immunization”(16

percent). Study conducted by Kulkarni et al <sup>[31]</sup> showed similar responses for non immunization of children, unawareness of need of immunization was 8 percent and unawareness of need to return for second and third dose was 5 percent. Various studies have cited different reasons of non immunization. <sup>[27,28,30]</sup> A study conducted by Nath et al <sup>[39]</sup> in Lucknow showed visit to native place/village (14.7 percent), apprehensiveness due to sickness of the child or an elder sibling due to immunization (11.7 percent) and lack of knowledge (10.4 percent) as reasons for non immunization. Various studies have been conducted worldwide to derive major reasons associated with non immunization. <sup>[40]</sup> Study conducted in Turkey showed that the most common reason for non immunization was lack of awareness, non compliance by spouse and health status of the child <sup>[6]</sup>. A study in Philippines showed maternal illiteracy as the major cause of under vaccination. <sup>[41]</sup> Studies from other parts of the world have reported similar reasons. <sup>[42-44]</sup> A systematic review by Rainey et al of all the articles published between 1999 and 2009 categorized the reasons for under vaccination into four categories that is related to immunization systems, communication and information, family characteristics and parent attitude and knowledge. <sup>[45]</sup>

### Factors associated with immunization uptake

In the current study the factors influencing immunization uptake were explored. As seen from Table 4 place of delivery, mother's and father's education, father's occupation, migration, caste are closely associated with the immunization status of the children ( $P=0.001$ )

<b>Table 4 –Immunization Status of Children in Relation to Socio-Demographic Factors (Factors associated with immunization coverage/ uptake)</b>				
Factors	Completely Immunized	Partially Immunized	Non Immunized	p-Value
<b>Place of delivery***</b>				
Institutional	<b>72.6</b>	<b>21.1</b>	<b>6.3</b>	P=0.001
Non –institutional	<b>52.4</b>	<b>14.3</b>	<b>33.3</b>	
<b>Mother's education***</b>				
Illiterate	<b>58.6</b>	<b>27.9</b>	<b>13.6</b>	P=0.001
Primary School	<b>72.4</b>	<b>21.1</b>	<b>6.6</b>	
Higher Secondary	<b>80.7</b>	<b>15.3</b>	<b>4</b>	
College	<b>90.0</b>	<b>10</b>	<b>0.0</b>	
<b>Father's education***</b>				
Illiterate	<b>54.2</b>	<b>27.7</b>	<b>18.1</b>	P=0.001

Primary School	73.3	20.7	5.9	
Higher Secondary	75.2	19	5.7	
College	85.3	14.7	0.0	
<b>Mother's occupation</b>				
Daily Labourer	67.9	23.2	8.9	P=0.363
Self employed	90.9	4.5	4.5	
Government	71.4	14.3	14.3	
Home-maker	71.4	21.4	7.2	
Others	33.3	33.3	33.3	
<b>Father's occupation**</b>				
Daily Labourer	65.4	24.8	23.2	P=0.006
Self employed	86.7	12.2	1	
Government	90.9	0.0	9.1	
Others	78.4	13.5	8.1	
<b>Availability of Mamta card***</b>				
Yes	83.1	15.1	1.9	P=0.001
Yes but lost it	25	53.1	21.9	
No	5	25	70	
<b>Caste***</b>				
General	86.3	12.5	1.3	P=0.001
SC	63.7	28.7	7.6	
ST	67.6	19.7	12.7	
OBC	60.8	23	7.6	
<b>Years of migration**</b>				
5 years	47.8	26.1	26.1	P=0.02
More than 5 years	77.3	22.7	0.0	

*P<0.10 (10%) corresponds to \*, P <0.05 (5%) corresponds to \*\* and P <0.001(1%) corresponds to \*\*\**

The study showed that there is a strong association between the place of delivery of the child and immunization. It was found that those children born in hospital had a higher immunization coverage rate compared to those delivered at home. Similar result has been found in the study conducted in the urban slums of Mumbai<sup>[27]</sup>. The study conducted by Nath et al found that children born at home were found to be less likely to receive any vaccination<sup>[39]</sup>



Parent's education plays a vital role in the immunization uptake of the children. The study shows that the education of both the parents influences the immunization of the child. Study conducted in Istanbul report that both paternal and maternal education influences the immunization and non immunization status of the children.<sup>[4]</sup> Several studies show the influence of education of mother on the immunization uptake of the child.<sup>[46, 47, 48]</sup> Thus with the increase in the education of the mother and father the immunization status of the child also increases. Since it is implied that parent's formal education is related to the enhanced knowledge of the protective function of childhood immunization and greater awareness of immunization schedule.

The present study reports that maternal occupation did not significantly affect the immunization coverage of the children on the study. But father's occupation affects the immunization of the child. Immunization coverage of the children whose fathers have earning power such as public servants (91 percent) and self employed (86.7 percent) have relatively higher immunization coverage compared to father's that have very low earning power such as daily labourers (65.4 percent). A study by J.C. Okoro et al<sup>[49]</sup> and Bugvi et al<sup>[50]</sup> noted similar trend in the study in Nigeria and Pakistan respectively. However a contrary view was documented in a study by Malkar et al<sup>[51]</sup> in India where the occupation of the father did not affect the immunization status of the child.

The study shows that the availability of the immunization card is associated with the immunization coverage. Availability of immunization card may be beneficial in various ways as it may facilitate the follow up of vaccines doses, remind the mothers to avoid dropouts and encourage them to complete the vaccination of the children.

Scheduled Caste/ Schedule Tribe (SC/ST) and Other Backward Class(OBC) are socially disadvantaged group and the study reports that the immunization coverage in these class is lower compared to children belonging to the general category. Thus it can be implied that caste system is associated with the immunization uptake. Yet in a study conducted by Mukherjee et al in Madhya Pradesh, Odisha and Rajasthan show that caste only does affect the immunization coverage independently, it interacts with other socio-economic, demographic and programme factors.<sup>[52]</sup>

## CONCLUSIONS

Immunization is one of the most cost effective public health interventions as vaccines avert both morbidity and mortality. The study shows full immunization in the Nadiad block of district Kheda district is 72% which points that we still have a long way to go in order to achieve the MDG 4 i.e. reduction in IMR (less than 30/1000 live births before the year 2015). It was also revealed from the study that demographic and socioeconomic factors such as literacy, place of delivery, occupation of parents do affect immunization of the child. There was lack of information existing on the subject of immunization amongst the population, as majority mothers cited reasons like unaware for need of immunization, no faith in immunization and fear of side effects for failure in providing full immunization. So to combat this, there is a need to do more focus and proper Information, Education and Communication (IEC) activities to improve the demand and utilization of services. It also shows that dropout rate from BCG to Measles is around 14% and from DPT 1 to DPT 3 is 11% which is on a higher side. Therefore, there must be regular follow up of the cases and strengthen monitoring through the district officials. It is true that there is a gap between the desirable and actual situation. Thus these findings may be used for further planning and implementation of health services by exploring the detailed reasons of non immunization and creating awareness regarding the benefits of immunization.

## LIMITATIONS OF THE STUDY

Short time duration of three months is not sufficient to conduct an in-depth study on this subject. Thus this study can act as a reference point for others to take off detailed projects.

In case there was no immunization card available the mother had to recall about the immunization dosage administered to the child prior. This led to recall bias by the respondents.

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**Annexure-1**

BLOCK	SERIAL NUMBER	SLUM AREA	POPULATION
NADIAD	1	Wagri Was	2207
	2	Rajiv nagar & Miy mandir	1789
	3	Wagri was- Kapadwanj Road	2186
	4	Omnagar(sindhi chali& paigai chali)	2150
	5	Shankar Kui (Salun)	2030
	6	IDC Slum	1575
	7	Kumkum nagar	2010
	8	Jawahar nagar & Saint Ram nagar	2095
	9	Kanipura	2178
	10	Subhash nagar (Champa Talavdi)	2512
	11	Sai Baba Nagar	2135
	12	Chaklasi Bhakor	2665
	13	Pij Bhakor	1942
	14	Juna Dumral Road	2050
	15	Kabir Road	1985
	16	Dairy Road	2436
	17	Bhitasi Road	2318
	18	Shastri Nagar	2080
	19	Wagar wari Mandir	1742
	20	Indira Nagar	3509
	21	Majur Gam	2278
	22	Nehru Gam	2310
	23	Abuda Nagar -2	2278
	24	Malhar pura	2130
	25	Nava-Juna makhanpura	2168
	26	Sheetal Cinema	2014
	27	Hari Om nagar	2286
	28	SRP- Pragati nagar	1996
	29	Rabari Vas- Civil Hospital	2000
	30	Chatiyawas Limbdi	2079
	31	Rabari Vas-Globe Cinema	2084
Total Population			67217