

# Immunization in Nineveh Governorate

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## ABSTRACT

The present study aims to determine the coverage completeness of immunization in urban and rural areas of Nineveh governorate among children (9 months -5years) according to the program of immunization stated by ministry of Health and factors affecting immunization uptake. To achieve the above aim cross-sectional survey design was adopted the catchment area of Al-Wahda primary health care center and sherikhan village was the study setting. Random sample of 205 subjects were interviewed from each setting amounting to 410. The immunization coverage was quite high, the majority (97.1%) of urban children and (84.4%) in rural area were completely vaccinated. Almost equal sex distribution in both areas had an equal chance of being adequately immunized. A mothers in urban areas showed a satisfactory level of knowledge about the benefit of vaccines compared to mothers in rural area. The present study revealed that in an urban area the important effective factor on immunization uptake was the parity. Mother's age and family type were the significantly effective factors in rural areas, knowledge, and attitudes of mothers were also effective in both settings.

**Keywords:** immunization, rural, primary health care center (PHCC), vaccine, urban.

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## INTRODUCTION

### Immunization coverage studies:

In Asia, Immunization coverage rate has been little or no fall off. Bangladesh has overcome enormous odds in raising immunization coverage from almost zero in 1980 to 62% in 1990 and has maintained coverage at 60% in 1991 despite every conceivable difficulty.

In Middle East and North Africa, almost all countries have sustained their level of immunization coverage.

In Americans, coverage has remained stable with important lower immunization rates in 1991 than in 1990. Nevertheless, Polio eradication campaign in the region is on verge of victory<sup>[1]</sup>.

In sub-Saharan Africa that steepest decline has occurred, overall immunization level fell by approximately 10% in 1991 with coverage falling below 50% for polio, measles and DPT<sup>[2]</sup>.

Several studies were done in Iraq .in 1985 a very low coverage was reported (25%) which was increased to 69% in 1989. In Nineveh governorate, it was 46.0% in 1989 dropped to (43.0%) in 1992, while other study in 1993 showed an increasing trend (84.2%). In samevenue, a raising fraction was recorded in 1999 to reach 92.0% for BCG and zero dose of polio, 136.0% for DPT and polio (3doses) and 100% for measles<sup>[3]</sup>.

### Aim of the present study

The aim of present study to determine the coverage completeness of immunization in an urban and rural areas of Nineveh governorate and effective factors.

## MATERIALS AND METHOD

### Sample size and technique:

Cross-sectional study design was adopted. A sample size of 410 children (9 months-5years) with their mothers were included (205 urban and 205 rural). Household survey was carried in each catchments area. The house-holds was selected at random. Every effort was made to re-interview the absent mothers.

### Data collection:

Survey was designed to be conducted during period of four weeks. It was prepared to cover children (9 months-5years) present in each household included in survey.

Date was collected through use of interview questionnaire form prepared for this purpose and by reviewing vaccination card.

Questionnaire form included age and sex of child, age of mother and fathers, mother's occupation and education, family size and type, monthly family income. Also data regarding knowledge of mother and their perception of child health. Also, mother was asked about side effect of vaccine like fever, swelling at site of injection and convulsion. Their knowledge about benefit of Vaccine and source of knowledge were also inquired about.

Vaccination cards were used to determinate completeness of immunization schedule.

### Statistical analysis:

Z test for difference between two proportions, two means and  $\chi^2$  were used in statistical analysis<sup>[4]</sup>.

## RESULTS

A total sample of 410 mothers were interviewed the study period 17th May to 10<sup>th</sup> June 1999. The response rate was 100% in both urban and rural areas. Overall availability of vaccination, cards was 100% in urban children and 90% of rural children at time of interview.

Characteristics of study sample are shown in (Table 1). In both study setting, almost one-quarter of children were at age group 9-12 months significantly higher proportion was recorded in rural area ( $p < 0.001$ ). Male to female ratio was 0.9:1 in urban area and 0.58:1 in rural area.

In urban area a minority of mothers were at < 20 years, 40 and more years, significantly higher fractions were recorded in rural area (6.8%  $p < 0.001$ ) and (11.7%,  $p < 0.05$ ) respectively. Mothers with high parity constituted one-third of study sample in urban area and significantly higher proportion was recorded among rural mothers.

Almost half of mothers in rural area had attained a primary education level, none of them had a college degree. 95% of mothers were housewives in urban area and all of them in rural area. Half of studied families were extended with a monthly income varied from 50000-100000 Iraqi diners. The present study revealed that both sexes were equally covered.

**Table 1: Socio-demographic profile of study sample**

Children	Urban		Rural		p-value
Age	No.	%	No.	%	
9-12 months	41	20.0	48	23.4	< 0.001
12-24 months	66	32.2	56	27.3	< 0.001
24-36 months	48	23.4	59	28.8	N.S
36 months	50	24.4	42	20.5	N.S
Total	<b>205</b>	<b>100.0</b>	<b>205</b>	<b>100.0</b>	
Gender					
Male	99	48.3	94	45.9	N.S
Female	106	51.7	111	54.1	N.S
Total	<b>205</b>	<b>100.0</b>	<b>205</b>	<b>100.0</b>	
Mothers Age (years)					
< 20	10	4.9	14	6.8	< 0.001
20-	49	23.9	39	19.0	
25-	56	27.3	63	30.7	
30-	48	23.4	36	17.6	
35-	29	14.1	29	14.1	
40+	13	6.3	24	11.7	< 0.05
Total	<b>205</b>	<b>100.0</b>	<b>205</b>	<b>100.0</b>	
Parity					
1-	42	20.5	25	13.7	
2-	39	19.0	24	11.7	

3-	40	19.5	32	15.6	< 0.001
4-	21	10.2	27	13.2	
5+	63	30.7	94	45.9	
Total	205	100.0	205	100.0	
Education					
Illiterate	15		56	27.3	
Read and write	13	7.3	34	16.6	
Primary	97	6.3	110	53.6	
Intermediate	52	47.3	5	2.4	
andsecondary		25.4	-	-	
University	27	13.2	-	-	
Total	205	100.0	205	100.0	
Occupation					
Housewife	195	95.1	205	100.0	
Employed	10	4.9	-	-	
Total	205	100.0	205	100.0	
Family type					
Extended	114	55.6	116	56.6	
Nuclear	91	44.4	89	43.4	
Total	205	100.0	205	100.0	
Family income					
< 50000	42	20.5	30	14.6	< 0.001
50000 –	108	52.7	91	44.4	
100000 +	55	26.8	84	40.9	
Total	205	100.0	205	100.0	

(Table 2) demonstrates that almost all (97.1%) of urban children were completed their immunization compared to significantly ( $p < 0.001$ ) lower fraction (84.4%) among rural children.

**Table 2: Distribution of children with complete and incomplete immunization in study settings**

Immunization	Urban		Rural		p-value
	No.	%	No.	%	
Complete	199	97.1	173	84.4	< 0.001
Incomplete	6	2.9	32	15.6	< 0.001
Total	205	100.0	205	100.0	

Furthermore, in rural areas, a significantly lower immunization coverage was recorded for st, 2nd and 3rd doses of DPT, polio and measles vaccine, (Table 3).

**Table 3: Immunization coverage for each vaccine in study settings**

Type of vaccine	Urban		Rural		p-value
	No.	%	No.	%	
BCG + polio (zero dose)	149	72.7	154	75.1	N.S
1st DPT + polio	205	100.0	192	93.6	< 0.001
2nd DPT + polio	205	100.0	186	90.7	< 0.001
3rd DPT + polio	201	98.0	175	85.4	< 0.001
Measles	199	97.1	174	84.9	< 0.001
Total	205	100.0	205	100.0	

Table 4 Shows the potential barriers to receiving immunization, child being ill and family problems were in the top of list of obstacles reported.

**Table 4: Potential barriers to receiving immunization (mother's point of view)**

Causes (n = 38)	Urban		Rural		p-value
	No.	%	No.	%	
Child being ill	4	66.7	14	43.8	N.S
Family problems	2	33.3	16	50.5	N.S
In availability of vaccines	-	-	1	3.1	< 0.001
Household far from the health center	-	-	1	3.1	< 0.001
Negative attitude of health staff	-	-	-	-	
Vaccination is not useful	-	-	-	-	
others	-	-	-	-	
Total	6	100.0	32	100.0	

(Table 5) indicates that (46.3%) of urban mothers completed immunization schedule enumerated three and more of target diseases. This fraction was significantly higher ( $p < 0.001$ ) than that of incomplete group. Similar association was recorded among rural mothers.

**Table 5: Naming of target diseases**

No. of target diseases named	Urban (n = 205) Immunization Status				p - value	Rural (n = 205) Immunization Status				P value
	complete	%	Incomplete	%		complete	%	Incomplete	%	
1	34	16.6	2	0.9	< 0.001	80	39.0	15	7.3	< 0.001
2	70	34.1	3	1.5	< 0.001	63	30.7	10	4.9	< 0.001
3+	95	46.3	1	0.5	< 0.001	30	14.6	7	3.4	< 0.001

(Table 6) present the respondents knowledge about benefit of EPI vaccines. Although higher fraction of urban mothers knew about benefit of vaccines compared to rural ones. However, this difference was not significant in case of DPT, Polio, and measles.

**Table 6: Respondents knowledge about benefit of each vaccine**

Type of vaccine	Urban (n = 205)		Rural		p- value
	know	%	know	%	
BCG	165	80.5	145	70.7	<0.05
Polio	182	88.8	174	84.9	N.S
DPT	175	85.4	165	80.5	N.S
Measles	190	92.7	182	88.8	N.S

(Table 7) shows the score of knowledge by immunization status in each study setting. In rural area mean score of knowledge for mothers who completed immunization schedule ( $x = 2$ ) was significantly higher ( $p < 0.001$ ) than that of mothers in the incomplete groups ( $x = 1.4$ ). No significant difference was observed in urban region.

**Table 7: Score of mother's knowledge by immunization status in each study setting**

Score of Knowledge	Urban (n = 205) Immunization Status				P value	Rural (n = 205) Immunization Status				P value
	Complete	%	Incomplete	%		complete	%	Incomplete	%	
1	34	16.6	2	0.9	< 0.001	70	34.1	20	9.7	< 0.001
2	75	36.5	2	0.9	< 0.001	63	30.7	10	4.8	< 0.001
3+	90	43.9	2	0.9	< 0.001	40	19.5	2	0.9	< 0.001

Regarding mothers awareness about seriousness of target diseases, no significant differences were observed between rural and urban mothers except in case of diphtheria, Table (8).

**Table (8): Awareness of seriousness of target diseases in each study setting**

Target diseases	Urban (n = 205)		Rural(n = 205)		p-value
	Aware	%	Aware	%	
T.B.	145	70.7	130	63.4	N.S
Whooping cough	165	80.5	160	78.0	N.S
Diphtheria	130	63.4	100	78.8	< 0.01
Tetanus	140	68.3	130	63.4	N.S
Poliomyelitis	175	85.4	170	82.9	N.S
Measles	185	90.2	175	85.4	N.S

In both study setting Table (9) recorded significantly higher level of awareness among mothers who completed immunization schedule.

**Table (9): Completeness of immunization and awareness of mothers in each study setting**

Target diseases	Urban (n = 205)Immunization Status				P value	Rural (n = 205 Immunization Status				P value
	complete	%	Incomplete	%		complete	%	Incomplete	%	
T.B.	143	69.7	2	0.9	< 0.001	118	57.5	12	5.8	< 0.001
Whooping cough	161	78.5	4	1.9	< 0.001	150	73.1	10	4.8	< 0.001
Diphtheria	127	61.9	3	1.5	< 0.001	88	42.9	12	5.8	< 0.001
Tetanus	137	66.8	3	1.5	< 0.001	122	49.5	8	3.9	< 0.001
Poliomyelitis	170	81.9	5	2.4	< 0.001	163	79.5	7	3.4	< 0.001
Measles	180	87.8	5	2.4	< 0.001	168	81.9	7	3.4	< 0.001

(Table 10) shows sources of Knowledge regarding benefit of EPIvaccines. PHCC and health visitors played a significant role in urban region compare to rural area

**Table 10: Sources of Knowledge regarding the benefit of vaccine**

Sources	Urban (n =205)		Rural (n =205)		p-value
	No.	%	No.	%	
Health visitors	193	94.1	180	87.8	< 0.05
Mass media	190	92.7	187	91.1	N.S
Health center	200	97.6	190	92.7	< 0.05
Relativeandfriends	180	87.8	185	90.2	N.S
More than one source	175	85.4	160	78.0	< 0.05

Table (11) portrays sources of Knowledge regarding the seriousness of target diseases.In urban PHCC ranked first, followed by mass media, health visitors, relatives,and friends. First, three sources played a significantly more distinct role in urban than in rural area.

**Table (11) Sources of Knowledge regarding seriousness of target diseases**

Sources	Urban (n =205)		Rural (n =205)		p-value
	No.	%	No.	%	
Health visitors	175	85.4	160	78.0	< 0.05
Mass media	180	87.8	145	70.7	< 0.001
Health center	185	90.2	160	78.0	< 0.001
Relatives and friends	160	78.0	150	73.2	N.S
More than one source	155	75.6	125	60.9	< 0.001

(Table12)indicates that significantly higher proportion of mothers in rural area had negative attitude towards vaccination (p<0.0001).

**Table 12: Attitude of mothers regarding vaccination in each study setting**

Mother's attitude	Urban (n = 205)		Rural (n =205)		p- value
	No.	%	No.	%	
+ ve attitude	195	95.1	170	82.9	< 0.001
- ve attitude	10	4.9	35	17.0	< 0.001

(Table 13) shows that in rural area (10.7%) of mothers who did not complete immunization schedule had negative attitude, while in urban area majority of mothers (94.1%) who completed immunization schedule had positive attitude.

**Table 13: Attitude of mothers and vaccination status in each study setting**

Mother's attitude	Urban (n = 205)				p value	Rural (n = 205)				P value
	Immunization Status					Immunization Status				
	complete	%	Incomplete	%		complete	%	Incomplete	%	
+ve attitude	193	94.1	2	0.9	<0.001	160	78.0	10	4.9	<0.001
- ve attitude	6	2.9	4	1.9	<0.001	13	6.3	22	10.7	< 0.05

(Table 14) demonstrates factors affecting completeness of immunization in both urban and rural area. Mother's parity was positively effective socio-demographic factor in urban area, Mother's age and Family type were effective factor in rural area. In urban area naming of target diseases, awareness and attitude of mothers all were significant factors. In rural area the mean score of knowledge, awareness, and attitude of mothers were the effective factor.

**Table 14: Factors affecting completeness of immunization**

In Urban Children		
Socio-demographic factors	Type of test	p-value
Sex of child	X <sup>2</sup> corrected	N.S
Mother's age	Z2 means	N.S
Mother's parity	Z2 means	< 0.01
Mother's education	X <sup>2</sup> corrected	N.S
Mother's work	X <sup>2</sup> corrected	N.S
Family type	X <sup>2</sup> corrected	N.S
Family income	X <sup>2</sup> uncorrected	N.S
<b>Knowledge about immunization</b>		
Mean score of knowledge	Z 2 means	N.S
Naming of target diseases	X <sup>2</sup> uncorrected	< 0.05
Awareness of seriousness of target diseases	Z2 proportions	< 0.001
Attitude of mothers	Z2 proportions	< 0.001
In Rural Children		
Sex of child	X <sup>2</sup> corrected	N.S
Mother's age	Z2 means	< 0.05
Mother's parity	Z2 means	N.S
Mother's education	X <sup>2</sup> corrected	N.S
Mother's work	X <sup>2</sup> corrected	N.S
Family type	X <sup>2</sup> corrected	<0.05
Family income	X <sup>2</sup> uncorrected	N.S
<b>Knowledge about immunization</b>		
Mean score of knowledge	Z 2 means	< 0.001
Naming of target diseases	X <sup>2</sup> uncorrected	N.S
Awareness of seriousness of target diseases	Z2 proportions	< 0.001
Attitude of mothers	Z2 proportions	< 0.001

## DISCUSSION

Children are among the most powerful agents to communicate their messages and help their parents to make full use of immunization services <sup>[5]</sup>.

The success of any vaccination programme (The vaccination that are offered to all children protect against 9 diseases diphtheria, tetanus, whooping cough, polio, infection caused by Homophiles influenza type b, measles, mumps, rubella and serious diseases caused by pneumococcus) whether local or a large scale one will depend on mother response in taking young children at right age to receive vaccination shots and scheduled time<sup>[6]</sup>.

The present study recorded a 100% response rate. This high rate might be attributed to prior explanation about study aim and satisfaction of mothers with PHC Services<sup>[7]</sup>.

The high proportion of children who had vaccination cards reflected high level of awareness of mothers in Nineveh regarding the importance of vaccination card. It also reflected effective policy of Ministry of Health (MOH) regarding the importance of vaccination card. It also reflected effective policy of the ministry of health (MOH) regarding provision and maintenance of vaccination cards. Furthermore, each mother ought to bring vaccination card at time she attended PHCC for immunization purposes.

Almost equal sex distribution in both areas implied that both sexes had an equal chance of being adequately immunized<sup>[7,8]</sup>.

In present study, immunization coverage was quite high. The majority (97.1%) of urban children (9 months-5 years) were completely immunized against six target diseases, while (84.4%) in rural children. Those fractions are higher than that recorded for Iraq in 1989 which was about 69.0%. And it is also higher than that reported for Nineveh in 1989 which was about (46.0%). It is also higher than that indicated for Nineveh in Al-Mammon PHCC in 1995 which was (73.1%)<sup>[9]</sup>. This can be attributed to continuing intensive educational measures taken by MOH to improve immunization level. This also reflected degree of awareness of mothers in regard to importance of immunization to health of their children<sup>[7-10]</sup>. In this study low coverage for BCG was due to exclusion of children who had no scar from calculation of completeness of immunization.

In present study, only a small proportion (2.9%) of urban children did not complete their immunization. A higher fraction (15.6%) was reported in rural area and no child was found to be completely non-immunized. This difference in immunization status could be attributed to difference in mother's literacy rate, socio-economic status, and accessibility to health care facilities.

By contrast, Levinsohn<sup>[11]</sup> in Khartoum, found that 29% of children attending governorate health facilities were completely not vaccinated.

In present study revealed that most common cause of incomplete immunization was child being ill, this makes 66.7% in urban and 43.8% in rural, most common illness was fever, gastroenteritis and chest infection<sup>[9,12,13]</sup>.

Lack of knowledge prevents mothers from playing an effective role in increasing coverage of vaccination. A mothers in urban areas showed a satisfactory level of knowledge about benefit of vaccines compared to mothers in rural area<sup>[14,15,16]</sup>. Italian workers in their study about knowledge, attitudes, behavior of mothers and vaccination recorded that level of knowledge about mandatory vaccination for infants correlated significantly with uptake of vaccination<sup>[17]</sup>.

Mothers attitude towards immunization showed that nearly 95.1% urban, 82.9% rural mothers, though it is important to immunize their children.

This high percentage reflected level of awareness of those mothers about importance of immunization in preventing target diseases, on the other hand, 4.9% urban, 17.0% rural, mothers expressed some fear about immunization which included fear that child might become sick, feverish, fault in giving injection and pain at site of injection.

Obaid and Belk<sup>[7]</sup> in Bahrain added another reason which was fear of mother about development of paralysis after giving an injection. This indicates that mothers were realizing importance of having their children completely immunized even if they had fears about vaccination.

Moreover, Alemu al<sup>[18]</sup> in Ethiopia suggested that mothers who were less worried about side effect of immunization had more visits than those who were worried.

The present study revealed that in an urban area the important effective factor on immunization uptake was mother's parity. Mothers age and family type were significantly effective factors in rural area. Knowledge and attitude of mother were also effective in both setting.

A nationwide survey was carried out in Saudi Arabia aiming at determination of immunization coverage level against six killer diseases of childhood. Variation between geographical zones, urban-rural setting, age, education and mother's employment, father's education and childbirth order were studied. A quite high coverage rate was recorded for all target



diseases. Immunization coverage was higher for children to younger mothers and non-immunized group-belonged exclusively to illiterate mothers. Children born to mothers with basic education showed highest coverage (88.0%) and birth order had negative effect on coverage<sup>[8,19]</sup>.

In an effort to improve immunization delivery system in Missouri state, study of socio-psychological factor effects on infant immunization was undertaken. Since perception of diseases, susceptibility, severity and vaccine efficacy has been shown to influence immunization decisional process, psychological information was considered important in developing strategies for increasing immunization level, parental age, education, income, and race have been correlated with level of immunization<sup>[20]</sup>.

Fassin et al.<sup>[15]</sup> studied social factors influencing immunization coverage in urban Senegal. They found that (18.0%) of children below five years of age were not immunized. They attributed their finding to low level of maternal literacy, older age and husband's salary. They also found that urban residence was associated with high immunization uptake.

Although vaccination coverage for children under five in Nineveh has recently improved, overall, they remain below the goals set by WHO for year 2000<sup>[21]</sup>, which is 100% coverage.

### CONCLUSION

The present study showed that vaccination coverage is higher in urban areas than in rural. Both sexes were equally covered and vaccination uptake was affected by many factors namely, parity, mother's age, and family type. Although there has been a great improvement in immunization coverage in Nineveh it is still beyond the target set by MOH.

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