



# Missed Immunisation and Immunisation Drop-outs among Infants in Rural Health Facilities in Abakaliki, Nigeria

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## **Author's contribution**

Author NCE designed, analysed, interpreted and prepared the manuscript.

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## **ABSTRACT**

**Background:** Missed immunisation, immunisation drop-out and coverage rates at primary health care (PHC) level indicate the level at which communities utilise the preventive services and thus serve as a measure of the strength of the public health system. They also measure the effectiveness of the immunisation programme. The extent of missed immunisation and immunisation drop-out is not well known in the study area. This study, therefore, determined the extent of missed immunisation and immunisation drop-outs in Abakaliki.

**Materials and Methods:** Descriptive cross-sectional analytical study design was used for the survey. Total number of infants in the health facilities was used as a sample size in this study (406 infants at Mile-Four hospital and 281 infants at St. Vincent hospital). Data were extracted from the existing immunisation registers in the two health facilities studied. Statistical Package for Social Sciences (SPSS) version 22 was used for data analysis. Ethical approval for this study was obtained from the Research and Ethics Committee (REC) of the Federal Teaching Hospital Abakaliki (FETHA).

**Results:** Showed significant differences in the proportion of missed immunisations (39.7% in Mile-Four and 48.4% in St. Vincent respectively,  $p=0.02$ ) and immunisation drop-outs (35.7% in Mile-Four and 47.7% in St.Vincent respectively,  $p=0.02$ ). The drop-out rate is 64.3% in Mile-Four and 52.3% in St. Vincent. It also showed that 36.6% of male infants when compared to 34.8% of female infants dropped-out of the 3<sup>rd</sup> dose of pentavalent vaccines in Mile-Four while 44.5% of male infants and 51.1% of female infants dropped-out 3<sup>rd</sup> dose of pentavalent vaccines in St.Vincent hospital. There was no significant difference in the immunisation drop-out rates between male and female infants in the study groups ( $p>0.05$ ).

**Conclusion:** A higher proportion of infants missed immunisation and dropped out of vaccination at St.Vincent than Mile-Four. This calls for an aggressive public campaign on the need to ensure immunisation timeliness for effective immunisation in such rural areas.

*Keywords: Missed immunisation; immunization drop-out; infants; rural health facilities; Abakaliki.*

## 1. INTRODUCTION

Immunisation drop-outs refer to infants who have used or missed immunisation services and do not return for subsequent vaccinations. When drop-outs exceed 10 percent, it indicates a problem of utilisation of services. In most settings where full immunisation coverage is low, most infants receive at least one dose of pentavalent vaccines, but the proportion that receives the needed second and third doses drops significantly. Drop-out rates are calculated as the percentage point difference between successive doses of a vaccine, expressed as a percentage of the first dose [1].

Immunisation coverage which is the indicator of access to the preventive services at PHC level is measured by the percentage of infants who have received the appropriate immunisations. Immunisation coverage is calculated as the total number of infants that have received all their immunisations up to the measles vaccine, divided by the total population of children under one year old in a given area [1]. However, differences in the indicators of access and utilisation of immunisation services exist. Indicators of access to health services among other factors include a level of education, sex, patriarchal social arrangement, rural residence, poverty, religious and cultural beliefs about certain diseases and location of health facilities etc. Indicators of utilisation of immunisation services include quality of staff skills, protocols of treatment, availability of supplies and environment of health facilities, physical and financial accessibility of services, knowledge of which services exist, education about how to best utilise self and practitioner-provided services and cultural norms of treatment [2,3]. Vaccination is typically offered free in Primary health care

centres and are usually not compulsory for school enrolment. Childhood vaccines are given at interval of 0, 6<sup>th</sup>, 10<sup>th</sup>, 14<sup>th</sup> week and 9<sup>th</sup> month of birth. Immunisation drop-out usually are due to far distance to health facility. The extent of missed immunisation and immunisation drop-out is not well known in the study area. This study, therefore, determined the extent of missed immunisation and immunisation drop-outs in Abakaliki.

## 2. MATERIALS AND METHODS

This study was carried out at Mile four and St. Vincent hospitals (in Ebonyi and Izzi Local Government Areas respectively) in Ebonyi State. Both private facilities are in the rural area. Descriptive cross-sectional analytical study design was used for the survey. Data were extracted from the existing immunisation registers in the two health facilities studied. A total number of infants in the health facilities was used as sample size for the study (406 infants at Mile-Four hospital and 281 infants at St. Vincent hospital, both in Abakaliki, Ebonyi State). Statistical Package for Social Sciences (SPSS) version 22.0 was used for data analysis. Chi-squared test was to determine association or differences between proportion of the variables and the level of statistical significance was set at  $p < 0.05$  and confidence level at 95%. Ethical approval for this study was obtained from the Research and Ethics Committee (REC), Federal Teaching Hospital Abakaliki (FETHA), Ebonyi State, Nigeria.

## 3. RESULTS

A total of 687 infants were studied, 406 (59%) in Mile-Four and 281 (41%) in St. Vincent. These figures were the number of infants recorded as at

the time of data extraction. Review of immunisation register showed significant differences in the proportion of missed immunisations (39.7% in Mile four and 48.4% in St. Vincent respectively,  $p=0.02$ ) and immunisation drop-outs (35.7% in Mile Four and 47.7% in St. Vincent respectively,  $p=0.02$ ). Table 1 showed that the proportion of infants who missed immunisations was 39.7% in Mile-Four and 48.4% in St. Vincent. The difference in proportion of infants who missed immunisation was statistically significant ( $p=0.02$ ). Table 2 showed that the proportion of male and female infants who missed penta-valent vaccines. The difference in their proportion was not significant. Table 3 showed that 35.7% of infants dropped out of pentavalent vaccines 3 in Mile-Four when compared with 47.7% who dropped out of pentavalent vaccines 3 in St. Vincent. The difference in their proportions was statistically significant ( $p=0.02$ ). The drop-out rate is 64.3% in Mile-Four and 52.3% in St.Vincent. Table 4 showed that 36.6% of male infants and 34.8% of female infants dropped-out of 3<sup>rd</sup> dose of pentavalent vaccines in St. Vincent while 44.5% of male infants and 51.1% of female infants dropped-out 3<sup>rd</sup> dose of pentavalent vaccines in Mile-Four. There was no significant difference in the immunisation drop-out rates between male and female infants in the study groups ( $p>0.05$ ).

#### 4. DISCUSSION

In this study, a significantly lower proportion of infants (39.7%) in Mile Four than St.Vincent (48.4%) missed immunisation. More infants missed immunisations in increasing interval (most commonly missed are 14<sup>th</sup> week vaccines compared to 10<sup>th</sup> week vaccines and least missed are 6<sup>th</sup> week vaccines). This may be due to the fact that as immunisation time intervals increase, caregivers tend to forget the exact date of immunisation of their infants thereby making immunisation timeliness unrealisable and putting such infants temporally at risk of infection by vaccine preventable diseases [4]. This finding is at variance with that found in Nnewi in a study of mother-neonate pairs where most commonly missed immunisations were BCG, OPV0 and OPV1, HBV1 and DPT1 compared to the 10<sup>th</sup> week and 14<sup>th</sup> week vaccines. In that study, mother's age, education and knowledge of immunisation were not significantly associated with missed immunisation. There was

comparable proportion of missed immunisations (pentavalent vaccines 1 and 3) between the male and female infants who were vaccinated three (3) months before the intervention. This may explain the importance attached to both male and female infants now unlike olden days when preference was given to male infants in the African society. A higher proportion of infants missed OPV3, Pentavalent 3 vaccines and PCV3 than the 6<sup>th</sup> and 10<sup>th</sup> week vaccines. The prevalence of missed immunisation in Mile-Four (39.7%) is higher compared to those reported in Nnewi (17%) [5], Benin City (27.6%) [6] among mothers of infants 6 months to 1 year and consistent with that in Calabar (39.1%) [7] but lower than the 57.1% reported in India [8]. The missed vaccines would invariably reduce herd immunity of such population and consequently make such infants prone to vaccine preventable diseases [4]. The commonest vaccines missed were OPV1, HBV1 and DPT1 (40.38%), followed by BCG and OPV0 (38.46%), and OPV2, HBV2, and DPT2 (11.54%). The finding of higher rate of missed immunisation is in keeping with other study elsewhere [9] suggesting that the reasons for this high level of missed immunisation have not been adequately addressed. These should be addressed through adequate communication between mothers and health workers, training of health workers and policy flexibility [5].

Lower proportion of infants in Mile-Four (35.7%) than St.Vincent (47.7%) dropped-out of vaccination. There was a statistically significant difference in the proportion of infants who dropped-out of vaccination in the groups. This significant dropout rate among the infants would invariably compromise the herd immunity of such population and consequently make such infants prone to vaccine preventable diseases with attendant morbidity and mortality [4].

There was no significant difference in the immunisation drop-out rates between male (36.6%) and female (34.8%) infants in Mile-Four and St.Vincent (male; 44.5% and female; 51.1%). The cumulative drop-out rates were 64.3% in Mile-Four and 52.3% in St.Vincent. This may be due to the fact that most infants were delivered in the facility and as their mother's postnatal care services ended, they continued the immunisation in a nearby health facility [5].

Table 1. Proportion of infants who missed immunisations in both facilities

Variables	Mile-Four (n=406) Freq. (%)	St. Vincent (n=281) Freq. (%)	$\chi^2$ (p-value)
<b>Number who missed immunisation</b>			
Yes	161 (39.7)	136 (48.4)	5.17 (0.02)*
No	245 (60.3)	145 (51.6)	
<b>Number who missed each vaccine</b>			
BCG	0 (0.0)	0 (0.0)	
OPV0	0 (0.0)	0 (0.0)	
HB0	2 (0.5)	0 (0.0)	
OPV1	60 (14.8)	22 (7.8)	
Pentavalent1	11 (2.7)	5 (1.8)	
PCV1	26 (6.4)	7 (2.5)	
OPV2	89 (21.9)	57 (20.1)	
Pentavalent2	80 (19.7)	58 (20.6)	
PCV2	99 (24.4)	57 (20.3)	
OPV3	152 (37.4)	136 (48.4)	
Pentavalent3	146 (36.0)	135 (48.0)	
PCV3	161 (39.7)	136 (48.4)	

\* statistically significant

Table 2. Within group comparison between Sex of infants and missed immunisation in both facilities

Variables	Mile Four (n=406)				St.Vincent (n=281)			
	Missed immunisation			$\chi^2$ (p-value)	Missed immunisation			$\chi^2$ (p-value)
	Yes Freq. (%)	No Freq. (%)	Total		Yes Freq. (%)	No Freq. (%)	Total	
<b>Sex of infants</b>	<b>Pentavalent vaccines1</b>			0.90 (0.34)	<b>Pentavalent vaccines1</b>			FT (0.37)
Male	4 (2.0)	201 (98.0)	205 (100)		4 (2.7)	142 (97.3)	146 (100)	
Female	7 (3.5)	194 (96.5)	201 (100)	1 (0.7)	134 (99.3)	135 (100)		
	<b>Pentavalent vaccines 3</b>			0.22 (0.63)	<b>Pentavalent vaccines 3</b>			1.51 (0.21)
Male	76 (37.1)	129 (62.9)	205 (100)		65 (44.5)	81 (55.5)	146 (100)	
Female	70 (34.8)	131 (65.2)	201 (100)	70 (51.9)	65 (48.1)	135 (100)		

FT=Fisher's exact test

Table 3. Proportion of clients who dropped- out of vaccines in both facilities

Variables	Mile-Four (n=406) Freq. (%)	St.Vincent (n=281) Freq. (%)	$\chi^2$ (p-value)
<b>Number who dropped-out vaccines</b>			
Yes	145 (35.7)	134 (47.7)	6.10 (0.02) *
No	251 (64.3)	147 (52.3)	
<b>Drop-out rate</b>	64.3%	52.3%	
<b>Number who dropped-out each vaccine</b>			
OPV3	147 (36.2)	134 (47.7)	9.05 (<0.01)*
Pentavalent3	145 (35.7)	134 (47.7)	9.87 (<0.01)*
PCV3	152 (37.4)	136 (48.4)	7.11 (0.01)*

\* statistically significant

Table 4. Within group comparison between sex of infants and immunisation drop-outs in both facilities (3<sup>rd</sup> dose of pentavalent vaccines)

Variables	Mile Four (n = 406)				St.Vincent (n=281)			
	Immunisation drop-out			$\chi^2$ (p-value)	Immunisation drop-out			$\chi^2$ (p-value)
	Yes Freq. (%)	No Freq. (%)	Total		Yes Freq. (%)	No Freq. (%)	Total	
<b>Sex of infants</b>	<b>Pentavalent 3</b>				<b>Pentavalent 3</b>			
Male	75 (36.6)	130 (63.4)	205 (100)	0.13 (0.71)	65 (44.5)	81 (55.5)	146 (100)	1.22 (0.26)
Female	70 (34.8)	131 (65.2)	201 (100)		69 (51.1)	66 (48.9)	135 (100)	

## 5. CONCLUSION

Higher proportion of infants missed immunisation and dropped out of vaccination in St.Vincent than Mile-Four hospital. This finding calls for an aggressive public campaign on need to ensure immunisation timeliness for effective immunisation in such rural areas.

## CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

Ethical approval for this study was obtained from the Research and Ethics Committee (REC), Federal Teaching Hospital Abakaliki (FETHA), Ebonyi State, Nigeria.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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