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Urban–Rural Disparities on Clients Knowledge of Cause and Preventive Measures for Childhood Immunizable Diseases in Primary Health Centers of Enugu State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author AAF conceptualized the study. Author ENO did the literature searches, designed the study and supervised the collection of data. Author ENO did the statistical analysis and wrote the initial draft of the manuscript which was revised by author AAF. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: The study was designed to determine urban–rural disparities on clients knowledge of cause and preventive measures for childhood immunizable diseases in primary health care facilities of Enugu State, Nigeria.
Methodology: Using a cross-sectional analytical study design, a three stage sampling technique was adopted to select 800 clients who presented with their children/wards to 18 of 440 primary health centers in the study area for immunization services. The study took place between October and December 2013. The outcome measure of study was clients' good knowledge of cause of childhood immunizable diseases, and was determined by proportion of clients who knew the cause of four of the eight childhood immunizable diseases in the national immunization schedule.
Results: Majority of the clients were aware of the childhood immunizable diseases and also their

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preventive measures. Knowledge of cause of tetanus was high, (urban, 75.3%; rural 71.3%), but low for poliomyelitis, (urban 0.5%;, rural 3.3%), and yellow fever, (urban, 5.0%; rural 5.5%). None of the clients knew the cause of measles. Low and comparable proportion of clients in the two study groups had good knowledge of cause of childhood immunizable diseases, (urban, 23.8%; rural 27.5%). Predictor of good knowledge of cause of the diseases is maternal attainment of primary education, (AOR) =0.4, 95% CI: 0.2- 0.8).

Conclusion: Majority of the respondents were aware of the childhood immunizable diseases and also their methods of prevention. The clients perception of the cause of childhood immunizable diseases was poor in the study area. There is need for adequate public enlightenment on the cause of these diseases including health education of the mothers during immunization visits as good understanding of the causes may serve as a boost to the immunization programme and help to increase its coverage.

Keywords: Healthcare disparities; urban population; rural population; health knowledge; primary health care; vaccination; child health; Nigeria.

1. INTRODUCTION

The World Health Organization, (WHO), launched the Expanded Programme on Immunization, (EPI) in 1974, with the vaccines for six childhood killer diseases that included poliomyelitis, diphtheria, whooping cough, measles, tetanus and tuberculosis [1,2]. The EPI programme commenced in Nigeria in 1979 with the vaccines for these six childhood diseases. Nigeria later introduced the yellow fever and hepatitis B vaccines into the national schedule in 2003, the pentavalent vaccine (DPT + HBV +Hib) in 2012 and the pneumococcal conjugate vaccine in 2013 [3]. There are also plans to introduce the vaccine for rotavirus.

The EPI serves as the entry point for primary health care delivery in communities in Nigeria [3]. In 1996, the government of Nigeria renamed EPI, the National Programme on Immunisation, (NPI), as a way of demonstrating ownership of the programme and also to ensure its sustainability. Also, in 2007, following the health sector reforms, NPI was merged with the National Primary Health Care Development Agency with its functions taken over by the Department of Disease Control and Immunization of the agency [3]. Based on the prominence of immunization and its activities, it is on record that the current priorities of the health sector in Nigeria are in the areas of childhood immunization and HIV/AIDS prevention [4].

The choice of primary health centers for this study is of relevance as it has been observed that irrespective of where a child is delivered, the primary health centers are mainly the point of call for immunization and its services in both the urban and rural areas [5]. To a large extent, the administrative structure in Nigeria supports the use of primary health centers for immunization services since the immunization coordinating agency, the National Primary Healthcare Development Agency also supervises all matters related to the Primary Health Care system [3]. Also, in India, an analysis of maternal and child health services of an urban health center revealed that immunization was the highest in terms of utilization of services at the health center [6]. Consequently, at the global level, it has been recognized that in areas where the primary health centers function adequately that vaccine coverage is always high, [7] hence the conclusion that immunization is the building block of primary health care [1].

The intense and long period of immunization activities in Nigeria notwithstanding, immunization coverage is still very low with only 25% of children aged 12-23 months being fully vaccinated [4]. Also, there is evidence that knowledge of causes of these childhood diseases is poor among beneficiaries of these services. For example, in a study that involved 11 states in northern Nigeria, most of the respondents attributed the spread of childhood diseases including poliomyelitis to such factors as bad food, contaminated water and weather conditions [8]. In another study in Gombe state, Nigeria, majority of the respondents did not know the mode of transmission of poliomyelitis [9].

This observation prompted suggestion on the need for advocacy and enlightenment campaigns on the route of transmission of the childhood immunizable diseases [9]. Before then, there had been a call to improve maternal knowledge of these childhood immunizable diseases [10]. It has also been found that poor knowledge of

vaccine-preventable diseases by mothers has been associated with delayed immunization or non immunization of children [11]. This study was designed to determine urban– rural disparities on clients knowledge of cause and preventive measures for childhood immunizable diseases in primary health care facilities of Enugu State, Nigeria.

2. METHODOLOGY

2.1 SETTING

The study was conducted in Enugu State, one of the five states in Nigeria's southeast geo-political zone. Administratively, it is made up of 17 local government areas and 291 political wards. It has a total area of 7,618 square kilometer with a population of 4,881,500 people based on 2006 national population census [12]. Its inhabitants are mainly of the Igbo ethnic nationality and are predominantly Christians. In the urban areas of the state, the major occupation of the people are trading and formal employments while in the rural, it is subsistence farming and animal pasturing.

Enugu State operates the District Health System, with seven functional district hospitals, 40 cottage hospitals, 440 primary health centers, two teaching hospitals, two specialist hospitals and 384 private hospitals and clinics [13]. Immunization services in the state are free and are anchored on the primary health centers.

2.2 Study Design

A cross-sectional analytical study design was employed.

2.3 Study Population

The study population was clients who presented with their children/wards for immunization services in the primary health centers selected for the study. The infant welfare/ immunization clinics of the selected primary health centers served as points of recruitment for the clients and the study took place between October and December 2013.

2.4 Sample Size Determination

The minimum sample size for the study was determined by the formula used to compare two independent proportions [14]. From a study in Lagos, Nigeria, 83.3% of urban respondents were aware of poliomyelitis, [15] while 78.7% of the rural respondents also had knowledge of the disease [15]. A total of 400 clients was estimated for each group based on a type 1 error (α) of 0.05 in a two-sided test and a power of 0.8.

2.4.1 Sampling technique

The study employed a three stage sampling technique. The 17 local government areas of the state were stratified into urban and rural. (five are classified as urban and 12 rural) A simple random sampling technique of balloting was used to select three local government areas each in urban and rural areas in the first stage of sampling. In the second stage, from a list of all the primary health centers in the selected local government areas, three health centers were randomly selected by the balloting method. In the third stage, a systematic random sampling technique was used to select the clients as they presented in the immunization/ infant welfare clinic of the selected primary health centers on each day of data collection. The average attendance at the health centers for immunization services in the last six months served as the sampling frame, (2021 in urban and 1657 in rural area) and by dividing this population by the sample size of 400 in each group, one out of every five clients in urban and one out of every four clients in rural area were selected. The index client was selected among the first five clients in urban and the first four clients in rural area by a simple random sampling method through balloting using the health facility register of the clients on each day of data collection. The research assistants had a register for all the clients that were included in the study, and this was cross checked before a new client was included to ensure that no client was selected twice.

2.5 Study Instrument

A validated semi-structured questionnaire was used, and this was adapted from the protocol of the Addis Ababa University KABP study on immunization: Exit Interview Questionnaire [16]. In the questionnaire, all the childhood immunizable diseases in the national immunization schedule of Nigeria were introduced one after the other to the clients using their local names. Information was then obtained from the clients on whether they know the disease, what causes the disease and the preventive measure for the disease. There were

slight modifications to the questionnaire as it related to the independent variables and this was to suit some peculiarities of the study area. The validated questionnaire was administered to the clients by trained research assistants.

2.6 Data Analysis

Data analysis was done using the Statistical Package for Social Sciences, (SPSS), statistical software, version 20. Frequency tables and cross tabulations were generated, and level of significance was determined by a p-value of less than 0.05. The socio-demographic characteristics of the clients of immunization services, their knowledge of cause and preventive measures of the childhood immunizable diseases in the two study groups were compared. Furthermore, the clients' good knowledge of the cause of childhood immunizable diseases was compared. This was assessed by the proportion of the clients in the two study groups who correctly answered the cause of four of the eight childhood immunizable diseases in the national immunization schedule. Multivariate analysis using binary logistic regression was used to determine the factors predictive of good knowledge of cause of childhood immunizable diseases. Variables that had a p-value of less than 0.2 in bivariate analysis were entered into the logistic regression model to determine the predictors of clients' good knowledge of cause of childhood immunizable diseases. A logistic regression model was fitted for both the urban and rural area and the results were reported using Adjusted Odds Ratio, (AOR) and 95% Confidence Intervals (CI).

2.7 Outcome Measure

The outcome measure was the good knowledge of the clients of immunization services of cause of childhood immunizable diseases. This was assessed by the proportion of the clients in the two study groups who knew the cause of four of the eight childhood immunizable diseases in the national immunization schedule.

3. RESULTS

Table 1, shows the socio-demographic characteristics of the clients. Majority of respondents in urban and rural primary health centers were in the age group 25- 29 years. Also, majority of the parents of the children for immunization services in the two study groups had secondary education and were self employed. Similarly, majority of the clients were the mothers of the children to be immunized.

Table 2, shows the clients perception of the cause and preventive measures of measles, poliomyelitis, whooping cough and tetanus. None of the clients in the urban and rural primary health centers knew the cause of measles. Also, a significantly higher proportion of clients in urban (75.3%) knew the cause of tetanus when compared with those in the rural, (71.3%). A very low proportion of the clients in the two study groups knew the cause of poliomyelitis, (urban, 0.5% and rural 3.3%).

Table 3, shows the perception of clients of the cause and preventive measures of diphtheria, tuberculosis, hepatitis B and yellow fever. A significantly higher proportion of clients in the rural area, (53.8%) were aware of the cause of diphtheria when compared with those in the urban area, (43.5%) A low but comparable proportion of clients in the two study groups were aware of the cause of hepatitis B. (urban, 29.3%; rural 24.8%). Also, a minor proportion of the clients, 5.0% in urban and 5.5% in rural were aware of the cause of yellow fever and high but comparable proportions of the clients in the two study groups were aware of the preventive measure for the disease.

Table 4, shows clients' good knowledge of the cause of childhood immunixable diseases. Low and comparable proportions of clients in the two study groups (urban 23,8% and rural, 27.7%) had good knowledge of cause of the childhood immunizable diseases by knowing correctly the causes of four of the eight childhood immunizable diseases.

Table 5 shows the factors that affect clients good knowledge of cause of childhood immunizable diseases. Among all the clients of immunization services in the study area, the educational attainment of the mothers of the children showed a statistical significant association with the clients' good knowledge of cause of childhood immunizable diseases. The mothers who had primary education and less were twice less likely to have good knowledge of cause of childhood immunizable diseases when compared to the mothers who had secondary education and above.

Table 1. Socio-demographic characteristics of clients of immunization services

Variable	Urban (n=400) N (%)	Rural (n=400) N (%)	χ^2	p value
Age of clients				
Mean ±SD (years)	28.9±4.5	26.7±5.1	6.447*	<0.001
Age groups in years				
< 20	7 (1.8)	32 (8.0)	48.073	<0.001
20 – 24	58 (14.5)	111 (27.8)		
25 – 29	163 (40.8)	133 (33.3)		
30– 34	110 (27.5)	94(23.5)		
≥ 35	62 (15.5)	30 (7.5)		
Relationship of client to child				
Mother	390(97.5)	392 (98.0)	1.382	0.501
Father	5 (1.3)	6 (1.5)		
Female guardian	5 (1.3)	2 (0.5)		
Marital status				
Married	390(97.5)	371 (92.8)	13.346**	0.001
Never married	10 (2.5)	24 (6.0)		
Separated/Divorced/widowed	0 (0)	5 (0.6)		
Religion				
Christian	399 (99.8)	393 (98.3)	4.712	0.095
Others***	1 (0.2)	7 (1.8)		
Ethnic group				
Igbo	391 (97.8)	394 (98.5)	0.611	0.434
Others ****	9 (2.3)	6(1.5)		
Education of mother of index child				
No formal education	1 (0.3)	3 (0.8)	37.257	<0.001
Primary education	30 (7.5)	49 (12.3)		
Secondary education	255 (63.8)	301 (75.3)		
Post secondary education	114 (28.5)	47 (11.8)		
Occupation of mother				
Self employed	211 (52.8)	238 (59.5)	8.360	0.015
Unemployed/housewife	130 (32.5)	128 (32.0)		
Salaried employment	59 (14.8)	34 (8.5)		
Education of father of index child	**n= 390 N (%)**	**n= 371 N (%)**		
No formal education	2 (0.5)	18 (4.9)	40.256	<0.001
Primary education	31 (7.9)	47 (12.7)		
Secondary education	223 (57.2)	241 (65.0)		
Post secondary education	134 (34.4)	65 (17.5)		
Occupation of father				
Self employed	269 69.0)	298 (80.3)	13.069	0.001
Salaried employment	116 (29.7)	69 (18.6)		
Unemployed	5 (1.3)	4 (1.1)		
Socio-economic status	**n=400 N (%)**	**n=400 N (%)**		
Least poor	157 (39.3)	45 (11.3)	152.982	<0.001
The poor	121 (30.3)	84 (21.0)		
Very poor	86 (21.5)	107 (26.8)		
Poorest	36 (9.0)	164 (41.0)		

**student t test; **Likelihood ratio; ***Islam and Traditional African religion; ****Yoruba, Hausa and minority tribes*

4. DISCUSSION

Majority of the clients of immunization services in the two study groups (urban, 98.3% and rural 97.0%), were aware of measles; however, they attributed the cause of the disease, mainly to weather conditions, (hot weather and excess heat) with none of the clients in the study area being aware of the true cause of measles. The knowledge and observation that outbreaks of measles are more frequent in the dry season [1] may have informed the opinion of the clients that the disease was being caused by weather conditions.

Similarly, in a study in Hulu Langat district of China, it was found that 91.6% of the respondents did not know the cause of measles [17]. In another study in northern Nigeria, it was found that 26% of the respondents were of the view that measles was caused by evil spirits, witchcraft and heat [18]. Perhaps, it is this poor perception of cause of measles that ensured that among mothers whose children had measles in sub-urban and rural areas of northern Nigeria, only 31% of them were treated in formal health facilities [18]. A very high proportion of the respondents in the two study groups were aware that immunization is the recommended preventive measure for measles. This result is however, at variance with the results of a study in northern Nigeria, where only 1% of the respondents believed that measles can be prevented by immunization and 25% of the respondents in that study had never heard of measles immunization [18].

Table 2. Clients perception of measles, poliomyelitis, whooping cough and tetanus

Variable	Urban (n=400) N (%)	Rural (n=400) N (%)	χ^2	p value
Aware of measles				
Yes	393 (98.3)	388 (97.0)	1.348	0.246
No	7 (1.8)	12 (3.0)		
Perceived cause of measles				
Hot weather/Excess heat	367 (91.8)	359 (89.8)	1.568	0.457
Malnutrition	26 (6.5)	29 (7.3)		
Don't know	7 (1.8)	12 (3.0)		
Prevention measure				
Vaccination	370 (92.5)	387 (96.7)	7.103	0.008
Don't know	30 (7.5)	13 (3.3)		
Aware of poliomyelitis				
Yes	302 (75.5)	328 (82.0)	5.049	0.025
No	98 (24.5)	72 (18.0)		
Perceived cause of poliomyelitis				
Viral infection	2 (0.5)	13 (3.3)	12.701	0.005
Incomplete /delayed vaccination	188 (47.0)	204 (51.0)		
Malnutrition	112 (28.0)	111 (27.8)		
Don't know	98 (24.5)	72 (18.0)		
Prevention measure				
Vaccination	273 (68.3)	322 (80.5)	15.747	<0.001
Don't know	127 (31.7)	78 (19.5)		
Aware of whooping cough				
Yes	285 (71.3)	309 (77.3)	3.766	0.052
No	115 (28.8)	91 (22.8)		
Perceived cause of whooping cough				
Bacterial infection	139 (34.8)	169 (42.3)	5.933	0.115
Cold and dust	103 (25.8)	101 (25.3)		
Dirty environment/worm	43 (10.8)	39 (9.3)		
Don't know	115 (28.8)	91 (22.8)		
Prevention measure				
Vaccination	262 (65.5)	306 (76.5)	11.753	0.001
Don't know	138 (34.5)	94 (23.5)		
Aware of tetanus				
Yes	354 (88.5)	332 (83.0)	4.951	0.026
No	46 (11.3)	68 (17.0)		
Perceived cause of tetanus				
Infected wound	301 (75.3)	285 (71.3)	7.982	0.046
High fever	36 (9.0)	24 (6.0)		
No vaccination	17 (4.3)	23 (5.8)		
Don't know	46 (11.5)	68 (17.0)		
Prevention measure				
Vaccination	328 (82.0)	331 (82.8)	0.077	0.781
Don't know	72 (18.0)	69 (17.3)		

Table 3. Clients perception of diphtheria, tuberculosis, hepatitis B and yellow fever

Variable	Urban (n=400) N (%)	Rural (n=400) N (%)	χ^2	p value
Aware of diphtheria				
Yes	243 (60.8)	302 (75.5)	20.038	<0.001
No	157 (39.2)	98 (24.5)		
Perceived cause of diphtheria				
Bacteria/throat infection	174 (43.5)	215 (53.8)	33.114	< 0.001
Malnutrition	31 (7.8)	64 (16.0)		
Don't know	195 (48.8)	121 (30.3)		
Prevention measure				
Vaccination	220 (55.0)	292 (73.0)	28.125	<0.001
Don't know	180 (45.0)	108 (27.0)		
Aware of tuberculosis				
Yes	329 (82.3)	323 (80.8)	0.298	0.585
No	71 (17.8)	77 (19.3)		
Perceived cause of tuberculosis				
Air borne/bacterial infection	196 (49.0)	196 (49.0)	24.857	<0.001
Exposure to cold/dust	82 (20.5)	58 (14.5)		
Dirty environment/worm	17 (4.3)	50 (12.5)		
Tobacco smoking	34 (8.5)	19 (4.8)		
Don't know	71 (17.8)	77 (19.3)		
Prevention measure				
Vaccination	302 (75.5)	318 (79.5)	1.835	0.176
Don't know	98 (24.5)	82(20.5)		
Aware of hepatitis B				
Yes	289 (72.3)	305 (76.3)	1.674	0.196
No	111 (27.8)	95 (23.8)		
Perceived cause hepatitis B				
Viral infection of liver/ contaminated sharps/STI	117 (29.3)	99 (24.8)	6.252	0.100
Nutritional disorder	111(27.8)	126 (31.5)		
High fever/ Untreated malaria	61 (15.3)	80 (20.0)		
Don't know	111 (27.8)	95 (23.8)		
Prevention measure				
Vaccination	264 (66.0)	300 (75.0)	7.789	0.005
Don't know	136 (34.0)	100 (25.0)		
Aware of yellow fever				
Yes	313 (78.3)	315 (78.8)	0.030	0.863
No	87 (21.8)	85 (21.3)		
Perceived cause of yellow fever				
Viral infection/ infested mosquitoes	20 (5.0)	22 (5.5)	7.162	0.067
Nutritional disorder	182 (45.5)	188 (47.0)		
Untreated malaria	72 (18.0)	94 (23.5)		
Don't know	126 (31.5)	96 (24.0)		
Prevention measure				
Vaccination	288 (72.0)	308 (77.0)	2.632	0.105
Don't know	112 (28.0)	92 (23.0)		

Table 4. Clients good knowledge of cause of childhood immunizable diseases

Variable	Urban (n=400) N (%)	Rural (n=400) N (%)	χ^2	p value
Good knowledge of cause of childhood immunizable diseases				
Yes	95 (23.8)	110 (27.5)	1.476	0.224
No	305 (76.3)	290 (72.5)		

Table 5. Factors affecting clients good knowledge of cause of childhood immunizable diseases

Variable	Good knowledge of cause of immunizable diseases N (%)	Poor knowledge N (%)	p value on bi-variate analysis	Adjusted odds ratio 95% confidence Interval on multivariate analysis
Location				
Urban	95 (23.8)	305 (76.3)	0.224	NA
Rural	110 (27.5)	290 (72.5)		
Age category	128 (25.4)	376 (74.6)	0.847	NA
< 30 years	77 (26.0)	219 (74.0)		
≥ 30 years				
No of living children				
≤ 2	107 (24.7)	327 (75.3)	0.493	NA
≥ 2	98 (28.8)	268 (73.2)		
Marital status				
Married	197 (25.9)	564 (74.1)	0.453	NA
Single*	8 (20.5)	31 (79.5)		
Education of mother				
Primary education and below	11 (13.3)	72 (86.7)	0.006	0.4 (0.2- 0.8)
Secondary education and above	184 (27.1)	523 (72.9)		
Occupation of mother				
Unemployed/ housewife	65 (25.2)	193 (74.8)	0.573	NA
Self employed	112 (24.9)	337 (75.1)		
Salaried employment	28 (30.1)	65 (69.9)		
Socio economic status				
High socio-economic status	113 (27.8)	294 (72.2)	0.158	1.2 (0.8- 1.6)
Low socio-economic status	92 (23.4)	301 (76.6)		
Education of father				
Primary education and below	24 (24.5)	74 (75.5)	0.735	NA
Secondary education and above	173 (26.1)	490 (73.9)		
Occupation of father				
Self employed	139 (24.5)	428 (75.5)	0.067	NA
Salaried employment	53 (28.6)	132 (71.4)		
Unemployed	5 (55.6)	4 (44.4)		
Relationship of client to child				
Mother	203 (26.0)	579 (74.0)	0.154	2.9 (0.7- 12.6)
Others **	2 (11.1)	16 (83.9)		

**never married, divorced, widowed; **Father, guardian; NA Not applicable*

Even though the awareness of poliomyelitis was high among the respondents in the study, only a minor proportion of the clients were aware of the cause of the disease (urban 0.5% and rural 3.3%). Majority of the respondents attributed the cause of the disease to incomplete, absent or delayed vaccination. It is pertinent to note that the whole focus of immunization services in Nigeria in the past decade has been on poliomyelitis, and this has attracted wide media coverage and public attention. This has been further reinforced with the frequent house to house administration of the oral polio vaccine during the National Immunization Days, and the gory picture painted of the disease by health workers during the health education periods.

One consistent story associated with poliomyelitis has been that it has persisted in Nigeria, especially in the northern region due to the one-year stoppage of immunization activities consequent to the rumours that the vaccine was

being used to reduce the fertility of young girls [7,19]. It may be this link of the disease with lack of vaccination services as was obtained in northern part of Nigeria between the years, 2002 and 2003 that was reflected in the opinion of the respondents as the very cause of the disease. It appears; there is a good emphasis on poliomyelitis in the study area, but the respondents had very poor perception of its cause.

In a study that involved eleven states in northern Nigeria, it was found that majority of the clients attributed the causes of childhood diseases, including poliomyelitis to factors like bad food, bad water, weather conditions and poor environmental conditions [8]. In another study in Gombe State, Nigeria, 83.6% of the respondents perceived poliomyelitis to be a very serious disease, but only 44.3% of the respondents knew its mode of transmission [9]. In Jos, north-central Nigeria, it was found that about 30% of adult women who participated in a study did not have proper understanding of poliomyelitis [20]. This poor perception of poliomyelitis prompted the suggestion on the need for good public enlightenment on the disease even as the regular immunization campaigns were on going [9]. Perhaps, a good understanding of the cause of these diseases could serve as a boost to the immunization programme as it may reinforce its relevance and need.

A very high proportion of the clients, 88.5% in urban, and 83.0% in rural were aware of tetanus and also majority of them, (75.3% in urban and 71.3% in rural) knew the cause of the disease. This good perception of the cause of tetanus could have been informed by the antenatal care experiences of the women where tetanus toxoid injection is a common feature and well emphasized by the antenatal care providers [4]. Also, a very high proportion of the respondents in the urban and rural primary health centers were aware that vaccination is the preventive measure for tetanus, and this may also be related to their good perception of the cause of the disease, and the use of tetanus toxoid injections during the antenatal period. This report from tetanus is an indication that a good health education campaign among the clients of immunization services will increase the knowledge of causes of these childhood diseases.

Most of the respondents in the two study groups (82.3% in urban, and 80.8% in rural), were aware of tuberculosis and this is expected as the disease has been of old. However, 49.0% of the clients in both study groups had a good perception of the cause of the disease. Also, 24.9% of clients in urban and 18% in rural perceived tuberculosis as being caused by exposure to cold and dust. This is an indication that previous perceptions of the cause of the disease have persisted to this period. For example, in a study in Ethiopia, 45.9% of the respondents attributed the cause of tuberculosis to exposure to air, 38% noted that it was due to starvation, and 21.8% referred to dust as the causative agent [21]. Also, in a study among general out patients of tertiary care hospitals of Bengal, India, it was found that only 16.8% of the respondents knew the cause of tuberculosis [22]. Similarly, in another study in Arusha, Tanzania, it was found that 75% of the respondents that participated in the study had poor knowledge of tuberculosis [23].

Knowledge of the preventive measures of the eight childhood immunizable diseases were high among the respondents in the urban and rural primary health centers and this could be attributed to the intense immunization activities in Nigeria in the last decade. However, very low but comparable proportions of the respondents, 23.8% in urban and 27.5% in rural had good knowledge of the cause of childhood immunizable diseases. When one recalls the good emphasis on immunization and its services in Nigeria, [4] this result is very poor. It is also supported by the result of a study in Lagos, Nigeria which revealed that even though the awareness for immunization was high that knowledge of vaccine-preventable diseases in both the urban and rural areas was low [15]. This poor knowledge of the causes of childhood immunizable diseases may be partly responsible for the low immunization coverage in Nigeria not minding the great attention it has received from the country's authorities.

From the binary logistic regression analysis, the only significant factor associated with good knowledge of the cause of childhood immunizable diseases is the educational attainment of the mothers of the children that came to be immunized. Mothers who had no formal and primary education were 2.3 times less likely to have a good knowledge of cause of childhood immunizable diseases when compared with those who had secondary and tertiary education. Education has been found to be closely related to immunization and its services. In Nigeria, access to all basic vaccinations

increases as the educational attainment of the mother increases [4]. In a study in Eastern Uganda, it was also found that mothers who had secondary education were less likely to miss scheduled vaccinations when compared with those who had primary education [24].

The relevance of good knowledge of these childhood diseases is further reinforced by the finding that poor knowledge of vaccine-preventable diseases by mothers has been associated with delayed immunization or non immunization of children [11]. Consequently, it has been postulated that even in the presence of maternal illiteracy, educating mothers about vaccine preventing diseases will be of relevance in increasing immunization coverage [11]. There is thus the need for adequate public enlightenment on the causes of the childhood immunizable diseases as such good understanding by the public of the causes of these diseases may boost the need for immunization services thereby increasing its coverage which at present is low in Nigeria.

5. CONCLUSION

Majority of the respondents were aware of the childhood immunizable diseases and also their methods of prevention. The clients perception of the cause of childhood immunizable diseases was poor in the study area. There is need for adequate public enlightenment on the cause of these diseases including health education of the mothers during immunization visits as good understanding of the causes may attach relevance to the immunization programme and help to increase its coverage.

ETHICAL APPROVAL

Ethical approval for the study was obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital Ituku-Ozalla, Enugu. Clients were required to sign or thumbprint on the written informed consent form before the interview and the nature of the study, its relevance and the level of their participation were adequately explained to them. Participants were assured that participation was voluntary and that there would be no victimization of anyone who refused to participate or who decided to withdraw from the study after giving consent. Also, measures were taken to ensure that no identifying information was obtained from the study participants using the questionnaire.

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DISCLAIMER

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Obionu CN. Primary Health Care for developing countries. 2nd ed. Enugu: Delta Publications; 2007.
2. Bloom DE, Canning D, Weston M. The value of vaccination. World Economics. 2005;6(3):15-39.
3. Federal Ministry of Health, National Primary Health Care Development Agency. Comprehensive EPI multi-year plan, 2011-2015; 2011. Abuja, Nigeria.
4. National Population Commission [Nigeria], ORC Macro. National Demographic and Health Survey 2013. Calverton, Maryland; National Population Commission and ORC Macro; 2014.
5. Fatiregun AA, Ossai EN. Clients' satisfaction with immunization services in the urban and rural primary health centers of a South-Eastern State in Nigeria. Niger J Paed. 2014;41(4):375-382.
6. Banarjee B. A qualitative analysis of maternal and child health services of an urban health centre, by assessing client perception in terms of awareness, satisfaction and service utilization. Indian Journal of Community Medicine. 2003; 28(4):153-156.
7. World Health Organization, UNICEF, World Bank. State of the world's vaccines

and immunization. 3rd edition. Geneva. WHO; 2009.

8. National Programme on Immunisation. Knowledge, perception and beliefs about childhood immunization and attitude towards uptake of poliomyelitis immunization in Northern Niigeria. Study Report. November; 2006.
Available:www.comminit.com/polio/node. (Accessed 9th December, 2015)
9. Obute JA, Arulogun OS. Parents' awareness and perception of the polio eradication programme in Gombe Local Government Area, Gombe State, Nigeria. International Journal of Health Promotion and Education. 2007;45(3):81-86.
10. Manjunath U, Pareek RP. Maternal knowledge and perceptions about the routine immunisation programme: A study in a semi-urban area in Rajasthan. Indian J Med Sci. 2003;57:158-63.
11. Rahman MM, Islam MA, Mahalanabis D. Mothers' knowledge about vaccine preventable diseases and immunization coverage of a population with high rate of illiteracy. Journal of Tropical Pediatrics. 1995;41(6):376-378.
12. Federal Republic of Nigeria. Official Gazette. Lagos. Nigeria; 2007.
13. Enugu State Ministry of Health. Planning, Research and Statistics Department. Enugu. Nigeria; 2014.
14. Taofeek I. Research Methodology and Dissertation Writing for Health and Allied Health Professionals. 1st ed. Abuja: Cress Global Link Ltd; 2009.
15. Okafor IP, Dolapo DC, Onigbogi MO, Iloabuchi IG. Rural- urban disparities in maternal immunization knowledge and childhood health seeking behavior in Nigeria: A mixed method study. Afri Health Sci. 2014;14(2):339-347.
16. WHO/AFRO. Mid-Level Management Course for EPI Managers; Conducting Assessment of the Immunization Programme. Module 23, EPI. WHO/AFRO; 2004.
17. Teng AK. A knowledge, attitude and practice survey of measles among mothers attending Government health clinics in the Hulu Langat District. University of Malaya, 50 years of Research; 2013.
Available:www.spm.um.edu/research (Accessed 14th September 2015)
18. Ambe JP, Omotara BA, Mandu Bara M. Perceptions, beliefs, and practices of mothers in sub-urban and rural areas towards measles and measles vaccination in northern Nigeria. Trop Doct. 2001;31(2): 89-90.
19. Jegede AS. What led to the Nigerian boycott of the vaccination campaign? PLoS Med. 2007;4(3):e73.
DOI: 10.1371/journal.pmed.0040073
20. Jombo GTA, Enenebeaku MNO, Salako A, Nimzing L, Egah DZ, Kandakai O. Beliefs and perceptions about poliomyelitis among adult women in a Nigerian city: Implications for global polio eradication early 21st century. The Internet Journal of Pediatrics and Neonatology. 2008;8(1): 5580/578.
21. Legesse M, Ameni G, Mamo G, Medhin G, Shawel D, Bjune G, Abebe F. Knowledge and perception of pulmonary tuberculosis in pastoral communities in the middle and Lower Awash Valley of Afar region, Ethiopia. BMC Public Health. 2010;10:187.
22. Das P, Basu M, Dutta S, Dias D. Perception of tuberculosis among general patients of tertiary care hospitals of Bengal. Lung India. 2012;29:319-24.
23. Mfinanga SG, Morkve O, Kazwala RR, Cleaveland S, Sharp JM, Shirima G, Nilsen R. Tribal differences in perception of tuberculosis: A possible role in tuberculosis control in Arusha, Tanzania. Int J Tuberc Lung Dis. 2003;7(10):933-941.
24. Nankabirwa V, Tylleskar T, Tumwine JK, Sommerfelt H, Study Group P. Maternal education is associated with vaccination status of infants less than 6 months in Eastern Uganda: a cohort study. BMC Pediatrics. 2010;10:92.
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