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A Cross-sectional Study on Awareness, Attitude and Utilisation of Immunisation Services by Mothers of Under-five in Elele, Rivers State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors KAU and URO developed the research question, questionnaire design, write up and general coordination. Author ACI managed the data analysis. Author CBD did the literature review. Authors EN and INAO collected the data. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Approximately 6.2 million under-five children die globally on annual basis and immunisation having been recognised as the most successful and cost-effective public health intervention of the 20th century regarding the number of deaths averted can help to prevent approximately 2 million of these deaths if coverage is optimal.
Objectives: To assess the awareness and attitude of mothers towards utilisation of immunisation services in Elele, Rivers State.
Methodology: It was a descriptive cross-sectional study conducted between April and July 2015. The study population comprised of mothers with at least one under-five-year-old child. Stratified sampling technique was used, and data collection was with a pre-tested, semi-structured,

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interviewer-administered questionnaire. Data analysis was done using IBM SPSS version 20. Level of statistical significance was set at p-value ≤ 0.05.

Results: The average age of the respondents was 28.6 ± 5.3 years. Most (89.3%) had at least a secondary level of education. Respondents level of awareness of childhood immunisation was high (95.0%) and the major sources of information on immunisation were antenatal clinic (61.0%) and health workers (20.0%). Respondents' knowledge of vaccine-preventable diseases (VPD) was highest with poliomyelitis (76.0%) while diphtheria at 34.4% was the least known. Approximately seven percent (7.3%) of the respondents' children were unimmunized while 18.1% were partially immunised. Tetanus toxoid utilisation was significantly associated with respondents' level of education (χ^2 = 9.44, p-value = 0.0240) while the odds of completing their children immunisation was higher if done in a hospital setting compared to home service {OR (95% CI): 4.03 (1.09 – 14.95)}.

Conclusion: Health education on some of the VPDs by healthcare personnel is advocated for the community. Greater efforts should be placed on strengthening routine immunisation as against supplemental immunisation since the former has a better immunisation completion rate.

Keywords: Childhood; immunisation; mothers; utilisation; Nigeria.

1. INTRODUCTION

Approximately 6.2 million children under the age of five died globally in 2013 with sub-Saharan Africa contributing almost half (3 million) of these deaths [1]. The World Health Organisation had in 2009 estimated that if global vaccine coverage increased to 90% by 2015, then approximately two million deaths of children under the age of five would be prevented [2].

Immunisation has been recognised as the most successful and cost-effective public health intervention of the 20th century regarding the number of deaths prevented per year [3]. Zangene et al. have also reported that childhood immunisation indirectly prevents infectious diseases in adults through herd immunity [4]. They found that the use of pneumococcal protein conjugate vaccine among children reduced the total number of invasive pneumococcal disease (IPD) cases and resulted in a 38% decrease in the rate of IPD among non-vaccinated elderly adults through herd immunity [4].

Immunisation campaigns became more popular since 1988 when World Health Organisation (WHO) in conjunction with United Nations Children Fund (UNICEF), Rotary International, Bill and Melinda Gates Foundation and the United States Centre for Disease Control and Prevention (CDC) launched the polio eradication programme. Immunisation campaigns against polio and measles have yielded tremendous results globally and in Nigeria. Global polio cases have been reduced from 350,000 in 1988 to 74 reported cases in 2015 (> 99% reduction) [5] Likewise, and global measles deaths have decreased by 79% from an estimated 651,600 in the year 2000 to 134,200 in 2015 [6]. Despite the success of expanded programme on immunisation (EPI), such as eradication of smallpox and global lowering of the incidence of polio and measles; many vaccine-preventable diseases remain prevalent especially in developing countries [7].

Child immunisation in Nigeria is provided through routine immunisation and catch-up supplemental immunisation campaigns (also known as National Immunisation Days) organised across the country or sub-nationally in selected areas [8,9]. A fully immunized child in Nigeria is expected to have received one dose of Bacillus Calmette-Guerin (BCG) at birth or soon after, 3 doses each of diphtheria, pertussis and tetanus (DPT) and oral polio vaccines at 6, 10 and 14 weeks and one dose of measles vaccine at 9 months of age or thereabout [10,11]. Yellow fever vaccination is also given at 9 months. Vaccines introduced more recently and administered during the first year of life include hepatitis B, pneumococcus and rotavirus vaccines [9]. Also, vitamin A is administered at 9 and 15 months [11]. As part of the Polio Eradication and Endgame Strategic Plan, inactivated polio vaccine was introduced in the routine immunisation schedule in 2015 and Nigeria participated in the April 2016 switch from trivalent to bivalent polio vaccine [12]. Furthermore, given the introduction of the second dose of measles vaccine and other booster doses by countries, improved coverage of routine immunisation is expected in the second year of life and beyond as this provides opportunities to

catch up on any missed immunisation from the first year [11].

Vaccine-preventable diseases account for about one in five child deaths in Nigeria, amounting to over 200,000 deaths per year [13]. Despite recent improvement, immunisation coverage in Nigeria is still abysmally low. According to Nigerian Demographic and Health Survey of 2013, only 25% of children aged 12 – 23 months were fully vaccinated with BCG, Measles and three doses each of DPT and Polio vaccines [10]. Specifically, 51% received BCG vaccination, 38% received the recommended three doses of DPT, 54% were fully vaccinated against polio, and only 42% received measles vaccine. Twenty-one percent (21%) of Nigerian children aged 12 – 23 months received no vaccination at all according to this survey [10]. Given that immunisation is not 100% effective [14], this high level of under-immunised and unimmunized children will impact negatively on the herd immunity thereby significantly increasing the risk of infection for vaccinated children.

Asides operational factors relating to policies, vaccine funding, vaccine availability and health workers related factors, some researchers [7,15] have identified awareness, attitude and perception of parents/caregivers as major obstacles to high immunisation coverage. In spite of efforts directed at solving operational problems, immunisation coverage in Nigeria has persistently remained unacceptably low [16,17], examining maternal factors that could impede utilisation of immunisation cannot be overemphasised. The aim of this study is therefore to assess the awareness and attitude of mothers towards immunisation services and their utilisation of the services in Elele, Rivers State.

2. MATERIALS AND METHODS

This was a cross-sectional descriptive study that was conducted in Elele community in Ikwerre Local Government Area of Rivers State between April and July 2015. The community has a total population of 20,620 according to the 2006 national population census and a projected population of 27,712 in 2016 using 3% annual growth rate.

Mothers with at least one child less than five years of age and who consented to participate in the study were included. Mothers who refused to give consent despite adequate explanations were excluded from this study.

Sample size was determined using the Cochrane sample size formula for single proportion in population greater than 10,000 people; $n = Z\alpha^2P(1- P)/d^2$, where n is the minimum sample size, Zα is the standard normal deviate at 95% confidence level (1.96), P is the proportion of fully vaccinated children from previous study (0.25) and d is the level of precision required, set at 0.05. The calculated sample size was 288. Considering a potential non-response rate of 10%, the minimum sample size required is 317, however, 400 participants were enrolled for this study.

Stratified sampling technique was utilized for this study. Respondents were stratified by those interviewed in their homes, hospitals, primary and secondary schools, university (Madonna University, Elele) and markets. A total of eighty eligible mothers were interviewed by trained interviewers in each of the five stratums on the first seen basis. Data was collected using a questionnaire design adapted from 2013 Nigerian Demographic and Health Survey [10] and modified to suit the study environment following a pre-test. A semi-structured interviewer-administered questionnaire was used for this study.

Data collected from mothers included mother's age, mother's highest educational level, marital status and occupation. Others were on awareness, knowledge, attitude and utilisation of immunisation services.

Ethical approval for this research was obtained from Madonna University Ethical Review Committee with reference number ADM/E15/A VOL. 111/816 and informed consents were given by eligible mothers. Data entry and analysis were done using SPSS version 20. Data were analysed as proportions of responses and results presented as tables and charts. Association between variables was tested using the chi-square test and level of significance was set at $p < 0.05$.

3. RESULTS

3.1 Sociodemographic Profile of Respondents

The average age of the respondents was 28.6 ± 5.3 years and Christianity (89.8%) was the dominant religion. The majority (96.3%) of the

participants were married and of Igbo (39.8%) and Ikwerre (38.8%) ethnic nationalities. Fairly equal proportions were unskilled (32.5%), and skilled (31.0%) workers and majority (89.3%) had post-primary education (Table 1).

Table 1. Sociodemographic profile of respondents

Variable	Frequency n = 400 (%)
Age (years)	
20 – 30	270 (67.5)
31 – 40	124 (31.0)
41 – 50	6 (1.5)
Mean age ± SD	28.6 ± 5.3
Religion	
Christianity	358 (89.7)
Islam	36 (9.0)
Others	6 (1.3)
Marital status	
Single	10 (2.5)
Married	385 (96.3)
Divorced	1 (0.3)
Widowed	4 (1.0)
Ethnicity	
Igbo	159 (39.8)
Ikwerre	155 (38.8)
Yoruba	23 (5.8)
Hausa	15 (3.8)
Others	48 (12.0)
Occupation	
Housewife	92 (23.0)
Unskilled	130 (32.5)
Semi-skilled	54 (13.5)
Skilled	124 (31.0)
Educational status	
None	14 (3.5)
Primary	29 (7.3)
Secondary	238 (59.5)
Tertiary	119 (29.8)

3.2 Respondents Level of Awareness of Immunisation

Most of the respondents (95.0%) were aware of immunisation, but the majority (61.0%) do not know that there could be vaccination failure (Table 2). The major sources of information on immunisation were antenatal clinic (61.0%) and health workers (20.0%), (Fig. 1).

3.3 Knowledge and Attitude of Respondents towards Immunisation Services

Most of the respondents believe that vaccination can prevent diseases in individuals and that immunisation is important (97.0% and 98.8% respectively). Concerning knowledge of vaccine-preventable diseases (VPD), poliomyelitis was the one mothers had the most knowledge of (76.0%) while the least was diphtheria (34.4%). Most of the respondents (98.3%) believed that immunising their children will help avert VPD and will be encouraging other mothers to immunise their children (99.2%) just as 75.2% do not think that reactions from vaccination are lethal and 98.5% believed that pregnant women should be vaccinated when necessary.

Table 2. Respondents level of awareness of immunisation

Variable	Frequency n = 400 (%)
Aware of immunisation	
Yes	380 (95.0)
No	20 (5.0)
Awareness of vaccination failure	
Yes	156 (39%)
No	244 (61%)

The most common reason for not fully immunising a child was ignorance (50.0%). Others were fever/illness (27.0%) and fear of injection abscess (19.0%), (Fig. 2).

3.4 Utilization of Immunisation Services by Respondents

Most of the respondents received tetanus toxoid during pregnancy (90.2%), had their under-five-year-olds immunised (92.7%) and had immunisation cards (92.0%). However, only 81.9% of respondents completed the immunisation schedule for their under- five-year-olds children. BCG (90.0%) and OPV (77.3%) were the most common vaccines received by these children while the least common were DPT (22.3%) and yellow fever vaccine (46.5%).

3.5 Effects of Mothers' Educational Status on Selected Parameters

The uptake of tetanus toxoid vaccination during pregnancy is significantly associated with educational status of mothers (χ^2 = 9.44, p = 0.0240) just as mothers with some level of education have greater odds of ensuring completion of scheduled vaccination for their under 5 children compared to mothers without formal education through this failed to reach statistical significance (χ^2 = 2.02, p = 0.5690), Table 5.

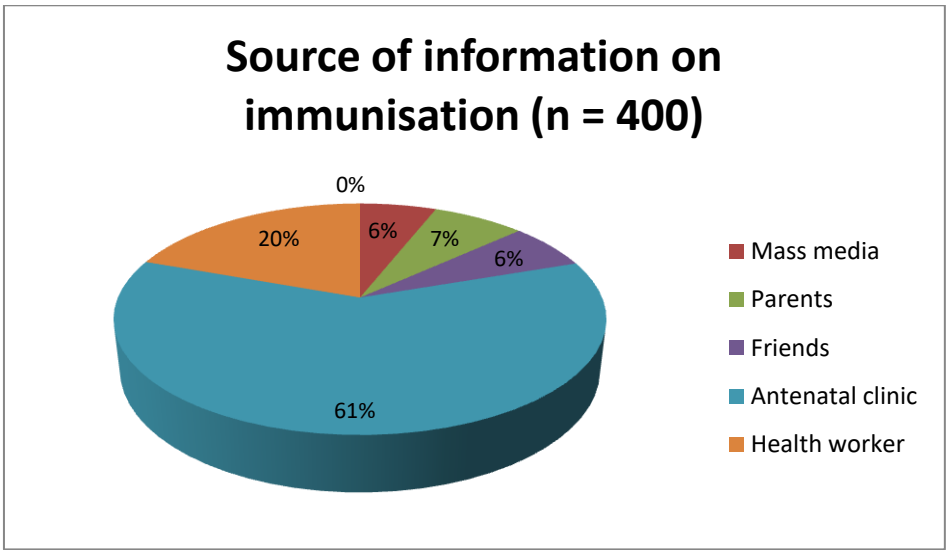

Fig. 1. Source of information on immunisation

Table 3. Knowledge and attitude of respondents towards immunisation services

Variable	Frequency n = 400 (%)
Can vaccine prevent diseases in individuals?	
Yes	388 (97.0)
No	12 (3.0)
Is immunisation important?	
Yes	395 (98.8)
No	5 (1.2)
Knowledge of vaccine-preventable diseases (VPD)**	
Tuberculosis	256 (64.0)
Poliomyelitis	304 (76.0)
Whooping coughs	168 (42.0)
Diphtheria	137 (34.3)
Tetanus	239 (59.8)
Measles	275 (68.8)
Yellow fever	224 (56.0)
Will immunising your child help in averting VPD	
Yes	393 (98.3)
No	7 (1.7)
Will you be advising other mothers to immunise their children	
Yes	397 (99.2)
No	3 (0.8)
Can reactions from the vaccine kill	
Yes	99 (24.8)
No	301 (75.2)
Should pregnant women receive the vaccine	
Yes	394 (98.5)
No	6 (1.5)

3.6 Effects of Place of Immunisation on Completion of Vaccination

Place of immunisation of under 5 children by their mothers has a statistically significant influence on the completion of vaccination (χ^2 = 9.69, p = 0.0080). Mothers whose children were vaccinated in a hospital setting were 4 times more likely to complete the vaccination compared to those vaccinated at home (OR = 4.03, p = 0.0369), Table 6.

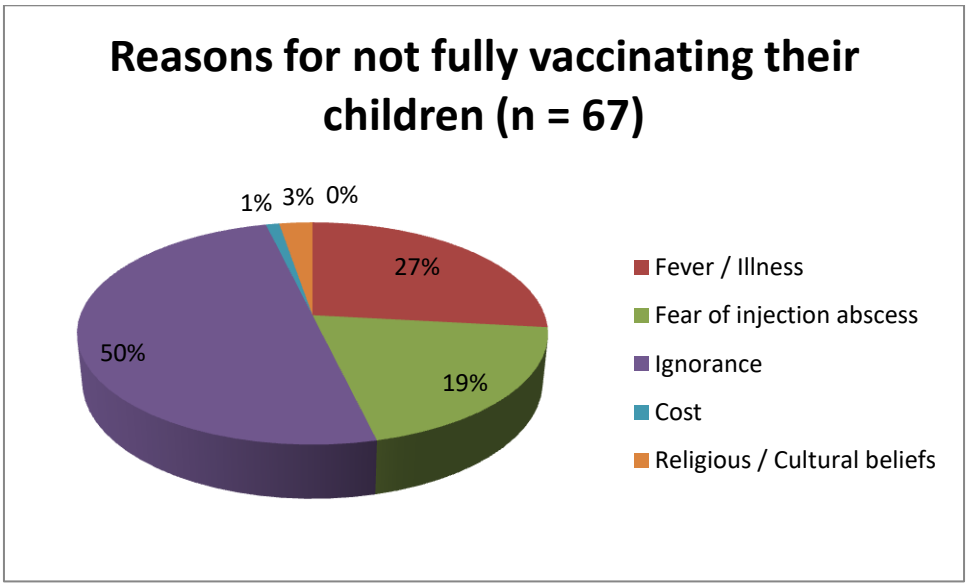

Fig. 2. Reasons were given by some respondents for not fully vaccinating their children

Table 4. Utilisation of immunisation services by respondents

Variable	Frequency n = 400 (%)
Received tetanus toxoid during pregnancy	
Yes	361 (90.2)
No	39 (9.8)
Children under 5 years of age immunised	
Yes	371 (92.7)
No	29 (7.3)
Have immunisation cards	
Yes	368 (92.0)
No	32 (8.0)
Place of immunisation	
At home	13 (3.5)
Hospital	131 (35.3)
Health centre	227 (61.1)
Completion of immunisation (n = 371)	
Yes	304 (81.9)
No	67 (18.1)
Vaccines received by under 5 children	
BCG	360 (90.0)
OPV	309 (77.3)
DPT	89 (22.3)
HBV	188 (47.0)
Pentavalent vaccine	216 (54.0)
Yellow fever vaccine	186 (46.5)
Measles vaccine	253 (63.3)

4. DISCUSSION

This study describes the knowledge, attitude and utilisation of immunisation services by mothers of under-five children in Elele, a suburban community in Rivers State. It has been known that successful immunisation of children depends substantially on mothers' existing knowledge and positive disposition [18].

Table 5. Effects of mothers' educational status on selected parameters

Variable	Yes n =351(%)	No n = 49 (%)	X^2	OR (95% CI)	p-Value
Tetanus toxoid utilization					
None	10(2.8)	4(8.2)	9.44	1.00	0.02
Primary	29(8.3)	0(0.0)		25.25(1.25 - 510.67)	0.04
Secondary	212(60.4)	26(53.1)		3.26(0.95 – 11.15)	0.06
Tertiary	100(28.5)	19(38.8)		2.11(0.60 – 7.41)	0.25
Completion of immunisation by children	**n = 329 (%)**	**n = 71(%)**			
None	10(3.0)	4(5.6)	2.02	1.00	0.57
Primary	23(7.0)	6(8.5)		1.53 (0.35 – 6.65)	0.57
Secondary	200(60.8)	38(53.5)		2.11 (0.63 – 7.06)	0.23
Tertiary	96(29.2)	23(32.4)		1.67 (0.48 – 5.80)	0.42

Table 6. Effects of the place of immunisation on completion of vaccination

Variable	Yes n = 304 (%)	No N = 67 (%)	X^2	OR (95% CI)	P - Value
Place of immunisation					
Home	9 (3.0)	4 (6.0)	9.69	1.00	0.01
Hospital	118 (38.8)	13 (19.4)		4.03 (1.09 – 14.95)	0.04
Health centre	177 (58.2)	50 (74.6)		1.57 (0.47 – 5.32)	0.47

Almost ninety percent (89.3%) of mothers in the current study had at least a secondary level of education. This probably explained the high level of awareness (95%) of immunisation services by respondents in this study. The above average literate level of participants in this study could also be responsible for their high level of knowledge and attitude towards immunisation services. Most mothers in this study believe that immunisation is important (98.8%) and can prevent vaccine-preventable diseases (98.3%). Also, their knowledge of the different vaccine-preventable diseases (VPD) is above average except for pertussis (whooping cough) and diphtheria. The rarity with which these two VPD are seen in the study area presently could be the reason for the low awareness.

Respondents' educational status is significantly associated with tetanus toxoid utilisation during pregnancy, and educated mothers have higher odds of completing their children immunisation schedule compared to mothers with no formal education. The significant impact of maternal education on the utilisation of immunisation services have also been noted by other authors. Tagbo et al. in their study on mothers' knowledge, perception and practice of childhood immunisation in Enugu, South Eastern Nigeria observed that educated mothers are more likely to immunise their children at an appropriate age as well as utilise supplemental immunisation campaigns [19]. Kabir et al. had also noted that mothers with formal education were more likely to be aware of the need for childhood immunisation compared to those who had no formal education [20]. It could then be inferred that the more educated a population is, the higher the immunisation coverage. However, a study by Manjunath and Pareek in India found that literacy status did not significantly influence immunisation coverage rates [7].

Most of the respondents in this study immunised their children (92.7%) and have immunisation cards (92.0%). However, only 81.9% completed the immunisation schedule for their children. Thus, 7.3% of the respondent's children received no immunisation, and almost one-fifth (18.1%) were partially immunised. The percentage of fully vaccinated children is appreciably higher than the 55% reported for Rivers State in the 2013 Nigeria Demographic and Health Survey (NDHS) [10]. The NDHS 2013 also reported that nearly 21% of Nigerian children were unimmunized [10]. The differences could be due to immense socioeconomic, ethnic and cultural diversity of the country. Tagbo et al. reported routine immunisation rejection rate of 4% in Enugu [19] Compliance to routine immunisation is generally high in the South Eastern part of Nigeria [10].

Ignorance (50%), child's febrile illness (27%) and fear of injection abscess (19%) were given as the

major reasons for not fully immunising a child in this study. Vonasek et al. identified being fearful of side effects (46%), ignorance, disinterest or laziness (42%) and travel or financial constraint (18%) as the major reasons parents do not fully immunise their children in their study on childhood immunisation in rural Uganda [21]. Other workers in Ethiopia and Kenya had reported busy schedules of parents as the major reason for not completing their children immunisation schedule [22,23]. These discrepancies may reflect true differences in barriers to immunising children in the different study communities. It may also be a reflection of the different study designs used.

The major sources of information on immunisation were from antenatal clinic (61%) and health workers (20%). Adeyinka et al. in their study in Igbo-ora in Oyo State, South Western Nigeria also reported antenatal care (65.7%) and health educators (19.2%) as the major sources of knowledge about immunisation [24]. This underlines the need for continuous training and re-training of health workers concerning immunisation services as this has been shown to have a direct impact on knowledge, awareness and utilisation of immunisation services by mothers [25].

Place of immunisation also has a statistically significant impact on the completion of immunisation in this study. We observed that mothers generally preferred to have their children vaccinated in a hospital setting rather than at home. Some researchers have reported that mothers preference for immunising their children in hospitals is based on their belief that the child will be properly assessed before the vaccination [19]. Another reason given by mothers for preference of hospital vaccination was that they believed that hospital staff were more competent compared to campaign vaccinators [19]. It has been reported that the rejection rate is higher for supplemental immunisation compared to routine immunisation [19]. These findings are important in policy formulation and suggest that greater attention is focused on the more acceptable routine immunisation.

5. CONCLUSION

Given that antenatal clinics and health workers were the major sources of information on immunisation, there is a need to continually update the knowledge of these categories of persons on immunisation. The importance of regular public enlightenment on immunisation cannot be overemphasised given that the major reasons some mothers deny their children immunisations were ignorance and unfounded fears. Lastly, since immunisation completion rate is better among children immunised in hospital settings in comparison to those immunised at home, greater attention should be given to routine immunisation as against supplemental immunisation.

ETHICAL APPROVAL AND CONSENT

Ethical approval for this research was obtained from Madonna University Ethical Review Committee with reference number ADM/E15/A VOL. 111/816 and informed consents were given by eligible mothers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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