Original Research Article

AWARENESS OF ZIKA VIRUS DISEASEEFFECTS ON CHILDREN,AND ATTITUDE TOWARDS INFECTED UNBORN BABIES, AMONG CAREGIVERS THAT VISIT IMMUNIZATION CLINIC OF A TEACHING HOSPITAL, ENUGU, NIGERIA

ABSTRACT

Aims: To assess caregivers' awareness of Zika virus disease effects on children, infected by their mother during pregnancy; and attitude towards infected unborn babies.
Study design:This quantitative study, was of observational, descriptive, and cross-sectional design.
Place and Duration of Study: The study was conducted in the Immunization unit, Enugu State University Teaching Hospital, Enugu, Nigeria; between November2016 and February2017.
Methodology:A trained Resident doctor in the department of Community Medicine, interviewed 10 randomly selected female caregivers that brought children to the hospital for immunization. Thirty respondents were interviewed each week for eight weeks, since immunization activity was conducted three days in a week. Sixteenwere interviewed on the ninth week; making a total of 256 respondents.
Results:A total of 256 women participated in the study, with 89.5% of them being married, and 86.0% falling within the age range of 20 – 39 years. Overall awareness on Zika virus infection effect on children such as failure to thrive, involuntary muscle contractions, learning handicap, visual and hearing impairment, and less functional individual with reduced societal value were poor. None of the total scores were up to 50.0%. In situation where Zika virus is detected in an unborn baby, praying and leaving the outcome to God was the highest selected option (48.8%), while abandoning the baby in the hospital was the least selected option (6.6%). Other options were accepting and caring for the baby (41.8%), and terminating the pregnancy (14.8%).
Conclusion: Though the declaration of Zika virus infection by the World Health Organization, as a Public Health Emergency of International Concern was lifted since November 2016; the infection could still be going on undetected, in many low- and middle-income countries. Efforts should be made to improve on the level of awareness on Zika virus, and effects on children.

Keywords: *Zika virus, Awareness, Effect, Children, Attitude, Unborn, Babies.*

1. INTRODUCTION

Zika virus is a Flavivirus that is predominantly transmitted to humans through the bite of *Aedes aegyti* mosquito, causing Zika virus disease (ZVD). Aedes albopictus mosquito also transmits Zika virus to humans [1]. Dengue, Chikungunya and Yellow fever diseases are also transmitted to humans through the bite of *Aedes aegypti* mosquito [2]. In addition to the mosquito borne route of Zika virus infection transmission, it can also be transmitted through blood transfusion and blood products, sexual intercourse, during pregnancy from mother to the unborn fetus, organ transplantation and breast milk [2,3]. This virus was first detected in monkeys in the Zika forest of Uganda in 1947. In 1952, it was later found in humans in Uganda and Tanzania [4]. Infection in man was also detected in Nigeria in 1952, but was not reported until 1954 [5].

Majority of ZVD cases are asymptomatic, hence pass undetected and unreported. Even in situations where the disease is symptomatic, many countries are unable to make the diagnosis and report, because they do not have the capacity for routine surveillance, case detection and reporting of ZVD. Diagnoses are mostly made based on clinical reports during outbreaks [6].Symptomatic cases present with general non-specific symptoms such as conjunctivitis, headache, fever, weakness, body pains, and rashes. The

incubation period is about 3 – 14 days [4]. Before the major ZVD outbreak in the Pacific island of Yap (2007), in the Federated States of Micronesia, where 73% of the population older than three years was affected; only fourteen cases of human ZVD had been reported globally [7,2]. The next major outbreak was between 2013 and 2014, which occurred in French Polynesia, the Cook Islands, New Caledonia and Easter Island all in Pacific Islands [2]. The very major outbreak that led to the World Health Organization (WHO) declaring ZVD a Public Health Emergency of International Concern (PHEIC) in February 1, 2016 occurred in Brazil in 2015. This was however brought under control in November 2016, and this WHO declaration was lifted [6].More countries and territories however continued to report mosquito borne transmission of Zika virus infection, and by December 2021, eightynine countries and territories had reported mosquito borne transmission of Zika virus infection [8].Though the incubation period of ZVD is about 3 – 14 days, the symptoms last for about 2 – 7 days [4], except when complications set in. Currently there is no available treatment for ZVD, and no vaccine for prevention [2].

Zika virus infection in adults and older children could lead to the development of Guillain-Barre Syndrome; a neurological disease in which there is numbness and weakness in the limbs, possibly as an allergic response in the peripheral nerves [6,9]. Infection in pregnant women could lead to complications such as microcephaly in the baby, stillbirth, preterm delivery, abnormal brain development, abnormal cranial nerve morphologies, eye abnormalities, limb contractures and other neurological problems. Severe forms of these complications are collectively termed Congenital Zika Syndrome (CZS) [6].

Though the last episode of Zika virus infection outbreak declined substantially towards the end of 2016, infection has however continued on a lower scale, especially in the WHO region of Americas where about 22,885 cases of Zika virus infections were reported in the year 2020. Brazil alone reported 18,941 cases out of this number [6].Since the Aedes mosquito is commonly found in West Africa, including most regions of Nigeria, and mosquito-borne transmission of Zika virus infection had been documented in Cape Verde and Guinea-Bissau [10 – 13]; it is possible that transmission has been going on in Nigeria undetected. Microcephalic babies that are occasionally seen in Nigerian hospitals and managed as cases of congenital malformation, could well have been as a result of Zika virus infection [14]. It is thus important that Zika virus information is still shared among the general population, especially those in low- and middle-income countries such as Nigeria, where awareness is low; and facilities for diagnosis of the disease is still not readily available. This will equip the community with necessary information needed for protecting themselves from Zika virus infection, and the complications associated with it. The main objective of this study is to assess theawareness of zika virus disease effects on children, and attitude towards infected unborn babies, among caregivers that visit immunization clinic of a teaching hospital in Enugu, Nigeria.

2. MATERIAL AND METHODS

2.1 Study Area

Enugu state is one of the thirty six states that make up Nigeria, and is located at the Southeastern part of the country, with the capital city also called Enugu. Enugu North Local Government Area where the study health facility issited, is one of the five urban Local Government Areas, out of seventeen [15]. There are two teaching hospitals in Enugu state, one being owned by the Federal Government, and our study site owned by the State government. Immunization activities are conducted for children in the hospital every Monday, Wednesday and Friday. About 263 children are immunized weekly, during the period of this study.

2.2. Study Design

This quantitative study, was of observational, descriptive, and cross-sectional design

2.3. Study Population

The study was done among caregivers that bring children for immunization at the Immunization clinic of Enugu State University Teaching Hospital, Parklane, Enugu. Only female caregivers that visited the hospital for the purpose of getting the child or children immunized against certain diseases, were included

in the study. Female caregivers who were hospital staff, and male caregivers were excluded from the study.

2.4. Sampling Instrument and Data Collection

Interviewer administered, and pre-tested questionnaire was used to collect information from respondents. This study was conducted for nine weeks, commencing in November 2016, and terminating in February 2017.A trained Resident doctor in the department of Community Medicine, interviewed 10 randomly selected female caregivers that brought children to the hospital for immunization, each immunization day. Hence, 30 respondents were interviewed each week for eight weeks, since immunization days were Monday, Wednesday, and Friday. Sixteen were interviewed on the ninth week; making a total of 256 respondents.

2.5. Data Analysis

Data generated were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 for windows. Outcomes of the analysis were expressed in frequencies and percentages, with scores 50.0% and above being rated good awareness/attitude, while those below 50.0% were rated poor awareness/attitude.

2.6. Ethical Consideration

Oral informed consent was obtained from each of the respondents prior to the administration of the questionnaire. Ethical clearance for the research was also obtained from the Ethical Research Committee of the Enugu State University College of Medicine.

2.7. Limitation

Sample size calculation was not done before administeringquestionnaire. Calculating the sample size based on age and educational level would have given a study sample whose findings would have been more reliably compared in terms of educational levels and age. Most of the respondents in this study (86.0%) werebetween 20 years to 39 years, of age

3. RESULTS

3.1. Socio-Demographic Characteristics

Respondents aged 40 years and above were only 10.5%, and 3.5% were 19 years and below. Majority of the respondents (86.0%) were between 20 to 39 years of age. Most of the respondents (92.2%) belong to the Igbo tribe of Nigeria, while 3.1% and 2.3% were Hausa and Yoruba respectively. Most (89.5%) were married while 10.2% were singe, and only one individual was divorced. As high as 94.9% belonged to the Christian religious faith, 3.1% were Muslims, and 2.0% practiced traditional religious worship. About half (50.4%) were educated up to the tertiary educational level, 25.4% secondary level, 21.1% postgraduate level, 2.0% primary level, and 1.2% had no formal education. Civil servants constituted the largest part of the respondents (48.4%), followed by Petty traders (15.2%), Students (11.3%), Teachers (8.2%), while self-employed and privately employed individuals together made up 5.4%.

Table 1: Socio-DemographicVariable

	N	**% (256)**	**(100)**
Age Range (yrs)			
19 and below		9	3.5
20 – 29	108	42.2	
30 – 39	112	43.8	
40 – 49	21	8.2	
50 and above	6	2.3	

Tribe				
Igbo		236		92.2
Efik		1		0.4
Yoruba		6		2.3
Hausa		8		3.1
Igala		1		0.4
Cross Rivers		1		0.4
Benue		2		0.8
Western Country		1		0.4
Marital Status				
Married		229		89.5
Single	26		10.2	
Divorced/Separated		1		0.4
Religion/Denomination				
Christian		243		94.9
Muslim		8		3.1
Traditional Religion		5		2.0
Educational Level				
No Formal Education		3		1.2
Primary Level		5		2.0
Secondary Level		65		25.4
Tertiary Level		129		50.4
Postgraduate Level		54		21.1
Occupation				
Nothing		5		2.0
Farmer		6		2.3
Teacher		21		8.2
Petty Trader		39		15.2
Civil Servant		124		48.4
Public Servant		7		2.7
Student		29		11.3
NYSC		2		0.8
Business (Self-employed)		7		2.7
Hair Dressing		1		0.4
Engineer		2		0.8
Tailoring/Fashion Designer	3		1.2	
Banking		1		0.4
Optometrist		1		0.4
Privately employed		7		2.7
Nursing		1		0.4

3.2. Educational level pattern ofawareness on Zika virus disease effects on children

All the respondents with formal education and those with only primary level education were uncertainof Zika virus infectioneffects including failure to thrive, while 30.8%, 20.2% and 42.6% of those with secondary, tertiary and postgraduate levels of education respectively were aware. Only 27.0% of all respondents had this awareness.

Out of the three persons that had no formal education, only one person was aware that effects of Zika virus infection include involuntary muscle contractions in the infected child, while none of the five

respondents with primary level education was aware of this. On the other hand, 9.2% of respondents withsecondary level, 13.2% of those with tertiary, and 13.0% of those with postgraduate level of education were aware. The percentage of the total number of respondents that were aware is 12.1%.

None of the respondents with no formal education or primary level education were aware that Zika virus infection in children could result in mild to significant learning handicap and ever dependency on parents. However, 40.0%, 51.9% and 46.3% of respondents with secondary, tertiary, and postgraduate levels of education respectively, were aware of this effect of Zika virus infection on children. A total of 46.1% of the respondents were aware that Zika virus infection in children could cause mild to severe learning handicap, and ever dependency on parents.

All the respondents with no formal education and those with primary level education were not aware that visual and hearing impairment in children could be as a result of Zika virus infection. 35.4% of respondents with secondary level education, 50.4% of those with tertiary level education, and 46.3% of those with postgraduate level education respectively were aware that Zika virus disease could lead to visual and hearing impairment. Overall, 44.1% of respondents across all the different levels of education were aware that Zika virus infection could cause visual and hearing impairment.

Again, no respondent without formal education or primary level education was aware that Zika virus infection in children could lead to less functional individual with reduced societal value. On the other hand,33.8% of those with secondary education were aware, with 45.7% of those with tertiary education being aware, while 38.9% of those with postgraduate level education also were aware that Zika virus infection could lead to less functional individual with reduced societal value.

Table 2: Educational level pattern of awareness on Zika virus disease effects on children

Question	**Level of Education**	**Correct Response**
Zika virus infection effect onchildren include failure to thrive?	No formal education	0 (0.0%)
	Primary	0 (0.0%)
	Secondary	20 (30.8%)
	Tertiary	26 (20.2%)
	Postgraduate	23 (42.6%)
	Total	69 (27.0%)
Zika virus infection effecton childreninclude involuntary muscle contractions?	No formal education	1 (33.3%)
	Primary	0 (0.0%)
	Secondary	6 (9.2%)
	Tertiary	17 (13.2%)
	Postgraduate	7 (13.0%)
	Total	31 (12.1%)
Zika virus infection effecton childreninclude mild to significant learning handicap, and ever-dependency on parents?	No formal education	0 (0.0%)
	Primary	0 (0.0%)
	Secondary	26 (40.0%)
	Tertiary	67 (51.9%)
	Postgraduate	25 (46.3%)
	Total	118 (46.1%)
Zika virus infection effecton childreninclude visual and hearing impairment?	No formal education	0 (0.0%)
	Primary	0 (0.0%)

	Secondary	23 (35.4%)
	Tertiary	65 (50.4%)
	Postgraduate	25 (46.3%)
	Total	113 (44.1%)
Zika virus infection effecton childreninclude less functional individual with reduced societal value?	No formal education	0 (0.0%)
	Primary	0 (0.0%)
	Secondary	22 (33.8%)
	Tertiary	59 (45.7%)
	Postgraduate	21 (38.9%)
	Total	102 (39.8%)

3.3 Age-related pattern of awareness on Zika virus disease effects on children

The bulk of the respondents were aged 20 to 39 years. Only 27.8% of those aged 20 – 29 years, and 27.7% of those aged 30 – 39 years were aware that Zika virus infection in children could lead to failure to thrive. On the other hand, 22.2%, and 23.8% of 19 years and above, and 40 – 49 years respectively were aware that effect of Zika virus infection in children includes failure to thrive. Only 2 persons out of the 9 aged 19 years and 1 person out of the 6 aged 50 years and above were aware that Zika virus infection can cause failure to thrive in children. Overall, 27.0% of respondents were aware.

None of the respondents aged 19 years and below, and those aged 50 years and above were aware that involuntary muscle contraction in children, could result from Zika virus infection. Few of the respondents aged 20 -29 years (13.9%), 30 – 39 years (12.5%) and 40 – 49 years (9.5%) were aware that involuntary muscle contractions in children could result from Zika virus infection. A total of 12.1% of respondents were aware.

Out of the 9 respondents that were 19 years and below, only one person was aware that Zika virus infection in children could result in significant learning handicap and ever-dependency on parents; and none of those aged 50 years and above was aware of this. The awareness was better among respondents aged 20 – 29 years (48.1%), 30 – 39 years (50.0%) and 40 – 49 years (42.9%). Total percentage of all respondents that were aware that Zika virus infection could cause significant learning handicap, and ever-dependency on parents was 46.1%.

Highest percentage of respondents that were aware that Zika virus infection in children could cause visual and hearing impairment came from age groups 20 – 29 years (46.3%), and 30 – 39 years (46.4%). Among those aged 40 - 49 years, and 19 years and below, 42.9% and 22.2% respectively were aware. None of the respondents in 50 years and above age group was aware, and overall, 44.1% of respondents were aware.

The awareness of Zika virus infection making children less functional individuals with reduced societal value was poor among different age groups, with none of them recording up to 50.0%. respondents aged 19 years and below recorded 33.3%. Those 20 – 29 years was 36.1%, 30 – 39 years was 44.6%, 40 49 years was 47.6%. None of those aged 50 years and above were aware. Overall, 39.8% of respondents were aware that Zika virus infection could make the child less functional with reduced societal value.

Table 3: Age-related pattern of awareness on Zika virus disease effects on children

Question	Age range (Years)	Correct Response
The effect of zika virus infection in children include failure to thrive?	19 and less	2 (22.2%)
	20 - 29	30 (27.8%)
	30 - 39	31 (27.7%)
	40 - 49	5 (23.8%)
	50 and above	1 (33.3%)
	Total	69 (27.0%)
The effect of zika virus infection in children include involuntary muscle contractions?	19 and less	0 (0.0%)
	20 - 29	15 (13.9%)
	30 - 39	14 (12.5%)
	40 - 49	2 (9.5%)
	50 and above	0 (0.0%)
	Total	31 (12.1%)
The effect of zika virus infection in children include mild to significant learning handicap and ever-dependency on parents?	19 and less	1 (11.1%)
	20 - 29	52 (48.1%)
	30 - 39	56 (50.0%)
	40 - 49	9 (42.9%)
	50 and above	0 (0.0%)
	Total	118 (46.1%)

The effect of zika virus infection in children include associated visual and hearing impairment?	19 and less	2 (22.2%)
	20 - 29	50 (46.3%)
	30 - 39	52 (46.4%)
	40 - 49	9 (42.9%)
	50 and above	0 (0.0%)
	Total	113 (44.1%)
The effect of zika virus infection in children include less functional individual with reduced societal value?	19 and less	3 (33.3%)
	20 - 29	39 (36.1%)
	30 - 39	50 (44.6%)
	40 - 49	10 (47.6%)
	50 and above	0 (0.0%)
	Total	102 (39.8%)

3.4Educational level pattern of preferred options, in situation where Zika virus infection is detected in an unborn baby

No respondent among those without formal education, and those with primary education were certain about whether they would like to accept and care for unborn baby who was confirmed in the womb to have been infected with Zika virus. Among those with secondary, tertiary and postgraduate levels of education; 40.0%, 48.8%, and 33.3% respectively said that they would like to accept and care for the Zika virus-infected baby. A total of 41.8% of all the respondents affirmed that they would like to accept and care for the infected baby. Among the respondents that would not like to accept and care for the baby were 16.9% of those with secondary level education, 14.7% of those with tertiary education, and 25.9% of those with postgraduate education level. Overall, 17.2% of all the respondents would not like to keep, and care for the baby. As high as 41.0% of all respondents were uncertain about what they would prefer to do with infected unborn babies, with 43.1%, 36.4%, and 40.7% of those with secondary, tertiary and postgraduate levels of education respectively being uncertain about what they would do with infected unborn babies, with respect to accepting and caring for the babies.

With the exception of one respondent that said he/she would not terminate the pregnancy, every other person without formal or primary level education were uncertain about whether they would terminate the pregnancy, if diagnosis of Zika virus infection was made before delivery of the baby. For secondary, tertiary, and postgraduate levels of education; 10.8%, 14.0% and 24.1% respectively said they would terminate the pregnancy if diagnosis of Zika virus infection was made prior to delivery of the baby.Overall, 14.8% of respondents would prefer terminating the pregnancy if diagnosis of Zika virus infection was made during pregnancy. Good number of respondents from secondary (43.1%), tertiary (50.4%) and postgraduate (35.2%) educational levels however, would not terminate the pregnancy if a diagnosis of Zika virus infection was made. Many were also uncertain about whether they would terminate the pregnancy or not; 46.2% for those in secondary education level, 35.7% for those in tertiary education level, and 40.7% for those in postgraduate education level. Overall, 41.0% were uncertain.

Only one respondent among those without formal education, or primary level education said that she would pray and leave the outcome to God, if a diagnosis of Zika virus infection was made during her period of pregnancy. The rest were not sure whether they would just pray, and leave the outcome to God, or whether they would explore other options. Slightly above 50% of those with secondary (50.8%) and tertiary (51.9%) levels of education said that they would pray, and leave the outcome to God, while 44.4% of those with postgraduate level of education would also pray, and leave the outcome to God. Overall, 48.8% of respondents would pray and leave the outcome to God. Fewer respondent from the secondary level (10.8%), tertiary (11.6%), and postgraduate (22.2%) educational levels would not want to pray, and leave the outcome to God. Overall, 13.3% of respondents would not want to pray, and leave the outcome to God. Less than 40.0% of respondents from secondary (38.5%), tertiary (36.4%), and postgraduate (33.3%) educational levels were uncertain of what they would do if presented with the option of praying and leaving the outcome to God. Overall, 37.9% of respondents were uncertain.

All the respondents with no formal education or only primary educational level were uncertain whether they would prefer to deliver the baby, and abandon him/her in the hospital, if a diagnosis of Zika virus infection was made during pregnancy period, except one person without formal education that said she would deliver the baby and abandon him/her in the hospital. Very few persons from secondary (7.7%), tertiary (7.0%), and postgraduate (3.7%) educational levels affirmed that they would deliver the baby, and abandon him/her in the hospital if diagnosis of Zika virus was made during pregnancy. A total percentage of 6.6% agreed that they would deliver the baby and abandon him/her in the hospital. Many of the respondents from secondary (46.2%), tertiary (56.6%), and postgraduate (64.8%) educational levels would not abandon the baby in the hospital after delivery, if diagnosis of Zika virus was made during pregnancy. Overall, 53.9% of respondents would not abandon the baby in the hospital after delivery. With regards to being uncertain whether to abandon the baby after delivery or not, 46.2% of respondents with secondary, 36.4% of those with tertiary, and 31.5% of those with postgraduate levels of education were not certain whether they should abandon the baby in the hospital after delivery. Overall, 39.5% were uncertain.

Table 4: Educational level pattern of preferred options, in situation where Zika virus infection is detected in an unborn baby

Option	**Educational Level**	**Yes**	**No**	**Uncertain**
Accepting and caring for the baby	No formal education	0 (0.0%)	0 (0.0%)	3 (100.0%)
	Primary level	0 (0.0%)	0 (0.0%)	5 (100.0%)
	Secondary level	26 (40.0%)	11 (16.9%)	28 (43.1%)
	Tertiary level	63 (48.8%)	19 (14.7%)	47 (36.4%)
	Postgraduate level	18 (33.3%)	14 (25.9%)	22 (40.7%)
	Total	107 (41.8%)	44 (17.2%)	105 (41.0%)
Terminating the pregnancy	No formal education	0 (0.0%)	1 (33.3%)	2 (66.7%)
	Primary level	0 (0.0%)	0 (0.0%)	5 (100.0%)
	Secondary level	7 (10.8%)	28 (43.1%)	30 (46.2%)
	Tertiary level	18 (14.0%)	65 (50.4%)	46 (35.7%)
	Postgraduate level	13 (24.1%)	19 (35.2%)	22 (40.7%)
	Total	38 (14.8%)	113 (44.1%)	105 (41.0%)
Praying and leaving the outcome to God	No formal education	1 (33.3%)	0 (0.0%)	2 (66.7%)
	Primary level	0 (0.0%)	0 (0.0%)	5 (100.0%)
	Secondary level	33 (50.8%)	7 (10.8%)	25 (38.5%)
	Tertiary level	67 (51.9%)	15 (11.6%)	47 (36.4%)
	Postgraduate level	24 (44.4%)	12 (22.2%)	18 (33.3%)
	Total	125 (48.8%)	34 (13.3%)	97 (37.9%)
Delivering the baby, and abandoning him/her in the hospital	No formal education	1 (33.3%)	0 (0.0%)	2 (66.7%)
	Primary level	0 (0.0%)	0 (0.0%)	5 (100.0%)
	Secondary level	5 (7.7%)	30 (46.2%)	30 (46.2%)
	Tertiary level	9 (7.0%)	73 (56.6%)	47 (36.4%)
	Postgraduate level	2 (3.7%)	35 (64.8%)	17 (31.5%)
	Total	17 (6.6%)	138 (53.9%)	101 (39.5%)

3.5 Age-related pattern of preferred option, in situations where Zika virus infection is detected in an unborn baby

Reasonable number of the respondents said they would accept and care for the baby, except those in the 50 years and above age range, where only 16.7% agreed to accept and care for the baby. The percentage of respondents in the other age range that agreed to accept and care for the baby are as follows; 55.6% for 19 years and below, 48.1% for 20 – 29 years, 37.5% for 30 – 39 years, and 33.3% for 40 – 49%. Overall, 41.8% of respondents would accept and care for the baby. Those that would not want to accept and care for the baby were 33.3% of 19 years and blow, 15.7% of those 20 – 29- years, 17.0% of 30 – 39 years, 19.0% of 40 – 49 years, and 16.7% of those that were 50 years and above. A total of 17.2% of all the respondents would not accept and care for the baby if diagnosis of Zika virus was made during pregnancy. Many of the respondents, 11.1% for those 19 years and below, 36.1% for 20 – 29 years, 45.5% for 30 – 39 years, 47.6% for 40 – 49 years, and 66.7% for 50 years and above; were also uncertain about whether they should accept and care for the baby. Overall, 41.0% of respondents were uncertain about whether they would accept and care for the baby, if diagnosis of Zika virus was made during pregnancy.

Few respondents across the different age groups preferred terminating the pregnancy if diagnosis of Zika virus infection was made. These were 0.0% for 19 years and below, 14.8% for 20 – 29 years, 15.2% for 30 – 39 years, 23.8% for 40 – 49 years, and 0.0% for 50 years and above. An average percentage of respondents that would prefer terminating the pregnancy is 14.8%. Reasonable percentage of respondents among 19 years and below age group (77.8%), and 20 – 29 years age group (51.9%) would not want to terminate the pregnancy. Those that would not want to terminate the pregnancy among 30 – 39 years age group, 40 – 49 years age group, and 50 years and above age group were 38.4%, 28.6% and 16.7% respectively. An average percentage of 44.1% for all respondents would not want to terminate the pregnancy. The percentage of respondents that were uncertain were; 22.2% for 19 years and below, 33.3% for 20 - 29 years, 46.4% for 30 – 39 years, 47.6% for 40 – 49 years, and 83.3% for 50 years and above. Overall, 41.0% 0f respondents would not want to terminate the pregnancy because a diagnosis of Zika virus infection was made.

Good number of respondents would just want to pray, and leave the outcome to God, following the delivery of a baby, who had a diagnosis of Zika virus infection in pregnancy. The percentages are as follows; 77.8% for 19 years and below, 50.0% for 20 – 29 years, 50.0% for 30 – 39 years, 33.3% for 40 – 49 years, and 16.7% for 50 years and above. Average percentage of those that agreed to praying and leaving the outcome to God was 48.8%. Few however disagreed to praying and leaving the outcome to God. These were 11.1% of 19 years and below age group, 13.0% of 20 – 29 years age group, 13.4% of 30 – 39 years age group,19.0% of 40 – 49 years age group, and none from 50 years and above. Those that were uncertain about praying and leaving the outcome to God were; 11.1% of 19 years and below age group, 37.0% of 20 – 29 years age group, 36.6% of 30 – 39 years age group, 47.6% for 40 – 49 years age group, and 83.8% for those aged 50 years and above. Averagely, 37.9% of respondents were uncertain about praying and leaving the outcome to God.

Very few respondents would prefer to deliver the baby and abandon him/her in the hospital, if diagnosis of Zika virus infection was made during pregnancy. These include; 7.4% of 20 – 29 years age group, 5.4% of 30 -39 years ag group, and 9.5% of 40 – 49 years group. Only one person out of nine in 19 years and below age group, said she would deliver the baby and abandon him/her in the hospital; while none of the respondents that were 50 years and above had the same opinion. An average of 6.6% of all the respondents had the opinion of delivering the baby, and abandoning him/her in the hospital. On the other hand; 77.8% of 19 years and below, 56.5 % of 20 - 29 years, 52.7% of 30 – 39 years, 47.6% of 40 – 49 years, and 16.7% of 50 years and above would not abandon him/ her in the hospital. Overall, 53.9% of respondents would not abandon him/her in the hospital. Good percentage of respondents were however uncertain about whether they would wish to deliver the baby and abandon him/her in the hospital. They include; 11.1% of 19 years and below age group, 36.1% of 20 – 29 years age group, 42.0% of 30 – 39 years age group, 42.9% of 40 – 49 years age group, and 83.3% of the 50 years and above age group. Total percentage of 39.5% were uncertain about whether to deliver the baby and abandon him/her in the hospital, or not.

Table 5: Age-related pattern of preferred option, in situations where Zika virus infection is detected in an unborn baby

Option	Age	Yes	No	Uncertain
Accepting and caring for the baby	19 years and below	5 (55.6%)	3 (33.3%)	1 (11.1%)
	20 – 29 years	52 (48.1%)	17 (15.7%)	39 (36.1%)
	30 – 39 years	42 (37.5%)	19 (17.0%)	51 (45.5%)
	40 – 49 years	7 (33.3%)	4 (19.0%)	10 (47.6%)
	50 years and above	1 (16.7%)	1 (16.7%)	4 (66.7%)
	Total	107 (41.8%)	44 (17.2%)	105 (41.0%)
Terminating the pregnancy	19 and below	0 (0.0%)	7 (77.8%)	2 (22.2%)
	20 – 29 years	16 (14.8%)	56 (51.9%)	36 (33.3%)
	30 – 39 years	17 (15.2%)	43 (38.4%)	52 (46.4%)
	40 – 49 years	5 (23.8%)	6 (28.6%)	10 (47.6%)
	50 years and above	0 (0.0%)	1 (16.7%)	5 (83.3%)
	Total	38 (14.8%)	113 (44.1%)	105 (41.0%)
Praying and leaving the outcome to God	19 years and below	7 (77.8%)	1 (11.1%)	1 (11.1%)
	20 – 29 years	54 (50.0%)	14 (13.0%)	40 (37.0%)
	30 – 39 years	56 (50.0%)	15 (13.4%)	41 (36.6%)
	40 – 49 years	7 (33.3%)	4 (19.0%)	10 (47.6%)
	50 years and above	1 (16.7%)	0 (0.0%)	5 (83.3%)
	Total	125 (48.8%)	34 (13.3%)	97 (37.9%)
Delivering the baby and abandoning him/her in the hospital	19 years and below	1 (11.1%)	7 (77.8%)	1 (11.1%)
	20 – 29 years	8 (7.4%)	61 (56.5%)	39 (36.1%)
	30 – 39 years	6 (5.4%)	59 (52.7%)	47 (42.0%)
	40 – 49 years	2 (9.5%)	10 (47.6%)	9 (42.9%)
	50 years and above	0 (0.0%)	1 (16.7%)	5 (83.3%)
	Total	17 (6.6%)	138 (53.9%)	101 (39.5%)

4.0 DISCUSSION

Zika virus disease was such a global public health problem in 2015 and 2016, that the World Health Organization declared it a "Public Health Emergency of International Concern" on February 1, 2016. Though this declaration was lifted in November of the same year, sub-epidemic transmission of the disease, especially in low- and middle-income countries has been going on; with probably many undiagnosed cases. Findings from this research that was conducted towards the end of the period of "Public Health Emergency of International Concern" (PHEIC) declaration; shall be useful in re-focusing attention of health workers, on the possibility of ongoing transmission of Zika virus infection, and manifestation of the effects on children, that were infected in their mother's womb. These manifestations are as a result of the ability of the Zika virus to infect brain cells [16]. In addition to the obvious physical and neurological effects of Congenital Zika Syndrome on children who were infected with Zika virus in the womb; mortality rate for the children up to 3 years old were more than eleven times higher than those that did not have Congenital Zika Syndrome, as revealed in a study done in Brazil [17]. However, only about 5% of women infected with Zika virus in the United States of America and territories, during pregnancy; had Zika-associated birth defects [18].

Though information collected among same respondents in a related study as this one, revealed that 59.8% of the 256 respondents knew that Zika virus could affect the brain [19]; less than 40.0% were aware of some manifestation of this brain involvement, such as involuntary muscle contractions, learning handicap, visual and hearing impairment, and less functional children. However, a study that was conducted around the same time with this one, in Northern part of Nigeria, recorded a better awareness

level of Zika virus causing brain damage (65.77%) [20], than what was found among same respondents in this study (59.8%), that participated in a related study [19].

Only 46.1% of respondents in this study were aware that Zika virus infection of a pregnant woman could lead to learning handicap, and 44.1% were aware that visual and hearing impairment could be the effect of Zika virus infection. Overall, awareness of the respondents on all the studied Zika virus effect on children were poor, irrespective of educational level, except for respondents with tertiary level of education; where over 50.0% were aware that Zika virus infection could cause learning handicap/ever dependence on parents, and visual/hearing impairment. One would have expected that the level of awareness would increase with increasing level of education. This pattern was not observed in this study. Respondents with postgraduate level of education, who were expected to record the highest levels of awareness in all items studied, only recorded the highest level on being aware that Zika virus infection could lead to failure to thrive of the baby (Table 2). This disordered pattern of awareness among different educational level groups, could be related to certain socio-demographic variables among the respondents. This thinking however, needs further research work to authenticate it.

Since overwhelming majority of respondents fall within the age range of 20 - 39 years (86.0%) in this study (Table 1); age-related pattern of awareness will only be assessed among respondents within this age range, so that interpretation of the results will be more reliable. The percentage score of correct response for people aged 20 – 29 years, and 30 – 39 years on; Zika virus infection causing failure to thrive, involuntary muscle contractions, learning handicap, visual/hearing impairment, and less functional individual were not very different (Table 3). They all scored less than 50.0% in all the variables, except respondents aged 30 – 39 years, who had 50.0% correct response score on Zika virus infection causing mild to significant learning handicap and ever-dependency on parents. Respondents aged 20 – 29 years had 48.1% correct response on this. Essentially, awareness level across all the age groups was poor, and age appeared not to have had any effect on the level of awareness, of Zika virus effects on infected children.

Surprisingly, a study conducted among a university community in an endemic zone in Mexico, also revealed poor knowledge on babies being born with disabilities. That study found that only 37.38% of female respondents stated that the baby may be born with disabilities, while 35.77% of males had the same response [21]. It is however possible that the study method used in the Mexican study could have contributed to the result recorded. Online Survey Monkey was used, and all members of the university community were eligible to participate. Forty-eight questions were asked, and respondents who could not respond to at least 50% of the questions were excluded. Finally, response from 749 respondents were analyzed. Conducting the Mexican study among only children caregivers, probably would have revealed a better awareness level. This group of persons were directly involved in caring for children, some of whom could have been affected by Zika virus infection, hence their interest in Zika virus information would be high. Many respondents in a study conducted in Peru among women of childbearing age, also were not aware that Zika virus infection in the mother could lead to physical disability in the child. Only 15.8% of respondents were aware of this information [22]. As suggested in the Mexican study, the poor awareness on the possibility of Zika virus infection causing physical disability in the child, as demonstrated in the Peru study; could also be due to the sociodemographic characteristics of the respondents. Since only 16.3% of the respondents were married, and 4.4% were pregnant, many of the respondents probably would not pay attention to Zika virus effect, information on pregnancy. The relatively better findings in our study, could be because almost all the respondents could have been exposed to Zika virus information during their Antenatal Care (ANC) visits. In our study facility, health education talks are usually given to pregnant women during their ANC visits.

Any Zika virus-infected pregnant woman that is aware that there is a chance of giving birth to an abnormal baby will certainly be worried. Naturally, some may opt for amniocentesis with the aim of ascertaining if the unborn foetus is infected with Zika virus; so that they can prepare themselves psychologically or otherwise, or terminate the pregnancy. Among the options of (a) accepting and caring for the baby, (b) terminating the pregnancy, (c) praying and leaving the outcome to God, and (d) abandoning the baby in the hospital after delivery; the one that was most preferred by the respondents in this study was option (c), where 48.8% of respondents, reported that they would pray, and leave the

outcome to God (Table 4). This is not surprising, since 94.9% of respondents were Christians (Table 1), and good Christians strongly believe in the teaching, that the outcome of any situation is determined by God. This also explains why the least number of respondents opted for option (d), which suggested abandoning the baby in the hospital after delivery (6.6%). The next least chose option of terminating the pregnancy (14.8%) is also in the same line of reasoning.

Only respondents with secondary and tertiary levels of educational qualification, barely managed to score above 50.0% in choosing "praying and leaving the outcome to God"; though those with postgraduate level of education came close with 44.4%. There is this thinking that some people tend to pay less attention to the things of religion, as they go higher in education. It is said that intelligent people disbelieve some dogma of religion, when they ask questions and do not get convincing answers. So, it has been reasonably accepted, that intellectuality is inversely related to religiosity in many cases [23,24]. Respondents with no formal education, and primary level education are only eight in this study, hence their opinion may not be relied upon, in analyzing the opinion of the whole group.

Most of the respondents (86.0%) are within the age range of 20 to 39 years; hence, comparing the age-related pattern of preferred options, will be more reliable, if done among respondents within this age range. Incidentally, the difference in percentages of positive responses given for the above four options, by respondents aged 20 – 29 years and those aged 30 – 39 years are not glaring. One should however note that slightly more respondents aged 20 – 29 years (48.1%) elected to accept and care for the Zika virus-infected baby, while 37.5% of those aged 30 - 39 years would do same (Table 5). Again, slightly less percentage of those aged 20 – 29 years (14.8%) opted for termination of pregnancy, as against 15.2% of those aged 30 – 39 years. Though the difference is not glaring, this finding is in keeping with previous findings ofmarried women commonly opting for abortion more than the unmarried ones, probably because they have sufficient number of children [25]. There were probably more married women among the 30 – 39 years group, than among 20 – 29 years group.

The finding in this study, that up to 14.8% of all respondents would opt for termination of pregnancy, if the unborn baby is found to have Zika virus infection; is reasonably higher than 6.1% that was found among United States of America immigrants that were born in countries with Zika transmission. Even respondents born in the United States of America also scored low on opting for termination of pregnancy (6.2%) in the same study [26].This study was conducted around the same period as our own. Less respondents in the United States of America opting for termination of pregnancy, could be because of a more developed and efficient health system in America, that will enhance care for the Zika-infected baby.

5. CONCLUSION

Though the declaration of Zika virus infection by the World Health Organization, as a Public Health Emergency of International Concern was lifted since November 2016; the infection could still be going on undetected, in many low- and middle-income countries. The finding of poor awareness on, the effects of this infection on children is something that requires concerted efforts to improve on. Many people being aware of these effects on children, would assist in raising the index of suspicion in some communities where transmission could be going on unsuspected. The finding also that less than 50.0% of the respondents are willing to accept and care for Zika virus-infected babies is worrisome. Using different media of communication to enlighten the population on possible effects of Zika virus infection on children, and recommending ways of enhancing good outcomes for the children; will encourage many to accept and care for Zika virus-infected babies.

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ABBREVIATIONS/ACRONYMS

Abbreviation	Meaning
ANC	Antenatal Care
CZS	Congenital Zika Syndrome
ESUT	Enugu State University of Science and Technology
NYSC	National Youth Service Corpse
PHEIC	Public Health Emergency of International Concern
WHO	World Health Organization
ZVD	Zika Virus Disease