

Zika Virus Knowledge: A Study of Pregnant Women Attending the Antenatal Clinic at a Local Health Center in Trinidad and Tobago

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Received: March 13, 2018 Accepted: March 31, 2018 Online Published: April 11, 2018

doi:10.5539/gjhs.v10n5p117

URL: <https://doi.org/10.5539/gjhs.v10n5p117>

Abstract

Background and Aim: The ZIKV is a major public health concern and has the potential to cause a pandemic. Health knowledge is a critical factor in the prevention of the ZIKV. This study aims to ascertain the knowledge levels of the antenatal women attending the antenatal clinic at the Sangre Grande Health Center Trinidad, regarding the ZIKV and its implications as well as to determine the socio-demographic factors that influence their knowledge.

Material and Methods: A descriptive study was conducted. 69 pregnant women were randomly selected from registers of attendance at the clinic on days of data collection. The researchers-designed and pre-tested questionnaire was utilized for data collection. Using the SPSS version 20, results were presented as frequencies.

Results: Most of the participants (98.6%) were of the reproductive age, 18 to 40 years and mainly of mixed ethnicity. The majority of the population had secondary school education and mostly married or in common law relationships. Knowledge of the ZIKV was mostly adjudged moderate; the majority had low knowledge on the implications of the ZIKV. A weak positive correlation ($p \leq 0.05$) was noted between the educational levels of the participants and their knowledge of the ZIKV as well as between ages of the participants and their levels of knowledge of the implications of ZIKV ($p \leq 0.050$).

Conclusion: The study showed that the pregnant women had moderate knowledge levels of Zika but not a corresponding knowledge on the implications of the conditions. Healthcare geared at increasing the knowledge level of ZIKV and its implications among the populace is recommended. The development of health education and health promotion programs that target disease prevention and control are principal components necessary for success against the ZIKV and its implications.

Keywords: Zika virus, Caribbean, nursing, health education, antenatal

1. Introduction

Zika virus (ZIKV) is an emerging viral disease, primarily transmitted through the bite of an infected mosquito, primarily the *Aedes aegypti*. It can also be transmitted via sexual intercourse with an infected person (Centers for Disease Control and Prevention (CDC), 2016). This virus has become a global public health emergency as there is compelling serological evidence that the virus causes severe neurological disorders and fetal death (Boeuf, Drummer, Richards, Scoullar, & Beeson, 2016). Vertical trans-placental transmission of the infective agent from the expectant mother to the fetus accounts for the neurological implications associated with the ZIKV Central nervous system (CNS) malformations, congenital microcephaly, Guillain-Barré Syndrome (GBS), fetal akinesia and fetal death are documented consequences of the ZIKV. In addition, transmission of the ZIKV can also occur during childbirth and via blood transfusion (Schwartz, 2016).

Diagnosis of the disease is often difficult as many persons affected are asymptomatic, in addition, ZIKV is characterized by non-specific symptoms (Derraik & Slaney, 2015). Treatment, is aimed at management of the symptoms as there presently exist no specific treatment or vaccine for the ZIKV (CDC, 2016). Consequently, prevention against mosquito bites and non-mosquito-borne transmission such as sexual transmission has been identified as the best options in the fight against the ZIKV (Musso & Gubler, 2016). According to the CDC (2016), the virus is explosive and evolving rapidly as such the protection of pregnant women and their unborn children

from the ZIKV and its implications is of primary concern. The CDC (2016) has identified the prevention of mosquito bites and the use of condom during sexual intercourse with persons infected with the ZIKV or those who have been to areas affected by the ZIKV as the best methods of prevention in the fight against this virus. To win this battle against the ZIKV, the populace must be knowledgeable of the all aspects of the virus inclusive of causative agent, prevention, modes of transmission and treatment.

The ZIKV is a major public health concern and has the potential to cause a pandemic, (CDC, 2016), According to the World Health Organization (WHO), the context of people's lives determine their health (Braveman & Gottlieb, 2014). Another factor that influences the health of individuals and families is health knowledge (Yin et al., 2013). Health knowledge is generated in many ways, ranging from the immediate experience of individuals to methodical processes. Health knowledge refers to the knowledge that people have about a health related issues (Fielding, 2015). It involves the acquisition of information that affects the health behavior, healthcare access, health outcomes and quality of life of individuals (He et al., 2016). Health knowledge is linked to the awareness, inspiration, comprehension, appraisal and application of health information. These factors are essential in the maintenance and/or improvement of individuals behaviours and quality of life as it influences appropriate judgment and informs decisions regarding healthcare, disease prevention and health promotion (He et al., 2016)

Individuals utilize their knowledge of disease and/or illness to protect themselves and their family members from the effects of the disease as well as to improve their health through modified health behaviour informed by knowledge (Yin et al., 2013).

The illness associated with the ZIKV though not life threatening remains one of great public concern because of its link to the neurological birth defects (CDC, 2016). The ZIKV infection if symptomatic shows common symptoms of fever, skin rash, joint pain, red eyes, muscle pain and headache presenting what is known as "dengue-like" syndrome. Even so, WHO has since declared the ZIKV as a public health emergency (World Health Organization, 2016).

The WHO has highlighted public education about the preventative measures and potential complications associated with the ZIKV, as a principal factor in the fight against this virus (Mohammad, Mohammed, Fahad, Muhammed, Akram, Akshaya, & Shazia, 2017). These preventative measures, such as vector control, and personal preventative measures such as avoiding mosquito bite; the use of mosquito nets; avoiding sexual intercourse with infected persons and pregnant women avoiding visits to areas where the epidemic is present are integral to the prevention and spread of the ZIKV (Lin, Tambyah, Yong, Biswas, & Chan, 2017).

The effectiveness of these preventative measures is dependent on the health knowledge of the public, particularly of antenatal women and women of child bearing age as it relates to the ZIKV and its implications (Rather, Kumar, Bajpai, Lim, & Park, 2017). It is imperative to the health and well being of these women, that they understand the causes of ZIKV and recognize the extent to which they and their foetus are vulnerable to, or at risk for (CDC, 2016). Knowledge and knowing about ZIKV and its implications is a necessary step primarily because ignorance about this disease will put antenatal women at great risk for contracting the disease (CDC, 2016). Secondly knowledge is a critical step to behavior change as it has the potential to motivate people to take action (Fielding, 2015). Knowledge of a disease has the potential to significantly influence changes in behavior and cause those who can be affected to take preventative action. The study seeks to explore the knowledge levels of antenatal women pertaining to ZIKV and its implications.

The impetus for this study stems from discussions the researcher held with a pregnant relative and her husband who is a registered nurse. The researcher discovered that they both thought that the ZIKV did not in fact cause microcephaly. According to these individuals, the insecticide sprays used to control the mosquito caused microcephaly and not the ZIKV. Their statement sparked the researcher's curiosity regarding the knowledge of other antenatal women on the topic of ZIKV and its implications.

Surveys conducted in the US, revealed several gaps in the knowledge of the ZIKV and its implications (Berenson, Trinh, Hirth, Guo, Fuchs, & Weaver 2017; National Opinion Research Center (NOTRC) 2016; Ryan, 2016) while the one done in Qatar revealed inadequate knowledge about ZikV (Cheema et al., 2017). Knowledge development is critical in the control and management of the ZIKV (Possas, 2016). According to the CDC as cited by Possas (2016), there is scientific consensus that the ZIKV infection during pregnancy is a cause of microcephaly.

Seventy-three (73) countries and territories worldwide inclusive of Trinidad and Tobago had reported evidence of vector-borne ZIKV (WHO, 2016). Despite increased awareness about the virus, there is a gap in public knowledge concerning the ZIKV and its implications. As an emerging threat, it is important to understand just how much the public knows about Zika (Binsaad et al., 2017). This is essential because an evaluation of antenatal women's

knowledge regarding the ZIKV provides the opportunity to address knowledge gaps and to determine the factors that may influence their knowledge.

Several important gaps were noted in the knowledge of individuals regarding the ZIKV and its implications. A study conducted by Aidoo-Frimpong, Basta, Gomez, Casapulla, and Grijalva, (2017), revealed several gaps in participants knowledge as it relates to modes of transmission of the ZIKV, prevention and treatment. According to the Pan American Health Organization (PAHO), low knowledge or lack of knowledge about the ZIKV and its implications does not foster behavioural change necessary for the elimination of mosquito breeding sites or the adoption of measures to prevent the ZIKV infection, which are critical to the prevention and spread of the ZIKV (PAHO, 2016).

The investigators surmised, it is therefore essential to gauge the public knowledge, especially pregnant women, about the virus and its implications in Trinidad and Tobago. This lack of awareness surrounding areas such as sexual transmission of the disease, the implications of the disease namely GBS and microcephaly, and the non-availability of a vaccine for the ZIKV are of great concern given the potentially fatal nature of the disease (PAHO, 2016). Although, there are four (4) confirmed cases of brain abnormalities in fetuses of expectant women in Trinidad and Tobago, who have contracted the ZIKV (Paul, 2016), and 308 Zika-positive pregnant women in Trinidad and Tobago (Shaliza Hassanali, 2016); the investigators are not aware of any studies on the knowledge levels of individuals in the tourist destination, Twin Island Republic in the Caribbean.

The purpose of this study is to assess the knowledge level of the women attending the antenatal clinic at the Sangre Grande Health Center about ZIKV and its implications. We also would ascertain if their knowledge levels of Zika, and its implications are associated with their selected demographic variables.

1.1 Conceptual Framework/Theory Application

Theories can be used to gain understanding as to why, how and what influences our knowledge (Schunk, 2015). People differ in their breadth and depth of knowledge. They differ in what they know, how they know and the way they organize their knowledge (Lemos, 2007). A clear understanding of what these antenatal women know about the ZIKV and its implications, how they know and how they have organized this knowledge form the basis of this research project.

Learning theories are conceptual frameworks that describe knowledge in terms of absorption, processing and retention (Schunk, 2015). The theory of constructivism, posits that the mind screens information from the world to construct its own distinctive reality (Oermann, 2013). According to the theory of constructivism, knowledge of the world is derived from individual interpretation of experiences. Based on these experiences knowledge is created (Ertmer & Newby, 2013).

Constructivism a theory of knowledge is a psychological and philosophical perspective which states that individuals form or construct much of what they learn and understand (Schunk, 2015). It is rooted in the concepts of Piaget who stated that learners internalize knowledge through processes of accommodation and assimilation (Schunk, 2015). A basic assumption of constructivism is that people are active learners and must construct knowledge for themselves (Schunk, 2015). The core of constructivism is that learners actively construct their own knowledge and meaning from their experiences, by perceiving various meaning around them and making sense out of these in various learning situations (Schunk, 2015). The function of cognition is adaptive and serves the organization of the experiential world (Kalpana, 2014).

The tenets of constructivism are: active accumulation of knowledge; cognitive adaption; cognitive organization and knowledge founded in both biological, neurological, social, cultural and language based interactions (Woolfolk, Hughes, & Walkup, 2012). Knowledge, defined as a human product by constructivist, is socially and culturally constructed by these antenatal women, as they create meaning through their interactions with the environments in which they live (Kalpana, 2014)

According to the principles of constructivism, there are several factors that juxtaposes the process of knowledge construction (Hutchison, 2006). These are the social interactions, environment, cultural tools, identity, and the activities that shape the individuals development and learning (Schunk, 2015). In relation to these antenatal women, it involves their socio-demographic characteristics of: age, marital status, socio-economics and education and how these affect their knowledge of the ZIKV and its implications. Figure 1 is a conceptual representation of this theory.

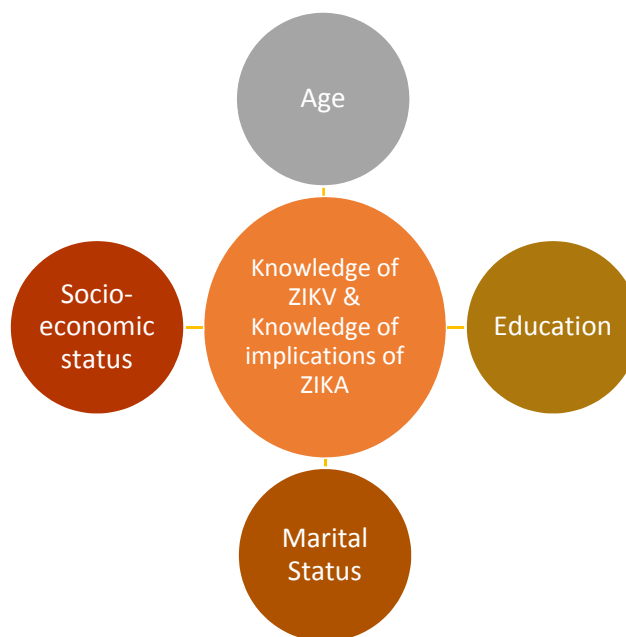


Figure 1. Conceptual Framework for study

1.2 Objectives of the Study

The primary objective of this study therefore is to:

- 1) To ascertain the knowledge levels of ZIKA among antenatal women attending Sangre Grande Health Center.
- 2) To ascertain the knowledge levels about the implications of ZIKV among antenatal women attending Sangre Grande Health Center.
- 3) To ascertain if their knowledge levels of (a) ZIKV and (b) implications of ZIKV are associated with their socio-demographic characteristics (age, education, socio-economics and marital status) of the women attending the antenatal clinic of the Sangre Grande Health Center.

1.3 Research Questions

- 1) What is the knowledge level of the women attending the antenatal clinic at Sangre Grande Health Center specifically as it relates to disease prevention, modes of transmission, symptoms and treatment?
- 2) What is the knowledge level of the women attending the antenatal clinic at Sangre Grande Health Center about the implications of ZIKV?
- 3) Is knowledge of the women attending the antenatal clinic of the Sangre Grande Health Center on (a) ZIKV and (b) implications of ZIKV associated with their socio-demographic characteristics.

2. Methodology

2.1 Design

A descriptive quantitative approach was used as it allowed for the use of a structured questionnaire and the quantification of the data collected including the description of the characteristics of the description of characteristics of the population and the comparison of multiple variables at the same time (Houser, 2016).

2.2 Population and Sampling

Women attending the antenatal clinic at the Sangre Grande Health Center, was the population under study. The sample consisted of 10% of the antenatal women attending the Sangre Grande Health Center. There were 688 women enrolled at the facility as at September 2016. The probability, random sampling technique was employed to select what was considered a representative of the study population. They were sampled from the attendance

register on clinic days.

2.3 Instrument

A questionnaire was used for data collection. This questionnaire was a modified and pre-tested version of the World Health Organization (WHO) Knowledge Attitude and Perception (KAP) Question Bank (World Health Organization, 2016). The resource pack questionnaire is about ZIKV and its complications such as microcephaly, Guillain-Barre syndrome and other neurologic disorders. The questionnaires were then reviewed and used believing that it followed all the requirement for question construction according to LoBaiondo-Wood and Harber (2013) and Fernando, Louvain De Souza, and Medina Acosta, (2016).

2.4 Data Analysis Methods

Section B contains 22 questions on the knowledge of the ZIKV as it pertains to: transmission of the virus; symptoms associated with the virus; treatment; methods of prevention and some common myths associated with the ZIKV. For each correct answer a score of “1” was given and for each incorrect answer a score of “0” was given. These scores were added to arrive at a single value out of a possible total score of 22 for knowledge of the ZIKV. The maximum possible score for knowledge of the disease therefore, was 22 and the minimum score was 0.

The third section of the questionnaire related to knowledge of the implications of the ZIKV was scored in the same manner. One (1) point for the correct answer and “0” points for the incorrect answer. These scores were added to arrive at a single value out of a possible total score of 14 for knowledge of the implications ZIKV. The maximum therefore was 14 points and the minimum score was 0. The grading system in Trinidad and Tobago used for measuring knowledge at the secondary school level was used for grading the knowledge level of respondents for this research paper (Caribbean Examinations Council, 2017). The scores were categorized into three levels: ‘Poor knowledge –persons scoring 50% or less; ‘average knowledge, 51-75% correct responses; and good knowledge – above 75% correct responses. The data collected was coded by the researchers; the results of which were represented with the use of the Statistical Package of Social Sciences (SPSS) software package. Basic Descriptive statistics summarized the characteristics of the sample and the general frequencies and categorical variables. A correlation analysis was also done to determine if levels of knowledge of respondents were associated with selected participants’ demographic characteristics.

2.5 Ethical Consideration

Necessary approvals were sought from (a) the ethics committee of the University of the West Indies; and (b) the Eastern Regional Health Authorities of Trinidad and Tobago (ERHA) ethics committee. In addition a letter of request was sent to the Primary Care Nurse Manager of the ERHA for permission to conduct the study. Finally, the participants pregnant which consisted of pregnant women of Sangre Grande Health Center were required to give their written and informed consent before engagement in the study.

3. Results

Table 1 highlights the demographic characteristics of the participants, pregnant women at Sangre Grande Health center, in Trinidad and Tobago. It shows that most of the participants (98.6%) were of the reproductive age, 18 to 40 years and mainly of mixed ethnicity. The majority of the population had secondary school education and mostly married or in common law relationships (Table 1).

With regard to levels of knowledge of Zika Virus, and the implications of Zika v, Figure 2 highlights that the knowledge level for Zika among the women is adjudged moderate (39.10%) while 35% of the women had high knowledge levels. Also regarding the knowledge of the implications of Zika only 33% of the respondents had moderate (13%) and high (20%) knowledge levels of the implications of Zika (Figure 1)

Pertaining to research question 3, *Is knowledge of the women attending the antenatal clinic of the Sangre Grande Health Center on (a) ZIKV and (b) implications of ZIKV associated with their socio-demographic characteristics?* Table 2, shows that the women’s knowledge of Zika is associated only with their ages (≤ 0.037) while theoretical knowledge of the implications of Zika was associated with their (a) age ($p \leq 0.011$) and (b) religion ($p \leq 0.041$).

Table 1. Socio-demographic characteristics of participants

Characteristic	Frequency	Percentage
Age		
18-25	11	15.9
26-33	47	68.1
34-40	10	14.5
41+	1	1.4
Education		
Primary	9	13.0
Secondary	32	46.4
Tertiary	25	36.2
Vocational	3	4.3
Ethnicity		
African	18	26.1
East Indian	17	24.6
Mixed	31	44.9
Other	3	4.3
Religion		
Christian	53	76.8
Hindu	6	8.7
Muslim	2	2.9
Other	2	2.9
None	6	8.7

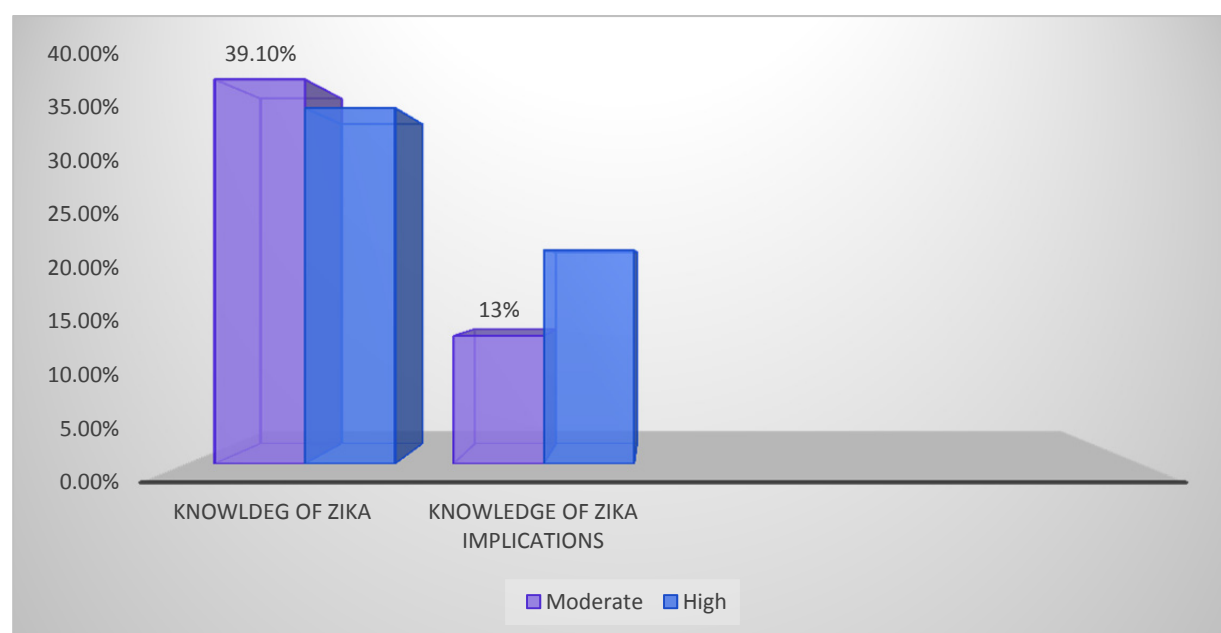


Figure 2. Levels of Knowledge of Zika and Zika Implications

Table 2. Relationship between Levels of Knowledge of ZIKA and ZIKA implications among pregnant women in Sangre Grande and their selected demographic Characteristics (N=69)

	Knowledge of ZIKA			Knowledge of Implications of ZIKA		
	df	f	sig	df	f	sig
age	3	3.0	0.037*	3	4.06	0.011*
Ethnicity	3	0.612	0.609	3	0.599	0.618
Religion	4	1.847	0.134	4	0.949	0.041*
Education	3	6.651	0.462	3	1.238	0.172

*P≤0.05.

4. Discussion

The following is a discussion of conclusions drawn from this study's results. The results from the study showed that:

- Knowledge of the ZIKV is sufficient
- Knowledge of the ZIKV is related to educational level
- Knowledge of the Implications of ZIKV is low
- Knowledge of the implications of the ZIKV is related to age and religion.

The majority of participants in this study had sufficient levels of knowledge regarding the ZIKV. A cumulative score of 84% of participants demonstrated medium and high levels of knowledge regarding the modes of transmission, symptoms, prevention and treatment of the ZIKV. This finding is consistent with that which was recently reported by Ramírez and Buitrago Álvarez, (2017), who found that in general people were very knowledgeable about the transmission, symptoms and prevention of the ZIKV. Mejía, et al., (2016), reported similar findings. Their study revealed high acceptable knowledge of mosquito borne diseases among participants. On the other hand the general knowledge of the implications of ZIKV was poor as 63.8% of the population demonstrated low knowledge of the implications of the ZIKV. This finding is a concern because there is strong evidence which links ZIKV infection to microcephaly and GBS and other congenital abnormalities. These serious congenital consequences that arise from infection with the ZIKV and the substantial long term consequences necessitates strong public response to limit and prevent the infection of the disease and thus the major health, social and economic impact of the virus (Boeuf et al., 2016).

Assessing specific demographic factors for association with the knowledge of the ZIKV and the knowledge of the implications of the ZIKV did lead to particular trends. The age of the respondents for one, determined their knowledge levels regarding the implications of the ZIKV. Respondents between the ages of 26-33 years were more knowledgeable than their younger and older counterparts respectively. This is likely due to general acceptance related to personal health and information seeking. It could also be as a result of influences and perceived responsibility and readiness and acceptance of responsibility, future needs for wellbeing; and their beliefs about health. In addition the participants in this age group reported hearing about the virus from various platforms such as the media and healthcare personnel. Another possibility for the association could be the participants' perception of the disease. The association between knowledge levels and age in the present study is in line with those from Jhansi City, India, where age was identified as an influencing factor in the knowledge level of participants (Gupta, et al., 2014). These studies identified acceptance of responsibilities for health during adulthood as a critical factor which augmented the knowledge of participants of the disease at a particular age.

According to Naing et al., (2011), in their study on dengue awareness, older persons even though they possessed formal education were less knowledgeable about the disease because, dengue prevention and control programmes were introduced in the school system after they had passed that level of education. Their younger counterparts were more knowledgeable because of their exposure to information about the disease in their school's curriculum.

The results of this study are also consistent with other studies that have pointed out the effects of socio-economics as an influencing factor of health knowledge. Syed et al., (2010), reported knowledge of dengue as inadequate in the low socio-economic class. Similar results were reported by Badar, Yasmeen, Wajahat, and Amjad, (2014). The results of their study revealed that participants knowledge of dengue fever was influenced by their socio-economic class. Higher socio-economic status was also associated with better knowledge about dengue in a study conducted

in Peru by (Paz-Soldán, Morrison, Lopez, Lenhart, Scott, elder, Sihuíncha, Halsey, Astete and McCall (2015). Participants in the group scored higher than those in lower socio-economic class.

Persons in low socio-economic class were less knowledgeable than those from high economic class. This is so because persons with high income has the means to access adequate health facilities and they generally also possess higher levels of education and are therefore more literate (Badar et al., 2014).

Overall, studies show that socio-economics does not act on health knowledge in isolation from other factors. Socioeconomic and educational attainment have a reciprocal relation. Actually, according to Zimmerman, Woolf and Haley (2012), education is perhaps the most basic socio-economic component since it shapes occupational opportunities and earning potential. It also provides knowledge and skills that allow persons with higher education to readily access information and resources that promote health. Generally persons in higher economic standing are able to afford higher education and better health care while low socio-economics is associated with poor cognitive development (Zimmerman, Woolf, & Haley, 2012). According Henandez and Blazer (2006), socio-economics is measured by three different indicators, collectively or separately. These are educational attainment, income and occupational status. All of these measures are correlated.

One of the critical ways that education influences health is through increased health knowledge, (Shartzer, Johnston, Courtot, and Kenney, 2016; Shankar et al., 2013; Shuaib et al., 2010). This is explained in part by health literacy. Individuals that are more educated make better-informed health related decisions for themselves and their families. These individuals are better able to interpret and understand information received, it increases their capacity for better decision making and thus influences perceived personal control and the adoption of health-related recommendation. This study revealed an association between the level of education of the participants and their knowledge of the ZIKV.

The marital status of the participants in this study bore no relationship to their knowledge of the ZIKV and its implications. Conversely Alobuia et al (2016), conducted a cross-sectional study among patients of family members waiting to be seen at hospitals in Western Jamaica to determine their knowledge, attitude and practices regarding vector-borne diseases. The authors reported that single and divorced participants were 2.24 times more likely to have a higher knowledge score compared to married people. Even so, this finding, after appropriate adjustments were made, was not found to be statistically significant for knowledge score. As a matter of fact this particular study revealed no significant association between the socio-demographic characteristics (age, marital status or socio-economic status) of the participants and their knowledge of the diseases (Alobuia et al., 2016).

5. Conclusion and Recommendation

This study identified that although most of the participants had sufficient knowledge (medium-high) of the ZIKV, their knowledge of the implications of the ZIKV was generally low. The ZIKV has the potential to be a devastating disease that affects people's lives worldwide. As an emerging threat, it is necessary to recognize the knowledge levels of the public regarding this disease and its implications as insufficient knowledge and misconceptions are essential drivers in the way individuals comprehend a disease. The study also evidenced two socio-demographic characteristics that are influential in the knowledge or lack thereof of the ZIKV and its implications. Though some of the results were variable, there was a noticeable common theme, and there is a need to raise awareness about all aspects of the disease and its prevention.

The pathways linking health to education are many. Education has a positive effect on health knowledge. In this study, it positively affected the participant's knowledge about the ZIKV. Education fosters the accumulation of related health knowledge and renders the individual more efficient in health as they are better able to understand instructions and information and make better health decisions based on their knowledge. Therefore a clear understanding of the knowledge of the population regarding this disease, could inform policy development as well as the need for systematic education in the fight against the ZIKV.

Competing Interests Statement

The authors declare that they has no competing or potential conflicts of interest.

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