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## RESEARCH ARTICLE

# Zika, Public Health, and Future Professionals: An Assessment of Student Knowledge, Media Utilization and Health Literacy Levels

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### Keywords

Zika, Health literacy, Risk communication, Public health

## Introduction

Over the past year, there has been increased public attention focused on the continued spread of Zika worldwide [1-4]. The origin of the Zika Virus (ZIKV) was the result of a flavivirus found in the blood of a rhesus monkey (isolated in 1947), found near the city of Entebbe, Uganda, in the Zika forest [5]. Zika is a virus carried by its vector of the mosquito, *Aedes* species [6]. Modes of transmission are through blood, from mother to fetus, and sexual intercourse [7]. According to the Centers for Disease Control and Prevention (CDC), common symptoms are fever, rash, joint pain, red eyes, muscle pain, and headache. The two main health risks associated with Zika are Guillain-Barre Syndrome, which affects the nervous system, and microcephaly, a birth defect that causes inadequate development or growth of the brain revealed upon birth. Zika symptoms commonly present for a single week duration, showing similarities to infections like dengue and chikungunya [5,7].

Zika is not only a problem for the United States, but also for East Africa and Southeast Asia, as well as the regions of South and Central America. The World Bank in 2016 projected that Zika-related economic losses in Latin America alone would reach \$3.5 million [1]. Furthermore, findings from an online poll reported 77% of the United States public is “not very worried” about Zika virus. Epidemiological trends of Zika in the United

States have portrayed inequalities in low-income regions. Pregnant women in regions of unkempt environmental conditions, usually indicative of lower socioeconomic status, endure a higher proportion of burden due to risk of microcephaly [5].

International travel has made disease prevention a global concern. The news media and recent reports continue to keep the topic at the forefront. There remains an increased interest in understanding how the general public perceives and absorbs health information, to ensure preventive measures are comprehensive yet still understandable to a variety of literacy levels. Although Zika has been headline news in national and international settings, little research has been done to understand the knowledge and attitudes for this issue. One study which examined Zika awareness concluded that participant was well informed about Zika, knowledge of credible sources of information concerning the virus, and were more likely to vaccinate themselves if a vaccine was available [8]. These findings articulate the desire for a vaccine, but do not illustrate opinions and attitudes regarding media outlets, and other common modes of mass communication. The objective of this study was to assess student knowledge about public health concerns and utilization of different media channels for information for public health concerns, including older adults and Zika. Additionally, health literacy levels were recorded.

Three research questions guided this study, which included:



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**Table 1:** Survey question from World Health Organization and the Centers for Disease Control and Prevention.

Question number	Question	Question type
1	What is the number one public health issue in the world today	Multiple choice
2	What is the number one public health issue in the United States today	Multiple choice
3	Which of the following regarding symptoms of Zika is true	Check all that apply
4	There is a cure for Zika	True/False
5	The Zika virus is linked with which of the following syndromes/disorders	Check all that apply
6	The older population is at higher risk for Zika due to its correlation to which of the following syndromes/disorders	Check all that apply
7	What are some precautions one can take to protect oneself from Zika	Check all that apply
8	There are special precautions for older adults to take to prevent getting the Zika virus	True/False
9	What individuals or groups are more at risk of harm from Zika	Check all that apply
10	If a pregnant woman has Zika, what are the risks she faces	Check all that apply
11	If a pregnant woman has Zika, what are the risks for the fetus/baby	Check all that apply
12	Why should a woman avoid getting pregnant because of Zika	Check all risks
13	Which of the following are ways of transmitting Zika	Check all that apply
14	In the last year estimate, how many people have died from Zika transmission	Open ended

**RQ1:** For students in public health and communication, what is the level of knowledge about public health concerns including Zika.

**RQ2:** For students in public health and communication, what are the media channels used for information public health concerns including older adults and Zika.

**RQ3:** For students in public health and communication, what is the health literacy rate.

## Methods

### Study design

The study design was a pilot study using a test-survey. The study design mirrored a previous study design by the authors which measured Ebola [9]. The survey was distributed to a convenience sample of college students enrolled in communication and health profession programs using the online Qualitrics® data collection software during an eight week period in spring 2017. Participants were recruited through convenience sampling through course and program email. The survey was self-administered; consent was obtained prior to completion of the survey.

Survey questions assessed student knowledge, and opinions of: General information about Zika, current public health issues, student media use and information sources, media coverage of Zika, and U.S. policy regarding Zika and health literacy levels. Demographic questions to describe the population characteristics (i.e. gender, age, family income) were included. This study was approved by a university Institutional Review Board.

### Measures

The outcomes of interest were Zika knowledge, health literacy, and media usage. The survey assessed level of knowledge about Zika using information from World Health Organization and the Centers for Disease Control and Prevention posing 13 questions about top health concerns in the United States and globally,

symptoms of Zika, general Zika information, and associated risk factors (Table 1). : (1) What is the number one public health issue in the world today (multiple choice), (2) What is the number one public health issue in the United States today (multiple choice), (3) Which of the following regarding symptoms of Zika is true (check all that apply), (4) There is a cure for Zika (T/F), (5) The Zika virus is linked with which of the following syndromes/disorders (check all that apply), (6) The older population is at higher risk for Zika due to its correlation to which of the following syndromes/disorders (check all that apply), (7) What are some precautions one can take to protect oneself from Zika (check all that apply), (8) There are special precautions for older adults to take to prevent getting the Zika virus (T/F), (9) What individuals or groups are more at risk of harm from Zika (check all that apply), (10) If a pregnant woman has Zika, what are the risks she faces (check all that apply) (11) If a pregnant woman has Zika, what are the risks for the fetus/baby (check all that apply), (12) Why should a woman avoid getting pregnant because of Zika (check all risks) (13) Which of the following are ways of transmitting Zika (check all that apply), and (14) In the last year estimate, how many people have died from Zika transmission (open-ended). Maternal/Child health questions (Q10-12) were analyzed and reported separately.

Student's perception about public health concerns including Zika was evaluated using open-ended questions. For instance, what are the key messages you have recently heard about Zika (open-ended), briefly describe the cure for Zika (open-ended), and what microcephaly (open-ended). Other measures that were also employed to assessed participants perception about Zika includes, Please rate your level of concern about the spread for Zika in the United States (5-points Likert scale), Please rate your confidence in knowing what to do to protect yourself from Zika (5-points Likert Scale), and Please rate your support for closing U.S borders to protect Americans from infectious diseases (5-points Likert scale), Do you think there is a link between

Zika and microcephaly (4-points Likert scale). Again, open-ended maternal/child health questions were analyzed and reported separately.

Media usage was assessed using 9 questions measuring tools including, How do you usually get information about health issues, such as a specific (check all that apply), please rate your response to the following state: I am sick and tired of hearing about Zika (5-points Likert scale), how much information about health issue do you get from "X" (Newspapers, Social media, internet, radio and TV, books and brochures, family member/friends or co-workers, and doctors, nurses, therapist or psychologist) (5-point Likert scale), and In everyday life, how often do you usually use email (5-point Likert scale). Health literacy was screened using a tool developed by Chew, et al. [10-12] consisting of three health literacy questions. Health literacy levels were calculated based on summed responses of the three questions and categorized as low, adequate and high health literacy consistent with previous methodology [9].

## Data Analysis

All data were analyzed using IBM SPSS Statistics version 19. Descriptive statistics were used to describe demographic, health status, with health literacy variables. Open ended questions were analyzed by content analysis and frequency/range of responses. Cumulative scores were calculated for responders who answered all three health literacy questions. Health literacy levels were classified as: Low health literacy (scores 3-8), moderate health literacy (scores 9-14) and high health literacy (score = 15).

## Results

The majority of respondents were female (85.7%, n = 43) with a mean age of 27 (SD = 10.11). The highest per-

centage of respondents reported parental income between \$20,000-\$59,999 (44%, n = 21) and reported educational status as 4<sup>th</sup> year college student (53%, n = 26), and 3<sup>rd</sup> year college student (18%, n = 9) see Table 2.

## Zika knowledge

Seventy one percent (71.1%, n = 37) of the study participants reported there is no cure for Zika. No student responses were 100% accurate for signs/symptoms of Zika. When the participants of this study were asked "what is the number one public health issue in the world today?", 22.0% (n = 13) reported cardiovascular diseases, while just less than half, 47.5% (n = 28), correctly identified malnutrition/hunger. The majority of participants, 69.4% (n = 41), correctly identified cardiovascular diseases as the number one public health concern in the United States, followed by tobacco at 15.3% (n = 9) and 13.6% (n = 8) for depression. Approximately 1.7% (n = 1) of the study participants selected malnutrition as the number public health issue in the United States. The majority of participants (84.3%, n = 43) correctly identified Zika is transmitted through mosquitoes, 60.8% (n = 31) indicated that Zika is transmitted congenitally from mother-child, 51.0% (n = 26) reported Zika to be transmitted through sexual contact, and 51.0% (n = 26) of the study participants self-reported that Zika is transmitted through blood transfusion. Participants incorrectly identified Zika transmission through the air (13.7%, n = 7), and kissing/sneezing (13.7%, n = 7).

When participant's knowledge about the symptoms of Zika was assessed, 94.1% (n = 48) correctly identified fever, 76.5% (n = 39) identified joint pain, 64.7% (n = 33) identified muscle pain, 56.9% (n = 29) identified headache, and 51.0% (n = 26) identified red eyes. Just under half of participants (49.0%, n = 25) incorrectly identified stomach pain and loss of appetite as a symptom of Zika, and 31.4% (n = 16) incorrectly identified cough/sore throat as a symptom.

Responses for the open-ended question asking students, "What are the key messages you have recently heard about Zika included four categories: (1) 18.8% (n = 5) stated Zika is from mosquitoes and it is spreading, (2) 21.9% (n = 9) recalled messages that Zika affects pregnant women and fetuses, (3) 9.4% (n = 3) recalled prevention messages including to use sprays and receive vaccinations, and (4) 9.4% (n = 3) stated remembering messages to restrict travel. Other responses (40.6%; n = 12) included "not much" or "nothing recently" and were placed in a no-specific messages recalled category (Table 3).

**Table 2:** Participant characteristics.

	n	(%)
<b>Sex (n = 59)</b>		
Male	6	12.24
Female	43	87.76
<b>Age (n = 43)</b>		
Maximum	64	
Mean	27.19	
Standard Deviation	9.99	
Variance	99.87	
<b>Parents/caregivers annual income range (n = 48)</b>		
Below \$ 20,000	16	33.33
\$ 20,000 - \$ 59,999	21	43.75
\$ 60,000 - \$ 89,999	5	10.42
\$ 90,000 or more	6	12.5
<b>Year in College (n = 49)</b>		
Year 1	1	2.04
Year 2	4	8.16
Year 3	9	18.37
Year 4	26	53.06
Graduate School	9	18.37

**Table 3:** Question 14, key messages responses (n = 32).

	%	n
Spreading; from mosquitoes	18.8	5
Affects pregnant women and fetuses	21.9	9
Use sprays; prevention	9.4	3
Restrict travel	9.4	3
Other (not much, no specifics in the response)	40.6	12

**Table 4:** Health information sources (n = 59).

	%	n
Newspapers	32.20	19
Social media	64.41	38
Internet	86.44	51
Radio and TV	45.76	27
Books or brochures	37.29	22
Family members, friends, or co-workers	66.10	39
Talking to health care professionals	69.49	41

## Health literacy

The majority of participants self-reported health literacy rates were moderate (79%, n = 37) and 10% had low and high health literacy levels (n = 5, respectively).

## Media utilization

Results (listed in non-ranking order) indicated the top 3 sources of health information were 1) Internet, 2) Health professionals, and 3) Family and friends (Table 4). Respondents indicated their three most accessed sources for Zika information were 1) Social media (64.4%, n = 38), and radio and television (45.8%, n = 27). The majority (81%, n = 48) of respondents used e-mail as a part of their daily life.

## Discussion

The number of people diagnosed with Zika virus continues to increase as Zika remains a public health issue. The incidence is expected to increase in a number of countries and Zika continues to be a topic for investigation [6,13,14]. The demographic results seem to be consistent with the family status of many college students. Study participants reported higher incomes and educational levels, as well as higher self-reported health literacy rates than national averages. Previous studies have linked higher education levels with higher health knowledge [15-18]. The lack of Zika knowledge among the educated respondents from this study confirms the continued need for improved education for future professionals about Zika and other public health issues.

Additionally, study findings highlight the need for health literate information to be disseminated through media outlets. Public health agencies will continue to use the media to disseminate timely health information messages, such as Zika. Results highlight the importance of clear and accurate health communication messages that are delivered at the appropriate health literacy level. These methods are crucial to communicate accurate signs and symptoms for Zika virus and other health topics to aid in public awareness and promote prevention.

The internet and social media continue to serve as important mediums for health messages for all ages. Social media could serve as an educational outlet for public health issues but messages should include clear information that is easily understood [19]. The internet and social media have been frequent sources of misinformation [20]. The proportion of misinformation

available on the internet and social media combined with the frequency participants reported use of these sources for health information highlights the need for increased public health messages and increased overall online presence on social media by health agencies and professionals. This study confirms some of the findings from a previous study using a similar methodology including the same types of sources for access to health information [9].

Future efforts will need to focus on ensuring college students can understand emerging public health issues and support widespread communication of these messages for prevention. Supporting the engagement of this population in the online dialogue about health information and topics may be a critical component to address the amount of misinformation, both unclear and inaccurate information, available online.

## Limitations

As with any research study, our findings are not without limitations. First, this was a pilot study with a test-survey instrument. The authors continue to conduct research studies with public health topics surveying health profession, public health and communications students to improve the methodology. Future studies will continue to expand to additional, relevant disciplines and increase the sample size. The survey was issued through only one modality (online Qualtrics software) limiting the sample to include only respondents with access to a computer. Because this was a pilot study, no sample size estimates or power calculations were included for the study.

## Conclusion

This pilot study confirms findings from a previous study regarding low health knowledge levels among college students regarding current public health issues, current media use and information sources and general health literacy levels. This study was an important step in understanding students' knowledge of Zika virus. Results from this study highlight the need to improve health communication training and further evaluate the quality of health information dissemination via all communication sources.

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## Conflict of Interests

None to Report.

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