

# A Cross-Sectional Survey of the Zika Virus and its Prevention: The Knowledge, Thoughts, and Beliefs of a Community of Residents in Caguas, Puerto Rico

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**Objective:** The objective of this study was to explore the knowledge, thoughts, and beliefs regarding the Zika virus and its prevention in a community of residents in the municipality of Caguas, Puerto Rico, and elicit their concerns and perceptions of risk.

**Methods:** A quantitative, non-experimental, descriptive, cross-sectional correlational study was conducted in a community in Caguas, Puerto Rico. A structured questionnaire was administered to a sample of 158 residents, aged 21 and older, who participated voluntarily. The data were analyzed using SPSS version 17 via univariate and bivariate analysis.

**Results:** Of 158 surveyed, 64.6% were women; with a population average of 53.85 years. Of the respondents who believed that they would be affected in some way if they were infected by the Zika virus, over half (52.3%) felt that the virus represented a significant threat to their emotional stability. Of those who perceived emotional threat, 39.5% (n=32) continued to study after completing high school ( $X^2=9.217$ ,  $p=0.027$ ), 57.9% (n=55) had private health insurance ( $X^2=6.325$ ;  $p=0.042$ ), and 67.9% (n=55) reported it was little or unlikely to become infected ( $X^2= 6.783$ ;  $p=0.034$ ). Out of those concerned, 57.4% (n=54) considered Zika very or extremely severe ( $X^2=22.827$ ,  $p<0.001$ ) and 98.9% (n=93) clean the house surroundings as a preventive measure ( $X^2 = 4.951$ ,  $p=0.026$ ). Lack of interest was the most common reason identified for not complying with preventive actions by the residents (89.2%).

**Conclusion:** The underestimation both of the risk concerning the Zika virus and of its consequences was evident. This study reaffirms the need to develop a network that effectively and constantly communicates risk estimates, doing so while addressing the specific needs within the communities served by that network. Community interventions aimed at improving the benefits of and reducing the risks associated with and the perceived barriers to preventive behaviors are needed. [*PR Health Sci J* 2018;37(Special Issue):S57-S65]

*Key words:* Zika, community, Risk perception, Preventive behaviors, Emerging disease

**E**merging and reemerging diseases have a major impact on the health of the population due to their incidence and the number of deaths they can cause (1). Disease emergence, in particular, puts at risk the public health and economic stability of societies the world over. The appearances of new diseases have caused increases in mortality, morbidity and disability and increasingly threaten global health and impede human progress. In view of the effects caused by the appearances of

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these new diseases, health authorities declared an international public health emergency (2). These diseases are the result of a process of the interaction of multiple factors, such as social determinants of health, climate change and certain conditions endemic in some populations (3).

Puerto Rico's geographical location and climate make it susceptible to emerging and reemerging diseases such as Zika. Characterized by its subtropical climate, Puerto Rico has an annual average rainfall of ~1800 mm with trade winds prevailing most of the year (4). Weather conditions such as temperature threshold and humidity are determinants for the emergence of vector-borne outbreaks, such those that can be caused by *Aedes aegypti* (5). Consequently, arboviral diseases transmitted by it, dengue, chikungunya and Zika continue to increase, annually and geographically (6).

The Zika virus, in particular, has caused concern in the scientific community due to its health consequences. Zika's rapid spread in Brazil and the Americas has populations involved, resulting in the virus's being added to the growing list of emerging and reemerging diseases (7). The Puerto Rico Department of Health reported the first case of Zika virus infection in December 2015 (8). According to the 2016 annual health report of Puerto Rico, of the 65,778 cases believed to arboviral in origin 35,638 can be tied to Zika (8). Additionally, 233 cases had positive serology tests for flaviviruses, specifically for Zika and dengue antibodies. Recent studies have shown that infection with Zika virus during pregnancy has been associated with congenital microcephaly, severe fetal brain defects and loss of pregnancy, among other perinatal complications (9). Case reports from the Puerto Rico Department of Health identified 2,864 pregnant women diagnosed with Zika, of which 1,694 presented symptoms and 1,170 did not; 7 cases of congenital defects were reported. Subsequently, in 2016, the World Health Organization (WHO) declared Zika to be a public health emergency of international concern (10).

Zika is spread mostly by the bite of an infected *Aedes* species mosquito (*Ae. aegypti* and *Ae. albopictus*), which can also spread chikungunya and dengue. Other transmission mechanisms of Zika are sexual intercourse, during which the virus can be passed from a person who is infected to his or her partners, blood transfusion (to date, there have not been any confirmed cases of Zika transmission via blood transfusion in the United States), and exposure in a health care setting (not clearly established); in addition, a pregnant woman infected with Zika can pass the virus to her fetus (11). Source reduction of *Aedes* mosquito breeding sites is critical for the control of the virus. Most larval mosquito breeding sites are related to human behavior (accumulations of garbage, debris and tires) (6, 12, 13).

Previous studies have investigated the knowledge, concerns, attitudes, and perceptions of individuals toward the *Aedes aegypti* mosquito and the risks and diseases associated with it (14, 15). These studies underscore the need for effective strategies aimed at the prevention and control of this species of mosquito. Such strategies are crucial for minimizing both disease spread and the impact of the outbreaks that occur, by adopting recommended

preventive measures (14-20). The health belief model (HBM) (21-23), a well-established theoretical approach, may be employed to address the problem of Zika vector control. This framework theory may be used to design a health education health behavior change intervention, a means of testing and evaluating whether a program works and can be used, as well, to create educational materials and health messages (24, 25). The principal constructs of the HBM are the following: 1) *perceived susceptibility*, which refers to a person's belief in the likelihood of contracting a disease (What is the probability of getting infected with Zika virus during the last year?); 2) *perceived severity*, which refers to person's belief that contracting the disease may result in harsh health consequences (How serious do you think Zika is?); 3) *perceived benefits*, are those benefits that the individual believes may result from complying with such health-related measures as are intended to prevent the disease or reduce its effects (What do you do to reduce or eliminate *Aedes aegypti* mosquito breeding sites? or Can you identify what blocks people experience from implementing the recommendations to prevent the spread of Zika?); 4) *cues-to-action*, are activities that heighten awareness in terms of preventing or controlling the health problem (How often should steps be taken to eliminate the potential breeding sites of mosquitoes in and around the home?), and 5) *self-efficacy*, which refers to the confidence that an individual has that he or she will be able to perform the necessary health actions (How confident are you in your own ability to avoid getting Zika?) (14, 24-28).

Recent investigations have shown that community perceptions and responses are a critical component of reducing vector control, since perceptions shape actions that might or might not improve quality of life and, thus, have the potential to influence both behavioral responses and the acceptance (or lack of same) of shifts in policy and management (9, 13, 29-31). Our study explored this issue with the following questions: *How worried are you about the Zika virus?*, *How much would the Zika virus affect your life?*, and *How much would it affect you emotionally if you were to acquire the Zika virus?* During the survey, we were careful to observed whether the respondent seem to feel angry, scared, depressed, or anxious (7, 30-32).

Currently there is no antiviral treatment or specific vaccine for Zika virus infection. The recommended course of action after the exclusion of more serious illnesses is symptomatic treatment; vector control is the only way to prevent the spread of this disease (27, 28, 33).

The development of effective strategies for promotion, prevention and intervention should lead to empowerment of communities, which is a vital element in the reduction of the human-vector interaction (34). In this study, we surveyed residents of a small community in Puerto Rico to ascertain their knowledge of the Zika virus (and its prevention), their personal perceptions of risk with regard to becoming infected with the virus, and the existence of such barriers to prevention that might be in place in the respondents, both as individuals and as members of said community.

## Methods

### Study population

This cross-sectional study (35) was conducted with 158 adults recruited from a community setting in the municipality of Caguas, Puerto Rico. Participants were informed about the study by research graduate students with the help of community leaders. The students were trained regarding the protection of human subjects, recruitment, data collection, study design, data entry, and data management. In addition, the graduate students went to the community to invite potential participants to volunteer and to orient them about the purpose and procedures of the study, during the months of June and July 2017.

The sample for the present study was selected by identifying the households within the census tract and census blocks using the American Community Survey (ACS), with the estimates of 5 years (36). The community for this study consisted of 276 potential households (37), data that was confirmed with the community leaders' maps and by visiting through the community. Per the inclusion criteria, all the participants had to be able to read, speak and write Spanish. A participant was eligible if he or she was 22 years or older (participants ranged from 22 to 86 years old, with a mean age of 54 years); being pregnant, elderly or a member of a vulnerable population did not rule out the participation of an interested subject. The exclusion criteria included having a documented mental illness, being bedridden, being unable to give consent to participate in the study, and being under a guardian's care. In addition, screening questions were asked to identify potential non-eligible persons. These questions assessed for awareness of current date, the municipality where the resident lived, the name of the current governor, and individual's birth year. If the participant could not answer at least 3 of the questions posed, he or she was thanked for the valuable time and effort spent in the study (38).

The final sample obtained was 158 participants, each representing a single household. During the interview process, the residents of 69 houses never answered their doors, though the houses were inhabited, according to information provided by community leaders; 17 of the homes were abandoned and that information was also confirmed; 30 residents refused to participate; 1 household member did not meet the inclusion criteria for minimum age; and 1 resident could not answer the screening questions, that were asked before the survey began. The response rate for the present study was 61.5%.

The study was approved by the University of Puerto Rico Medical Sciences Campus Institutional Review Board (B1000217), and consent was obtained prior to survey participation. Participants were not offered incentives for responding to the survey and participation was anonymous.

### Measures

#### Survey design

The survey for the study covered 3 main areas; the first covered demographics and the second included questions

related to perception and severity of the risk, vulnerability, knowledge, and preventive strategies, all relating to Zika; the third area explored quality of life. Questions related to demographic characteristics explored gender, age, educational level, marital status, income and health insurance. The survey included questions that assessed perceptions of risk, severity, and vulnerability, as well as knowledge and preventive strategies all relating to Zika vector control; these questions were used in recent studies exploring the Zika epidemic in Hispanic populations (32, 39-41). The quality of life section was assessed using the Spanish version of the SF-36, v2<sup>®</sup>; permission for the use of the copyrighted survey was obtained through OPTUM (42, 43). The SF-36, a short-form health survey, has 36 questions that explore an individual's functional health and well-being and that are organized into 8 multi-item scales, which can themselves be organized into 2 summary measures consisting of a physical score and a mental score.

Experts reviewed the questions for validity, social context, clarity, response options, and purpose. A pilot questionnaire was administered to 15 persons not related to the community under study to assess the comprehensibility and the relative ease or difficulty of completing the questionnaire. The pilot testing resulted in minor changes related to grammar corrections, and also improved the clarification of the questions among research graduate students and the quality and accuracy of the data collected.

### Statistical analysis

Frequency distributions and descriptive statistics were used to describe the study sample members and their knowledge of reproduction sites and areas that facilitate mosquito breeding, as well as respondents' perceptions of why people do not practice preventive measures to reduce mosquito reproduction sites. Bivariate analyses employing chi-square tests of independence were used to examine the association of sociodemographic characteristics with general and emotional risk perception and perceived concern regarding Zika. Furthermore, we assessed the associations of perceived susceptibility and severity with general and emotional risk perception and perceived concern regarding Zika. All the statistical analyses were performed using SPSS version 17 (44).

## Results

### Characteristics of the sample

One hundred fifty-eight adults consented to participate in the study, and all ranged in age from 22 to 86 years of age at the time of their participation. More than half (64.6%) were women and 35.4% were men; more than one-third of the participants (35.4%) were 65 years old or older. The average age of those surveyed was 54 years. Approximately, one-third (34.8%) of the participants had completed at least some college or had an associate's degree. Regarding household yearly income, 42.8% had an annual income of \$10,000 to



\$24,999, followed by those who earned less than \$10,000 (40.8%); and less than one-fourth (16.4%) had an income greater than \$25,000. More than half reported (61.8%) that they had private health insurance; a bit more than one-third (35%) had public insurance, and only a 3.2% reported having no insurance at all.

Figure 1 shows the frequency distribution of the respondents' risk perceptions towards the Zika virus. More than half (61.7%; n=95) of the respondents perceived that their lives would be very affected if they acquired the virus, and 52.3% believed that they would be very emotionally affected. Additionally, a large proportion of the respondents (60.3%) were very concerned about the virus.

Table 1 shows the relationship between sociodemographic variables and their general risk perception, emotional risk perception, and perceived concern towards Zika. More than half of the participating women (64.2%), people over 65 years old (40.0%), individuals those who completed high school (36.8%) and those with some college (32.6%), people with an annual household income lower than \$10,000 (38.7%) and those with an income of \$10,000 to \$24,999 (45.2%), and participants who reported having either private (64.2%) or public health insurance (32.6%) perceived that Zika would affect their lives if they were to become infected with it.

The relationship of emotional risk perception and sociodemographic variables shows that more than half of the women (65.4%), people over 65 years old (42.0%), individuals

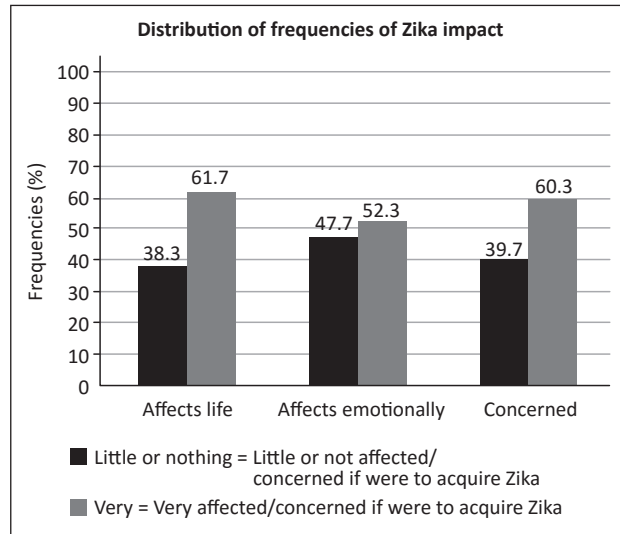


Figure 1. Frequency distribution of the levels of risk perception and concern towards acquiring Zika among residents of Caguas, Puerto Rico, during June and July 2017.

Table 1. Relationships of sociodemographic characteristics with general and emotional risk perception and perceived concern regarding Zika among residents of a community in Puerto Rico, during June and July 2017.

Sociodemographic characteristics	General risk perception				Emotional risk perception				Perceived concern									
	Affects life		Does not affect life		Affects emotionally		Does not affect emotionally		Concerned		Not concerned		X <sup>2</sup>	p value				
	n	%	n	%	n	%	n	%	n	%								
<b>Sex</b>																		
Male	34	35.8	21	35.6	0.001	0.980	28	34.6	27	36.5	0.062	0.803	28	29.8	28	45.2	3.837	0.050
Female	61	64.2	38	64.4			53	65.4	47	63.5			66	70.2	34	54.8		
<b>Age</b>																		
22-34	14	14.7	12	20.3	5.650	0.227	10	12.3	17	23.0	7.471	0.113	17	18.1	10	16.1	2.158	0.707
35-44	12	12.6	14	23.7			10	12.3	16	21.6			15	16.0	11	17.7		
45-54	14	14.7	6	10.2			12	14.8	8	10.8			14	14.9	7	11.3		
55-64	17	17.9	11	18.6			15	18.5	13	17.6			19	20.2	9	14.5		
65 or older	38	40.0	16	27.1			34	42.0	20	27.0			29	30.9	25	40.3		
<b>Education level</b>																		
Less than high school	15	15.8	10	16.9	7.826	0.050	13	16.0	12	16.2	9.217	0.027	12	12.8	13	21.0	6.784	0.709
Completed high school	35	36.8	10	16.9			28	34.6	18	24.3			32	34.0	15	24.2		
Some college/ associate's degree	31	32.6	24	40.7			32	39.5	23	31.1			37	39.4	18	29.0		
Bachelor's degree or higher	14	14.7	15	25.4			8	9.9	21	28.4			13	13.8	16	25.8		
<b>Household yearly income</b>																		
Less than \$10,000	36	38.7	34	42.1	0.333	0.847	26	32.9	35	48.6	3.972	0.137	37	39.8	24	41.4	0.604	0.739
\$10,000 - \$24,999	42	45.2	23	40.4			39	49.4	26	36.1			42	45.2	23	39.7		
\$25,000 or more	15	16.1	10	17.5			14	17.7	11	15.3			14	15.1	11	19.0		
<b>Health insurance</b>																		
No insurance	3	3.2	2	3.4	1.260	0.533	4	4.9	1	1.4	6.325	0.042	4	4.3	1	1.6	0.811	0.667
Public insurance	31	32.6	24	41.4			22	27.2	33	45.2			33	35.1	22	36.1		
Private insurance	61	64.2	32	55.2			55	57.9	39	53.4			57	60.6	38	62.3		

who completed high school (34.6%) and those with some college (39.5%), almost one-third of the people with an annual household income lower than \$10,000 (32.9%) and those with an income of \$10,000 to \$24,999 (49.4%), and participants who reported having either private (57.9%) or public health insurance (27.2%) perceived that acquiring the Zika virus would affect them emotionally. Associations between emotional risk perceptions were found for educational level and health insurance ( $p < 0.05$ ).

perceived concern and the probability of contracting the virus, more than two-thirds reported being concerned about acquiring but considered that they had little chance of acquiring or were unlikely to acquire the virus.

The relationship between perceived severity towards Zika virus and general risk perception show that more than half (57.9%) of the participants who considered that acquiring Zika would affect their lives, perceived the virus as being very severe, and this relationship had a statistically significant

**Table 2.** Relationships of perceived susceptibility and severity with general and emotional risk perception and perceived concern regarding Zika among residents of a community in Caguas, Puerto Rico, during June and July 2017.

	General risk perception				Emotional risk perception				Perceived concern									
	Affects life		Does not affect life		Affects emotionally		Does not affect emotionally		Concerned		Not concerned		X <sup>2</sup>	p value				
	n	%	n	%	n	%	n	%	n	%	n	%						
<i>Perceived susceptibility</i>																		
Little or no susceptibility	60	63.2	38	64.4	3.50	0.173	55	67.9	44	59.5	6.78	0.034	60	63.8	40	64.5	4.414	0.110
Some susceptibility	16	16.8	15	25.4			10	12.3	21	28.4			15	16.0	16	25.8		
Extreme susceptibility	19	20.0	6	10.2			16	19.8	9	12.2			19	20.2	6	9.7		
<i>Perceived severity</i>																		
Little or no severity	23	24.2	22	37.3	17.84	0.001	19	23.5	27	36.5	10.36	0.006	16	17.0	31	50.0	22.87	0.01
Some severity	17	17.9	23	39.0			16	19.8	24	32.4			24	25.5	16	25.8		
Extreme severity	55	57.9	14	23.7			46	56.8	23	31.1			54	57.4	15	24.2		

In addition, the bivariate analysis of sociodemographic characteristics regarding perceived concern resulted as follows: almost one-third of the women (70.2%), people over 65 years old (30.9%), individuals who completed high school (34.0%) and those with some college years (39.4%), people with an annual household income lower than \$10,000 (39.8%) and those with an income of \$10,000 to \$24,999 (45.2%), and participants who reported having either private (60.6%) or public health insurance (35.1%) indicated that they had concerns about becoming infected with Zika.

Table 2 shows the associations of risk perception, emotional risk perception, perceived concern between perceived susceptibility and perceived severity for Zika. Regarding the relationship between general perceptions of risk and perceived susceptibility, more than half (63.2%) of respondents reported that their lives would be affected if they contracted the Zika virus, but perceived their susceptibility as little or none. Regarding the associations between emotional risk perception and perceive susceptibility to Zika disease, more than two-thirds (67.9%) of the participants indicated that being infected by the virus would affect their emotional well-being, but reported little or no chance to be infected. This association had statistical significance ( $X^2 = 6.78$ ;  $p = 0.034$ ). Comparing

**Table 3.** Frequency distributions of knowledge of reproduction sites and areas in which mosquito breeding is facilitated among residents of a community in Caguas, Puerto Rico, during June and July 2017.

	Zika knowledge					
	Yes		No		Do not know	
	n	(%)	n	(%)		n
<i>Breeding sites</i>						
Soil	18	(11.5)	133	(85.3)	5	(3.2)
Trash	106	(67.1)	52	(32.9)	0	(0.0)
Shrubbery	115	(72.8)	43	(27.2)	0	(0.0)
Water leaks	150	(96.2)	4	(2.6)	2	(1.3)
Stagnant water	154	(97.5)	4	(2.5)	0	(0.0)
Other breeding sites	41	(25.9)	117	(74.1)	0	(0.0)
<i>Facilitators of mosquito breeding</i>						
Garbage around	132	(83.5)	26	(16.5)	0	(0.0)
Uncovered water tanks	153	(98.1)	2	(1.3)	1	(0.6)
Plants in the soil	80	(50.6)	78	(49.4)	0	(0.0)
Unclean animal water troughs	151	(96.8)	4	(2.6)	1	(0.6)
Clean and organized gardens	19	(12.2)	135	(86.5)	2	(1.3)
Flower vases	147	(93.0)	11	(7.0)	0	(0.0)
Old uncovered tires	152	(97.4)	3	(1.9)	1	(0.6)
Holes with water	151	(95.6)	7	(4.4)	0	(0.0)
Others	23	(14.6)	135	(85.4)	0	(0.0)

association ( $X^2=17.84$ ;  $p<0.001$ ). Forty-six respondents (56.8%) felt that they would be emotionally affected if they acquired Zika and perceived the virus as being very severe. A statistically significant association was observed for this relationship ( $X^2=10.36$ ;  $p=0.006$ ). In examining the perceived concern about and the perceived severity towards Zika, we found that more than half (57.4%) of those who were concerned considered the virus to be very or extremely severe, a significant association was observed for the relationship ( $X^2=22.827$ ;  $p<0.001$ ).

The residents' knowledge of reproduction sites and of reducing mosquito breeding sites was assessed through several questions (Table 3). The results show that mostly (85.3%) of respondents believed that the *Aedes aegypti* mosquito did not reproduce on land. Furthermore, most of the participants recognized that trash (67.1%), shrubbery (72.8%), water leaks (96.2%) and stagnant water (97.5%) were favorable sites for mosquito breeding. The majority (83.5%) of the respondents considered that having garbage around the house facilitated the growth of mosquitoes. Participants, also identified untreated animal water troughs (96.8%), flower vases (93%), old uncovered tires (97.4%) and holes with water (95.6%) as places that favor the reproduction of the vector. Finally, 86.5% believed that the mosquito could not grow in clean and organized gardens.

Table 4 shows the participants' perceptions of why people do not practice preventive measures, to reduce the vector's breeding sites. The most common reason identified by the residents for why individuals do not comply with preventive actions is their lack of interest in the topic (89.2%), followed by their belief that people do not understand the message (50.6%).

**Table 4.** Frequency distribution of perception of why people do not practice preventive measures, among residents of a community in Caguas, Puerto Rico, during June and July 2017.

Reasons	Reasons why people do not practice preventive measures			
	Yes		No	
	n	%	n	%
People do not understand the message	80	50.6	78	49.4
Lack of interest	141	89.2	17	10.8
Lack of information	60	38	98	62
Lack of resources	60	39	94	61
Other	35	22.2	123	77.8

## Discussion

The purpose of this study was to examine the perception of risk, factors that either promote or act as barriers to risk communication, and needs related to individual and community prevention, when addressing emerging and reemerging diseases in people living in community settings, specifically as relates to the Zika virus. During the study 2 variables were used to assess the perception of risk: disease (that is, the perceived threat of

the disease in terms of how much it would affect their lives and emotions of participants if they were to acquire the disease) and concern. Both dependent variables were used to measure their association with sociodemographic factors, perceived susceptibility and severity, and indicators for action, among others.

The results showed that participants were very concerned about the Zika virus. However, studies have shown that when imminent threats become more immediate, risk perception tends to be more pessimistic (45). In general, women perceived themselves to be more affected by Zika compared than men did, which is consistent with the literature, in which women tend to perceive themselves as having greater levels of risk than men do (13). Moreover, the difference in terms of their concern and beliefs that they could be affected might be attributed to the constant media campaigns directed for them (45). In our study, people older than 65 years were the least concerned, contrary to what is revealed in the literature. According to several studies people aged 65 years-or-more tend to perceive themselves as having high levels of risk (17, 18). The literature supports the notion that the general concern of a population regarding health risk is based on the incidence of risk and on the social factors related to that risk (20). Among the findings of our study, most participants considered it is unlikely to acquire an emerging disease, such as Zika. It is important to note that according to the information provided by the study participants, the community was exposed to a series of educational campaigns to reduce vector breeding sites and the spread of infection during the Zika epidemic of 2016. These campaigns were conducted by the Department of Health of Puerto Rico, by the Centers for Control and Prevention Diseases (CDC) and the Vector Control Unit in Puerto Rico (11). Therefore, there is a possibility, that as a consequence of these interventions, the community perceives itself as having a low risk of acquiring the disease. Other studies indicate that self-comparisons with other people cause a lower estimated risk of health, which could lead people to misjudge their risk of acquiring a certain disease (46).

Regarding risk perception and perceived severity, the results demonstrate that the perceived impact of a disease on the respondent's life and emotions influences his or her perception of disease severity. The more that people consider that a disease could affect their lives and emotions, the greater the perceived severity. These results are supported by findings in which authors suggest that the susceptibility to and perceived severity of a disease are proportional (23).

In regard to concerns of Zika, most of the subjects interviewed considered it to be very or extremely severe, while those who reported not being concern by it considered it minimally or not at all severe. These findings support a tendency evidenced by previous studies in which concern was directly proportional to perceived severity (24). Additionally, it is important to consider the idea that the degree of concern with respect to acquiring a disease could be influenced by the perceived risk of acquiring



other diseases (25). Several researchers have reported that an individual's concern with respect to acquiring a disease is associated with applying preventive practices; therefore, preventive efforts should be directed towards concern as well as perception of risk (19, 22).

Preventive behaviors and risk perception were observed in the majority of participants (>74.2%) in that they purported to clean their houses and surroundings, eliminate hatcheries, fumigate, and use repellent regardless of whether or not they were concerned about the virus spread. However, this does not correlate with what has been well established in the literature, which indicates that when an event is perceived as highly dangerous, unfamiliar, or remains beyond individual and institutional control is likely to generate concern or panic, then the people acquire preventive behavior to reduce their risk (27).

To study general knowledge about Zika, the participants were asked about mosquito breeding sites and places and conditions that facilitate the breeding of the vector *Aedes aegypti*. Most respondents correctly identified breeding sites and facilitators. These results may also be a related consequence of the media campaigns employed in 2016 during the Zika epidemic (28). These campaigns were implemented to increase people's awareness regarding the elimination of mosquito breeding sites as well as areas and conditions that facilitate the breeding of *Aedes aegypti* (29).

Other studies have found that information on disease does not necessarily translate into knowledge and appropriate practices (30). To determine the reasons that people do not carry out preventive measures, the respondents were asked why they believe that others do not implement recommendations to prevent the spread of Zika. The most prevalent reason identified was the lack of interest of people, followed by people not understanding the message.

Some limitations should be considered when interpreting the results of our study. First, the response rate was 61.5%, which means that our study suffers from a non-response bias of 38.5%. This type of study may be prone to non-response bias if participants who consent to take part in the study differ from those who do not, resulting in a sample that is not representative of the population. Second, we relied on self-report assessment which are subject to memory recall and do not provide other tools to confirm a given participant's information. Third, the study followed a cross-sectional design; such designs are not ideal for determining causal relationships.

Despite these limitations, the findings of this study might contribute to further expand knowledge, societal attitudes and perceptions towards emergent diseases like Zika. In addition, the results from this study, which will support other such studies carried out in communities in Puerto Rico, highlighted 2 primary obstacles to disease prevention: the lack of acceptance of responsibility for prevention and the fact that erroneous concepts are occasionally mistakenly presented in educational materials (27). Likewise, the lack

of interest in prevention might be the result of changes to and transformations in the health system, which went from a preventive to a curative approach, as well as current economic changes which may cause people to prioritize other issues over health.

## Resumen

**Objetivos:** El objetivo fue examinar conocimiento, preocupaciones y percepción de riesgo hacia el Zika y su prevención entre residentes de una comunidad en Caguas, Puerto Rico. **Métodos:** El estudio tuvo un enfoque cuantitativo, de diseño no experimental, descriptivo, transversal y correlacional. Se administró un cuestionario estructurado a una muestra de 158 residentes de una comunidad en Caguas, mayores de 21 años y que accedieron a participar voluntariamente. Los datos fueron analizados utilizando SPSS versión 17, por medio de análisis univariados y bivariados. **Resultados:** De 158 encuestados, 64.6% eran mujeres con una población de edad promedio de 53.85 años. El Zika representa una gran amenaza para más de 52.3% de aquellos que perciben que les afectaría sus vidas y emociones. De aquellos que percibieron una amenaza emocional, 39.5% (n=32) completaron algunos años universitarios ( $X^2=9.217$ ,  $p=0.027$ ), 57.9% (n=55) tienen seguro privado ( $X^2=6.325$ ;  $p=0.042$ ), y 67.9% (n=55) reportaron estar poco o nada a riesgo de enfermarse ( $X^2=6.783$ ;  $p=0.034$ ). De estos, 57.4% (n=54) lo considera muy severo ( $X^2=22.827$ ,  $p<0.001$ ) y 98.9% (n=93) limpia la casa y sus alrededores preventivamente ( $X^2=4.951$ ,  $p=0.026$ ). La falta de interés (89.2%) fue la razón más prevalente para no adoptar acciones preventivas. **Conclusión:** La subestimación del riesgo al virus del Zika y sus consecuencias son evidentes. Este estudio reafirma la necesidad de desarrollar una red de comunicación de riesgo constante y efectiva, abordando las necesidades específicas dentro de las comunidades. La elaboración de intervenciones comunitarias es necesaria para mejorar los riesgos, beneficios y barreras percibidas ante los comportamientos preventivos.

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