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Knowledge, perceptions and practices regarding Zika virus of university students in northern Colombia (Santa Marta, 2016)

Conocimientos, percepciones y prácticas sobre el virus del Zika en estudiantes universitarios del norte de Colombia (Santa Marta, 2016).

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ABSTRACT

This study focuses on the knowledge, perceptions and practices of 171 university students regarding Zika virus and its vector in Santa Marta (Colombia) in 2016. A survey was conducted, and the answers about causative agent and mode of transmission were classified into three levels of knowledge. Altogether, 32.1% of the students stated that they had suffered from Zika. A total of 60% stated that they knew what the disease was; however, only 29.2% knew what the causative agent was, and 45.6% knew the mode of transmission. Regarding the level of knowledge, only 14.6% knew the causative agent and the mode of transmission (Level 2). In general, the students recognize the symptoms of Zika virus, and 53.8% of them consider Zika to be very serious. More than half of them believe that they, the community, and the government are responsible for controlling the vector. Even though more than half the students know the most important strategies to control the vector, they do not apply them; the reasons for this might be their everyday habits, the lack of organization in their communities, a deficient public health system, and climate change. It is recommended to implement permanent strategies for vector control that take into account the sociocultural characteristics of at-risk populations.

Keywords: Zika Virus; ZIKV; Infectious disease vectors; Vector Borne Disease; VBD; knowledge; Colombia.

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RESUMEN

Este estudio analiza el nivel de conocimiento, percepciones y prácticas de 171 estudiantes universitarios sobre el virus del Zika y su vector en Santa Marta (Colombia) en 2016. Se aplicó una encuesta y las respuestas sobre el agente causativo y el modo de transmisión se clasificaron en tres niveles de conocimiento. Se encontró que el 32,1% de los estudiantes manifiestan haber sufrido Zika. Un 60% afirmó que conocían la enfermedad, sin embargo, solo el 29,2% conocía el agente causal y el 45,6% el modo de transmisión. Sólo el 14,6% conocía el agente causal y el modo de transmisión (Nivel 2). En general, los estudiantes reconocen los síntomas del Zika. Para el 53,8% es una enfermedad muy grave y más de la mitad considera que ellos, la comunidad y el gobierno son responsables de controlar el vector. Aunque más de la mitad de los estudiantes conocen las estrategias más importantes para controlar el vector, no las practican; esto puede explicarse debido a sus prácticas cotidianas, falta de organización comunitaria, deficiencia en el sistema de salud pública y el cambio climático. Se recomienda implementar estrategias permanentes de control de vectores que consideren las características socioculturales de las poblaciones en riesgo.

Palabras clave: Virus Zika; ZIKV; vectores de enfermedades; conocimientos; Colombia.

INTRODUCTION

Zika is a viral disease produced by an arbovirus of the *flavivirus* genus, transmitted by the mosquito *Aedes aegypti*[1]. However, there might be other mosquitoes involved[2]. This virus was reported for the first time in Uganda in 1947[3]. Then, reports arose on Yap Island in 2007, in French Polynesia in 2013 and on the Cook Islands and New Caledonia in 2014[4]. In February 2015, it was detected in South America on Easter Island (Chile), and in May 2015, two cases were detected in the State of Paraíba (Brazil)[5,6]. Once it appeared in Brazil, it rapidly began to spread in several Latin American countries, including Colombia[7,8]. The Zika virus has probably been in South America since 2013[9]. In October 2015, the first 9 cases of Zika were confirmed in Colombia in the department of Bolivar[10], and then in other departments, like Atlántico[11], Sucre[12] and Magdalena[13].

Zika quickly alerted different health organizations on the global scale, such as the World Health Organization (WHO), the Pan American Health Organization (PAHO), and governments from different countries like Colombia, due to neurological (microcephaly, meningoencephalitis, Guillain-Barré syndrome) and immunological (thrombopenic purpura, leukopenia) implications [14-16] ; thus, *Aedes aegypti* vector prevention and control campaigns were implemented in some countries[17].

Research done in Colombia and other parts of the world on the control of *Aedes* has reported that different factors, such as climate change, deficient socio-economic conditions, migratory patterns, inadequate public and health services[18-21], low level of knowledge[22,23], and inefficient control practices of *Aedes*, have allowed the vector and its diseases to proliferate. In a similar way, political and economic factors expressed in the healthcare system crises, the absence of public policies and permanent vector control programs have influenced the incidence and prevalence of vector-borne diseases (VBD), which is associated with low levels of appropriation of the strategies in order control them[24-27].

In addition to having suffered from Zika in 2015-2016, the population of Colombia, and, in particular, of the department of Magdalena and its capital Santa Marta, , has suffered from Dengue and Hemorrhagic dengue[28] since the 1980s, and most recently from Chikungunya. Before starting with this study, already 1,540 cases of Zika had been recorded in Santa Marta[29] during the sixth week of 2016 (week 17 of the Zika outbreak in Colombia). Considering this background, it was expected that the population's level of knowledge, perception and practices in regards to *Aedes* control was high, and especially among the university-educated population, given that, as it is referred to in other research[30,31], at a greater education level, greater

access to information and greater understanding of it.

On the basis that the Zika virus is new in Latin America and in other places in the world, and while this research was being developed, few publications were found[32-34] regarding the level of knowledge of this disease in Colombia. Thus, this study's goal is to show evidence of the level of knowledge, perceptions and practices in regards to Zika among the population of university students in Santa Marta, Colombia.

MATERIALS AND METHODS

Study area

This study was carried out in an urban area of Santa Marta (Magdalena), located in the northern coast of Colombia (11º14'50" N - 74º12'06" W), between 0 and 200 meters above sea level, with an average annual precipitation of 500 mm, relative average humidity of 75% and average annual temperature of 28 ºC that ranges between 22 and 34 ºC monthly average[35].

The city has approximately 461,900 inhabitants. In 2005, its coverage of public services were: 97.2% energy, 72.5% sewage, 77.7% water and 90% plumbing[36]. Despite the fact that the majority of the population has water, the situation is not permanent, as proven by the shortage of water in this city, which increased in 2014 and 2015 due to the El Niño Phenomenon[37]. Different strategies have been used in order to solve the lack of water, such as: storing water in plastic containers, building ponds, or underground and above ground tanks[38,39]. The aforementioned sums up the fact that the city does not have a rainwater collector, which means that rainwater, as well as water from households, is drained in the streets, stagnating in some sectors[38].

Sample

A total of 171 students from the Universidad del Magdalena, who lived and studied in Santa Marta, were randomly selected to perform a survey between February and April 2016.

Instrument and Data analysis

The survey was made using other studies as a reference, which have analyzed the level of knowledge, perceptions and practices regarding vector-borne diseases (VBD), such as Dengue and Malaria[30,40-42], since, at the time of the study, there were no works that assessed the level of knowledge in regards to Zika.

The survey examined socio-demographic aspects and the state of health regarding VBD, the perceptions and level of knowledge of Zika, and the practices to prevent and control the vector. The survey was tested by academics in social sciences, and applied in a control group of ten university students with the goal of providing clarity to the questions and adjust the survey. The information was systemized in the statistical Program R[43].

In order to assess the level of knowledge in regards to the causative agent and Zika's non sexual mode of transmission, the answers to, What causes Zika? and How is it transmitted? are analyzed together. The values assigned were: *Low level of knowledge* (Level 0), does not know the causative agent nor the mode of transmission; *Medium level of knowledge* (Level 1), does not know the causative agent but knows the mode of transmission, or knows the causative agent but not the mode of transmission, and *High level of knowledge* (Level 2), knows the causative agent and the mode of transmission (Table 1).

Table 1. Level of knowledge about Zika.

	Knows causative agent	**Doesn´t know causative agent**
Knows mode of transmission *(by Aedes mosquito)*	2 (High level of knowledge)	1 (Medium level of knowledge)
Doesn´t know mode of transmission	1 (Medium level of knowledge)	0 (Low level of knowledge)

Declaration on ethical aspects

The goal of the study was presented to participants both written and verbally, in order to obtain their informed consent. Anonymity and confidentiality were maintained. This research did not have any type of implications on the health of those surveyed to accord to principles of the Helsinki and Resolution 8430 of 1993 of the Ministry of Health of Colombia. The study was cleared by the ethical committee at the Magdalena University.

RESULTS

Of the 171 surveyed students, 119 (59%) were women and 52 (30.4%) were men, between 18 and 44 years of age, and an average age of 21.6 years. In terms of public services, the 98.8% of students have access to electricity, 91.8% to water and 87.7% to sewage; 78.9% store water in tanks with a cover and 7.6% in tanks without a cover (Table 2).

Table 2. Sociodemographic and VBD information.

	Number n=171
Which public services do you have?	
Electricity	169 (98.8%)
Water	157 (91.8%)
Gas	157 (91.8%)
Sewage	150 (87.7%)
Internet	131 (76.6%)
Places where water is stored	
Underground Water Tank or tank with a lid	135 (78.9%)
Underground Water Tank or tank without a lid	13 (7.6%)
Underground Water Tank or tank with or without a lid	5 (2.9%)
Well with a pump	4 (2.3%)
Buckets, pots with a lid	2 (1.1%)
Buckets, pots without a lid	0 (0%)
No response	9 (5.2%)
*Have you suffered from diseases transmitted by VBD?**	
Chikungunya	83 (48.5%)
Zika	55 (32.1%)
Dengue	15 (8.7%)
Hemorrhagic dengue	3 (1.7%)
No	65 (38.8%)

* Perception, not confirmed cases. Multiple answers were possible.

Of those surveyed, 15 (8.7%) stated that they have suffered from Dengue, three (1.7%) from Hemorrhagic dengue, 83 (48.5%) from Chikungunya, and 55 (32.1%) from Zika (Table 2). A total of 103 (60.2%) stated that they have heard of Zika. However, in analyzing the causative agent, only 50 (29.2%) know that it is a virus, 52 (30.4%) incorrectly said that it is caused by the *Aedes* mosquito, 33 (19,2%) did not know, and 13 (7.6%) answered "by any mosquito". Regarding transmission, 78 (45.6%) considered the *Aedes* mosquito as responsible, 27 (15.7%) any mosquito, 24 (14%) that it is transmitted by other people and 34 (19.8%) do not know (Table 3).

Table 3. Knowledge of Zika virus and its Vector

	Number n=171
Have you heard about Zika?	
Yes	103 (60.2%)
Do you know what causes Zika?	
The *Aedes* mosquito	52 (30.4%)
A virus	50 (29.2%)
Any mosquito	13 (7.6%)
Don't know	33 (19.2%)
*Do you know how Zika is transmitted?**	
The *Aedes* mosquito	78 (45.6%)
Any mosquito bite	27 (15.7%)
Person to person	24 (14%)
Water	14 (8.1%)
Airborne	13 (7.6%)
By coughing or sneezing	9 (5.2%)
Don't know	34 (19.8%)
Level of knowledge about Zika	
0=Doesn't know what causes it or how it is transmitted	67 (39.2%)
1=Doesn't know what causes it but does know how it is transmitted, or does know what causes it but doesn't know how it's transmitted	79 (46.2%)
2= Knows what causes it and how it's transmitted	25 (14.6%)

* Multiple answers were possible.

In terms of the level of knowledge regarding the causative agent and the mode of transmission of Zika, in the High level (Level 2), there were 25 students (14.6%) who had knowledge about the causative agent and the mode of transmission. In the Medium level (Level 1), 79 (46.2%) students knew the causative agent or the mode of transmission. In the Low level (Level 0), 67 (39.2%) students did not answer to any of the questions (Table 3).

Regarding the symptoms, 133 (77.7%) students mentioned fever as the most frequent symptom, 118 (69%) headache, 110 (64.3%) skin rash, and 98 (57.3%) joint pains (Table 4). Of the 55 people who stated that they had suffered from Zika, once they felt the symptoms, they took the following actions: 26 (47.2%) self-medicated, 21 (38.1%) rested, 15 (27.2%) went to a

healthcare center and 13 (23.6%) visited a doctor (Table 5).

Of those who attended a healthcare center or visited a doctor (28 students), their perception of the healthcare system and treatment was as follows: four (14.2%) suggested that medical attention and diagnosis was very good, five (17.8%) considered treatment very good and three (10.7%) claimed that the recommendations and control of the symptoms were very good. In general, they considered the medical attention to be between fair and good. Those, who did not attend a health center and who had suffered from Zika (27 people) offered various reasons for not going: 23 (85.1%) identified symptoms without needing to go to the doctor, 19 (70.3%) believe professionals at the healthcare center only prescribe acetaminophen and 17 (62.9%) think the quality of the health service is poor (Table 5).

Table 4. Knowledge and perception on Zika virus

	Number n=171
What are the symptoms?	
Fever	133 (77.7%)
Headache	118 (69%)
Skin rash	110 (64.3%)
Joint pain	98 (57.3%)
Myalgia	91 (53.2%)
Fatigue	77 (45%)
Nausea	67 (39.1%)
Conjunctivitis	66 (38.5%)
How serious a problem is Zika virus?	
Very serious	92 (53.8%)
Serious	50 (29.2%)
Slightly serious	18 (10.5%)
Not serious	2 (1.1%)
Where did you hear about Zika virus for the first time?	
Television	144 (84.2%)
Internet	118 (69%)
Radio	93 (54.3%)
Family and friends	85 (49,7%)
News	74 (43.2%)
Bulletins	50 (29.2%)
Informative campaign sites of study/work	32 (18.7%)
Institutional home visits	26 (15.2%)
Who is responsible for eliminating mosquito breeding sites?	
The community	108 (63.1%)
State-run institutions	105 (61.4%)
The family	97 (56.7%)
You	96 (56.1%)
Don’t know	18 (10.5%)

Table 5. Perception on medical treatment.

	Number n=55
What did you do the first time you experienced the symptoms?	
Self-medicated	26 (47.2%)
Rested	21(38.1%)
Went to a health center	15 (27.2%)
Visited the doctor	13 (23.6%)
Took home remedies	5 (9%)
Nothing	5 (9%)
Went to a traditional doctor	1 (1.8%)
Do you consider your medical treatment to be very good?	n=28
Treatment	5 (17.8%)
Quick and opportune diagnosis	4 (14.2%)
Attention	4 (14.2%)
Recommendations	3 (10.7%)
Decrease in the symptoms	3 (10.7%)
Why didn´t you go to the doctor?	n=27
I identified my symptoms	23 (85.1%)
They only prescribe acetaminophen	19 (70.3%)
You must be expected to be served	18 (66.6%)
The quality of the service is poor	17 (62.9%)
It wasn't necessary and the symptoms passed	17 (62.9%)
I knew what treatment to follow	13 (48.1%)
It annoys me to go to the doctor	10 (37%)
They would have only treated my fever	7 (25.9%)

In regards to the risks and consequences of Zika, 92 (53.8%) students considered the disease to be a very serious problem due to the implications it has on health (Table 4). One of those reasons is that pregnant women infected with Zika transmit the virus to her fetus, which can develop microcephaly and even die, *"it is a very dangerous virus and affects pregnant women aggressively, deforming the fetus,"* (Survey 23); it can also affect the nervous system, *"cases of Zika present […] side effects such as Guillain-Barré syndrome"* (Survey 57). It is a public health problem aggravated by the faults of the healthcare system, "*it could cause a hospital crisis with the healthcare system in this country*" (Survey 137). Some believe the disease has socioeconomic implications, claiming that *"it affects a large part of the population and mostly people with few resources"* (Survey 133), and it can *"affect the communities in their economic development"* (Survey 41). Finally, others share the perception that people have little knowledge on the topic, and are negligent when dealing with it, *"because if they do not have the necessary knowledge, it could cause harm to society"* (Survey 25) and *"the negligence is greater, it predominates and is due to this that it is propagating more"* (Survey 43).

In terms of how they learned of Zika, 144 (84.2%) students learned about it through TV, 118 (69%) through Internet, 85 (49.7%) through

family and friends, 26 (15.2%) through home visits and 32 (18.7%) through campaigns in their place of study and/or work. In terms of who is responsible for eliminating or controling mosquito breeding sites, students provided various answers, such as: 108 (63.1%) it should be the community, 105 (61.4%) state-run institutions, 97 (56.1%) the family, and 96(56.1%) themselves (Table 4).

A large percentage of students know the most important strategies that must be implemented in order to control mosquito breeding sites: 138 (80.7%) mentioned eliminating standing water around the household, 134 (78.3%) mentioned fumigating inside the household, 137 (80%) mentioned controlling standing water, 130 (76%) fumigating around the household, 119 (69.5%) mentioned eliminating trash and weeds around the household, 120 (70.1%) mentioned collecting plastic containers and used tires, and 110 (64.3%) mentioned keeping the containers covered where water is stored. In terms of practices and strategies implemented to control the spread of *Aedes*, 58 (33.9%) students answered that they always cover containers where water is stored, 43 (25.1%) control standing water within the household, 35 (20.4%) avoid places infested with mosquitoes and standing water, and 33(19.2%) collect or perforate used tires or plastic containers. On the other hand, only eight (4.6%) use a mosquito net when they sleep and 12 (7%) use repellent (Table 6).

Table 6. Practices regarding Zika virus and its vector

	Number 171
Which strategies are the most important for eliminating mosquito breeding sites?	
Eliminating standing water around the household	138 (80.7%)
Eliminating standing water in the household	137 (80.1%)
Fumigating the household	134 (78.3%)
Fumigating around the household	130 (76%)
Collecting rims, jars	120 (70.1%)
Eliminating trash and weeds around the household	119 (69.5%)
Covering containers that store water	110 (64.3%)
Cleaning	80 (46.7%)
Adequately sweeping and disposing of trash	78 (45.6%)
Trimming trees	29 (16.9%)
Don't know	7 (4%)
Which strategies do you always use to prevent Zika and mosquito bites?	
Covering containers that store water	58 (33.9%)
Controling standing water in the household	43 (25.1%)
Being informed on the topic	37 (21.6%)
Avoiding places infested with mosquitoes and standing water	35 (20.4%)
Collecting or perforating containers where water is stored	33 (19.2%)
Controling standing water around the household	30 (17.5%)
Cleaning up trash and weeds around the household	27 (15.7%)
Fumigating around the household	25 (14.6%)
Cleaning dark areas	25 (14.6%)
Fumigating inside the home	23 (13.4%)
Draining lakes, ponds and standing water	23 (13.4%)
Shaking out clothes	15 (8.7%)
Daily cleaning of the neighborhood	16 (9.3%)
Wearinghoes and socks	13 (7.6%)
Avoiding contact with people who have Zika	13 (7.6%)
Using repellent	12 (7%)
Trimming trees	9 (5.2%)
Using mosquito net to sleep	8 (4.6%)
Wearing long clothes	8 (4.6%)
Taking medication	8 (4.6%)
Using mosquito net on doors and windows	7 (4%)
Using home remedies	6 (3.5%)

DISCUSSION

Previous studies on VBD have shown that: a) having suffered from this type of disease and having been part of prevention campaigns increase the level of knowledge regarding how to control the transmission vector[44]; and b) that a higher educational level reduces the risk of spreading the vector[45] and favors greater access to information and a greater understanding of the diseases[31,16]. In the case of the population surveyed in Santa Marta, it was observed that these conditions coincide: they have recurrently suffered from VBD, they have been exposed to mass media campaigns and have a university-level education. Notwithstanding, in this study, it can be determined that 46.2% of students have a medium level of knowledge (Level 1). Even though more than half of students stated that they know what Zika is, only 29.2% know what the causative agent is and 45.6% what the mode of transmission is, and only one of every seven know the causative agent and the mode of transmission (Level 2). Apart from that, it was reported in several studies that at least a high percentage of those interviewed know that Zika is transmitted by mosquitoes (not specific for *Aedes*): a survey with students from a public university in the US (43% were health majors) found that 88% know how is transmitted[46]; which is the same value found in a study in Lambayeque (Peru) regarding reproductive-age women[22]. In Villanueva (Colombia) 77% of the general population know what causes Zika and 74% know how it is transmitted[33,] In Ecuador, 93% of the rural and urban population know how it is transmitted[47]. in the U.S. 49% of pregnant women know what causes Zika, and 87% know how it is transmitted[48]. A total of 90% of women of childbearing age in Kentucky (U.S.) know how it is transmitted[16], which is very similar to the general population from suburban New York City (91% know how it is transmitted)[49].

One of every two surveyed students confused the causative agent of the disease with the mode of transmission, mentioning that it is caused by the *Aedes* mosquito. In terms of the mode of transmission, there is a lot of confusion and lack of knowledge, since almost half the students mentioned that it is transmitted through any mosquito, by air, by water, by contaminated food[50], or that it can happen because of malnutrition. On the other hand, a few mentioned that it can be transmitted from person to person, in despite of at the moment of carrying out the survey, it had not yet been confirmed, nor had it been widely circulated information on sexual transmission[51].

The low level of knowledge or confusion of the students regarding the causative agent and the mode of transmission of Zika, despite having some kind of university training, can be associated with the fact that this disease was new in Colombia, and the information campaigns that circulated through national and local media allowed the appropriation to be focused on information referring to the health risk, such as, the symptoms and collateral effects of diseases that can affect unborn children, instead of focusing on the ecology of the disease. The high level of knowledge of symptoms can be associated with the fact that one of every three students believes to have suffered from Zika at the time of the survey (not confirmed cases). These results contrast with those presented by in regards to Dengue[30], in which, unlike our study, the population had a low educational level but a high level of knowledge on the disease and the vector, as a result of educational and prevention campaigns offered by the national and regional authorities. This can be associated with the Dengue campaigns authorities have been developing and implementing for more than four decades, and the fact that the studies can coincide with recent campaigns that aim to control the vector.

Half of the students that suffered from this disease did not go to medical centers, since they thought they could identify the symptoms on their own. Others believed that the quality of the health service is poor, or that physicians only prescribe acetaminophen. Some students self-medicated and others used home remedies, such

as medicinal plant infusions, like chamomile, cornstarch with camphor, and Caladryl®. Regarding those who went to a healthcare center, few people that considered medical attention to be useful. On one hand, the aforementioned shows the lack of credibility of the healthcare system; on the other hand, the sub-record presented in regards to this type of disease, due to great percentage of the people are not diagnosed or treated in the health centers, in this sense, a study in Aceh (Indonesia) shows a low level of knowledge in doctors (only 35.9% of the participants had good knowledge about Zika infection)[52].

Despite the fact that one of every two students considers Zika to be very dangerous and more than half of them have a high level of knowledge about the most important strategies to control the vector, the prevention practices to counteract its spreading are deficient, as mentioned in the case of the people of Villanueva (Colombia)[33]. This is because one of every five students states that they always cover water containers, one of four controls standing water inside the household, and one of every five collects and perforates used tires and plastic containers. Other important strategies, that are less implemented, are the use of a mosquito net to sleep (4.6%) and repellent (7%). The tendency to have a low level of knowledge regarding Zika and deficient vector control practices coincides with studies done on Dengue and Malaria. For example, research done two years later in a national plan to control Dengue and three years after the classic Dengue epidemic began allow this work[40], to explainsdue to the research done two that people possibly forgot what they learned during the campaigns. In other research[42], the knowledge-practice gap resulted in a lack of time and interest among community organizations.

At the time this study was performed, the Zika epidemic was in full bloom, and the informational campaigns on this disease were circulating through different methods of communication. The reasons that can contribute to the understanding of the inconsistency between the level of knowledge and vector control practices are socio-cultural, environmental, economic and political.

From a cultural perspective, despite knowing the risks of Zika on health and its collateral effects, the population did not change its practices and habits to minimize the risk of contracting it, such as wearing long clothes, shoes and socks, using of a mosquito net on doors and windows, cleaning dark places, fumigating the inside of the household, collecting and perforating, and maintaining covered containers where water is stored. The aforementioned can be associated with the lack of knowledge of the disease's mode of transmission. From a social standpoint, no permanent collective practices that contribute to decreasing the risk of the vector spreading have been established. This is a evidence of the fact that, although half of those interviewed believe that both they and the community are responsible for controlling the spread of the vector, very few stated that they have participated in the neighborhood clean-up campaign. It is clear that the lack of interest and participation of the community to ensure the collective wellbeing can be associated with the fact that those interviewed are university students, mostly dependent on their parents. This students do not assume individual and collective responsibility, attributing the responsibility to others, similar to that established by[53].

At the environmental level, the city's shortage of water requires the community to create transitory or permanent alternatives to store water, which does not go hand in hand with VBD vector control strategies, since their priority is water. In terms of economics, the city lacks rainwater collectors, and in some sectors sewage and trash collection, and the disorganized and unplanned growth of the city does not contribute to creating social and environmentally-friendly alternatives to control and decrease the vector's longevity.

Finally, in political terms, the public health strategies implemented during the Zika epidemic

seek to guarantee education, follow up, prevention and control of the VBD occurring only during crises and outbreaks. This is not only ineffective as a prevention strategy,; it contributes to the strengthening of the credibility of institutions in the eyes of citizens, and therefore to the transformation of socio-cultural practices of the population tthat can counteract the vector and the transmission of the VBD, as it has been seen by[25].

In conclusion, it is necessary to provide permanent VBD information, and implement control campaigns that do not only respond to crises, as it has been reported by other researchers, where the citizen participation and health education is only offered during epidemics or emergencies[27]. This situation does not allow the communities to acquire a sufficient level of knowledge, which affects their active participation and the chance of controlling the vector permanently[54,55]. While the health implications reported for Zika, such as microcephaly, are assumed to be worse than other VBD, they show it is important to develop short-term vaccines for this virus[48,56,57]. Nevertheless, involving the communities is a priority, their worldviews and their narratives about the disease, as several authors have proposed[24-26,58,59]. The way communities understand and face the disease and the vector will determine, on one hand, the communication strategies that should be implemented in order to learn the risks of acquiring VBD, its causes and consequences, and, on the other hand, the implementation of vector control strategies[25,60,61,62]. In this way, interventions in prevention strategies must focus on the daily lives of the communities in relation to their sociocultural, economic and environmental particularities.

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CONFLICT OF INTEREST

The authors declare that they do not have conflict of interest.

AUTHORS' CONTRIBUTIONS

First author: study conception, design and execution of the survey; analysis and interpretation of data; approval of intellectual content and version to be published.

Second author: study conception, design and execution of the survey; analysis and interpretation of data; approval of intellectual content and version to be published

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