



Zika-Related Knowledge, Attitudes, and Practices

PROGRAMMATIC IMPLICATIONS FOR ZIKA PREVENTION IN THE **DOMINICAN REPUBLIC**

This brief provides key insights for implementers of social and behavior change (SBC) activities for Zika prevention in the Dominican Republic. The insights are based on data from a representative sample of people living in select United States Agency for International Development (USAID) Zika program implementation communities and support an evidence-based approach for programming directed toward increasing the practice of prevention behaviors for Zika and other *Aedes aegypti*-transmitted viruses. The data indicate a need to: (1) narrow existing knowledge gaps related to the Zika virus, particularly its health consequences and effective preventive practices; and (2) communicate more specifically about preventive behaviors to enable effective action.

Background

The first outbreak of Zika detected in the Americas occurred in 2015, with a spike in suspected congenital malformations and other neurological complications.¹ In April 2016, the U.S. Department of State dedicated funding for the USAID Zika response, prioritizing prevention efforts and programming to minimize negative pregnancy outcomes in affected countries.

A key component of the USAID Zika Response is SBC programming that aims to promote the uptake of effective prevention behaviors to reduce Zika transmission. Programs emphasize ensuring personal protection for pregnant women, engaging high-risk communities in prevention practices, and improving women's demand for and access to antenatal care services.*

Why Did We Collect Information on Knowledge, Attitudes, and Practices?

Behavior change theories help us understand what enables and motivates people to act the way they do.⁴ The social-ecological model of behavior change highlights the importance of individual factors (such as knowledge, perceptions, and attitudes about a disease and how to prevent it), community-level factors (such as normative environment), and social and structural factors (such as access to resources and services) for understanding whether or not a person carries out a particular behavior. The extended parallel processing model highlights how a person's perception of risk associated with a disease, as well as their beliefs in the effectiveness of solutions and their own confidence to practice them, will influence whether people will take preventive action.⁴ These and other theories provide the groundwork to measure constructs that help SBC implementers make decisions about how best to influence behavior within target communities.

How Was the Data Collected?

In 2018, the Breakthrough RESEARCH project conducted cross-sectional household surveys in Guatemala, Honduras, El Salvador, and the Dominican Republic. The survey assessed knowledge, attitudes, and practices among the factors related to Zika and other diseases transmitted by the *Aedes aegypti* mosquito. The multistage cluster random sample included men and women ages 18 to 49 living

* For more information visit www.usaid.gov/what-we-do/global-health/zika.

WHY ZIKA MATTERS

- Zika virus (ZIKV) is a communicable disease spread by *Aedes aegypti* mosquitoes, which also transmit other arboviruses including dengue and chikungunya.¹
- ZIKV can also be transmitted through sexual intercourse and from pregnant mother to unborn child.¹ ZIKV is known to cause neurological problems, such as Congenital Zika Syndrome (CZS).^{2,3}
- Many people infected with ZIKV do not develop symptoms, leading to a lower perceived risk of infection.²

in USAID program implementation areas. In the Dominican Republic, the survey was carried out in August 2018 within USAID Zika program implementation areas of nine provinces: Puerto Plata, Santiago, La Vega, Azua, San Cristobal, La Altagracia, La Romana, Santo Domingo, and Distrito Nacional. Interviews were conducted with 651 individuals, of which 34 percent were men and 66 percent women. Data were weighted by sociodemographic characteristics to reflect the population in the implementation areas.



This study collected information in five main areas:

- Sociodemographics: Age, education, sex, household assets.
- Knowledge: Transmission, health effects, prevention for each disease.
- Attitudes: Perceptions of disease risk, effectiveness of prevention behaviors, feasibility of conducting prevention behaviors.
- Self-reported prevention practices: Behaviors to prevent mosquito bites and mosquito breeding in the last 30 days and last seven days.
- Observed practices: Observation of the use of secure lids for water storage containers in which mosquitoes are known to breed.

Programmatic Implications

These insights for SBC programs are based on key findings from the surveys in the Dominican Republic.

1. Prevention programming and messages should emphasize the links between the Zika virus and birth defects, including CZS, especially among the male population, as it is a key differentiating factor between Zika and other arboviruses. For pregnant couples, having a healthy child may be a key motivator for prevention.
2. Prevention programming should prioritize prevention behaviors with high potential for effectiveness against *Aedes aegypti*-borne diseases; messages should highlight evidence of effectiveness and should contain specific instructions for complex preventive behaviors.
3. Prevention messages should continue to highlight sexual transmission of Zika, especially during pregnancy.
4. Prevention programming should highlight and design ways that behaviors can be made easier, enhancing both their perceived and actual feasibility for adoption.
5. Prevention programming should leverage the existing knowledge about mosquito transmission and dengue risk by linking to the lesser known *Aedes aegypti*-borne diseases. This link may help to quickly raise awareness and risk perception for Zika and chikungunya, but Zika's added risk during pregnancy must be highlighted.
6. Prevention messages should specify that mosquitoes can bite at any time to emphasize that personal protection, such as repellents, should be used throughout the day.
7. Prevention programming should specifically target men as they lag behind women in key knowledge and attitudes indicators. This implication is particularly important given men's role in the negotiation of condom use.
8. Prevention messages through interpersonal communication delivered through household visits by vector control educators, are a promising practice for increasing knowledge and promotion of prevention behavior.

Key Findings on Zika Knowledge

Awareness of Disease

The majority of people surveyed had heard about Zika, dengue, or chikungunya, and at least three in four people had heard about all three diseases (see Table 1). However, of the three, Zika was the least commonly known, especially among men. About 78 percent of men had heard of Zika, significantly fewer than the proportion of women who had heard of Zika (90 percent, $p < 0.01$).[†]

TABLE 1. AWARENESS OF Aedes Aegypti-TRANSMITTED DISEASES

DISEASE	% OF PEOPLE WHO HAD EVER HEARD OF DISEASE
Zika	85%
Dengue	95%
Chikungunya	94%

Transmission and Health Effects

By mosquitoes: Among those who had heard of each disease, nearly everyone knew that mosquitoes transmit dengue (90 percent), but far fewer knew that mosquitoes transmit Zika (59 percent) and chikungunya (53 percent); significantly fewer men (52 percent) than women (64 percent) knew that Zika is transmitted via a mosquito bite ($p < 0.05$). Less than a third (29 percent) of those aware of mosquito transmission of Zika knew that the mosquito can bite at any time of the day or night.

Through sexual and vertical transmission: Only 3 percent of participants who had heard about Zika knew that it could be sexually transmitted and less than 1 percent knew that it could be transmitted from the mother to the child while pregnant.

Only 10 percent of people who were aware of Zika identified birth defects as a potential adverse health outcome. Respondents' level of education was significantly associated with identifying birth defects as an adverse Zika health outcome: 1 percent of those with primary or less education knew about the consequences, while 20 percent of those with at least some tertiary education did ($p < .001$). This finding is likely due to wealthier individuals having greater access to information in general.

[†] Chi-square test for independence was used for all bivariate analyses.

Prevention Methods

Among people surveyed who were aware of Zika, only 61 percent knew at least one prevention method with high potential for effectiveness.‡

The most commonly known methods identified for reducing the risk of Zika were clearing stagnant water (44 percent), covering water storage containers (27 percent), using larvicide in stored and standing water (27 percent), and cleaning trash that harbor mosquitos (*deschatarización*) outside of the home (22 percent).

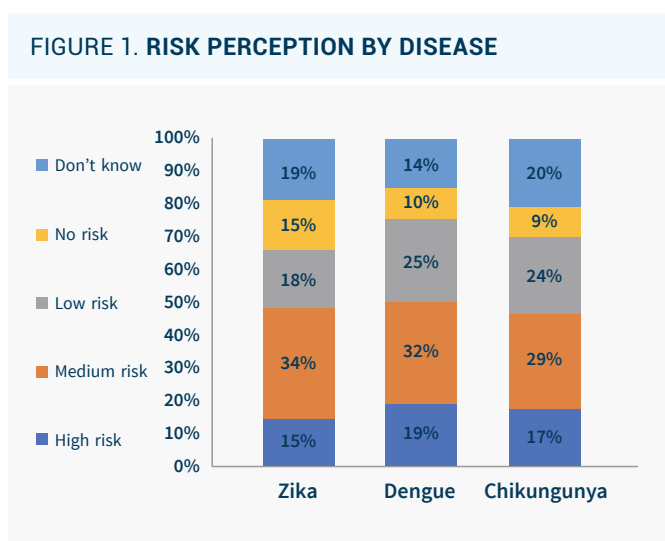
Only 15 percent identified scrubbing or cleaning water containers as a prevention method, 4 percent identified repellent use, and less than 1 percent identified condoms as a Zika prevention mechanism.

On average, men knew fewer prevention behaviors (average of one behavior known) than women (average of two behaviors known, $p < 0.001$).

Key Findings on Attitudes About Zika

Perceived Risk of Zika, Dengue, and Chikungunya

Most participants did not perceive themselves to be at high risk of Zika, dengue, or chikungunya, as presented in Figure 1. Over half of participants (52 percent) either perceived themselves as having no risk, little risk, or didn't know if they were at risk, with one in five falling in the latter category.



‡ Effective behaviors: Repellent use, clearing stagnant water, cleaning water storage containers covering water storage containers, using larvicide, and using screens on windows and doors.

Furthermore, we explored if risk perceptions varied by level of wealth, as measured by an index of household goods and services. A larger proportion of people in the poorest quintile (20 percent) were not able to assess their own risk, as compared to the wealthiest quintile (10 percent, $p < .05$).

Despite relatively low levels of perceived risk, most participants report they would be very concerned if they contracted Zika (82 percent), dengue (89 percent), and chikungunya (82 percent).

Perceived Feasibility of Prevention Behaviors

When asked about their perceptions of how easy it is to carry out certain prevention behaviors listed in Table 2, the majority of respondents do not report behaviors as being very easy.

TABLE 2. PERCENTAGE OF PEOPLE REPORTING PREVENTIVE BEHAVIOR TO BE VERY EASY

BEHAVIOR	%
Cover water containers	43%
Use larvicide	42%
Change intentionally stored water	39%
Remove stagnant water at home	38%
Clean water containers	36%
Use repellent	28%
Remove stagnant water in community	25%
Use condoms in general	21%
Use condoms during pregnancy	14%

Perceived Effectiveness of Prevention Behaviors

When asked to list known prevention behaviors by how effective they are to prevent mosquito breeding and illnesses such as Zika, almost 30 percent of participants thought spraying their surroundings with insecticide was among the top three most effective behaviors, followed by clearing stagnant water (23 percent) and using larvicide (22 percent) (see Table 3).

TABLE 3. PERCENTAGE OF PEOPLE WHO PERCEIVE BEHAVIOR AS AMONG THE TOP THREE MOST EFFECTIVE

BEHAVIOR	%
Spray with insecticide (e.g., Raid®)	29%
Clear stagnant water	23%
Use larvicide	22%
Clear trash outside the house	19%
Use repellent	19%
Cover water containers	16%
Use condoms	10%
Use screens on windows and doors	10%
Use bednets	9%
Clean water storage containers	8%
Change purposefully stored water	7%
Use coils	4%

Female respondents were significantly more likely to perceive cleaning water storage containers as among the top three most effective behaviors than men were (5 percent, $p < .05$). This difference between men and women may be due to assigned gender roles, with women being primarily tasked with household chores and therefore being knowledgeable of the benefits of cleaning water storage containers.

Key Findings on Prevention Practices

Practices to Prevent Mosquito Bites and Mosquito Breeding

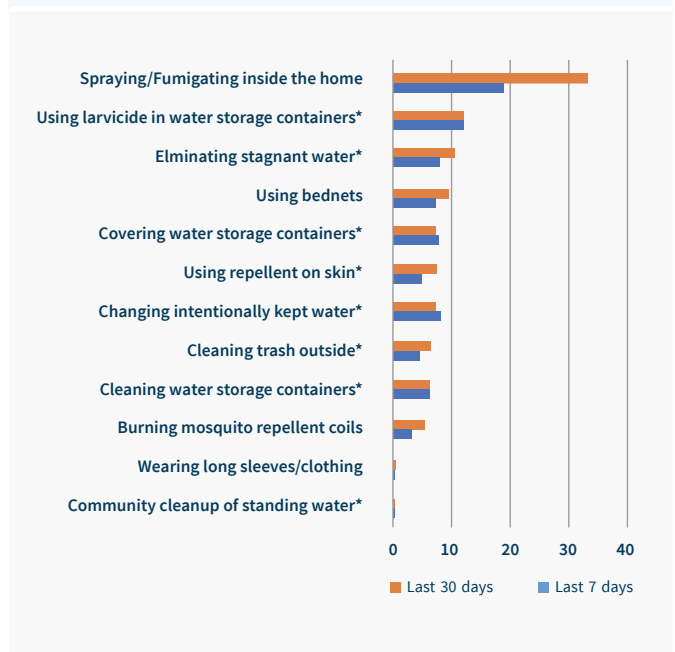
Out of people interviewed:

- 55 percent said they had done something to prevent mosquito bites **in the last 30 days**, but only 24 percent of all participants had done at least one behavior that had a high potential to be effective.
- 42 percent said they had done something to prevent mosquito bites **in the last seven days** but only 20 percent of all participants had done at least one behavior that had a high potential to be effective.

The most common responses to an open-ended question about prevention behaviors carried out in the last 30 days and last seven days are presented in Figure 2. The most commonly reported behavior is spraying insecticide within the home, while the least common is wearing protective clothing. Behaviors with the greatest potential to be effective are marked with an asterisk.

More than one-third (41 percent) of the sample reported not carrying out any type of mosquito prevention behavior in the past 30 days. Among them, the most common explanation given was not being worried about mosquito bites (27 percent). For repellent use specifically, the most salient barrier was cost and access to repellent, with 16 percent of those who had not used repellent in the last seven days naming access as the reason it had not been used.

FIGURE 2. PREVENTION BEHAVIORS IN LAST 30 AND LAST SEVEN DAYS



Practices Concerning Water Storage Containers

To understand how people clean their water storage containers, we asked those who reported doing so in the last seven days to specify steps taken. Table 4 shows in rank order the actions reported to clean water storage containers. Over half of respondents (58 percent) added bleach to water, which is not an effective means of eliminating mosquito larvae or pupae, and no respondents reported to have let cleaning ingredients act on the surface of the water storage container for a few minutes.

TABLE 4. PERCENTAGE OF PEOPLE WHO CLEANED THEIR WATER STORAGE CONTAINER REPORTING ACTIONS INVOLVED IN CLEANING

ACTIONS	%
Apply bleach to walls of container	65%
Add bleach to the water	58%
Empty the container	40%
Rinse container	33%
Scrub walls with brush	30%
Apply detergent to walls of container	13%
Let ingredients act for a few minutes	0%

In addition to the survey, data were also collected through observation of storage containers in participants' homes. In the Dominican Republic, out of 651 respondents 462 (71 percent) allowed surveyors to review their water storage containers, which included 227 wash basins (*piletas*) and 96 long-term water storage containers (commonly plastic drums known locally as *tanques*) (see Table 5). Surveyors observed containers for covers to assess the quality of the lids. For a container to be effectively covered, lids: must cover the container completely and fit tightly to avoid any gaps at any point in the circumference of the lid; if they are made from hard plastic, they must not be warped or allow water to pool on its surface; if they are made from a malleable material, they must not touch the surface of the water to form secondary breeding sites.

TABLE 5. STORAGE CONTAINER OBSERVATIONS

WASH BASINS	%
Covered	77%
Effectively covered	60%
<i>Found to have mosquito larvae</i>	24%
LONG-TERM STORAGE CONTAINERS	
Covered	70%
Effectively covered	57%
<i>Found to have mosquito larvae</i>	15%

Upon observation, no significant difference was found in the presence of larvae between wash basins or containers that were effectively covered and those that were not covered or were ineffectively covered.

Associations With Prevention Behaviors[§]

The most consistent factor associated with having carried out behaviors to prevent mosquito biting or breeding is knowledge of effective prevention behaviors. Using a scale measuring the number of Zika prevention behaviors known, we found that increased knowledge of effective prevention behaviors was significantly associated with greater self-reported use of covering water storage containers, clearing stagnant water, cleaning water storage containers, and repellent use. People with good knowledge about Zika—those who knew about six different prevention behaviors—were about three times as likely (48 percent v. 16 percent) to engage in preventive behaviors. Nevertheless, approximately half of people with good Zika knowledge in the Dominican Republic did not practice preventive behaviors. Therefore, **knowledge alone is insufficient to ensure behavior adoption.**

Perceived effectiveness of repellents as an effective method to prevent Zika was significantly associated with use of repellents in the last 30 days. People who ranked repellents among the top three most effective methods were 11 percent more likely to have used them ($p < .001$).

Lastly, **home visits by a community volunteer or technician to discuss mosquito prevention strategies were significantly associated with higher knowledge and self-reported behavior.** Controlling for education, age, sex, wealth, knowing someone who has had Zika, and sources of information, women whose households had been visited by someone who talked with them about how to prevent mosquitoes in and around the home were 6 percent more likely to know that Zika could be transmitted by sex than those who were not visited ($p < .05$). Men whose households had been visited were 13 percent more likely to know that Zika can cause birth defects ($p < .05$). People who were visited in their homes by someone who spoke to them about how to prevent mosquitoes in and around their home were 6 percent more likely to report having cleaned a water storage container in the last 30 days ($p < .05$), and men who were visited were more likely to report covering water storage containers ($p < .05$). There was no significant association between home visits and repellent use.

[§] Results in this section were derived from logistic regression analyses.

Implications for Action

Within the surveyed areas, Zika disease is known by most people. Despite this high level of general awareness, knowledge that the disease is transmitted by mosquitoes remains insufficient, which may affect effective protection given that among those who know that mosquitoes transmit the disease, few know that mosquitoes can bite at any time of day or night. Furthermore, almost one in five people who are aware of Zika are unable to assess their risk. **Pairing messages related to Zika with those of dengue may help to quickly raise knowledge of Zika's transmission by mosquito**, given the high levels of knowledge about mosquito transmission of dengue. Additionally, knowledge that Zika can be transmitted through sexual intercourse is extremely low, and few people reportedly know the link between Zika disease during pregnancy and adverse pregnancy outcomes. Even though sexual transmission has been estimated to account for only 4 percent to 5 percent of the overall Zika transmission, the implications of Zika transmission during pregnancy are very severe—**programs must continue to raise awareness of both sexual transmission of Zika and its potential health effects during pregnancy.**^{5,6}

Although most people know at least one way to effectively prevent against Zika, knowledge levels for most effective prevention behaviors are low, especially for personal protection behaviors. People are practically unaware of repellent

and condom use as a prevention mechanism against Zika. Perceived feasibility of effective prevention behaviors in general is low, especially for highly effective personal protection measures against Zika for pregnant women and their partners, such as repellent and condom use.⁷ In addition, a large share of people do not take any action to prevent mosquitoes breeding and biting. Among those who do take action, the most commonly reported prevention behavior against mosquitoes—spraying insecticide inside the home—has limited potential for effective impact on transmission of Zika.⁸ **Programs should prioritize activities aimed at raising knowledge of specific behaviors to prevent Zika—especially those behaviors that have been determined to be effective against *Aedes aegypti*-borne diseases—highlight their effectiveness and contain specific instructions for complex preventive behaviors** such as washing and covering water storage containers.^{7,8} Addressing missed steps, such as letting bleach act on the walls of the container, are crucial for effectively eliminating mosquito breeding sites.

Prevention programs should also strive to increase people's perceived feasibility of adopting effective prevention behaviors by highlighting easy implementation and designing new ways to reduce barriers.

Lastly, home visits constitute a promising way to engage at risk populations, increasing their Zika-related knowledge and promoting preventive practices.

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Breakthrough RESEARCH, Population Council

4301 Connecticut Ave., NW, Suite 280 | Washington, DC 20008
+1 202 237 9400 | breakthroughactionandresearch.org

BreakthroughRESEARCH@popcouncil.org



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