

Zika Outbreak in Brazil: Understanding Perceptions to Increase the Effectiveness of Preventive Action

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Abstract

This paper reports the findings of a research conducted in 2016 in order to identify optimal social communication strategies for increasing awareness around Zika virus. To understand how communication strategies could better impact the behaviour of the population, this research combined four health behavioural models to explain the main factors involved in taking preventive measures both individually and collectively.

Keywords

Zika virus outbreak; communication and community engagement; emergency response; transformative changes; communication strategies

Introduction

Transmitted by the *Aedes aegypti* mosquito, the Zika virus has become a cause for global concern due to its connection with neurological abnormalities in new-born children, especially microcephaly (Congenital Zika Syndrome). Brazil's outbreak began in the Northeast region back in 2014, and by 2015 there were anywhere between 440 thousand and 1.3 million cases of Zika, and nearly 5 thousand suspected cases of microcephaly (HEUKELBACH et alii, 2016).

When it comes to a potentially life-threatening virus like Zika, community-level action is crucial to reducing the population of mosquitoes and, therefore, the risk of infection. In comparison with approaches that entail a large-scale overhaul of physical infrastructure, **preventive measures** can promote faster and more effective responses, and **communication strategies play a central role** in promoting transformative changes among individuals and groups (FIGUEROA et alii, 2002).

Despite the large number of information campaigns about various mosquito-borne diseases such as Dengue, Chikungunya and Zika, **the failure to promote information about the virus and to emphasize preventive measures about Zika** meant that the public remained largely uninformed about mechanisms of transmission and telltale symptoms of infection during the first months of the epidemic. For instance, people doubted that mosquitoes could transmit

Zika, and did not see how standing water could be ideal for mosquito reproduction. Furthermore, individuals felt that preventive measures were very demanding and time-consuming, besides considering they had little to gain from it (DE ZWART, 2009).

This paper reports the findings of research conducted in the cities of Campina Grande and Recife, in the states of Paraíba and Pernambuco, Brazil, in March 2016 in order to identify optimal social communication strategies (e.g. UNICEF's "Communication for Development") for increasing awareness around Zika, which at the time was still infecting many people. It was key to understand which means of communication population in the most affected areas trusted most, but the main problem soon became to understand what provoked behaviour change concerning the preventive measures to control the Zika spread. Through several focus groups we investigated (i) what was the general knowledge people had about Zika — including forms of transmission, symptoms and preventive measures; (ii) risk perception about susceptibility and severity; (iii) which preventive measures they were taking in the individual and collective level; and, lastly (iv) perception on the government response to the epidemic.

Methods

This section is divided into "investigation methods" in which we talk about research techniques to collect data, and "interpretation methods" (FERNANDES, 1972 [1959], p. XVII-XVIII, p. 13), in which we discuss the relevance of selected explanatory behaviour models in health promotion and education to understand health behaviour towards the Zika outbreak.

Investigation methods

Following an extensive desk review of past research and information campaigns on other mosquito-borne diseases, we held focus groups with key public officials (community health workers and epidemiologists), residents of affected communities, and members of the most vulnerable demographic groups (i.e. teens and women of childbearing age). Focus groups took place in two different but near cities in Brazil's Northeast Region: Campina Grande in Paraíba (PB) state and Recife, the capital of Pernambuco (PE) state.

The focus group method allowed researchers to identify in participants' language what where their general knowledge about the Zika epidemic; their perception on the risk concerning severity and susceptibility; their usual individual and collective behaviour towards preventive measures during those initial stages of the epidemic; how community-level action was being organized; what was their knowledge on the government's response to the epidemic; and finally, their thoughts on general awareness campaign.

Focus group method is becoming increasingly popular among health-related research, mainly on research seeking to understand behaviour change towards preventive action. It explores the formation of "peoples' own meanings and understandings of health and illness" (WILKINSON, 1998, p. 341). Interaction between participants with similar profile either helps on forming a multiplicity of opinions — which allows particular, original and minority visions to emerge — and therefore find dissensus on a specific topic, or, with the help of the moderator, find consensus. The debate on focus groups also rely on the fact that individual opinion can alter or not to meet collective opinion (IERVOLINO, PELICIONI, 2001, pp. 115-116).

During our stay in Campina Grande and Recife we were able to visit hospitals where mothers of new-born children with Congenital Zika Syndrome were being assisted. We also got the chance to visit public schools which had incorporated educational actions with parents and children about diseases transmitted by the *Aedes aegypti* mosquito. Children even had a song in which they chant the main forms to prevent the mosquito's proliferation. Both in schools and hospitals we did participant observation and had informal talks over the same topics investigated in the focus groups.

Interpretation methods

When it comes to interpretation methods, this research is based on four different behavioural models — Health Belief Model, (HBM), Protection Motivation Theory (PMT), Integrated Model of Communication for Social Change (IMCSC), Socioecological Model (SEM) — to help understand and explain risk perception and behavioural change into taking precautionary actions on Zika proliferation.

According to the **Health Belief Model (HBM)** behaviour shift happens in three dimensions: (i) individual perception; (ii) modifying factors and (iii) likelihood of action. In order to adopt certain behaviours, individual perception must involve both **perceived susceptibility** and **perceived severity**. Modifying factors start to instil the idea that behaviour change is an important step to avoid contracting the referred disease. They can vary from the perception of imminent threat to sociodemographic conditions, psychological conditions and general knowledge on preventive action. Though individual perception and modifying factors can be responsible for a shift in behaviour, it very rarely happens if the individual doesn't believe that **the benefits of taking preventive measures surpass its barriers** (ROSENSTOCK; STRECHER, 1988).

The **Protection Motivation Theory (PMT)** is quite similar to the Health Belief Model. It points out that beyond individual risk perception (perceived susceptibility and perceived severity) there are still two other key factors that can play an important role on whether people would take preventive measures: **response-efficacy** and **self-efficacy**. "Response efficacy relates to the belief of people in the effectiveness of the available protective actions, for example hygienic measures. Self-efficacy relates to a person's perception of their ability to engage in such protective actions, e.g. that they are able to carry out the proposed hygienic measures" (DE ZWART, 2008, p. 19).

As to **Integrated Model of Communication for Social Change (IMCSC)**, both collective and individual behaviour change happens as community initiates a dialogue whenever it identifies a collective problem. This dialogue starts due to a "catalyst" that "represents the particular trigger that initiates the community dialogue about a specific issue of concern or interest to the community" (FIGUEROA et alii, 2002, p. 6). The catalyst can be an internal stimulus, a change agent, a form of innovation or policy, technology or even mass media. Community dialogue stimulates collective action to put pressure on individuals to change their behaviour. On the individual spectrum the idea is to develop abilities, knowledge, risk perception and self-efficacy; whereas on the collective spectrum, collective action should impulse leadership, equity of participation, collective self-efficacy, sense of ownership, social cohesion and social norms.

The last of the four behavioural methods is the **Social Ecological Model (SEM)**. This model is originally a model for violence prevention, but UNICEF's C4D (Communication for Development) applied it to "understand the multifaceted and interactive effects of personal and environmental factors that determine behaviours". The aim is to identify behavioural and organizational leverage points and intermediaries for health promotion within organizations¹. For change to be sustainable, it must happen in five hierarchical levels of a social system: individual, interpersonal, community, organizational and policy/enabling environment.

Throughout the analysis of the collected data in the focus groups, this research identified that none of the behavioural health models described above seemed to be able to fully explain the findings of behavioural change during the Zika outbreak in Brazil. On the other hand, the analysis showed a possibility to assemble these four models: they had similarities and their differences seemed to complement each other rather than making them incompatible or contradictory. Particular characteristics of each model will be highlighted throughout the results section.

Results

This section presents the main findings from focus groups data and how they were read through the lenses of the four behavioural models. Sub-sections are divided into (i) knowledge associated with Zika virus — forms of transmission, symptoms, forms of prevention; (ii) risk; (iii) preventive action on individual and collective levels; (iv) perception over government response to the outbreak.

Knowledge associated with Zika virus

According to the four behavioural models, some knowledge on the epidemic, including its causes and consequences, is the very first step to change behaviour, either individual or collective. This understanding is also shared by academic literature (GÓMEZ-DANTÉS; WILLOQUET, 2009) and health organizations (WHO, 2016). In short, there are three main aspects that population need to have some sort of information on: which diseases are transmitted by *Aedes aegypti* and how mosquitoes transmit these diseases, symptoms of each disease and what are key vector control measures.

Diseases, forms of transmission and symptoms

Participants of the focus groups had already heard about the Zika virus epidemic and its relation to the Congenital Zika Syndrome. Considering that one vector — *Aedes aegypti* — transmits at least three "tropical diseases" — besides Zika, Dengue and Chikungunya are also transmitted by this vector — it became a little complex to understand that there is a difference between the mosquito and the virus. It became clear that the majority of the interviewees believed there was one type of mosquito for each disease. Also, the idea that there could be uninfected mosquitoes didn't seem pretty clear.

¹ "Module 1: What are the Social Ecological Model (SEM), Communication for Development (C4D)?" Available online at: https://www.unicef.org/cbsc/files/Module_1_SEM-C4D.docx

Participants mentioned that relatives and friends didn't believe the mosquito was borne from a larva that develops in standing water, nor they believed the mosquito was the vector. If symptoms and consequences of Zika were different from dengue, how could they be transmitted the same way? Airborne transmission and direct contact were believed to be forms of Zika virus transmission. Misinformation led to rumours such as the existence of a "mutant mosquito".

Zika infection is asymptomatic in 80% of the cases (DUFFY et alii, 2009; HAYES, 2009). Participants knew Zika symptoms, which can be quite mild including light fever, joint pain, maculopapular rash and even non-purulent conjunctivitis. Participants didn't realize that there could be mid- and long-term effects on nervous system².

Vector control measures

Participants knew about main preventive measures which they knew through community health workers and epidemiologists, besides information on TV ads. Participants were sensible to notice that some preventive measures were more emphasized than others — too much attention was given to standing water on flower pots and water tanks and not so much attention on solid waste, when even a tiny candy wrapper could be enough to generate standing water.

Risk

Here we understand risk as the Health Belief Model, according to which risk is composed both by perceived susceptibility and perceived severity (DE ZWART, 2008). In the Zika scenario this equals the perceived susceptibility on being infected and the perceived severity of possible sequels in adults and the risk of newborns with Congenital Zika Syndrome. For the purposes of this research it was crucial to identify not only the perceived risks but the barriers for risk perception. Ideally these barriers can be overcome with communication strategies.

Risk perception

General knowledge about the virus including forms of transmission, symptoms and its severity are prior to risk perception. Again, due to be asymptomatic in 80% of the cases and to generate only mild symptoms in adults, Zika had low risk perception of its **severity**, except by pregnant women and women of childbearing age which felt exactly on the opposite spectrum, having high risk perception on Zika.

² This research happened in the thick of the outbreak and back then there weren't studies that could anticipate full range of possible consequences, but once it affected the nervous system of newborn children, there were untested hypothesis it could affect adults' nervous systems in the long term.

The lack of symptoms also contributed to generate a scenario of sub notification of infected adults. There were mainly children and pregnant women diagnosed with Zika because they were more likely to seek medical care.

Barriers for risk perception

Barriers for risk perception concerned mainly unknown information on its severity in the long term. For most adults that weren't thinking about having a child anytime soon, Zika meant to be sick for some days maybe a week, lay in bed, deal with possible rash and take paracetamol in case of joint pain or fever. This disease "routine" is quite similar to non-threatening diseases — a cold or an allergy — which led people to believe that Zika could also be non-threatening. If it was not that big of a deal, why should one bother taking preventive action that could be time consuming and physically demanding?

Individual behavior

This research identified that individual behavior change during the Zika outbreak happened as followed: (i) individual risk perception both on susceptibility and on severity, (ii) perception that benefits of preventive action surpasses any inconvenience to take them, (iii) self-efficacy; (iv) collective-efficacy; (v) enabling political and organizational environment and response-efficacy; (vi) favorable local context and social norms.

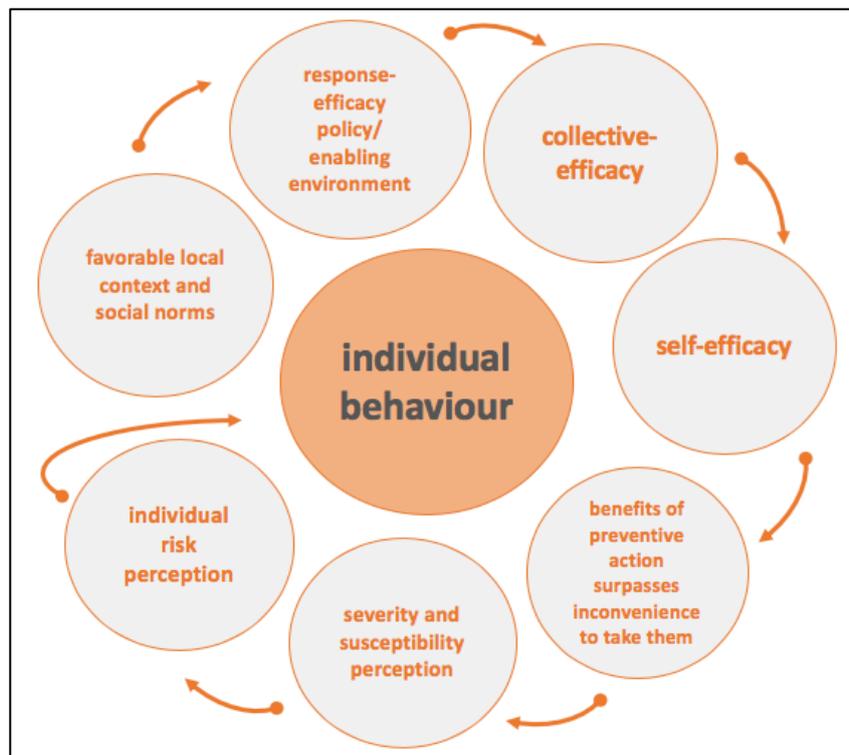


Figure 01. Factors for individual behavior change

Key factors for individual behavior change

The research has found that it is more likely to change behavior due to a multiplicity of factors rather than due to an isolated one. Behavior change is also likely to start out from information shared in the interpersonal level — between friends and relatives — or after someone close has had Zika. The presence of a pregnant women in any social circle — family or friends — can also be an important and lasting **catalyst**.

Barriers for individual behavior change

Little knowledge on the disease and its consequently low risk perception help maintain inertia towards preventive measures. Generally, preventive measures do not take part in people's daily priorities. They are perceived as time-consuming and physically demanding as mentioned before, but also as not highly effective. People feel that preventive measures are not as effective as expected due to the fact that it requires a lot of attention to identify potentially places to accumulate standing water. Even if preventive measures are taken, a single leaf may put all the effort in jeopardy. This rationale is a strong barrier to the **self-efficacy** concept.

When analyzing which factors of the **local context** could also represent a barrier to individual behavior change, it came to light that in vulnerable areas of both cities and urban contexts in general there is a common occupation of collecting recyclables and its storage at home before selling them out to recycling industries.

Collective behavior

Perceptions on collective engagement

It has been revealed to be inefficient whenever a sole residence takes vector control measures. Needless to say that collective-efficacy needs collective action from a community. Population needs to feel part of the process and by the time this research was made, participants mentioned that this feeling was still incipient. However, whenever an individual is highly concerned about their families' well-being it can play an important role to engage people living in the surroundings.

The most vulnerable members of society tended to be more proactive. Given the serious consequences for unborn children, women led the way in changing behaviour at the individual and community levels. Participants also believed teens play an important role in spreading awareness.

Community leaders and local organizations can also make a difference to stimulate change in collective behavior, but it also depends on if these leaders and organizations can take actions at the interpersonal level.

Barriers for collective engagement

In the same analysis of what **local context factors** can represent barriers for collective engagement, this research has found that population attributed the epidemic control to the government, excluding individual and collective action from their responsibility. Participants, mainly community health workers, mentioned to have found residents that strongly believe it was the government obligation to enter people's home and take preventive action, including cleaning water tanks.

At the same time, research has found that collective action is more likely to happen and more likely to be effective and sustainable whenever the government shows **effective response** to the epidemic.

Political action and communication strategies

In Campina Grande and Recife political action and social communication happened at individual, collective and political levels. Amongst individual action, interpersonal communication between friends, neighbours and relatives showed to be highly effective. One of the reasons was the sense of camaraderie in helping on physically demanding measures.

Collective action triggered by the community and government were perceived as not very effective by participants. They mentioned that actions as "D-Day" and large-scale movements in communities to spread the word on how important it is to take vector control measures didn't have a lasting impact on residents daily lives.

Teens and children were perceived as catalysts for collective and individual behavioural change. Through preventive action taught in their schools, they became multipliers in their homes and neighbourhoods.

The most effective catalyst factor to community and individual action was identified by the majority of focus groups' profiles as the community health workers. They were close to residents, they were believed by the population and they acted at the interpersonal level at the same time they represented part of the government response to the epidemic.

Conclusion

From the results described above, this research has concluded that individual and collective behavior of Campina Grande and Recife's population towards taking preventive action during the Zika outbreak couldn't be explained by a sole model. Each of the Results' subsections showed specific explanations found in the proposed models. Then, as showed in the Methodology section, this research assembles the four models — Health Belief Model, Protection Motivation Theory, Integrated Model of Communication for Social Change e Socio Ecologic Model — to explain the process behind individual behavior change in Campina Grande and Recife, as show in **Figure 02** below:

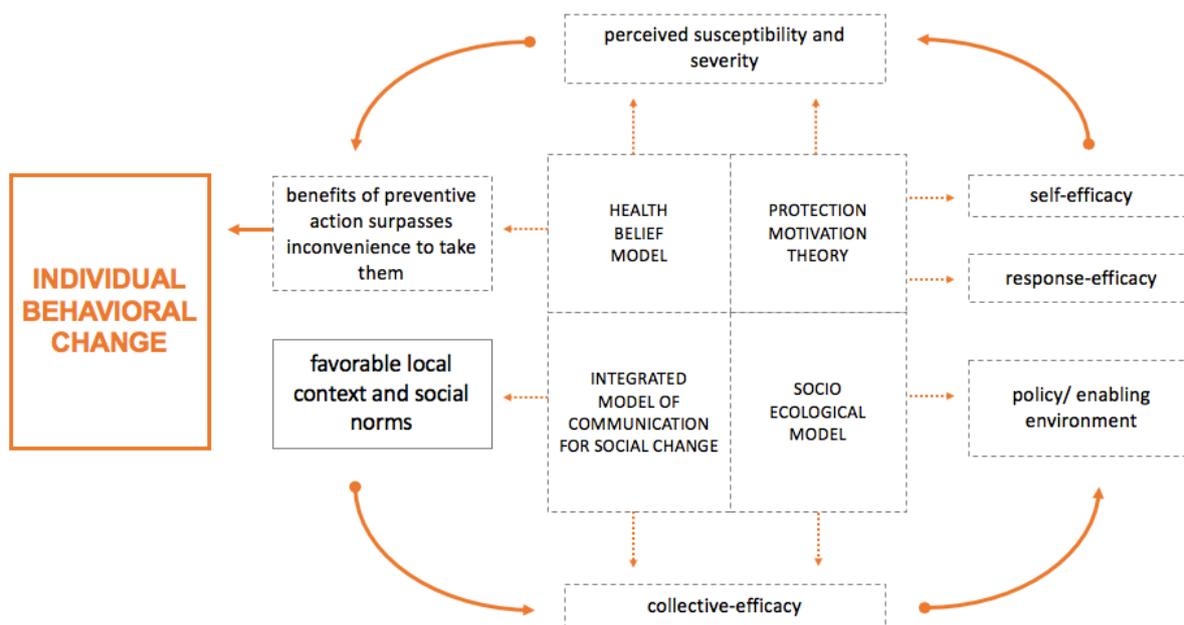


Figure 02. Four behavioral health models assembled

This research has provided local governments and the international community with insights into how information campaigns can promote transformational change in response to an emergency. By investigating public perceptions of the transmission and risk associated with Zika, our study informed the creation of communication tools that encourage individuals to incorporate preventive measures into their daily routines.

As viruses like Zika mutate and evolve, countries will have to rely on effective and efficient public health strategies that help citizens stay informed and build resilience at a societal level. Therefore, we consider this study to be thematically and methodologically relevant for the international evaluation community.

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