



ZIKA POLICY IN THE AMERICAS

Lessons learned for future vector-borne diseases
OCTOBER 1, 2018

Messages from the Presidents



"The Zika epidemic provided the perfect storm that those of us involved in public health fear the most—not only is the Zika virus spread by a mosquito that knows no borders, but it is also transmitted sexually, and most devastatingly, by mothers to their unborn children. I applaud the researchers from the AIDS Healthcare Foundation and the University of Miami for this thoughtful and highly practicable review of global reactions, policies, and programs to combat and control the spread of Zika. The lessons learned here have had both an immediate effect and a lasting impact on future generations."

*Julio Frenk, MD, PhD, MPH, President
University of Miami*



"In addition to HIV, AHF is committed to supporting generating evidence in other aspects of global public health. Now with a partnership with the University of Miami and the creation of the AHF Global Public Health Institute, we see one first tangible result—the Zika Policy Report. Like HIV, Zika generates fear and impacts people far beyond those who are directly affected. Zika seems to now be largely under control but analysis of policies and lessons learned needs to be standardized and shared to better prepare the world for the next regional or global health threat, including the possibility of Zika resurgence. I would like to personally thank the University of Miami for hosting us and for contributing to this joint effort."

*Michael Weinstein, President
AIDS Healthcare Foundation*

Foreword

The Zika epidemic caused panic in the Americas, not because it surprised us all, not because it was a new virus to the Americas, not because it was transmitted by a mosquito that had never been eradicated anywhere, and not because it spread quickly affecting nearly 50 countries in the Americas in a short time, but because of the proven association of the Zika virus with birth defects, namely microcephaly. For decision makers, the surprise was not just that Zika's impact exceeded the scope of medical care and epidemiological controls, but that it touched the most sensitive fibers of the human being by having an impact on their own descent, on the wellbeing of new births. The little knowledge that we had about the virus and its subsequent identification in semen - which as a consequence, indicated that it could be also sexually transmitted - increased the fears of communities and politicians at all levels of government. That the virus could be transmitted mosquito to humans, humans to mosquitos, humans to humans, mosquitos to mosquito, mothers to their children and female mosquitos to their offspring, made it so much more difficult to stop the outbreaks from becoming epidemics and ultimately endemic.

Because of its rapid spread and devastating outcomes for the unborn fetus, Zika became world news when it put in jeopardy the celebration of the 2016 Summer Olympics in Brazil, the most affected country in the Americas, when renowned athletes refused to attend for fear of the virus. Although the severity of outbreaks have declined, Zika is now part of the history of continental health. There may be many reasons for the reduction in the severity of Zika outbreaks, the most recurrent may be the possibly temporary immunity caused in a large number of affected persons.

For these reasons, the AIDS Healthcare Foundation and the University of Miami considered it important to review the policies and actions taken to control Zika and the reactions and impact of such decisions. It is our hope that the lessons learned and the recommendations derived from them will be used to prevent and manage future outbreaks or epidemics, if and when there is a resurgence of the Zika virus, or other similar diseases transmitted by vectors. Learning about successes and errors, about science and evidence, about what is published by scientific journals but also in the gray literature, including the press, as well as talking to key stakeholders involved, sometimes collecting only anecdotes, makes policy analysis a rich source of standardized information useful for future decision makers.

At the AHF Global Public Health Institute at the University of Miami as well as at the UM Department of Public Health of the University of Miami Miller School of Medicine, we are pleased that this policy report on Zika is the first published product of the collaboration initiated between our two organizations. We hope that this report is useful in strengthening public health in the Americas.



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Authorship Note

The development of this report was a collaborative effort that involved multiple authors, researchers, contributors, and editors, including in alphabetical order Jacob Batycki, Adriane Gelpi, Valerie Gramling, Jorge Saavedra, Mary Soares and José Szapocznik, among others. While every chapter benefited from this collaboration, each chapter was developed, shaped, and written by one or two main authors. Below is the list of the primary writer(s) for each chapter.



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We are grateful to Mary H. Soares, who in addition to literature research conducted extensive interviews in Brazil; Nikhita Allam, our Administrator; and Maria Pilar Ramirez, our Senior Administrative Assistant.

There were many stakeholders who agreed to be interviewed. Their work and observations helped shape this report. Because of requests for confidentiality, many will remain anonymous. We particularly want to thank Dr. Nelson Arboleda, Country Director and Public Health Attaché for the Centers for Disease Control and Prevention in the Dominican Republic, who was instrumental in facilitating our research there.

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of the University of Miami Writing Center, and particularly the guidance provided by Dr. Joanna Johnson, Dr. Chelsea Skelley, and April Mann. We also thank Dr. Valerie Gramling, who acted as lead editor of the final report.

This work built on the considerable expertise of the organizers and presenters at the Zika 2017: Where Do We Go Next community forum, held April 6, 2017. This conference was organized by one of us, Adriane Gelpi, under the auspices of the University of Miami Miller School of Medicine's Institute for Bioethics and Health Policy. We particularly would like to thank the Conference's Keynote Speaker, State of Florida's Surgeon General, Dr. Celeste Philip.

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Table of Recommendations

Recommendation 1:

Behavior change interventions

Behavior change interventions such as persuasive messaging and community mobilization save lives and should be pursued. Psychographic segmentation and entertainment are also recommended as effective approaches in changing behaviors.

Recommendation 2:

Public engagement

Public engagement should be a critical priority area, as its emphasis can improve the legitimacy, fairness and efficacy of future public health crisis management.

Recommendation 3:

Multisectoral collaboration

Multisectoral collaboration should be fostered as an essential tool in targeting the web of causation that leads to disease.

Recommendation 4:

Permanent vector control infrastructures

Permanent vector control infrastructures should be established. They should be led by scientists and have sources of funding independent of governments.

Recommendation 5:

Results-based financing

Results-based financing should be considered as a method for improving long-term public health outcomes and increasing accountability and transparency by linking financing incentives to verification of achieved public health milestones.

Recommendation 6:

Strengthening health systems

Strengthening health systems is the next frontier. The Zika epidemic revealed underlying structural inequities in health systems. In transitioning to a post-epidemic era, priority should be given to those programs that can be leveraged for system-level reforms.

Executive Summary



From 2015 to 2017, over one million persons were reported to have been infected with Zika in the Americas. Many more were likely to have been infected but not reported. The ways in which Zika spread and its potential impact on newborns sparked panic in the public. In this report, we attempt to frame Zika within the broader public health system perspective. Mixed methods were used in what can be considered a **quasi-scoping study**—a type of exploratory study aimed at synthesizing data from several sources: academic, grey literature, and original interviews to glean stakeholder perceptions about decision-making during the Zika outbreak.

Zika is transmitted by one of the most highly adaptive mosquitoes, *Aedes aegypti*. No community has ever been able to eradicate this mosquito, giving a sense of the challenge of responding to a virus carried by *Aedes aegypti*. Zika is transmitted, mosquito to human, human to mosquito, as well as human to human and mosquito to mosquito, both horizontally and vertically. Zika's adverse impact on the fetus made reducing transmission more urgent. Yet a major barrier to fighting Zika has been its relative invisibility—four out of five people infected do not show any symptoms (this invisibility also resembles HIV infections, in which a person can live for years after infection without showing any

symptoms). Zika's asymptomatic consequences and non-lethality for adults led to perceptions of limited risk—placing much of the burden of reducing transmission on pregnant women whose offspring experience the most serious consequences.

Capacity to respond has varied dramatically across countries. Differences in human and capital resources were evidenced by the responses in developing countries when compared to the 2016 outbreak in Miami. Because of its extensive resources, Miami was able to contain local outbreaks, preventing Zika from reaching epidemic proportions. Similarly, within developing countries Zika disproportionately affected the poor. Because of a lack of resources (e.g., mosquito screens, air conditioning) and the need of the poor to be outdoors either for work or transportation, the poor, as often happens, were most affected by the epidemic.

This report is intended to facilitate further deliberation about the lessons of the Zika epidemic for health policy and public health across the Americas. Despite the context-specific nature of certain elements of the response, the Zika epidemic represents opportunities for stakeholders across the Americas to learn from each other.

**Three questions guided
the start of this project—**

**1 | How can we
understand
the Zika epidemic?**

**2 | How can we
determine what
has worked?**

**3 | And what
should we do
next?**

An early draft of this report was followed by a stakeholder meeting on April 27, 2018. At that meeting, the draft report was reviewed with a small group of carefully selected stakeholders (Appendix B) to enrich these recommendations

as well as suggest others that should be considered in future work. An overview of those suggestions and discussions for further development of this work appears in Chapter VII.

RECOMMENDATION 1: Behavior change interventions

Behavior change interventions such as persuasive messaging and community mobilization save lives and should be pursued. Psychographic segmentation and messaging within mass media entertainment are also recommended as effective approaches in changing behaviors. However, while governments tend to rely on information and awareness campaigns, these interventions are typically unsuccessful in bringing about behavior change.

This recommendation clarifies that public health communication is a complex field that requires considerable scientific and private sector expertise to ensure that interventions achieve their intended outcomes. While all public health interventions should be assessed, evaluation of communication and behavior change strategies is most strongly recommended.

RECOMMENDATION 3: Multisectoral collaboration

Multisectoral collaboration should be fostered as an essential tool in targeting the web of causation that leads to disease. This is the case because diseases, including Zika, are promoted or prevented by a broad range of social and physical conditions. Thus, tackling Zika, like most other public health challenges, requires going beyond purely biomedical and narrow notions of public health. Ministries of Health should lead governments in understanding that improved health can only be achieved by harnessing the power of intersectoral actions.

RECOMMENDATION 2: Public engagement

Public engagement can improve the legitimacy, fairness and efficacy of public health responses. During the Zika epidemic, several communities found themselves embroiled in conflicts between decision makers and community residents who feared the use of certain interventions. Citizen participatory deliberations can help ensure that a diverse range of perspectives is taken into consideration before decision makers act. In addition, participatory processes themselves may contribute to improved health. A recent study from Brazil demonstrated that the presence of municipal citizen councils, who participate in making decisions on a small portion of the local budgets, was associated with lower infant mortality compared to neighborhoods without such participatory bodies. There is a need to build capacity in public health systems for citizen participatory processes.

RECOMMENDATION 4:

Permanent vector control infrastructures

Permanent vector control infrastructures should be established. *The Aedes aegypti* is a rapidly adapting mosquito. This requires ongoing research to understand the new challenges posed by the mosquito to conventional methods of mosquito control. Moreover, affordable strategies for mosquito control have to be adapted to local conditions. A permanent mosquito control team would be responsible for emergency response coordination and community engagement, designing and conducting research that is responsive to local conditions, and conducting effective field operations. Results-based financing could be applied to the establishment of these local, country, and/or regional resources to ensure effective mosquito-borne disease preparedness and response.

These infrastructures should be led by scientists and have sources of funding independent of governments.

Because governments tend to fund mosquito control operations during emergencies and tend to reduce funding in non-emergency periods, and because the fight against *Aedes aegypti* has never been won anywhere, it is important to have sources of funding for permanent infrastructures that are independent of governments.

RECOMMENDATION 5:

Results-based financing

Results-based financing should be considered as a means of improving long-term public health outcomes and increasing accountability and transparency by linking financing incentives to verification of achieved public health milestones. This recommendation builds on the experience developed by the Inter-American Bank as the implementation and fiscal agent of Salud Mesoamérica, an initiative to improve maternal-

child health. Salud Mesoamérica, in addition to providing incentives for achieving milestones set by the countries and the donors together, uses an innovative planning process within the context of a project management framework. Evaluation of the baseline, the process, and the impact outcomes at intermediate, medium, and long-term milestones have been contracted to an external organization, a reputable university-based institute. We conclude that a similar approach could be applied to the efforts to control the Zika epidemic (and other public health threats), by tying implementation of the Recommendations contained within to results-based incentives.

RECOMMENDATION 6:

Strengthening health systems

Strengthening health systems is the next frontier. The Zika epidemic revealed underlying structural inequities in health systems. In transitioning to a post-epidemic era, priority should be given to those programs that can be leveraged for system-level reforms. Zika, and other vector-borne diseases, are here to stay. In the short term, it is essential to determine which types of investment are needed to prevent future epidemic outbreaks of diseases carried by mosquitoes. It is essential that this kind of planning to prevent and respond to future outbreaks becomes part of the 'new normal' in public health preparedness and response. For example, ongoing mosquito surveillance to continuously monitor disease-carrying mosquitoes and when those mosquitoes become infected, must be part of any long-term response to Zika and other diseases carried by mosquitoes. The Zika outbreak represents an opportunity to address long-term structural and system level changes, such as the need to upgrade solid waste management and improve multisectoral collaboration.

ADDITIONAL TOPICS:

The process of learning from and improving the public health response to emergencies is an ongoing one, and while this report is focused on six key recommendations, it recognizes that there are additional topics that need to be addressed. At the Stakeholder Roundtable on April 27, 2018, several additional topics arose that warrant further exploration.

Travel and Migration throughout the Americas affects not only the spread of Zika and other epidemics, but also highlights how issues such as vector control cross national and regional boundaries. Issues of **Surveillance and Laboratory Capacity** throughout the Zika

epidemic illustrate the need for ongoing monitoring and research outside of the crisis period. For example, consistent measuring and recording of newborn head size allows doctors and researchers to notice patterns and changes that can show, among other things, an increase in microcephaly.

Sexual and Reproductive Rights vary widely throughout the Americas, which complicates public health responses to Zika. More information is needed about Zika as a sexually transmitted disease. Additionally, in responding to Zika and its significant danger to pregnant women and their fetuses, doctors, researchers, and others

need to be sensitive to the different options available to women in their area. Related to this is an awareness of the **stigma** women, especially pregnant women, may face in some communities, and the effect this has on both individual health choices and public understanding of and response to Zika.

The Stakeholder Roundtable ultimately concluded that the complexity of Zika and other public health crises, and the multiple issues that they raise for individuals, communities, municipalities and nations, underscores the need for ongoing multifaceted conversations that bring together experts and stakeholders in a regular forum.

CONCLUSION

Public health departments must address the most urgent threats to population health as they arise. In the face of new outbreaks of infectious disease or natural disasters, Zika cannot remain the highest level of priority. The urgency has in fact been reduced. Nevertheless, the Recommendations presented in this report highlight the opportunity to learn from Zika. The response to the unique Zika epidemic represents a treasure trove of data, experience, investments, and innovative efforts that should not be lost without learning its lessons.

Harnessing the momentum of the projects launched during the epidemic phases of Zika can help fuel structural reforms of the sort that do not tend to inspire political will in less urgent periods. If such a process of learning from this epidemic is prioritized, then the anguish of the Zika outbreak in the last few years can yield important benefits across the Americas, resulting in a greater capacity to respond, both effectively and ethically, to the next as-of-yet-unnamed emergency.

Introduction:

Zika Policy in the Americas

Adriane Gelpi

Jacob N. Batycki



48
countries

583,451
suspected cases

223,477
confirmed cases

The Zika epidemic first stormed the Americas in 2015.

As of December 31, 2017, 48 countries and territories had reported local transmission in the Americas (Pan American Health Organization [PAHO], 2017). Close to one million suspected and confirmed cases of Zika virus infection had been reported by December 17, 2017 (PAHO, 2017). The latest statistics (January 4, 2018) from PAHO show a total of 800,000 suspected cases and confirmed cases of Zika virus infection. The outbreak of the Zika virus across the Americas forced the rapid rollout of public health programs in all their forms and functions—from new municipal policies, programs, and practices to declarations signed by international bodies such as the World Health Organization. The scope and scale of the epidemic has been complex and vast, reaching from Canada to Chile, from the beaches of the Caribbean to the streets of New York. No part of the hemisphere has remained untouched by Zika. The ways in which Zika spread and the potential impact it may have had on the health of populations sparked panic in the public.

Overview: AHF Zika Policy in the Americas Project

This report represents the culmination of *Zika Policy in the Americas*, a research project launched at the University of Miami Miller School of Medicine through a grant by the AIDS Healthcare Foundation in the summer of 2016. The two co-Principal Investigators, University of Miami faculty members Drs. José Szapocznik and Adriane Gelpi, led a team of graduate-level research assistants to examine the public health response to Zika in the Americas.

This research initiative generated the initial set of findings and recommendations for further policy innovations, which are both specific to Zika as well as move beyond that health crisis. The goals, both of the project and this report, have been to take stock of the varied responses and thus provide much-needed context for policy makers to inform future responses.

The timing of the project—launched in 2016 at the height of the Zika outbreak in Miami and carried out during 2017 and early 2018—influenced the shape of this report in ways both advantageous and not. The main advantage of launching this project in the midst of the Zika epidemic is that it allowed the research team to gather evidence, in real time, of the processes by which a hemispheric response to a novel disease outbreak took place. It also enabled us to conduct timely interviews with key informants and help ensure a thorough documentation of the policy response in the region. A further advantage is that there is still the opportunity to contribute to the ongoing conversations about the Zika response and propose the uptake of this report's policy recommendations. On the other hand, the timing of the project during the outbreak also imposed certain analytic constraints,

most notably due to the paucity of available data or evaluations that can fully inform future public health response.

It may still be premature to make any definitive declarative statements about the impact of certain policies on outcomes. As data and preliminary results become available, more fine-grained conclusions about the impact of certain efforts on the Zika epidemic may emerge. Another limitation to these analyses is more fundamental: many of the important questions could not be answered because the relevant data had never been collected. For example, it has been difficult to determine microcephaly incidence numbers because the baseline data may be absent or inconsistent. Even though there are standard curves for head circumference, such as the Fenton curve and the curve of the InterGrowth study, some clinics may not have collected this baseline data while those that do may use different standards. Nunes and colleagues (2016) noted that differences in the way an infant's head is measured impacts the number of suspected microcephaly cases.

Brazil changed the guidelines for microcephaly twice. In 2015, the measurement for head circumference was changed with the goal of increasing sensitivity. However, it increased the number of false positives. In 2016, Brazil changed its guidelines for suspecting microcephaly to align with current World Health Organization guidelines, after noticing that some infants initially suspected of microcephaly were developing normally despite their head measurements (Brazil Ministry of Health, 2016; Sreeharsha, 2016; Victoria et al., 2016).

A final way that the timing of this project created challenges involved the reluctance of certain experts to speak on the record. Some of those to whom we reached out noted that it would be inappropriate for them to speak with outside researchers about their own institution's Zika response, while others said they might be freer to speak once their own internal evaluations had been concluded.

The context-specific nature of the Zika epidemic was a challenge to our initial goal of developing recommendations that could be generalized. The sheer complexity of the scope of the Zika epidemic across the hemisphere made systematic review impossible. Instead, the research team decided to pursue methods that would yield more targeted responses. The decision to frame our study of the Zika epidemic within the broader health system-level perspective made the task of narrowing down the scope of the inquiry more challenging, but ultimately seemed to be the only prudent approach. This study therefore employed a variety of data-gathering methods and can be considered a **quasi-scoping study**—a type of exploratory study, not uncommon in policy analyses, aimed at synthesizing data from several sources, including academic, grey literature, and original interviews to glean stakeholder perceptions about decision-making during the Zika outbreak. Refining the recommendations of the report for best practices must be a dynamic process, as more evaluations and analyses about the hemispheric response to Zika emerge.

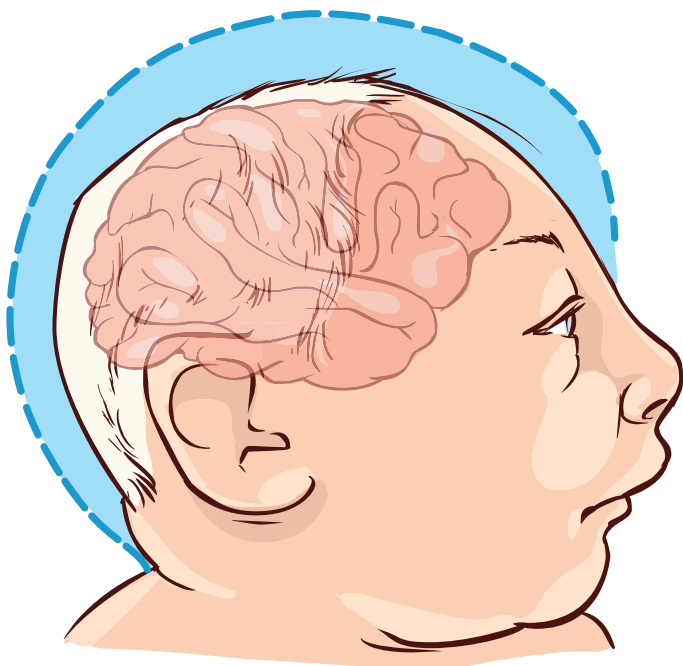


What is Zika?

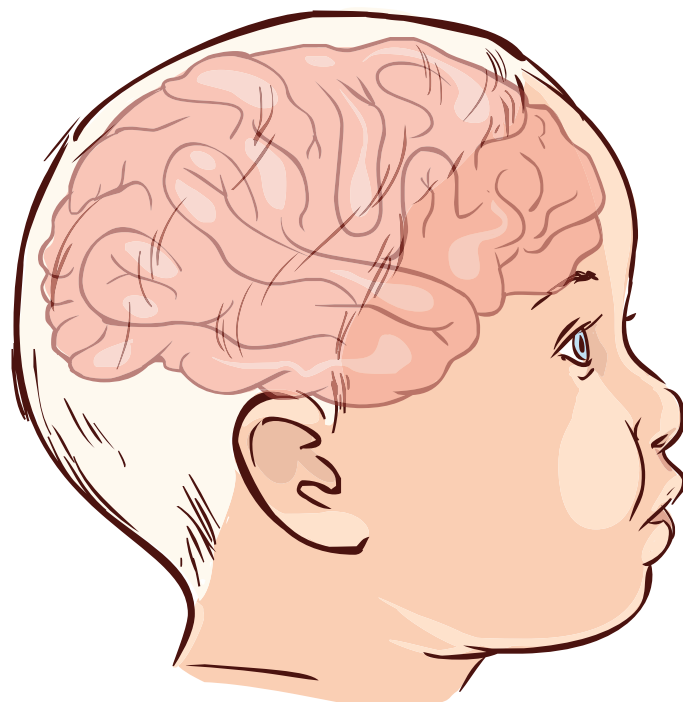
Zika is a vector-borne disease transmitted by *Aedes aegypti* mosquitoes that can be spread from mosquito to humans, from humans to mosquitoes, from female mosquitos to their offspring, from mother to child, through mosquito sexual contact, and unlike other mosquito transmitted diseases it also spreads through human sexual contact (Likos et al., 2016 ; Thangamani, Huang, Hart, Guzman, & Tesh, 2016; Gregory et al., 2017; Blohm et al., 2017; Baud, Musso, Vouga, Alves, & Vulliemoz, 2017;). For many individuals, Zika leads to very mild symptoms that could include a fever, rash, and conjunctivitis. However, it is possible for individuals not to display symptoms, which made the detection and surveillance of Zika challenging. Additionally, Zika has the ability to spread rather quickly. The health impacts disproportionately affect pregnant women and their unborn fetuses, resulting in birth defects such as microcephaly, encephalitis, transverse myelitis, and chronic inflammatory demyelinating polyneuropathy, which can

lead to long-term cognitive impairment (Likos et al., 2016; Araujo, Silva, & Araujo, 2016; da Silva, Frontera, de Filippis, & do Nascimento, 2017). In adults, Zika can rarely lead to the contraction of Guillain-Barré syndrome, a neuromuscular autoimmune disease that can cause paralysis (Likos et al., 2016; Weaver et al., 2016; Krauer et al., 2017). The potential health impacts of Zika are serious, and unfortunately much remains unknown about the long-term effects, particularly among children who were infected in utero but who did not show obvious impact at birth (Ventura, Maia, Dias, Ventura, & Belfort, 2016). Given that no treatment or vaccine exists, Zika represents a grave threat to the health of future generations (Relich & Loeffelholz, 2017).

Microcephaly



Normal head size



How did the Zika epidemic begin?

The Zika virus was first detected in Uganda in 1947

The Zika virus was first detected in Uganda in 1947 in rhesus monkeys that inhabited the Zika Forest, for which it was ultimately named (Torres, Murillo, & Bofill, 2016). It was eventually discovered in humans in 1952 (Torres, Murillo, & Bofill, 2016). Historically, Zika has been most common in regions in Africa and Asia, like other mosquito-borne diseases such as dengue fever and chikungunya virus (Torres, Murillo, & Bofill, 2016; Wikan & Smith, 2016; Weaver et al., 2016). This changed in May 2015, when Brazil announced the first locally transmitted cases of Zika in the Western hemisphere and the World Health Organization issued an epidemiological alert, declaring the first ever Zika outbreak in the Americas (Kindhauser, Allen, Frank, Santhana, & Dye, 2016).

The virus quickly erupted into an outbreak in many areas of the Hemisphere, including in the South Florida area, particularly in Miami-Dade and Broward counties, where the first locally acquired cases in the United States were detected (Likos et al., 2016). As of June 6, 2018, 5,700 symptomatic Zika virus disease cases have been reported in the U.S. and 37,250 cases in U.S. Territories (CDC, 2018a), mostly in Puerto Rico. Among US cases, 2,461 were pregnant women in the U.S. and 4,870 in U.S. Territories (CDC, 2018b).

The Zika virus was first detected in Uganda in 1947 in rhesus monkeys that inhabited the Zika Forest.

**ZIKA FOREST.
PROPERTY
OF**

**UGANDA VIRUS RESEARCH
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What is distinct about the Zika epidemic?

One of the most challenging components of analyzing the initial public health response to Zika has been conceptual: Zika is not only a novel virus, but it also confounds typical categories of public health categorization, as it is both mosquito-borne and sexually transmitted. While the Zika outbreak resembles other recent outbreaks in the hemisphere—like dengue and chikungunya in that it is transmitted by the *Aedes aegypti* mosquito—it also presents new challenges. For example, like Ebola, Zika represents an emergency outbreak of a virus spreading in dense urbanized areas (Heymann et al., 2016). However, unlike other mosquito-borne viruses, Zika can be also be sexually transmitted among humans as well as vertically transmitted from female mosquito to her offspring—allowing the virus to survive even in the absence of the vector in the first case, and humans in the second (Epelboin et al., 2017). The fact of its sexual transmissibility means that public health officials can draw lessons from the HIV epidemic, such as that promoting condom use to prevent its spread may meet with opposition or apathy (Shirley & Nataro, 2017).

In some ways, the Zika epidemic resembles that of previous new infectious diseases that sparked public attention. Like Ebola and SARS before it, Zika arrived as a novel virus, allowing it to spread rapidly among the non-exposed population. Additionally, like HIV infection a major barrier to fighting Zika has been its relative invisibility because four out of five people infected do not show any symptoms. However, a major difference between Zika and Ebola or SARS is that the gravest harms fall not on adults, but on the developing fetus.

Unlike the highly lethal Ebola, Zika does not typically cause death or even grievous illness among adults (though Guillain-Barré syndrome can be severe). However, Zika's adverse impact on the fetus has made reducing transmission more urgent.

The two key features of Zika—its asymptomatic consequences and non-lethality for adults—have led to perceptions of limited risk, placing much of the burden of reducing transmission on pregnant women whose offspring experience the most serious consequences (Interview, Likos, 2017).

The pediatric complications have also introduced yet another measure of complexity into studying the public health response to Zika, as data from pregnant mothers needs to be continuously tracked over time.

In the United States, the perceptions of limited risk have also had political consequences, particularly in terms of political will for swift action. In the spring of 2016, with Zika spreading through the U.S. territory of Puerto Rico, the U.S. Congress did not approve emergency Zika funding swiftly. Concerned that Zika could lead to a spike in abortions, some pro-life politicians delayed the approval of emergency funding for outreach and prevention efforts (Harris, Silverman, & Marshall, 2016).

Another impediment to the rapid rollout of the Zika response has been political neglect at the national level, due to the geographical limits of active Zika transmission that created a perception of Zika as a regionally localized epidemic. For individuals outside the zones of active transmission, Zika never rose to the level of most-urgent priority. This public apathy undermined political will. Even within Zika-affected areas, such as Florida and Texas, the lack of fatal risk and the nearly sole focus on pregnant women undermined prevention behavior. It was hard to convince non-symptomatic adults to take action in compliance with public health recommendations that could inhibit the further spread of the epidemic, such as preventing mosquito bites and draining standing water (Interview, Likos, 2017; Winneg, Stryker, Romer, & Jamieson, 2018; Squiers et al., 2018).

The complexities of Zika demanded new systems for coordinating the flow of information within agencies, as well as to the public, throughout the Americas. Despite this institutional imperative, bridging long-standing functional divisions between departments in public health agencies proved difficult. Prior to Zika, public health experts had never needed to develop expertise in both mosquito-borne and sexually transmitted disease. Once Zika hit, such communications across divisional lines became necessary. In the U.S. state of Texas, for example, the staff of the birth defects registry and the mosquito control division had to develop new points of contact, as an official with the Texas State Department of Health explained (Telephone Interview, Texas Researcher, May 2017). The Texas department ultimately created a new position of Zika Coordinator to manage the new demands for cross-division information flows.

Finally, the lack of standardized metrics for key epidemiological categories, including definitions of microcephaly, has made research on Zika difficult. Statistics on newborn head circumference has not been kept in many areas. These gaps in baseline data have further delayed learning about the scope of the Zika epidemic and evaluating the response. Despite the quick ramp up of scientific studies examining Zika, a great deal of scientific uncertainty remains (Metsky et al., 2017)—including questions about how the virus works, how long individuals can be carriers, and what the long term consequences of infection are, particularly to newborns who do not initially show damage to the brain (Walker et al., 2018). U.S. epidemiologists have begun to conduct retrospective chart review of all births since 2015 to search for any missed cases of Zika, yet whether or not they can complete this work before special Zika funding is exhausted is an open question.

Taken together, these distinctive features of the Zika epidemic—the novel juxtaposition—served as the key building block of our analyses that allowed us to explain many of the challenges observed in the public health response to Zika throughout the Americas.

Contextualizing Zika in the Global Health Policy Landscape: Thematic Perspectives

One of the fundamental approaches this project took when framing the analyses was the need for context. Given how the Zika epidemic triggered both global and regional responses, it was important to frame these responses to Zika within the broader landscape of global health and health systems.

In addition to seeking clarity about what was distinct about the Zika epidemic, a second question the project team wrestled with was largely epistemic: *how would the recommendations that we make be justified?* Given the complexity of the topic, and the differences in opinion that we confronted in the qualitative components of our research, we considered how to measure what has worked and what has not. Due to the normative natures of certain questions, such as the proper scope of public engagement with scientific uncertainty, the lack of empirical data did not represent insurmountable obstacles to our analysis. The outcomes of interest needed to be broader than simply a reduction in cases, as gauging success was not solely a scientific question but also an ethical, political, and social one (Aziz et al., 2017).





**critical processes of
social determination
systemically drive
disparities**

Spiegel, Breilh, & Yassi, 2015, p. 13

Three overarching thematic perspectives informed our analyses of responses to the Zika epidemic:

1. Globalization as both problem and solution

Globalization has contributed to the spread of Zika (Nelson et al., 2016).

Just as the Zika epidemic has transcended national borders, so too has the response to Zika across the Americas defied national borders. Travel of individuals between Zika-infected regions has spread the virus across the region, making travel warnings and travel-related advisories a central feature of the hemispheric response. The rapid rollout of new research studies and new initiatives to share scientific data about the virus itself has been a striking example of transnational cooperation. Understanding how such success stories of cooperation have developed will be an important component of learning lessons from the Zika outbreak that will be useful for handling novel outbreaks in the future (Siraj et al., 2018).

Globalization, according to Morens & Fauci (2013), reminds us that

“despite extraordinary advances in the development of countermeasures (diagnostics, therapeutics, and vaccines), the ease of world travel and increased global interdependence have added layers of complexity to containing infectious diseases that affect not only the health but the economic stability of societies” (para. 1, see also Barouch, Thomas, & Michael, 2017). Globalization, rapid modes of transportation, urbanization, and the processes inherent to democratic liberalization have also stimulated the tourism and transportation industries (Frenk & Gómez-Dantés, 2009; Atun et al., 2015), while resulting in new challenges. As Frenk (2006) suggests, “[i]n health we are victims of our own success” (p. 955). The origins of the Zika epidemic illustrate this point with force, as globalization aided the spread of the virus from its origins in the Zika Forest of Southeastern Uganda to communities around the globe.

2. Social Justice and Equity

The disease has disproportionately burdened women and children across Latin America and the Caribbean, especially among the most economically disadvantaged. Many factors have contributed to the disproportional impact of Zika on the poor, including the lack of access to mosquito repellents, mosquito screens and low health literacy rates (Colombara et al., 2016). This emphasizes that “critical processes of social determination systemically drive disparities” (Spiegel, Breilh, & Yassi, 2015, p. 13). As witnessed in the response to Zika, “narrow conceptions of maternal health undervalue the burden of illness faced by women,” and immensely undermine the potential of women and girls to contribute to their societies and developing economies (Knaul et al., 2016, p. e227). Zika has also threatened improvements in access to safe childbirth, emergency obstetrics, and basic reproductive healthcare in the

last decade. Adverse health outcomes as a result of Zika highlight the need for reform in the rights of women and children (Bailey & Ventura, 2018; Galli & Deslandes, 2016; Carabali, Austin, King, & Kaufman, 2018; Ndeffo-Mbah, Parpia, & Galvani, 2016). Another burden for mothers and families of children with congenital Zika virus syndrome is the psychological stress of dealing with the public health care system, the extensive family-centered care coordination for these children with such medical complexity, and the social stigma and self-guilt that mothers feel for not having protected themselves against mosquito bites (Bailey & Ventura, 2018).

Despite the common global patterns that gave rise to the Zika epidemic in the Americas, the outbreak has not impacted all countries equally, nor all at-risk populations equally within those countries. Indeed, one of the striking conclusions to be gained

from a comparative perspective on the Zika response is the differences both between and within the countries of the Americas in their capacity to respond (Rodríguez-Díaz, Garriga-López, Malavé-Rivera, & Vargas-Molina, 2017). The case studies that are presented in this report—of the Dominican Republic, Puerto Rico, Brazil—show the range of responses that different health systems were able to mount in response. Differences to human and capital resources is evidenced in the responses in developing countries as compared to the initial outbreak in Miami in 2016 where, because of the extensive resources Miami was able to utilize to contain local outbreaks, Zika was prevented from reaching epidemic proportions.

One of the earliest policy challenges posed by Zika in all affected regions concerned the testing for Zika and which individuals should be prioritized for such testing services. Once local transmission began, Florida moved quickly to provide free testing. On August 3, 2016, Florida Governor Rick Scott announced free Zika testing would be available to all pregnant women in the state. The goal of this policy was admirable, ensuring universal access to

Zika testing regardless of ability to pay or insurance status. The execution, however, prompted bottlenecks.

The sudden surge in demand for now-free Zika tests quickly overwhelmed the then limited laboratory capacity and led to delays, which further exacerbated public fears and impeded swift diagnoses (Interview, Christine Curry, MD, PhD, 2017). In contrast to Florida's decision to make Zika testing free on demand to all pregnant women, the Ministry of Health in the Dominican Republic decided to preserve scarce resources by adopting a passive method of surveillance. Pregnant women were tested only when symptomatic (Interview, Dra. Raquel Pimentel, September 2017). These contrasting policy decisions highlight how national wealth differentials drive ostensibly medical decisions, as well as point to the overlap between economic, medical, social, and ethical criteria in determining policy decisions. Such inextricable links between the varied influences that shape the ultimate policies is a theme that runs through both this project's analyses and the resulting recommendations.

3. The Threat of Zika Beyond the Health Sector

Zika poses major threats to society beyond that of human health. These risks include socioeconomic harms, such as undermining global security and reversing trends in social and economic development in the region (UNDP & IFRC, 2017). The epidemic has affected more than 65 countries worldwide, with particular societal and economic costs experienced in Latin America and the Caribbean. Despite the potential devastation across large areas, as Zika rapidly spread through the hemisphere in 2015 and 2016, response and research emphasized not these broader concerns, but rather the technical control of the two principal disease vectors, the *Aedes aegypti* and *Aedes albopictus* mosquitoes. Vector control has been challenged to continuously develop and adapt to dynamic vector and disease biology and behavior. However, integrated vector control is only one major piece of a larger puzzle. To be sustainable vector control must be part of

larger multisectoral strategy (Barreto et al., 2016).

The complex nature of the Zika epidemic has unfolded in what Frenk (2006) has called a "web of multiple causation" (p. 954). Poor infrastructure such as sewage, for example, not only increases the risk of Zika transmission, but also the risk for a broad range of other diseases. Multisectoral collaboration is important not only because the causes of disease may be found in multiple sectors but also because multiple sectors that are potentially affected by Zika may be motivated to act. This might include agriculture, tourism, and transportation sectors, among others, that sustain the development of Latin American economies. In addition, multiple sectors may have complementary strategic tools and resources that are required to tackle the epidemic (Frenk, Gómez-Dantés, & Knaul, 2014; Atun et al., 2015). Concerted,

multisectoral efforts must highlight “the role of health in the process of economic transition and thus provides lessons on how to position the health sector in the context of economic development and in the minds of economic policy-makers” (Knaul & Frenk, 2005, p. 1475).

Through effective, science-led, evidence-based, intersectoral partnerships, ministries of health will more adequately

tackle the emerging and re-emerging infectious diseases that threaten the sustainable social and economic development of the Americas (Alfaro-Murillo et al., 2016).

Future Agenda: Stakeholder’s Meeting on Zika Policy

This report is intended to facilitate further deliberation about the lessons of the Zika epidemic for health policy and public health across the Americas. Despite the context-specific nature of certain elements of the response, the Zika epidemic also represents opportunities for stakeholders across the Americas to learn from each other. To maximize their efficacy, future policy and operational responses must both build on past success as well as confront the gaps in knowledge and the rapidly evolving landscape of research. Shared complexities have complicated every aspect of the Zika response— from how doctors counsel patients to how public health departments manage risk communications plans, to how the federal government allocates resources for mosquito control or maternal health care. Learning from how others have approached these challenges can be beneficial.

To facilitate such a deliberation, the final phase of the project was convening a working group roundtable with Zika stakeholders from across the Americas to discuss a draft of this report, hosted by the University of Miami on April 27, 2018 (the list of attendees appears in Appendix B). The objectives of this roundtable discussion were to present the report’s recommendations, get feedback from the stakeholders, and discuss the policy recommendations, and obtain recommendations of other important topics. This report was developed by incorporating the guidance of the stakeholders in revising the existing

recommendations, as well as introducing additional issues for future exploration (discussed in Chapter VII). Beyond this year, convening a regular forum in Miami to address global health policy could serve to encourage the sort of democratic deliberations about solutions to global health challenges that we recommend here. Indeed, this forum could become an annual event, focused on the pressing policy challenges of the year, with the goals of fostering public engagement, civic engagement, and capacity building.

The three questions that guided the start of this project—*How can we understand the Zika epidemic? How can we determine what has worked? And what should we do next?*—are ones that can also guide an iterative process of reflection among stakeholders in all aspects of the Zika response. The answers that emerge from such deliberations will yield lessons that can drive innovations in health systems.

Yet the post-epidemic phase of the Zika epidemic also raises more, or at least a new set of, risks. It is an open question whether or not actions based on those lessons will improve the response to the next emerging infectious disease outbreak. The gains that have been made may be lost, the funds allocated will be diverted to other pressing matters, and the progress in overall system strengthening that an emergency may compel may also slip away.

Chapter I:

Creating Behavior Change

José Szapocznik

Xeniamaria Rodriguez

RECOMMENDATION 1:

Behavior Change Interventions such as persuasive messaging and community mobilization save lives and should be pursued. Psychographic segmentation and entertainment are also recommended as effective approaches in changing behaviors.

INTRODUCTION

Changing individual and group behaviors is an important strategy for saving lives and controlling the spread of disease during an epidemic. To encourage changes in behavior, stakeholders need to utilize effective behavior change interventions. However, common communication approaches such as information and awareness campaigns are not sufficient to change behavior. Therefore, more effective communication strategies need to be employed, such as persuasive messaging and community mobilization. One useful site for resources and tools to develop communication strategies is the Zika Communication Network (ZCN). Below we introduce this widely used Network, whose recommended approaches range from awareness to persuasive messaging.

The Zika Communication Network (ZCN).

Launched in 2016 at Johns Hopkins University, ZCN (<https://www.zikacommunicationnetwork.org>) is the world's largest initiative for curating tools and resources to help health and development professionals minimize the spread of Zika through social and behavior change communication. ZCN was developed to support communities affected by or at risk of Zika epidemics by compiling knowledge and tools that can be readily used or adapted to particular contexts. The goals of ZCN are to empower communities to tackle the Zika epidemic, to provide health care workers with quality counseling and training materials, and to equip policymakers and other advocates with communication materials and policy and preparedness guidelines to curb the spread of Zika and promote prevention. However, many of these approaches have not been evaluated and thus, there may not be evidence of their effectiveness.

In addition to curating evidence-based tools, ZCN has developed *Strategic Communication for Zika Prevention: A Framework for Local Adaptation* ([https://healthcommcapacity.org/hc3resources/strategic-communication-zika-](https://healthcommcapacity.org/hc3resources/strategic-communication-zika-prevention-framework-local-adaptation/)

[prevention-framework-local-adaptation/](https://healthcommcapacity.org/hc3resources/strategic-communication-zika-prevention-framework-local-adaptation/)). This strategic communication framework provides step-by-step guidance and illustrative content for creating a communication strategy about the risk and prevention of Zika in an easy-to-understand and comprehensive format. It is intended to guide country-level communication strategies. ZCN's framework builds on the messaging developed in the United Nations' *Risk Communication and Community Engagement for Zika Virus Prevention and Control Guidance* (<http://www.who.int/csr/resources/publications/zika/community-engagement/en/>). Those strategy recommendations are intended to ensure that communication activities and outputs are coordinated to achieve agreed-upon goals and objectives. Another excellent guide is available from the National Cancer Institute of the U.S. National Institutes of Health: *Making Health Communication Programs Work (Pink Book)* (<https://www.cancer.gov/publications/health-communication/pink-book.pdf>).

CHALLENGES

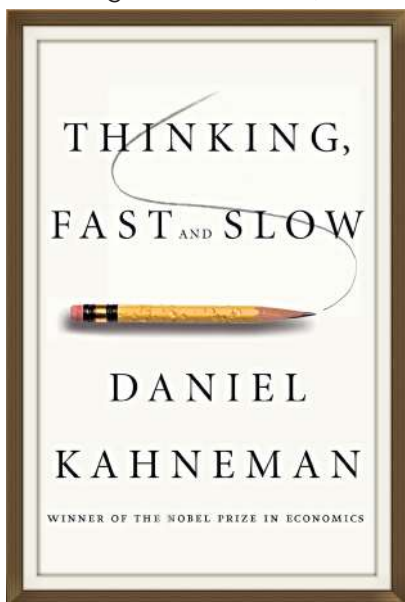
It is noteworthy that *Strategic Communication for Zika Prevention* has an excellent section to guide the development of a Monitoring and Evaluation Plan. In public health we often assume that well-intended good ideas will translate into successful public health outcomes. However, it is essential to monitor the outcome of our good ideas to determine if they achieve behavior change in populations, and to continuously improve our programs. Good ideas that turn into effective behavior change outcomes can be identified and expanded, while those that do not can be replaced.

One of the many reasons why evaluation is so important can be found in the work of the 2017 Nobel Prize winner, Richard Thaler. Thaler received the Nobel Prize in Economics for his work revealing that humans do not act entirely rationally. By applying insights from psychological research, he created a better understanding of individual decision-making. In his recent National Academy

of Sciences presentation on communications, Tony Folen (National Academies, 2017a, pp. 15-16) cited work by Thaler and Sunstein (2009),

Kahneman (2011), and Ariely (2008) that demonstrated that for big decisions (e.g., whom one is going to marry, whether one should buy a particular house), people tend to be more rational actors. However, for the many daily, habitual, small-scale decisions (e.g., whether to put mosquito repellent on now, whether to have unprotected sex in the moment of sexual arousal), the psychological, social, and emotional components of behavior come into play. This more intuitive decision-making happens rapidly; what behavioral economists define as fast thinking. According to Daniel Kahneman's (2011)

influential *Thinking, Fast and Slow*, fast decision-making (on small daily and habitual decisions) occurs too quickly for the more rational brain to register. As a result, Kahneman (2011) suggests that fast decision-making is more often flawed.



Communication that Fails to Lead to Behavior Change: Awareness and Instructional Messages.

Understanding how individuals make daily and habitual decisions can help suggest what kinds of communication strategies best promote real behavioral changes, and help explain why common strategies such as awareness messaging and instructional messaging often fail to create true, lasting behavioral changes. The purpose of awareness messaging is to inform the public of what they need to do (e.g., prevent mosquito bites), who needs to do it (e.g., everyone, not just pregnant women), and when and where it should be done. Similarly, instructional messages are intended to impart knowledge and skills acquisition by providing the individual with information on "how to do it." Awareness and instructional messaging can be effective in that they may encourage an individual to a behavior to which s/he was already predisposed (Rice & Atkin, 2011). For example, if I am going to buy rice, I might buy (not a new behavior) the rice that I saw advertised. However, neither of these are likely to significantly change behavior (Kahan, Gielen, Fagan, & Green, 2014; Rice & Atkin, 2011), much less create behaviors that were not already in an individual's repertoire (e.g., using mosquito repellent, draining standing water).



"Drain & Cover" flyer distributed by Mosquito Control, Miami-Dade County

DRAIN

Stop mosquitoes from living and multiplying around your home or business.

DRAIN STANDING WATER from garbage cans, house gutters, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.

DISCARD old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.

EMPTY AND CLEAN birdbaths and pets' water bowls at least once or twice a week.

PROTECT boats and vehicles from rain with tarps that don't accumulate water.

MAINTAIN the water balance (pool chemistry) of swimming pools. Empty plastic swimming pools when not in use.



To report a mosquito nuisance, call 311 or download our free 311 Direct Mobile App.



#DrainAndCoverMiami

RECOMMENDATIONS

While awareness and instructional messaging may not lead to long-term behavioral changes, two intervention strategies that have been shown to be effective at creating significant changes in behavior are persuasive communication messages and community mobilization.

Persuasive Messages

Persuasive messaging is likely to lead to changes in behavior, and therefore should always be considered in campaigns that pursue behavior change. While there are many characteristics of persuasive messaging, three that can increase the likelihood of bringing about behavior change are:

- a) segmentation
- b) salience of message
- c) use of entertainment

Segmentation.

Perhaps one of the most critical tools of marketing is market segmentation, a well-established and accepted precept in private sector marketing. Market segmentation is the process of dividing a market of potential customers into groups, or segments, based on different characteristics. For a communication campaign to change behaviors, it must segment the market along the lines of **WHY** people behave and make decisions the ways they do. This is typically different from the usual public health approach that segments individuals by a *priori* demographic characteristics such as race/ethnicity, age, gender, language, and socioeconomic status.

Market segmentation is the process of dividing a market of potential customers into groups, or segments, based on different characteristics. The market segments created are composed of *consumers who will respond similarly to*



Message segmentation is crucial

marketing strategies and who share traits such as similar interests, needs, or 'socio-cultural locations.' One form of segmentation, referred to as psychographic segmentation, identifies groups of people according to their motivations, priorities, and communication preferences. Psychographics pertain to people's attitudes, values, personalities, and lifestyles. In essence, psychographic segmentation classifies people according to **WHY** they behave and make decisions the way they do. Perhaps two of the most stunning recent successes of market segmentation were carried out by Cambridge Analytica (<https://cambridgeanalytica.org/>), a firm that claims to use psychographic data to change audience behavior. Cambridge Analytica has been credited with the unexpected success of Brexit (the political campaign for Britain to separate from the European Market; <https://www.theguardian.com/technology/2017/may/07/the-great-british-brexit-robbery-hijacked-democracy>), and claims responsibility for the unexpected success of the Trump campaign (<https://ca-political.com/casestudies/casestudydonalddjtrumpforpresident2016>) in America in 2016.

While the work of Cambridge Analytica is not available for review, the work of Rescue:

The Behavior Change Agency (<http://rescueagency.com/>) is available both in publications and presentations. The agency's president, Jeffrey W. Jordan, explains market segmentation in terms of creating "different brands" for different subgroups of potential youth smokers. Jordan conducted research both to identify psychographic subgroups as well as to test brands' effectiveness when matched with specific psychographic subgroups. A review of this work can be seen

in a presentation by Jordan at the World Social Marketing Conference (<https://www.youtube.com/watch?v=1TPkWVAK3wM&t=3s>) and in multiple publications (Jordan, 2017; Ling et al., 2014; Fallin, Neilands, Jordan, & Ping, 2015; Moran, Walker, Alexander, Jordan, & Wagner, 2017).

A qualitative study in Ecuador identified an important form of market segmentation relevant to Zika: “Quemeimportismo,” defined as an attitude of “why should I care?” concerning dengue and cleanliness (Stewart-Ibarra et al., 2014). The perception of Zika among the general population was that the disease was only mildly severe, and preventing it was someone else’s problem. In order to achieve real behavior change in individuals who are characterized by “quemeimportismo”, a first step would be recognizing that the person lacks solidarity with their community.

Building on the recommendations of Jordan (2017), for a communication campaign to be effective it would have to first portray such individuals and then have individuals who represent that perspective make a convincing argument for solidarity with the broader community.

Salience of Message

While saliency of message is a concept that has been discussed in the literature in isolation, its relationship to segmentation should also be recognized. Saliency refers to “with what or with whom do specific populations identify.” One potential example of this is found in a 2016 “Sesame Street” short featuring two main characters, Elmo and Raya, teaching children about the importance of eliminating standing water and the dangers of exposed garbage. Likewise, the characters highlight the importance of wearing long sleeves and pants as well as applying mosquito repellent. These episodes were produced in Spanish, Portuguese, and English (Joseph, 2016). Another example from Jamaica is a government-sponsored reggae music video sung by a doctor to encourage Jamaicans to get rid of stagnant water and prevent Zika transmission (Bailey, 2016).

While these examples demonstrate efforts to increase the salience of messages to specific populations, there is a lack of evaluation, which makes it impossible to determine their impact.

Entertainment

The use of entertainment is a well-documented method for delivering risk communication messages. Entertainment narratives have the potential of reducing resistance to a message and can also be used to reach individuals with low literacy. Public health messages that can be built into ongoing programming not only reach large populations but also generate relatively little cost for the public health sector.

There are several theories supporting the potential impact of Entertainment Education. For example, an individual learning vicariously by observing models and/or another person accomplish a challenging health behavior is supported by the social cognitive theory (Bandura, Grusec, & Menlove, 1966; Moyer-Gusé, 2008). The theory of Entertainment Persuasion posits that by using a narrative structure, participants become involved with the characters and are able to experience vicarious cognitive and emotional responses to the narrative. This involvement is believed to “facilitate an emotional experience of being swept up into the narrative itself” and “becom[e] involved with the characters therein” (Moyer-Gusé, 2008, p. 408). If partnered with prime-time television networks and novellas, this type of communication has the potential to reach large populations from a variety of socioeconomic backgrounds.

The use of entertainment for bringing about behavior change through public health messaging was examined at a 2015 workshop organized by the U.S. National Academies of Science, Engineering, and Medicine (National Academies, 2017a). At that workshop, Vicky Rideout of VJR Consulting discussed messages that could be embedded into the storylines of entertainment television shows that are already on the air, and how to evaluate the impact of those messages. Rideout described a case that involved the

popular U.S. television show *Grey's Anatomy*, in which a storyline about mother-to-child HIV transmission was written into the show. The health communication purpose was to inform the audience that the risk of transmission was less than 2% with proper medication on the part of the mother. In other words, there was a 98% chance that the child would be born healthy, without HIV. The message was also intended to reduce the stigma against HIV-positive women who choose to have children.

At the same workshop, it was also noted that audiences could engage with the core content through the use of narratives and exemplars as well as characters, particularly ones that are similar to the audience members. Research has demonstrated that engagement through interpersonal connection can occur through narrative formats (Kim, Shi, & Cappella, 2016), or the presence of specific characters (Kim et al., 2016). The impact of this approach has been demonstrated on smoking (Durkin,

Biener, & Wakefield, 2009; Kim et al., 2016) and mammography (Seitz et al., 2016), among other topics.

Television and radio stations typically use segmenting to appeal to specific populations; otherwise, their programs would fail. They understand what might appeal to specific audiences both in terms of which actors would be salient for specific populations, and what messages would be most useful in effecting behavior change. While television and radio narrative programs usually do not have the goal of changing behavior, much of the marketing expertise in advertising does.

Hence, it is essential to bring together mass media's narrative and marketing expertise to increase the likelihood of developing effective behavior change narratives.



A segment on a news broadcast warns of mosquito-borne disease.

Community Mobilization

Community mobilization, like persuasive messaging, has the potential to bring about behavioral changes. The primary purpose of community mobilization is to engage sectors of a community in developing their own solutions to the problems their community faces. The owning of solutions thus increases self-efficacy. That is, the community's belief in their own ability to be effective agents of change increases their confidence in successfully bringing about the targeted behavior change. The process of community mobilization both increases the likelihood that the community members will change their own behavior, and encourages community members to become agents of behavior change among other community residents, thereby having a multiplicative effect. Community sectors that need to be mobilized include sectors with the capacity to "mobiliz[e] necessary resources, disseminat[e] information, generat[e] support and foster[] cooperation across public and private sectors in the community" (Huberman, Klaus, & David, 2014, para. 2).

A number of studies have shown that community mobilization can reduce the number of mosquitoes that transmit viruses. One of the most recent and most rigorously conducted studies on the impact of community mobilization on mosquito control was conducted by Andersson et al. (2015) in Nicaragua and Mexico. This study tested the effectiveness of a community mobilization program referred to

as Camino Verde (The Green Way) in reducing dengue cases when added to the usual local dengue control strategy. Camino Verde is a program of community mobilization intended to improve vector control effectiveness when used in conjunction with conventional dengue control methods. It is a pesticide-free evidence-based program that tailors dengue prevention actions to a community's needs and resources. The purpose of the research study was to demonstrate that community mobilization strategies in which residents are involved in Camino Verde were more effective than current dengue control strategies alone.



Photo permission: © UNICEF / 34Q1152-X3/ Ueslei Marcelino

The first step in community mobilization interventions like Camino Verde is to have outside agents accepted and trusted by the community. This is achieved by having the outsiders be transparent, trustworthy, and show respect for and validate the community and its

organizational structure.

Before the study began, the Camino Verde researchers asked for permission not only from the mayoral office but also from community leaders. In this way, the researchers were modeling the respect for the community's organizational structure that they expected community residents to use in the community mobilization intervention. Their community mobilization protocol consisted of three steps: 1) Researchers asked permission from

community leaders and engaged them in discussion of baseline evidence of dengue. Respect was demonstrated by establishing a true partnership with the community; for example, bringing the baseline serological testing from the child participants to their parents. 2) Camino Verde personnel facilitated intervention groups (separately for men and women out of respect for the local culture) to discuss survey results, cost implications, and specific prevention strategies in each community, thus engaging the community in discussing the best prevention strategies they would recommend for their own community. Finally, 3) the research team invited volunteers, called brigadistas (a culturally specific term to Nicaragua's current governance, demonstrating respect for the larger context/governance of the country), to receive training as organizers and educators. The brigadistas then visited homes and schools to teach about the mosquito's life cycle and how to remove standing water to destroy breeding sites.

The research study revealed that, above and beyond the existing government dengue control program, the Camino Verde intervention participants were more likely to believe that communities could control dengue on their own and intervention clusters had lower dengue incidence. When the Camino Verde clusters of homes were compared to the clusters of homes that did not receive this intervention, the results showed:

**Lower infection rates with
dengue virus in children**

relative risk reduction

29.5%

95% confidence interval

3.8% to 55.3%

**Fewer reports of
dengue illness**

24.7%

95% confidence interval

1.8% to 51.2%

**Fewer houses with larvae or
pupae among houses visited
(house index)**

44.1%

95% confidence interval

13.6% to 74.7%

**Fewer containers with larvae
or pupae among containers
examined
(container index)**

36.7%

95% confidence interval

24.5% to 44.8%

Banning scientific information based on individual sensitivities

It has already been pointed out that information itself does not change behavior. However, controversy generated by censure of information generates the kind of emotional response in the public, and intense community involvement, that is far more impactful than information by itself as illustrated by this case study. This is particularly the case when the information censured is scientifically supported.

On August 2016, the AIDS Healthcare Foundation (AHF), a U.S.-based nonprofit organization, with regional offices in Fort Lauderdale, Florida, perceived that in most educational materials highlighted by the media about the spread of Zika in Latin America, the Caribbean and the U.S., the content of that information did not generally address human to human sexual transmission of Zika, something that was recognized by the U.S. Centers for Disease Control (CDC). Founded in 1986 with a long tradition of promoting safer sex and the use of condoms as a prevention tool, AHF perceived it had a moral duty to

raise its voice and generate awareness around sexual transmission of Zika, as it has done it in the past with HIV and other sexually transmitted diseases.



The strategy that AHF designed to raise awareness was to highlight that Zika was a sexually transmitted disease and that it could be prevented with condom use. It did so by displaying billboards, two in the City of Fort Lauderdale and two more in the City of Miami (see images).

According to Michael Kahane, Chief of AHF's Southern Bureau, the contracted company, 48 hours after installing the billboards in Fort Lauderdale, removed them. Kahane was informed by the contracted company that the removal of the billboard was due to concerns raised by the mayor's office and the tourism council. While the tourism motive may be the greatest worry expressed, it is also true that in Miami-Dade County, where tourism also represents a high proportion of its economy, local authorities not only did not express any concerns but welcomed the billboards and requested more.

The removal of the two billboards generated controversy and attracted wide media coverage, with local Channel 7 News following the story. Channel 7 interviewed local residents near the area where the billboards were removed. One of them expressed that "It's in an area where there are not too many kids, but it (the billboard) could be without the condom". Kahane says it was not the first time that the Office of the Mayor of Fort Lauderdale questioned the use of images of condoms in public places. However, in previous occasions when these images were related to the prevention of HIV and other STIs, the images of condoms in public places were never removed before.

In retrospect, the media impact of removing the billboards with an image of a condom resulted in wide-spread coverage of the message- that Zika is sexually transmitted and condoms can prevent Zika. The wide media coverage that resulted from removing of the billboards mobilized civic groups and caused many tens of thousands of persons who saw the media coverage to learn that Zika can be transmitted sexually and that condoms can avoid such transmission. Ultimately, the audience generated by the controversy was a much larger audience than if the two billboards had remained in place. And, the emotions aroused by the controversy most likely increased the saliency and effectiveness of the message.

CONCLUSION:

Persuasive messaging and community mobilization are two effective strategies for creating life-saving behavioral change, and should be utilized more aggressively in public communication campaigns. In fact, community mobilization, while not a cure-all, may be one of the most powerful and best tested behavioral strategies for responding to public health challenges. There is extensive research to suggest that, when properly done, community mobilization is highly effective in changing behavior, and has the potential to create sustainable changes in behaviors over the long-term.

In the next chapter, we discuss the role of community participation in public health decision making. The community mobilization techniques presented here could be viewed as one of many approaches to engaging communities in identifying their challenges and defining solutions. The approach presented here, however, has the advantage of providing a well tested intervention found effective in changing behaviors that are needed to stop public health epidemics.



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Chapter II:

Engaging Civil Society in Participatory Priority Setting

Adriane Gelpi

Christine Marie Castiglione

RECOMMENDATION 2:

Public engagement should be a critical priority area, as its emphasis can improve the legitimacy, fairness and efficacy of responses to future public health crisis management.

INTRODUCTION

Zika sparked panic among the public largely due to the potential harm to the developing fetus. Yet alongside this specific fear, another source of controversy during the Zika response resulted not from fears about the virus itself, but rather from concerns from citizens about the actions taken by their governments. For example, in the summer of 2016, newspapers headlines were dominated by images of protests erupting in San Juan, Puerto Rico; Miami, Florida; and Miami Beach, Florida. The most specific source of outrage was the decision to allow aerial spraying of the insecticide naled (Likos et al., 2016; Britch et al., 2018). Puerto Rican citizens took to the streets of San Juan to protest, followed by similar protests in the City of Miami and Miami Beach (McCarthy, 2016). Long simmering public distrust of the government's truthfulness led many citizens to discount the assurances that naled did not pose a health risk (Silver et al., 2017). The news that naled had been banned in the European Union further undermined trust in the local authorities.

Given the protests that swept the cities due to concerns over the toxicity of naled, the authorities found themselves embroiled in a battle with the public. They did engage in strategic

communications intended to inform the public about the facts of Zika. Public announcements told the citizens of Miami Beach when spraying would occur and what actions individuals could take to protect themselves (such as staying indoors). Yet the very fact of the naled protests suggests that local governments could improve their processes for public engagement.

Any analysis of the effectiveness of the official response to Zika must go beyond the technical aspects of Zika control to take into consideration broader questions about governance, or how decisions about controversial public policies are made. A specific question concerns the proper scope of citizen engagement in priority setting and policymaking. This section examines citizen advocacy and public engagement during the Zika crisis by focusing on two specific cases: that of protests over naled spraying and of the public debate over the proposed release of genetically modified mosquitoes in the Florida Keys.

There is a need to consider the processes by which citizens and patients are and should be engaged with the public health response.

“ *what
can
we
do?*

(Solomon & Abelson, 2012).

Democratic Deliberation and the Protests against Naled

In recognition of the value to reflect on the local response to Zika, on April 6, 2017, the Institute for Bioethics and Health Policy and the Clinical & Translational Science Institute at the University of Miami sponsored a stakeholder forum to discuss the role of public deliberation and ethics in dialogue in public health policymaking in general, and South Florida's Zika response in particular. Over 100 attendees representing a variety of perspectives participated in the forum, providing perspectives from fields such as academia, government, and journalism (see Appendix C for a synopsis of presentations).

The goal of the forum was to reflect on the Zika response against the ideals of democratic deliberation, which in recent years has become a more commonly employed tool for resolving policy questions in a fair and legitimate way. Deliberation has been called both a tool of, and a goal for, opening a necessary, ongoing, and controversial national conversation about science, technology, and societal values (U.S. Presidential Commission for the Study of Bioethical Issues [PCSB], 2010). Additionally, the ethical principles expressed in democratic deliberation emphasize the importance of the participation of the public with respect to the development

and implementation of policy (Hourdequin, Landres, Hanson, & Craig, 2012). A fundamental goal of democratic deliberation is to shift participants from their private, individual perspectives to a more collective, informed reasoning focused on the search for an answer to the question, "*what can we do?*" (Solomon & Abelson, 2012).

Democratic deliberation can help ensure that a diverse range of perspectives is taken into consideration. A democratic deliberation, according to a report published by the U.S. Presidential Commission for the Study of Bioethical Issues, "reflects on an approach to collaborative decision-making that embraces respectful debate of opposing views and active participation by citizens" (PCSB, 2010, p. 151). The term refers to a process of decision-making in which all stakeholders are involved equally, and gather to discuss how to educate each other and compromise with one another on a particular issue or set of issues. It encourages participants to come to a consensus and adopt a societal perspective rather than maintaining a narrow focus on individual interests (PCSB, 2010).

Democratic Deliberation for Public Health Policy

Why engage with the public at all, especially when faced with controversy? Should average citizens be consulted or informed about whether to adopt innovative policy alternatives such as approaches to mosquito control? Ultimately, there is both a public health rationale and an ethics rationale for democratic deliberation.

The public health rationale is that engaging with the public can have a direct impact on the core public health goal of prevention, in the sense of reducing the number of Zika

cases. The link between public outreach and health outcomes emerged during the Zika response. As a NYC Department of Health epidemiologist explained, the public strategy of outreach to NYC hospitals evolved over time as they realized that their initial focus for Zika—the tourists vacationing in the Caribbean—had fewer cases, and that more cases came from Queens from women who traveled back and forth from Central America and the Caribbean.

New York City's official communications plan

CASE 2

had to change as new data emerged about the epidemiological patterns of who was getting Zika (Telephone Interview, NYCDOH Epidemiologist, May 2017). Studies of civic engagement in Brazil demonstrated the health benefits that can accrue to communities that demonstrate active engagement of citizens in governance. A recent study from Brazil used neighborhood-level data to demonstrate that the presence of municipal citizen councils was associated with lower infant mortality compared to neighborhoods without such participatory bodies (Touchton & Wampler, 2014).

The second broad reason why engaging with the public makes sense is ethical, grounded in the idea that it is the right thing to do. This normative justification for deliberation rests on a notion of equality among citizens that leads to a shared commitment to mutual justification on the part of both government and citizenry.

This mutual respect motivates all parties to seek out reasons for their preferred path that the other parties will agree are relevant. As philosopher Norman Daniels (2011) has

argued, such engagement with citizens can foster a sense of legitimacy, a sense that due process was followed, regardless of the final course of action. Transparency for its own sake is not always preferable; there might be important reasons for withholding information from the public. The key is that explicit discussions about transparency—competing rationales for withholding or disclosing information about how much and what type of information to make public—can enhance legitimacy regardless of the final decision.

Given the intensity of the controversy that followed the decisions in Miami and Miami Beach to spray naled over Zika hotspots during the 2016 Zika outbreak, approaches that would have promoted public trust in the official response would have been valuable to initiate earlier. Hosting more town halls could have offered another path to building community buy-in.

A final rationale for public engagement in policy-making is that it leads to accountability because elected officials are subject to voters' preferences.

Should Genetically Modified Mosquitoes be released in the Florida Keys? The Public Referendum in the Florida Keys, November 2016

The 2016 Zika outbreak in South Florida had significant impacts not only on the health sector, but also on local, state, and national governments, businesses, and communities. One particular case that posed unique challenges to both the public and private sectors was the case of the Oxitec/Florida Keys referendum. The Florida Keys residents actively disputed a proposal to release Oxitec's genetically modified (GMO) mosquitoes in Key Haven,

Florida, as a pilot test for an experimental vector control strategy.

The issue was ultimately put up for public vote as a referendum in Monroe County. To understand what happened in the Florida Keys case, it is important to first identify the key stakeholders and outline the timeline of key events that led to the issue of the GMO mosquito trial in the Keys being put to a public referendum in November 2016.

Stakeholders in Zika: Who are the Key Advocates in Civil Society?

The Florida Keys Case exemplified ongoing tensions between science, policy, ethics, business, and the environment. In terms of citizen advocacy, Zika response differs from advocacy for other diseases in the nature of the demands made and concerns raised. Currently there is no treatment, nor a vaccine. As a consequence, advocates have nothing tangible to advocate for and no treatment to demand. Instead, most activism around Zika has actually focused not on demand for services but on opposition to public health interventions, such

as aerial spraying of the insecticide naled or, as discussed in the Florida Keys, the proposed release of genetically-modified mosquitoes in the Florida Keys (Adalja, Sell, McGinty, & Boddie, 2016).

The core constituency of advocates was sufficiently motivated to take to the streets over Zika largely by the way Zika response has overlapped with their more fundamental concerns. Such groups include:

■ **Reproductive health rights activists (e.g., in Brazil and El Salvador);**

■ **Environmental activists who oppose many of the mosquito control efforts;**

■ **Disability advocates who are concerned about the interventions available.**

Environmental advocates have been the most vocal critics of mosquito control efforts, which makes them an interesting wild card in terms of outreach. Equity issues around reproductive rights and health access make Planned Parenthood clinics - that provide both family planning tools (e.g., condoms, contraceptives) and abortion - a natural ally with a justice-based approach to Zika. An intervention to train schoolchildren to be accountable for cleaning up standing water is another. Treatment activists will emerge once and if a vaccine is discovered.

Other stakeholders in Zika are not activists as such, but rather those whose interests are indirectly related to the Zika outbreak and who therefore have strong interests in the Zika response. This group includes private sector actors in tourism and hospitality, such as real estate developers, elevator repair service providers, contractors, small business owners, etc. The economic impact of Zika on these groups has been significant. In addition, given how Zika spreads in water, other policy proposals have sought to create new regulations at construction sites to strengthen mosquito control. As an example of one such initiative sparked by Zika, Miami-Dade County Deputy Mayor Alina Hudak proposed the government's plan to require that all real estate developers in the county submit a vector management strategy as part of their application (Interview, John Beier, August 2017). Any such proposal must contend with the economic and political might of these groups in the local economy.

Oxitec and Genetically Modified Mosquito

Oxitec is a British biotechnology company owned by Intrexon Corporation that specializes in synthetic biology for insect control solutions. Oxitec takes pride in being a “pioneer in controlling insects that spread disease and damage crops” (Oxitec, 2017). According to its official mission statement/published documents, the company’s mission is to create solutions that will “help governments and communities around the world keep people healthy and increase food production” in a way that is “sustainable, environmentally friendly and cost effective” (Oxitec, 2017).

Oxitec manufactures the only genetically modified (GMO) male *Aedes aegypti* mosquitoes, the primary vector that transmits chikungunya, dengue, malaria, and Zika. The GMO mosquitoes are males that are engineered to not produce viable offspring, therefore suppressing the *Aedes aegypti* mosquito populations so that they die out (Resnik, 2017). Many people have raised concerns about being bitten by these GMO mosquitoes; however, the male *Aedes aegypti* do not bite, enabling possible extermination to be carried out taking advantage of mating instincts (Kolker, 2016).

Several organizations fund the innovative GMO mosquito technology efforts. The Bill and Melinda Gates Foundation provides millions of dollars in funding each year to their network of international programs, under the Gates-sponsored program, “Target Malaria”, that works to eradicate malaria and other mosquito-borne diseases (Regalado, 2016, September). After hearing about Oxitec’s potential tool to fight *Aedes aegypti* mosquitoes, the Bill and Melinda Gates Foundation provided Oxitec with \$5 million in funding (Enserink, 2010). Indeed, this idea of gene-driven technology became a priority to the Gates Foundation, when one of its representatives announced in September 2016 that the foundation would double the funding for “Target Malaria” to “explore the potential development of other constructs, as well as to start mapping out next steps for biosafety,

bioethics, community engagement, and regulatory guidance” for genetically modified vector control strategies (Bryan Callahan, qtd. in Regalado, 2016, September).

According to official materials published by Oxitec, several pilot tests releasing the self-limiting mosquito have been successfully conducted across Brazil, Panama, and the Cayman Islands, resulting in 90% suppression of *Aedes aegypti* mosquitoes (Regalado, 2016 October). These results can be put into perspective when compared with suppression rates using insecticide that average to be around 50% (Regalado, 2016 October); insecticides that cause harm and even death to other organisms, such as bees. In April 2016, after careful evaluation and research, the Pan American Health Organization (PAHO) announced that it would provide technical support to countries interested in implementing pilot projects of these new mosquito technologies (PAHO, 2016).

While there is evidence of public support for deploying Oxitec mosquitoes, significant community resistance and skepticism remain. One source of friction revolves around how much to inform or consult communities and other stakeholders before testing its products. As a private company, Oxitec has the ability to act on its own, but when working with other partners and for the public good, public deliberation is a very important part of the process. This ethical issue will be revisited later in this report.

An aerial photograph showing a vast flock of birds, likely seabirds, flying over a body of water. The birds appear as numerous dark silhouettes against the lighter blue and white water. The perspective is from directly above, looking down on the flock.

**Key Haven in the Florida Keys, Florida
was the proposed site for the release
of Oxitec's GMO mosquitoes in 2016**

(Key West Chamber of Commerce, 2014).

Florida Keys Mosquito Control District

Key Haven in the Florida Keys, Florida was the proposed site for the release of Oxitec's GMO mosquitoes in 2016 (Key West Chamber of Commerce, 2014).

The Florida Keys Mosquito Control District (MCD) is a local governing agency for the Florida Keys run by five elected board members who work together to address mosquito control in the Keys. The MCD represents the public and works to eliminate mosquito-borne illnesses by making decisions to best advocate for the residents in the Florida Keys (keysmosquito.org). All information, including insecticide spraying times, current events, mosquito control methods, and meeting minutes are made public on their web page, and MCD actively engages in community outreach and education (keysmosquito.org).

The MCD abides by strict national regulations regarding mosquito spraying, chemical use, and safety, as well as new mosquito control technologies (Telephone Interview, Phil Goodman, July 10, 2017). For example, mosquito spraying cannot occur, regardless of how many mosquitoes are present, when the wind is blowing at above 10 mph, at specific times of the day, and with certain chemicals, all to ensure the safety of the people who live within the same environment.



The Florida Keys

**The Florida Keys
is home to over
79,000 residents**

(US Census Bureau, 2016).

Community members

The Florida Keys is home to over 79,000 residents (US Census Bureau, 2016). Of the total number of residents, over 25,000 of them are located in Key West, which is the closest major city to the proposed site of the Oxitec trials. Many members of the Florida Key community were very concerned when they learned about the GMO mosquito release proposition, and the majority of opposition was grounded in concerns for the disruption of biodiversity and harm to humans, the environment, and other organisms (Roen, 2016). The leading activist groups included environmentalists, who focused their concerns in terms of environmental harms, and social activists, who felt as though the “company’s science [is] untested, unproven, and unsafe” (Kolker, 2016).

Timeline of the Case

Oxitec first sought to release its mosquitoes in the Florida Keys in 2010 following an outbreak of dengue fever in Key West. The Florida Keys Mosquito Control District considered accepting a proposal to release Oxitec's GMO mosquitoes as a pilot test (Resnik, 2017). The announcement was made public through community outreach, and the idea of GMO mosquitoes received mixed feedback (Ernst et al., 2015). The release was ultimately not carried out at that time.

In 2012, as a result of the controversy from the 2010 GMO mosquito proposal, a survey of 400 randomly selected residences was conducted to learn about the knowledge, attitudes, and practices of residents regarding mosquito control and the dengue virus (Ernst et al., 2015). Within the group of individuals who reported being aware of the proposal only 17.9% were strongly opposed or opposed (Ernst et al., 2015). The most common reasons for opposition included the disturbance of nature and the belief that it was unproven technology (Ernst et al., 2015). A further survey showed that the main concerns were the potential, unknown, harmful impacts; specific worries about human and animal health impacts from the GMO mosquitoes; and environmental concerns about potential negative effects on the ecosystem (Adalja et al., 2016). Additionally, the majority of residents who opposed the GMO mosquitoes had little knowledge or perception of the health impacts of mosquito-borne diseases (Adalja et al., 2016).

In August 2016, as the Zika outbreak was gaining momentum and spreading from the Americas to the continental United States, Oxitec received approval from the U.S. regulators to conduct field trials in Key Haven, in the Florida Keys, to release their GMO mosquitoes (Resnik, 2017). This announcement received pushback from residents, particularly in Key Haven, beginning the public debate over whether or not the mosquitoes should be released.

In 2016, the parent company of Oxitec, actively engaged in community outreach, mainly through a door-to-door public education-style campaign aimed at Florida Keys' 52,000 voters, to educate community members about the benefits of their vector control strategy of releasing "self-limiting" GMO mosquitoes (Resnik, 2017). The company set out to shape public opinion and influence public policy in favor of releasing the GMO mosquitoes on behalf of Oxitec (Telephone Interview, Alia Johnson, July 10, 2017; Telephone Interview, Jack Bobo, July 2017).

Because the residents of the Florida Keys and Oxitec were unable to come to a general consensus, the issue was put up to a public, non-binding referendum in November 2016. There were many opposing arguments rooted in distrust of the federal government and biotechnology companies as well as skepticism of scientists and the concept of GMOs. Supporters, generally speaking, felt that the benefits of trying this new technology would outweigh the minimal risks presented (Alvarez, 2016). The Keys Mosquito District Board Director Phil Goodman expressed his concerns for putting such a decision up to the public, stating that "opponents have very little information and are led by a few people who are non-science based" (Alvarez, 2016).

Ultimately, 57% of the residents in the Florida Keys voted to support the Oxitec trials. However, 65% of the residents in Key Haven (the site where the mosquitoes would be released) voted against the trials (Alvarez, 2016). The referendum was non-binding, so the decision was ultimately left up to the Mosquito Control District for final approval. The final consensus was to approve the release of GMO mosquitoes, under the condition that they would not be released in Key Haven.

REFLECTIONS:

Ethics of Public Engagement in Policymaking

The case described above, which concerns public engagement in public policymaking surrounding Zika, raises a host of questions. The following section analyzes the events of this case by considering some of these broader questions. The goal of this conceptual analysis is to take stock of the process for what was done well, and consider how such questions might guide approaches in the future. Strategies that engage private and public-sector actors in policy and decision-making processes that affect population health have both normative and empirical justifications.

One of the fundamental challenges raised by all aspects of the Zika response—from medical to the public health—was the lack of information about the Zika virus and the insecticide naled, and the Oxitec genetically modified mosquitoes to be released. How should public health decisions be reached in the face of such uncertainty? One concept that can guide decision-making is the precautionary principle, an ethical concept that suggests that under circumstances of great uncertainty regarding science, and when there is a potential risk of harm, it is preferable to resolve scientific uncertainty in favor of prevention (Goldstein, 2001). This principle has often been invoked in attempts to halt actions that could lead to potential environmental and food harms (Persson, 2016). To proponents of biotechnological progress, however, the **precautionary principle** is often criticized as counterproductive, as inhibiting the invention and application of newer, more effective technologies that could improve safety and health (Goldstein, 2001; Knols, Bossin, Mukabana, & Robinson, 2007; Lezaun & Porter, 2015).

Should the precautionary principle have been invoked in guiding decision-making about the Oxitec mosquitoes? Applied to the examples both of naled and the Oxitec mosquitoes, the precautionary principle would indicate the

need to exercise caution in making policies that could lead to harm either to health or the environment (Lezaun & Porter, 2015).

On the positive side, Oxitec's GMO mosquitoes have been scientifically tested and confirmed to have no short-term impacts on human or environmental health.

Questions remain whether public opposition should be a good enough reason to suspend a project, and how much, if any, community buy-in or consent should be required before taking controversial actions (Knols et al., 2007). Many citizens who opposed the release of the mosquitoes generally were not supportive of toxic chemicals or GMOs in any form, whether genetically modified food products or insects, due to concerns about the resulting disruption of the natural environment and ecosystem (Kolker, 2016).

Is there enough evidence to override the precautionary principle and take the chance to advance science and benefit human health? Precaution, of course does not imply inaction. In fact, the "principle originated as a tool to bridge uncertain scientific information and a political responsibility in order to prevent damage to human health" (Martuzzi & Tickner, 2004, p. 7). With a public health issue at stake that extends beyond just the current threat of the Zika virus to all mosquito-borne illnesses that have been killing people for decades, it is difficult for scientists, policymakers, and stakeholders like the MCD to ignore the potential to advance science and perhaps improve the health of humans for generations to come (Knols et al., 2007; Lezaun & Porter, 2015).

The Florida Keys Case: Democratic Deliberation and Public Referendum

Although there was certainly a process of public engagement leading up to the public referendum in the Florida Keys, it did not meet the strict criteria of deliberation, based on common definitions. It would be more accurate to state that several public debates took place during the lead up to the public referendum. As Dr. Lisa M. Lee, former Executive Director of the Presidential Commission for the Study of Bioethical Issues under President Obama, clarified, “a debate takes place when people are talking at one another, versus a deliberation when people are talking **with** one another” (Telephone Interview, Lisa M. Lee, August 2, 2017).

In the Florida Keys case, citizens were informed and educated about the Oxitec mosquitoes through public campaigns, town hall meetings, and forums. These actions served a valuable purpose of public education, from the positive side of the issue. Oxitec representatives educated community members, promoting its positive potential while answering questions and addressing concerns. The company worked to inform the public about what their plans were, how the mosquito worked, and the public health value of the new technology (Telephone Interview, Jack Bobo, July 17, 2017). However, skeptics and opponents of the proposal generally displayed distrust about the scientific evidence, while some questioned the motives of the private company, making it difficult for them to want to compromise.

Democratic deliberation is not always the best way to settle an issue or set of issues. With issues that are highly polarized, according to Solomon and Abelson (2012), public deliberation can exacerbate rather than ease tensions. In such cases, other methods of gauging public opinion—such as administering polls, surveys, and focus groups—may be more appropriate.

In contrast to a democratic deliberation, a **public referendum** is a vote called for the specific purpose of settling a particular policy question or set of issues. It may be preceded by a process of public discussion. Unlike a deliberation, in which the final decision is reached by the end of the process, the aggregation of individual votes that decide the outcome of public referendum is a method that rests on individual opinion without the need for mutual justification (LeDuc, 2015).

Just as a deliberation is not always appropriate for a policy issue, neither is a public referendum. In fact, to some the very idea of turning to a public referendum to decide on policy proposals that are highly scientific, as was the case of genetically modified mosquitoes, is ridiculous.

Although mosquito control is an issue familiar to residents of the Florida Keys, the majority of residents do not consider issues of biotechnology on a daily basis, and many are not familiar with complex scientific concepts. Skeptics have argued that the complexity of certain technologies makes a public referendum an overly populist approach to policymaking. An alternative method for policy making in such cases is to exercise democracy by electing representatives who appoint scientific experts who can weigh evidence in technical and scientific matters (Solomon & Abelson, 2012). Such technical questions should be best resolved by professionals in the field, some argue.

What role should the private sector play in public opinion and public policymaking?

In recent years, diminishing public funds for scientific research has made public-private partnerships particularly appealing to public sector actors (Marks, 2013). As a result, there is an increasing search for new forms of public-private collaboration (Allen & Bloomfield, 2016). Pharmaceutical and biotechnology companies, the food and beverage industries, and agricultural giants that have resources, technology and political clout often shape public policy and, in turn, the health of our nation. There are many potential benefits of collaboration between the public and private sectors that extend beyond public health; however, there is an underlying fear that commercial interests are the main incentives for shaping public opinion (Allen & Bloomfield, 2016).

Private companies have the ability to influence population health, such as by promoting the sale of both harmful and health-promoting products and technologies (Kickbusch, Allen, & Franz, 2016).

For example, pharmaceutical companies that work to develop new treatments obviously have a monetary incentive to create and sell their product. On the other hand, while these incentives drive company production, research, and development, the results often yield invaluable benefits for human health (Hernandez-Aguado & Zaragoza, 2016).

The private sector also represents an important stakeholder in promoting health (Kickbusch et al., 2016). In this case, there were potential human health benefits to the products developed by Oxitec.

The groups of individuals who vehemently opposed the mosquito trial in the Florida Keys raised concerns about the impact on the environment. They were also skeptical of Oxitec's motives. Public skepticism arose from the fact that the research on the GMO

mosquitoes was funded and performed by a private company, Oxitec, which would stand to gain financially from a decision to proceed with the pilot testing. Local citizens expressed concern that the evidence may have been distorted or developed in such a way as to support the company's product as a result of Oxitec's underlying profit motives (Kolker, 2016). When commercial interests outweigh the health of the public, which is often seen within research in the food industry, distrust is generated as it presents a conflict of interest (Mozaffarian, 2017).

Many people expressed discomfort with the fact that private companies generate scientific evidence and therefore drive public debate and can influence policy. Conflicts of interest arise when corporations establish financial relationships with research institutions, researchers, or public health organizations in order to market harmful products (Rowe et al., 2009). For example, the food industry plays a major role in influencing nutrition research by sponsoring academic institutions and scientific development in order to skew results to benefit the industry (Mozaffarian, 2017). There have been significant findings documenting strategies used by the food industry such as the promotion of harmful products, misleading advertising, corporate lobbying, and attacks against science (Mozaffarian, 2017).

In fact, tactics utilized by the food industry have also been compared with the tobacco industry and considered to be manipulative and detrimental to population health (Rowe et al., 2009). Additionally, substantial bias has been detected in the findings of industry-sponsored systematic reviews regarding the health effects of sugar-sweetened products (Mozaffarian, 2017).

The rise of obesity, a worldwide epidemic, has been attributed in part to advertising of

unhealthy products like sugar-sweetened beverages. This epidemic has been fueled by the corrupt relationships between organizations funding unethical research, and as a result it is jeopardizing the integrity of scientific research (Rowe et al., 2009).

Low levels of funding for public research and regulation mean that private sector research often is the only source of evidence for efficacy and safety. The promotion and distribution of many life-saving technologies and treatments, such as vaccines and cancer drugs, has been funded by the privately owned companies that developed them (Mello, Abiola, & Colgrove, 2012). Yet to be sure, many businesses and corporations within the food industry, such as manufacturers, restaurants, and agricultural producers, are committed to preserving health, science, and public welfare (Mozaffarian, 2017).

How should public health policies be made in the context of scientific uncertainty?

The challenge in public engagement can arise from a core tension inherent in many examples of risk communications: how to *communicate the fact of scientific uncertainty while still maintaining political authority and scientific credibility*.

This tension leads to difficult decisions for public health officials. This is particularly challenging when the technology under consideration was genetically modified, which has become a topic that has been in the spotlight of protests, arguments, and scientific conversations. The issue of genetic modification, whether it arises in a discussion about agriculture or biotechnology or both, often generates anxiety due to the relatively new development of the technology and fear of the unknown effects in the long term.

One recommendation would be that future decisions should be preceded by much more public outreach. Seeking out strategies to engage the public would offer an active way for the government to rebuild trust in government that will facilitate both legitimacy and compliance with future public health initiatives. Short of a full deliberation,

however, the area in which the public health response to Zika in Miami could have been most improved is that of communications. One element of unsuccessful communications is the unidirectional delivery of information. In the longer term, engaging the public more effectively will provide a key to building stable trust and legitimacy and so achieve public buy-in.

A reason that the citizen protests broke out in Puerto Rico and Miami Beach lay in the fact that the uncertainty about the Zika virus was then compounded by uncertainty about the toxicity of naled. For local citizens worried about the toxicity of naled, the lack of published information only reinforced their concerns. According to environmental scientist Dr. Helena Solo-Gabriele there are no data about certain aspects of how naled functions in real-world conditions, such as how quickly naled degrades from sand once sprayed on the beach. Thus, she explained that the inadequate answers given by the public health authorities resulted from the current state of knowledge.

The authorities could offer no answer to a citizen's questions about how long the chemicals would remain on the beach. What would have been a more appropriate message for the Centers for Disease Control and Prevention (CDC) to provide, Dr. Solo-Gabriel argued, would have been to say something like the following:

Trust our messages right now, but admit that we may get this wrong as data emerges. Initial efforts might be inaccurate, so messages must be adaptive over time. What is required for credibility is an iterative process of aligning and realigning messages with data

(Telephone Interview, Helena Solo-Gabriele, August 2017).

CONCLUSION:

Build Capacity for Participatory Priority Setting in Public Health

The analyses of the two cases described above indicate there is a need for capacity building among public health and policy makers on topics related to the development of communications and engagement strategies.

These cases also point to a clear need to more effectively engage with the concerns of the public—whether the protests in Puerto Rico or Miami Beach. There is an imperative to develop capacity among public health departments in the skills of public engagement, including communications that facilitate dialogue. Innovative civil society engagement offers one of the best strategies for public health departments to develop long-term trust that will reap benefits in the next unknown emergency.

What should such engagement with the public look like? How much is needed? These and many other empirical questions emerge when considering how to implement a more engaged approach to priority setting. Setting aside those research questions, a brief response is that there are many options that could be effective. In the field of deliberation and dialogue, there is a recognized spectrum of public engagement in public policymaking that exists—from informative to full participatory approaches, each of which have different advantages and disadvantages. The most intensive model is to empower the public into decision-making itself: in addition to informing,

persuading, and consulting with the public, a more intensive approach to public engagement is through policy-making councils. The specific answer about how to design a deliberative strategy may vary due to circumstantial factors, such as the level of controversy that surrounds the topic, the nature of the policy question, or the urgency of the issue.

Furthermore, this analysis of the civil society activism related to Zika advocacy indicates certain approaches to engaging activists going forward. For example, communications strategy for public health ought to incorporate more rigorous evidence-based approaches such as theories of behavior change. Public health programs should incorporate evaluation into their day-to-day activities so that in the future there will be baseline data available that would track responses based on several outcomes of interest over time. One approach, employed by UNICEF, is to link the problem of Zika with the broader and more fundamental questions of social justice, so as to leverage groups that already work on these broader causes. To engage social justice advocates, future advocates should harness the fears about Zika to create linkages with their core development goals, such as promoting conditions conducive to prevention and access to testing and prenatal care.

Chapter III:

Fostering Multisectoral Collaboration

José Szapocznik

Jacob N. Batycki

RECOMMENDATION 3:

Multisectoral collaboration should be fostered as an essential tool in targeting the web of causation that leads to disease.

INTRODUCTION

Zika, like many health challenges, is influenced by a broad range of diverse social and physical determinants (Castillo-Chavez, Bichara, & Morin, 2016; Crowcroft & Rosella, 2012; de Andrade et al., 2015; Horton et al., 2014; Magnan, 2017; Marmot, 2005; Moon, Szelzák, et al., 2010; Moon, Sridhar, et al., 2015; Porcelain, 2015; Spiegle, Breilh, & Yassi, 2015; Commission on Social Determinants of Health, 2008; WHO Africa, 2011; World Health Assembly, 2015). That is, there are typically many

nodes within the web of causation for a particular disease (e.g., Coatsworth, Pantin, & Szapocznik, 2002; Morens & Fauci, 2013; Frenk, 2006; Morse, 2004; Szapocznik & Coatsworth, 1999). Zika serves as a clear example of how a health problem results from many diverse factors, illustrating a clear need to go beyond purely biomedical and narrow notions of public health to understand and correct the factors that give rise to the epidemic (Gostin & Hodge, 2016; UNDP & IFRC, 2017).



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**health sector
interventions alone
are not enough to
improve population
health and social
wellbeing**

(de Andrade et al., 2015, para.
5; cf. United Nations, 1948;
World Health Organization, 2005).

CHALLENGES

In addition to the challenges of diseases such as Zika, which have multiple contributing factors, the tendency to over-rely on health systems for solutions impedes efficient responses to epidemics. For decades, public health leaders have developed an increasing understanding that “health sector interventions alone are not enough to improve population health and social wellbeing” (de Andrade et al., 2015, para. 5; cf. United Nations, 1948; World Health Organization, 2005). Although the authority and responsibility for protecting the health of populations falls on national and local health systems, ministries of health do not have all the tools needed to promote health and prevent illness (Frenk, 2006; Magnan, 2017; Moon et al., 2015; WHO Africa, 2011). Responses to health challenges can be most effective in achieving improved public health when ministries of health collaborate with key stakeholders across multiple sectors (WHO Africa, 2011).

This alternative to the traditional unisectoral organization of health recommends that the Minister of Health act as a leader and coordinator of distributed power and responsibilities within the leadership of the country, in particular the participation of national, regional, and local authorities. Ministries of health

in this view would lead governments in understanding that improved health can only be achieved by harnessing the power of intersectoral actions (de Andrade et al., 2015; National Academies, 2017b).

From this perspective, ministries of health function as conveners of all relevant sectors and stakeholders to advocate for health across sectors, to identify what each can contribute to the public health of the nation, to delineate and set priorities, and to evaluate for mutual accountability (Londoño & Frenk, 1997; Murray & Frenk, 2000; Frenk & Moon, 2013). This collaborative approach, in addition to functioning as a priority-setting method, serves as “a key instrument for accountability on the part of providers” (Frenk, 2006, p. 957).

A hierarchy of factors influences ZIKA transmission, illness, and social consequences:

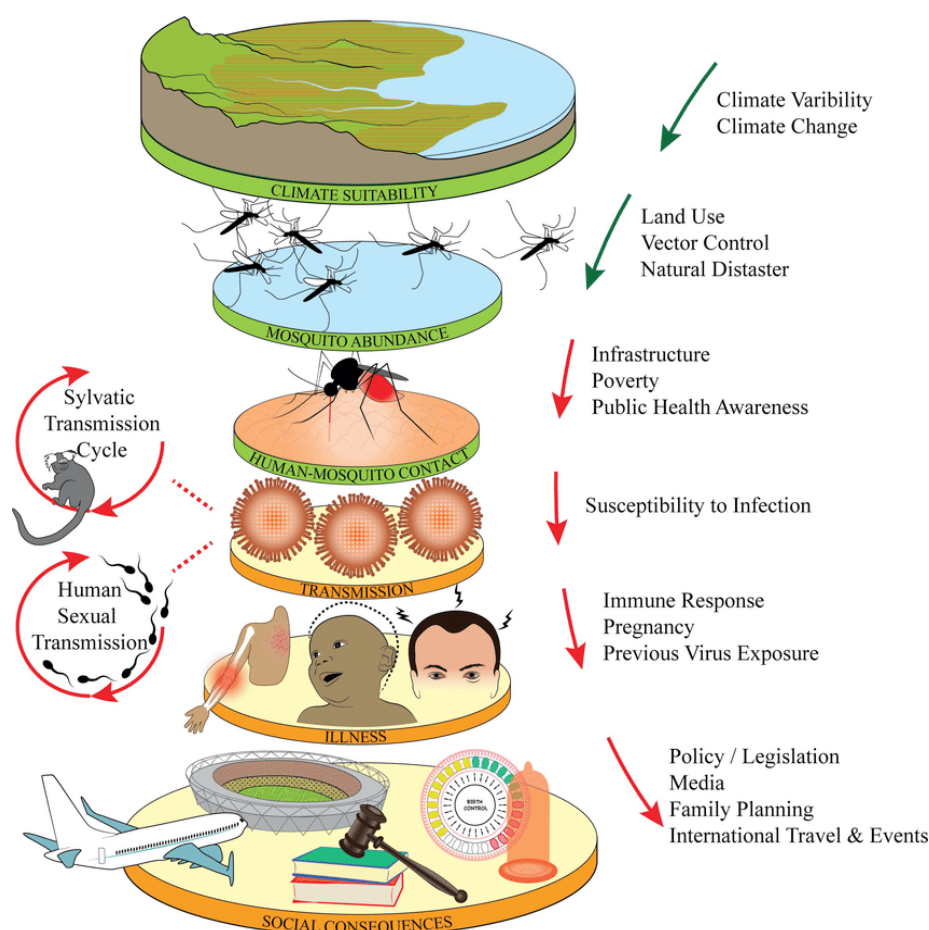


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RECOMMENDATIONS

In tackling Zika, we often think of traditional vector control methods. However, depending on local conditions, there may be essential governmental elements whose involvement would be required to effectively control the epidemic. Examples from the Zika epidemic include:

1) Improved garbage collection systems (interviews in Dominican Republic);

2) Improved state-implemented removal of standing water in public spaces;

3) Community mobilization initiatives that engage the population in the removal of standing water in and around their homes (Andersson, Arostegui, Nava-Aguilera, Harris, & Ledogar, 2017; Florida Department of Health, 2016, 2017);

4) Government-funded mosquito screens (Mushi, Schellenberg, Mponda, & Lengeler, 2003; Mubyazi, Kamugisha, Mushi, & Blas, 2004; Blas, 2013);

5) Making insect repellent available to the poor (Alley, 2016).

Sharing information, data, and results and collaborating on strategies for addressing the problem across health professionals, public health agencies, and governmental and non-governmental organizations optimizes nations' capacities to respond to health challenges such as those presented with vector-borne diseases like Zika.

There is already a large body of literature recommending multisectoral collaborations as a near-universal strategy for tackling public health challenges (Commonwealth Secretariat, 2002; Hasan, Patel, & Satterthwait, 2005; Public Health Agency of Canada, 2007; WHO, 2008; WHO Africa, 2011; Savoia, Testa,

& Viswanath, 2012; Alderman et al., 2013; among many others). There is wide agreement across the world that the collective impact of multiple sectors is more likely to have a stronger and faster impact than isolated interventions. Collective impact is the result of multiple sectors working toward a common end (Hanleybrown, Kania, & Kramer, 2012; Kania & Kramer, 2011, 2013).

Collective impact as a result of multisectoral collaboration is achieved by coordinating goals, objectives, strategies, resources, and activities that are mutually reinforcing. In the Zika example presented above, Solid Waste Management might be involved in garbage collection (Solid Waste Management, 2016); Mosquito Control might be involved in fumigation (Florida Department of Health, 2017; Miami-Dade County Mosquito Control Division, 2017b); the Military might deploy its resources to rid public spaces of water; Housing, Health, or Social Protection ministries might provide screens for homes; and local health units might provide mosquito repellent. Integrated Vector Management can be achieved with more effective national collaboration through country-level partnerships (UNDP & IFRC, 2017). Finally, NGOs might be trained in mobilizing community populations to rid neighborhood homes of standing water and report mosquito infestations. This underscores that addressing vector-borne diseases like Zika is not only a public health prerogative, but is also relevant to many, if not all, areas of international development (Chang, Fuller, Carrasquillo, & Beier, 2014; UNDP & IFRC, 2017).

A strong example of this collaborative approach is Brazil's multisectoral response to Zika, which was evident in a number of areas. For example, *National Coordination and Control Rooms* were established in 27 states and the Federal District. These "Rooms," managed by

the Ministry of Health, included governments (federal, state and municipal), armed forces, and community health and endemic control units. Hence, the Ministry of Health acted as a convener at the level of each state and the Federal District, creating the context that promoted multisectoral collaboration. Between May and June, 2016, nearly 47 million properties were inspected by the coordinated efforts of these actors. Additionally, Brazil's Ministry of Health coordinated international collaboration with the U.S. CDC in initiatives such as the release of Wolbachia-infected male mosquitoes and the study of their impact.

In Miami-Dade County, Florida, U.S.A., an integrated planning initiative, referred to as MetroLab, had already been established as part of the *Resilient Cities Initiative* supported by the Rockefeller Foundation, under the umbrella of the county and the cities of Miami and Miami Beach. A central principle in this effort was to bring together the municipalities and academic institutions of higher learning. Application of this framework to the Zika outbreak resulted in the recommendation to hire a mosquito control director who is a scientist (which is suggested in this report's Recommendation IV), and such an individual has now been hired to direct mosquito control for Miami-Dade County. This initiative demonstrated the role of academic institutions in multisectoral collaborations for preparing and responding to mosquito control and related epidemics.

CONCLUSION:

Threatened by the 2015-2016 Zika outbreaks, numerous government sectors from health, commerce, and finance to labor, tourism, and transportation may have been motivated to support Zika-related mosquito control and citizen behavior change efforts.

Integrating this recommendation with Recommendation II, we encourage the recognition of the role of communities in multisectoral collaborations. When appropriately informed and properly mobilized, the people are a reliable and essential force in the fight against mosquito-transmitted disease. Community mobilization, if not the silver bullet, is a highly effective strategy in any public health initiative. In the case of Zika, the relationship between mosquitoes and humans implies that there is a critical role for the community in Zika outbreak prevention. Unless communities are effectively mobilized by various sectors to control mosquito numbers and protect themselves against bites, vector control will be ineffective in the face of Zika and other mosquito-borne diseases (Chang et al., 2014; Woods, 2016; UNDP & IFRC, 2017).



Chapter IV:

Establishing Permanent Vector Control Infrastructures

José Szapocznik

Jacob N. Batycki

RECOMMENDATION 4:

Permanent vector control infrastructures should be established. They should be led by scientists and have sources of funding independent of governments.

INTRODUCTION

Vector control has a long history in the Americas with several short-term successes but no long-term achievements. Fluctuating levels of economic support due to competing priorities have resulted in intermittent support for vector control programs.

The combination of intermittent support for vector control, accelerating population growth and unplanned urbanization, and the extraordinary adaptability of *Aedes* mosquitoes to urban populations suggests the need for a more systematic approach to vector control on the part of regions, countries and municipalities.

RECOMMENDATIONS

The increasing number of mosquito-borne diseases in our region requires a more proactive and comprehensive approach to mosquito control that can be achieved through permanent vector control infrastructures established within ministries of health or health departments within provinces, states and/or municipalities, or even regionally covering several smaller countries. Thus, the proposed solution is the establishment of permanent mosquito control districts funded by **dedicated funding streams** independent of year-to-year government allocations. These centers would have the necessary resources to mitigate the long-term challenge of vector control. Adapting strategies from the Environmental Health Committee of Miami-Dade County's MetroLab's 2017 *Fight the Bite Initiative*, a mosquito control district could provide:

- Dedicated facilities, resources, and staff for effective mosquito surveillance and control, led by doctoral-level entomologists;

- Enhanced capacity to develop and test modern mosquito control approaches that involve state-of-the-art entomology and molecular biology; and

- Mechanisms for better intersectoral coordination during emergencies among and within agencies, partners, and the public.

The mission statement of such an initiative might be:

The suppression of mosquitoes that carry disease to humans, animals, or plants to protect human health and local economies.

A mosquito control infrastructure could carry out the following activities:

**EMERGENCY RESPONSE
COORDINATION &
COMMUNITY
ENGAGEMENT**

-
- Coordination of government response to outbreaks;
 - Coordination with outside agencies, laboratories, and educational institutions;
 - Community engagement and response coordination;
 - Community mobilization;
 - Behavior modification activities;
 - Public information campaigns;
 - Notification of residents and businesses prior to emergency control measures.

RESEARCH

-
- Operational research on mosquito biology for local mosquito population forecasting and guidance of mosquito control;
 - Laboratory, insectary, and field evaluation of emerging control methods;
 - Pathogen testing and insecticide resistance testing using standard and molecular techniques;
 - Collaborative engagement of academic, state, and federal laboratories;
 - Research on ecology, behavior, resistance, and vulnerabilities of local mosquito vectors to inform control measures;
 - Developing and testing novel mosquito control methods.

**FIELD
OPERATIONS**

-
- Real-time mosquito population and disease surveillance;
 - Long-term population suppression programs;
 - Rapid response capability for containment and suppression during outbreaks;
 - Rapid assessment, analysis, and methods adaptation through engagement of the Research Division.

An example of such an infrastructure is found in the mosquito control districts that have been developed in agricultural counties in the U.S. state of Florida. These vector control divisions operate on funding from special tax zones independent of the government.

The most effective of these facilities are led by doctoral-level entomologists who are also familiar with other relevant disciplines in public health, ranging from epidemiology to behavior change science (cf., Alfaro-Murrillo et al., 2016; Castillo-Chavez et al., 2016; Georgia Institute of Technology, 2017; Robert et al., 2016). Allocating sufficient resources, however, does not guarantee success. Rather, success is determined by having the right scientific leadership that can appropriately, efficiently, and effectively utilize the tools and limited resources at hand, including effective and efficient mosquito control, outbreak containment, behavior change interventions, and support for ministries of health in leading multisectoral collaborations.

While these facilities may be considered expensive for developing countries, it would be helpful to conduct a cost-analysis in low- and middle-income countries that weighs the cost of the facility against the tangible and intangible costs associated with mosquito-related epidemics such as Zika, dengue, chikungunya, and yellow fever. Epidemics like Zika affect not only health but also tourism and commerce. [It is recognized that a major challenge faced in many countries is the limited number of trained entomologists.] Another example of activities that can be coordinated by a permanent vector control infrastructure is found in the objectives recently developed in a collaboration between the Inter-American Development Bank and the country of El Salvador (Communication by Dr. Alejandro de la Torre, 10-11-17).

CONCLUSION:

Governments' attention to public health issues is necessarily impacted by current emergencies. This causes government funding to be available in spurts to specific public health issues. However, some areas of public health require long-term investments in infrastructure. Hospitals, for example, are not built in the midst of epidemics, but must be in place as part of the public health network of infrastructures to be used when the need arises. In the same way, vector control infrastructures must be available permanently to prevent and respond to vector-borne epidemics. The fight against certain vectors like *Aedes Aegypti* is never won, in part because the mosquito adapts quickly to changing environments. Moreover, from time to time, rapidly-spreading viruses emerge and re-emerge, such as Chikungunya or Zika. Permanent infrastructures must be in place to permit quick response. Outbreaks of existing and new vector-borne viruses will continue to occur in greater frequency as the world becomes a smaller place with increased travel, while the *Aedes Aegypti* mosquito will continue to adapt to new and changing environments.

Strategies to provide ongoing and stable funding for permanent vector control infrastructures will of necessity vary from country to country and region to region. In the Americas, few countries can afford such infrastructures on a permanent basis, much less provide sources of funding that are stable over time. Different funding strategies will have to be developed. These might include pooling the funds of multiple countries, obtaining funding from international bodies and/or from national and international philanthropic sources, and other creative funding strategies.

Chapter V:

Adopting Results-Based Financing to Improve Public Health Policies, Infrastructures and Outcomes

José Szapocznik

Jacob N. Batycki

RECOMMENDATION 5:

Results-based financing should be considered as a method for improving long-term public health outcomes and increasing accountability and transparency by linking financial incentives to the verification of achieved public health milestones.

INTRODUCTION

The response to the Zika epidemic in the Americas has illustrated the need for improvement not only in short-term emergency response but also in long-term public health infrastructure. Implementation of many of the Recommendations in this report would require systemic change in various aspects of government functioning that influence public health care systems. While acknowledging the challenge of proposing a single solution for all countries in the Americas, one strategy that has proven effective in improving public health infrastructures and health outcomes is linking financial incentives to the verification of achieved public health milestones.

Development aid programs typically control the use of their assistance by financing and monitoring easily tracked inputs, and requiring detailed reports of expenditures and activities.

This approach focuses on financial tracking and control, rather than on achievement of desired outcomes. Unfortunately, one of the most significant challenges in public health is that investments, activities, and deliverables do not necessarily translate into outcome- or impact-level results. The Paris Declaration (OECD, 2005) and Accra Agenda for Action (OECD, 2008) call for results-oriented aid with greater accountability, transparency, country ownership, and contextualization of aid within countries' realities.

However, these international agreements provide principles but not actionable mechanisms to achieve their outlined recommendations (Savedoff, 2011; Glassman, Fan, & Over, 2013; Kenny & Savedoff, 2013; Mills, 2014).

Results-based financing.

Results-based financing (also referred to as performance-based payment, Cash on Delivery, pay-for-performance, and output-based aid) is a tool to improve outcomes by linking financing and payments to verification of achieved milestones (Barder & Birdsall, 2006; Birdsall, Savedoff, Mahgoub, & Vyborny, 2010; Eldridge & Palmer, 2009; Oxman & Fretheim, 2009; Popova & Sharpanskykh, 2010). An excellent model for a focus on outcomes and impact-level results-based funding that also carefully addresses actionable mechanisms is found in the Salud Mesoamérica Initiative (SMI), which we discuss in this section. The results-based financing program established for SMI not only placed an emphasis on desired outcomes, but also created a structure to promote the development of internal country capacity to achieve the intended country outcomes.

Our analysis of SMI illustrates the thoughtful planning process that may be necessary for a results-based initiative to be successful in the developing countries of the Americas.

Salud Mesoamérica Initiative (SMI)

SMI is an innovative private-public partnership among the Gates Foundation, the Carlos Slim Foundation, the government of Spain, the Inter-American Development Bank, and the countries of Central America (Colombara et al., 2016; Dansereau et al., 2016; Mokdad, Colson, et al., 2015a; Mokdad, Gagnier, et al., 2015b). The Inter-American Development Bank is the executing agency on behalf of the donors; it set up systematic procedures for planning, project management, and monitoring and evaluation to guide the work in each country (cf. Eldridge & Palmer, 2009; Milosevic, 2003; Popova & Sharpanskykh, 2010).

The structure of SMI is designed to specifically address challenges faced by public health initiatives in developing countries. For the initial data-driven planning process, national and regional poverty maps were used to determine the localities where interventions were to be performed to reach the poorest 20% of the population. To reduce barriers to service demand and access among the poorest 20%, SMI adopted a focus centered at the geographic and household levels. The Inter-American Development Bank, working with Central American countries, developed master plans organized into goals, targets and milestones to be achieved. These detailed plans became part of the agreements that would permit countries to be financially rewarded for improvements in milestones and targets that moved the country toward better health outcomes. This planning process resulted in project management tools that outlined the steps each country would need to pursue—with data-driven milestones—to achieve the expected targets. The Bank is also responsible for the oversight of the evaluation process and the disbursement

of funds. SMI matches the investment of Central American governments, and then repays the governments half of their original contribution if they achieve pre-determined health targets. Movement toward expected results has been facilitated by a combination of incentives to create motivation to change, the building of collaborative working relationships between the Inter-American Development Bank and participating countries, and the guidance provided by externally measured progress.

The ultimate SMI targets were set up for fulfillment at 36 and 54 months.

However, there was full recognition that some intermediate targets had to be attained before ultimate outcomes could be achieved. These short-term targets were set at 18 months and included changes in policies, introduction of new interventions, and expansion of evidence-based service delivery that was both cost-efficient and impactful in improving maternal and infant health. Examples of evidence-based services include 90% vaccination rates for children under two years, maternal immunization, screening and management of infection-induced disorders during pregnancy, interventions addressing pre-existing chronic illnesses, interventions to improve nutrition and psychosocial health, and births attended by skilled personnel (Bhutta et al., 2014; de Figueiredo et al., 2016; Mokdad, Colson, et al., 2015a; Mokdad, Gagnier, et al., 2015b; Norheim et al., 2015).

Thirty-six- and Fifty-four- Month Targets.

After carrying out a health evaluation of the poorest population groups, each participating government in Central America committed itself to specific targets and indicators for

malnutrition, vaccination, and maternal and infant mortality and morbidity. For the region as a whole, the Initiative's goals for the poorest 20% were to:

260,000

Provide health services to 260,000 children to reduce chronic malnutrition;

15%

Reduce infant mortality by 15%;

15%

Reduce the rate of anemia among children under two years by 15% in seven of the eight countries in the region (in Chiapas, 10%);

90%

Ensure that 90% of children under two years complete their vaccination schedules;

50%

Increase births attended by skilled personnel by 50%, in order to reduce deaths of mothers and newborns.

Because the project is still ongoing, the 36- and 54-month outcomes are not yet available. However, 18- month outcomes met or exceeded expectations with five of the eight countries receiving performance payments (Regalia et al., 2017). Some of the better outcomes were as follows:

In Belize, management of obstetric complications according to accepted medical norms went from **2.6% in 2013 to 75% in 2016;**

In Costa Rica, basic health care team officials sensitized to provide quality care to adolescents went from **0% in 2012 to 92% in 2015;**

In El Salvador, prenatal care according to best practices went from **46.2% in 2011 to 85% in 2016;**

In Guatemala, health services with availability of necessary inputs for emergency obstetric and neonatal care

went from **0% in 2012 to 94.7% in 2014;**

In Chiapas, health services with necessary equipment for obstetrics and neonatal emergencies went from **20% in 2012 to 100% in 2015;**

In Honduras, obstetric complications managed according to the norm went from **11% in 2013 to 67.9% in 2016;**

In Panama, health centers that provide condoms, injectable and oral contraceptives, and intrauterine devices went from **10% in 2012 to 80% in 2014.**

More intangible, but important, outcomes of SMI have been a more transparent process for the management of the aid provided, and more accountability of funds for outcomes. Moreover, treasury and health ministries have experienced a different incentive system accompanied by a different dialogue about the health policies that support evidence-based practices in areas of maternal-child health. This results-based focus at the population level has also triggered changes in health systems that include: government commitment; strengthened leadership and operational management practices; enhanced coordination and collaboration between teams within the national ministries of health and between national and local levels in the health sector; new policies and norms focused on reproductive, maternal, neonatal, and child health; health information data collection and analysis for decision-making and accountability; strengthened commodity management systems; increased demand for health services at community levels; and enhanced service delivery readiness (Iriarte et al., 2017).



RECOMMENDATIONS

The case study of SMI suggests ways to successfully utilize results-based financing to improve outcomes and increase accountability and transparency of public health efforts in developing countries. What follows is a discussion of the unique innovations of SMI that make it a particularly useful model.

A unique aspect of SMI is its innovative, robust and flexible planning framework that has involved multiple stakeholders at all levels of planning. The planning focused on health status at the outcome and impact levels, with intermediate 18-month milestones on healthcare coverage and quality of care. Project management tools focused on how best to achieve these outcomes.

Through project management, participating countries and IDB have worked together to establish an evolving set of short-term quarterly indicators that measure the steps that need to be taken to achieve the expected 18-, 36- and 54-month outcomes.

“Working together” has been facilitated by the IDB staff’s capability in building interpersonal relationships and their knowledge of systems and implementation. This in turn has been facilitated by the IDB’s establishment of a dedicated unit for SMI implementation, with all staff using the same participatory change intervention approach (Regalia et al., 2017).

Planning for program management has been viewed as an ongoing process that supports the countries’ engagement in a step-by-step process. The participatory process through which countries have transformed their systems of service delivery in order to reach expected outcomes has led to the development of countries’ competence and self-efficacy. The consistent and ongoing monitoring of progress toward quarterly indicators have kept health program administrators focused on the goals, and to some extent could be said to have changed the usual contextual forces that influence politicians and administrators.

Competence and self-efficacy have been developed in a number of areas including planning, step-by-step project management, the use and internal advocacy for evidence-based interventions, development of health information systems, and the systematic use of data to monitor and evaluate progress. Thus, this process has led to sustainable skills in institutional, system, and cross-sectoral transformation.

Evaluation has been contracted to an external and objective agent, the renowned Institute for Health Metrics and Evaluation(<http://www.healthdata.org/salud-mesoamamerica-initiative>) at the University of Washington. The Institute has worked closely with the Inter-American Development Bank to collect trustworthy (independently collected) data and conduct analyses to evaluate the impact of SMI. Having an external evaluator has considerably increased the rigor of the methods by which the interventions’ impact is determined. External measurement in SMI has had multiple positive effects: filling important gaps in the use of data on health utilization and service-delivery capacity in the poorest municipalities; gaining government buy-in; measuring results for performance payments; reassuring donors of the value of their investments; and facilitating regional learning on how to improve the health of the poorest. When considering the potential longer-term impact of SMI, however, among the most important benefits of external measurement has been its catalytic effect on strengthening the countries’ ability to monitor and manage their own performance (Eichler et al., 2017) and creating a culture of accountability (El Bcheraoui et al., 2017). When considering the cost of this kind of independent evaluation system, it is important to note that the intention of this system is to improve outcomes. Hence, the evaluation can be viewed as paying for itself to the extent that outcomes are improved.

SMI differs from other international programs in that the participating countries do not compete for funds. Rather, amounts have been allocated



by country for five-year periods based on what is needed to close the health equity gap. Moreover, individual governments have determined the specific priorities and projects to be funded within the priority areas of SMI (i.e., maternal and child health). Therefore, although each country has had some discretion in the selection of programs, SMI has an integrated focus in maternal-child health: improving the coverage and quality of services, promoting the use of health services, and encouraging the adoption of healthier practices by poor households. Countries have recognized that they have to improve their ability to monitor and adjust their performance if they are to achieve results. They have also been spurred on by the competition among countries for reputation, and of course, incentive payments that are at stake (Eichler et al., 2017)

With financial incentives benefiting the countries, SMI has empowered ministries of health to engage other governmental actors, such as ministries of treasury/finance, to collaboratively tackle the web of causation of illness-wellness. As noted earlier, multi-ministry/multi-actor approaches are essential to address the interconnected challenges of public health.

It should be noted that results-based financing is a subset of a larger field of behavior change referred to as incentives or contingencies. Beginning in 1959 with B.F. Skinner (1976; 1999), a very large body of research has demonstrated that incentives that are contingent on defined behaviors make an effective behavior change strategy. When applied systematically, the management of contingencies has been demonstrated to strongly impact behavior. These principles are broadly used today in multiple settings such as schools, workplaces, psychological services, governments, and civil societies (Stitzer & Petry, 2006; Roll et al., 2006; Medland & Stachnik, 1972; Etter, 2012; State Health Policy and Practices, 2007).

A more subtle form of contingencies can be found in the Camino Verde study (discussed in detail in Chapter 1), in which individuals called “brigadistas” were given a special status (incentive) in their communities for adopting and promoting beliefs about the importance of getting rid of standing water, for volunteering for community services to identify and rid communities of standing water, and for educating their neighbors (outcomes).

CONCLUSION:

A results-based initiative might be applied to the efforts to control Zika epidemics (or other health threats) by tying the implementation of the Recommendations in this report to results-based financing. For example, donors could adapt a results-based incentive approach in which a country receives an incentive when permanent vector control infrastructures are established with the appropriate scientific leadership, a source of funding that is independent from the government is created, and/or a mechanism for supporting local-level efforts is established.

Chapter VI:

Beyond the Zika Crisis: From Emergency Response to Strengthening Health Systems

Adriane Gelpi

RECOMMENDATION 6:

Strengthening health systems is the next frontier. The Zika epidemic revealed underlying structural inequities in health systems. In transitioning to a post-epidemic era, priority should be given to those programs that can be leveraged for system-level reforms.

INTRODUCTION

In 2015, the panic around Zika reached fever pitch in the Americas. Today, Zika has faded from the headlines and the public's attention has moved on. In February 2016, the World Health Organization officially declared the end of the Zika outbreak as a 'public health emergency of international concern.' Thankfully, the direst predictions about Zika have not come to pass, as the number of new cases of Zika dropped throughout the Americas. Speculations about the reasons for this observed decline in the incidence of confirmed Zika cases have been advanced, though nothing has been determined conclusively.

Yet the end of the epidemic phase of Zika outbreak should not be misinterpreted. Indeed, close observers of Zika recognized that the shift in the WHO's classification of Zika represented not a declaration of victory, but rather an acknowledgment that a new phase of the battle against Zika was just beginning. The Zika virus is here to stay. Across the hemisphere, the battle against Zika has transitioned from epidemic to endemic.

For the public health research community, the need to examine the response to the Zika epidemic has never been greater. Many questions remain about Zika at all levels—from how it functions in cells to how populations understand its risk.

As previously discussed, one of the challenges of reaching conclusions about the Zika response has been the lack of evaluations. Indeed, it is only now that the data collected during the Zika crisis has begun to be evaluated; an enormous number of scientific research studies into all aspects of Zika are underway. Zika vaccine studies have begun recruiting for clinical trials in countries throughout the Americas. International

organizations such as UNICEF, USAID, and the CDC's Global Health Center have begun their own internal evaluations of their Zika programs (Telephone Interview, CDC Global Health Center, August 2017; Interviews, Dominican Republic, September 2017). When results from these evaluations are completed, they will offer valuable insights to further inform the analyses presented in this report.

This final Recommendation section of this report examines the emerging challenges confronting public health professionals in the post-epidemic era of Zika. These challenges can be divided into two principal categories: the short-term need to set priorities for which Zika projects will be maintained over time, and the related, longer-term goal of harnessing Zika-specific innovations that can strengthen health systems.

In addition to research into the biomedical aspects about how the Zika virus functions at the cellular level, there are also lessons to be gained from the Zika outbreak at a more macro-level perspective, such as how to strengthen health systems at the local, national, and regional levels. In order to harness these lessons for health system strengthening, the value of sustained academic evaluation of the first wave of Zika has never been greater. History shows that building long-term gains into emergency responses are notoriously difficult. Following previous outbreaks of emerging infectious diseases, such as SARS and Ebola, there were calls for long-term improvements and structural reforms that could improve future responses. With the epidemic phase of Zika over, now is the time to engage in taking stock of the responses to date, to engage in the type of reflection and evaluation that can ultimately lead to sustained action.

CHALLENGES

Priority setting in the “post-epidemic” phase of Zika

The key challenge facing Zika across the hemisphere is one of priority setting. Major international funding for the hemispheric Zika response has expired or will expire shortly (Interviews, Dominican Republic Field Officers, USAID and CDC). Funding agencies are making budgetary decisions about where to allocate the resources that previously had been dedicated to fight Zika. Stakeholders need to decide which aspects of the Zika response should be ended and which to recommend mainstreaming into broader public health activities.

During a meeting with Zika partners in Santo Domingo in 2017, for example, USAID’s Zika Advisor for the Dominican Republic (DR), Elizabeth Conklin, explained to those assembled that the USAID headquarters in Washington, D.C., was going to hold a major Zika meeting in late November, 2017, to make difficult decisions about what components of Zika programs to continue funding beyond 2019. To prepare for this meeting, Conklin urged the partners in the DR to shift from the emergency mindset that had predominated during the height of the Zika response toward a long-term orientation. She urged the local partners to evaluate their own programs with the goal of justifying to USAID why certain programs should continue to be funded going forward. As she explained, “we need to know better the types of investments [that] are needed for the future. Where are the pressing post-Zika epidemic needs? Which hospitals should be the target? Which provinces should we target?” (Zika Meeting, September 2017).

How can public health officials incorporate Zika planning into regular functions so that it becomes part of a new normal?

As an example of how the churning news cycle stripped Zika-related work from the country’s focus, several participants in the USAID-led Zika partners’ meeting held in the DR in September 2017 expressed concern that 2017 spate of severe hurricanes in the Caribbean had delayed the completion of their project deliverables and thus the systematization of the nation’s Zika policy. Partners in this meeting described their struggle to balance the competing need to complete their own Zika-focused projects already underway with the urgent need to devote attention to newly emerging problems, such as severe hurricanes, that demand immediate action (USAID Zika partners meeting, Dominican Republic, September 2017). Completing Zika projects will be harder as time goes on.

This process of shifting funds and attention from the epidemic to the post-epidemic phase of Zika is also taking place across the United States. For research studies about Zika currently underway, this pending loss of revenue will complicate ongoing research studies that could yield insights into Zika. Public health departments are facing decisions about what special research areas in Zika ought to be integrated into the ongoing operations of health departments. For example, medical entomologist Dr. Whitney Qualls from the Texas Department of Health described how the state birth defects registry had launched a retrospective evaluation of all births in Texas (from 2015 onward) to detect possible Zika cases that were missed at birth (Telephone Interview, Whitney Qualls, 2017). This effort at data collection and analysis will be difficult to maintain once the special period of funding ends. Another interviewee at the CDC Center for Global Health noted in the summer of 2017 that her team was planning to mainstream their Zika activities back into core functions once the special Zika funding had run out at the end of the federal fiscal year in September 2017 (Telephone Interview, CDC, June 2017).



In addition to the need to make decisions about whether to continue research studies, a related set of questions is whether to make or maintain institutional changes. How best to organize, fund and structure mosquito control operations remains an active question for many public health departments. The arrival of Zika prompted some public health department officials to reorganize their mosquito control programs, with some making decisions to restructure their departments for vector control. Expert-led groups such as Miami-Dade County's MetroLab wrestled with the pros and cons of creating entirely new types of institutional entities, such as the mosquito control districts described earlier. Ultimately, Miami-Dade County did not realize the recommendations of MetroLab, opting against the proposal to create a dedicated mosquito control district, and instead chose to invest more in ramping up the intensity of their current efforts at surveillance. They also decided to strengthen their mosquito-control programs through investments in personnel, hiring a doctoral-level entomologist to direct mosquito-control efforts (Interview, John Beier, August 2017).

In addition to restructuring their organizations for mosquito control, another looming decision concerns the level at which to maintain mosquito surveillance programs. Such programs should

be maintained to ensure the ongoing capacity to conduct surveillance while remaining nimble enough to shift focus to a non-mosquito-borne disease outbreak or emergency. The value of building on prior efforts was illustrated when Zika hit the Dominican Republic. The recent outbreaks of dengue and chikungunya had prompted the Dominican Ministry of Health to already update their national preparedness plan for **mosquito-borne illnesses**.

The DR's department of epidemiology had implemented some sweeping protocols for collection of entomological data during those earlier outbreaks. Strengthening the DR's surveillance capacity at the national level has been the major goal during the later phase. Investing in laboratory capacity and training field workers to conduct mosquito traps were also key areas of investment. Despite the need to cut back due to the lack of new cases of Zika, the DR epidemiologists and researchers agreed that these capacity gains should not be lost and that mosquito surveillance should remain strong enough to detect any Zika in mosquitoes that are caught (while cutting back on testing in pregnant women).

RECOMMENDATIONS

Long-term Planning: Harnessing Zika Responses to Strengthen Health Systems

Planning for Zika should involve setting priorities that will build on successes and emphasize those projects that can strengthen health systems. Public health preparedness must be reframed as a broader concept that is not merely surge capacity or vector control, but also includes criteria such as social equity. For example, UNICEF's Health Advisor at UNICEF Dominican Republic described how the outbreak of Zika represented an opportunity to make gains on the kind of long-term structural and system-level changes that have proven too entrenched to move. The problem of social exclusion for children with disabilities has long been a concern of UNICEF, but is so broad that it is difficult to build political momentum. Once Zika arrived, the risk of harm to the developing fetus opened the floodgates to funding for children's issues. The challenge now is how to harness the gains made during the short-term projects for Zika to sustain those projects for their long-wished for longer-term efforts.

To facilitate greater social inclusion for families affected by Zika, in 2017 UNICEF began to work with local social support agencies to train community workers in the psychosocial support of pregnant women diagnosed with Zika. In the short term, these community members accompany the women and families in attending their antenatal medical visits. In the longer term, this program aims to support the families after the birth and into the early childhood. Anticipating the risk that children born with Congenital Zika Syndrome will experience social exclusion as well as other challenges, the UNICEF Zika program has begun transforming their Zika-focused emergency initiatives into longer-term programs of social

support for children with a broader range of development disabilities in the Dominican Republic. This example illustrates how the shift away from the emergency focus on Zika offers an opportunity to advance the organization's more fundamental goals.

Another way that Zika programs may evolve into programs that serve system-level reforms concerns multisectoral collaborations, one of the recommendations developed earlier in this report. Such collaborations are critical for making the kind of structural reforms that can lead to more effective responses to future public health emergencies. Yet in many countries the functional isolation of sectors and competition for scarce resources between agencies impedes the development of such alliances or makes such efforts difficult to sustain. In the Dominican Republic, for example, several interviewees mentioned that the siloed nature of the functional areas of the National Ministry of Health makes such collaborations difficult. Since mosquitoes breed in water, the health department had natural allies in the Departments of Sanitation and Water in the efforts to control Zika. However, no representatives from these areas attended the meeting, as evidence of the difficulty in creating linkages across sectors.

Zika is uniquely complex, however, and this complexity has made multisectoral collaborations necessary for the emergency response. As discussed in the introduction to this report, the very complexity of Zika has forced departments to cut through institutional apathy and across previously isolated functional areas. Zika-specific projects can be maintained by folding them into broader projects that will maintain the innovative components. For example, community health workers in rural areas of the Dominican Republic have been trained to collect data on mosquito breeding sites. Going forward, these workers represent an investment in capacity building that should not be left to dissipate. Instead of letting these workers go at the end of the funding period for

Zika, a better decision would be to retrain them in related skills needed now. Given their in-depth knowledge of their local villages, these workers have insights into the needs of their communities that the national public health officials do not have. These workers could also be enlisted to make recommendations about what the highest priorities for ongoing projects should be. The goal should be to reframe the purpose of the Zika-related projects. Rather than simply tying up loose ends with Zika projects, they should be evaluated to determine how these projects, developed during the emergency phase of Zika, could be reshaped in a way that would justify to funding agencies the continued allocation of scarce resources to important public health infrastructures.

Risk communications programs for Zika have been rolled out, but evaluations of the overall impact of these communications on individuals' behavior are still lacking. Both the PAHO representative and the Director of Epidemiology mentioned that the DR had benefited from already having in place a national strategy for risk communications prior to Zika's arrival. This had first been developed in the global community after the attacks of September 11th, and had not been health-specific. When Zika first emerged, the DR already had a risk communication strategy that could be adapted for health, as well as used in other countries like Honduras, El Salvador, and Guatemala. Now the DR has a Zika-specific communication plan (*'Plan de accion de comunicacion en Zika'*). Yet these communication strategies must continue to evolve over time in recognition that the ultimate public health target is behavior change. As one participant noted, "it does not make sense to do the same things in each phase of the epidemic, pre and post. We should not keep talking about the same thing. It doesn't make sense to keep focusing on Guillain-Barré [syndrome], when in DR there hasn't been more than one or two cases in the last year."

CONCLUSION:

Public health departments have a duty to address the most urgent threats to population health as they arise. In the face of new outbreaks of infectious disease or natural disasters, Zika cannot remain the highest level of priority. The urgency has in fact been reduced. Nevertheless, the recommendations presented in this report highlight the opportunity to learn from Zika. The unique response to the unique Zika epidemic represents a treasure trove of data, investments, innovations, and efforts that should not be lost without learning their lessons. Harnessing the momentum of the projects launched during the epidemic phases of Zika can help fuel structural reforms of the sort that do not tend to inspire political will in less urgent periods. If such a process of learning from this epidemic is prioritized, then the anguish of the Zika outbreak in the last years can yield important benefits across the Americas, resulting in a greater capacity to respond, both effectively and ethically, to the next as of yet unnamed emergency.



**you might keep
having people coming
in and out with
infections that are
poorly controlled,
in areas where
[the] vector is not
controlled.**

Dr. Carmen Zorrilla

Chapter VII:

Stakeholder Roundtable:
Additional Topics that
Emerged from the Consultation,
April 27, 2018

Compiled by Valerie Gramling



INTRODUCTION

On April 27, 2018, the University of Miami Miller School of Medicine's Department of Public Health Sciences in collaboration with the AIDS Healthcare Foundation's Global Public Health Institute at the University of Miami, organized a day-long meeting to bring together stakeholders from several countries and various sectors involved in the response to the Zika health crisis in the Americas (a full list of participants can be found in Appendix B). The purpose of that meeting was to evaluate the recommendations and discussions of a draft version of this report. The meeting was facilitated

by UM Drs. Adriane Gelpi and José Szapocznik. The meeting was organized according to the chapters of the draft report, and suggestions and additions from that meeting have been incorporated into the relevant sections of this report. Throughout the meeting, however, there were additional themes and concerns that emerged from the discussions that merit future consideration. In this chapter, we provide an overview of those additional themes as discussed during the meeting, as well as the participants' closing thoughts on how to continue the work of this report.



From left to right: Isabel Griffin, Chalmers Vasquez, Mary Soares, Beth Murphy, Jacob Batycki, Adriane Gelphi, Valerie Gramling, Carmen Bou-Crick, Carmen Zorilla, Danielle Fernandez, Sarah Saunders, William Petrie, André Wilke, José Szapocznik, Ana Carolina Santelli, John Beier, Jorge Saavedra, Laura Multini

CHALLENGES: Additional Issues for Future Consideration

3/

Travel, Migration and the Spread of Zika

In considering specific, localized concerns versus broader, generalized approaches, it is important to consider that the spread of Zika in the Americas during the recent epidemic was at least partly due to international travel. Dr. Carmen Zorrilla observed that while vector control is essential in managing Zika, the lack of available resources in all areas means that even areas with strong vector control are still at risk, because “you might keep having people coming in and out with infections that are poorly controlled, in areas where [the] vector is not controlled.” Dr. Szapocznik acknowledged that as a genuine concern in Miami-Dade County, “because we have all the traffic from the Americas, where there’s a huge reservoir of dengue, Zika, [and] Chikungunya.” He suggested that this reality increases the need to be able to respond quickly to “contain and prevent local transmission” of the virus.

Dr. Jovana Ocampo proposed more investigation into the causal relationship between Zika and migration, observing that in both Mexico and Colombia “we have challenges regarding human mobility and mosquito behavior... It’d be very interesting to be able to study the behavior of Zika in a migrant, displaced population.” She also noted that the movement of migrant populations often alters ecological niches, and suggested that might be another fruitful area of study.

2/

Generalities and Specifics

A recurring theme throughout the meeting was the tension between discussing broad general approaches and being sensitive to the specific challenges (political, economic, social, etc.) faced by individual countries, towns and cities, communities, and communities within communities. Inevitably, there will be variations in how different communities within the Americas can implement the recommendations presented in this report. Yet each recommendation targets broad public health concerns observed throughout the Zika health crisis, and each is guided by broad principles that attempt to directly address those concerns while providing room to tailor the recommendations to specific communities. The regular use of case studies in the report is intended to highlight how individual regions responded during the epidemic, and provide examples both of strategies that succeeded as well as those that fell short in addressing the Zika crisis.

1/

Interconnectedness of the Report Recommendations

As noted in Chapter III, multisectoral coordination is an important component for any public health response, whether local, national, regional or global. The importance of this was underscored throughout the meeting, as it was clear that while each chapter of the report focused on a specific concern and recommendation for public health responses, it was impossible to discuss any section in isolation. The recommendations in this final report, therefore, cannot be taken in isolation; instead it is vital to recognize how they overlap and intersect, emphasizing how any response to a public health crisis requires a multi-pronged approach with several points of engagement with the affected community/ies.

Surveillance and Laboratory Capacity

One of the chief recurring themes was Surveillance and Laboratory Capacity, the need to conduct regular monitoring and research of various diseases and the mosquitoes that carry them, not only during health crises. Many participants agreed that there was a need for continuous mosquito sampling for surveillance to identify trends for tracking the development and spread of infectious diseases such as Zika. Celso Ramos, PhD asserted that “[d]eveloping countries need to have a preparedness and response to any infectious disease epidemic such as Zika,” emphasizing that programs need to be in place that continue even after an outbreak to provide “planning to prevent and respond to future outbreaks.” Dr. Ramos delineated multiple Zika issues that should be addressed prior to an epidemic to help communities better prepare and prevent future health crises, including research and policy efforts. One example discussed was studying ‘antibody dependent enhancement’ to determine how human responses to Zika are affected by a past history of flaviviruses (e.g., dengue). While participants agreed that antibodies against dengue fever do not protect against Zika, there was less consensus about whether or not there was a clear link between a history of both dengue and Zika and the development of Guillain Barré syndrome. Dr. Zorrilla noted that this “proposed explanation was the hypothesis” for apparent cases, but emphasized that it was still a hypothesis, suggesting that more research is needed to establish a clearer connection.

During the discussion into Chapter VI, “Systems Strengthening,” Dr. Ana Carolina Faria e Silva Santelli returned to the importance of surveillance, explaining how Brazil’s ongoing surveillance of newborns, specifically measurements of the size

of the head at birth, provided data that allowed Brazilian health workers to “see that there was a peak in the newborns with microcephaly” during the Zika crisis. The ongoing data provided a baseline for comparison, even though Dr. Faria e Silva Santelli agreed with Dr. Gelpi that the method for taking this measurement was not standardized. Dr. Gelpi noted that in the Dominican Republic she learned that “there was no uniform way, there was no requirement that [health care workers] measured [the] infant’s head.” As Dr. Gelpi noted, this highlighted “[t]he need for standardization across countries and communities with regard to what constitutes microcephaly.”

Dr. Faria e Silva Santelli stressed that, in addition to surveillance, there is a vital need for “laboratory capabilities . . . [if] we are talking of it but not looking at it, we won’t find it.” She noted that it took about two and a half months after first seeing cases of rashes in different cities in the northeast (of Brazil) to confirm a Zika diagnosis. Part of



the reason for the delay was that it took time to coordinate the findings of different laboratories and test for a variety of different viruses. Therefore, Dr. Faria e Silva Santelli asserted that laboratory capacity is vital to have “the capability of testing periodically a sample [to determine] what’s happening in your country.” She explained that while it took several months to recognize the severity of the disease in Brazil, with some cases of Guillain Barré syndrome not appearing until August 2015 and microcephaly in newborns until October or November 2015, “that knowledge at that time was important to establish very, very strong response[s]” in Brazil and other countries where the disease was still emerging.

Dr. Szapocznik, reflecting on Dr. Faria e Silva

Santelli's comments, noted "the capacity of Brazil to coordinate findings across laboratories and medical facilities to track the increase in Guillian Barré and microcephaly." Dr. Faria e Silva Santelli agreed with this assessment, noting local examples during the Zika crisis when systems around Brazil did come together. For example, one of the first people to recognize the increase of microcephaly births was an ultrasonographer and obstetrician, who noticed an increase in microcephalic fetuses and reached out to public health authorities. Recognizing that Zika was the only new health issue to arise during that year, she questioned if they could be related. That led to others observing the same trends in their communities, which helped create the larger national picture of the Zika crisis. However, "it was an alert obstetrician sounding the alarm, and having data to compare" that initiated that process.

John Beier, ScD, noted that with "mosquito-borne diseases, always expect the unexpected." He pointed to a former student of his who first discovered that Zika was a sexually transmittable disease through his own personal experience. The researcher was studying mosquitoes in Senegal and came home a little sick. Soon after he noticed his wife had developed the same symptoms, and he started to investigate and discovered that they both had Zika, leading him to publish "[t]he first report of sexual transmission of Zika or any other vector-borne disease" (Foy et al., 2011). Dr. Beier explained that this example underscores the need to "keep our eyes open," because "[w]e can't always understand what these vector-borne diseases are going to do."

A chief difficulty with on-going surveillance is lack of funding, highlighting the economic disparities across countries in the Americas, with some countries better able to support programs of regular mosquito surveillance than others. Dr. Beier noted that the international community needs to be more involved in building capacity throughout the region, since what happens in one country will ultimately affect others.

Dr. Szapocznik suggested that on-going surveillance becomes most valuable when the country also has "the ability to respond." Dr. Gelpi concurred, citing an example from the Dominican Republic where a public health school developed a one-week intensive field epidemiology course to train a cohort of workers to conduct mosquito surveillance in smaller

villages in the north of the country.

Dr. Zorrilla added that an important aspect of surveillance is "observation of clinical symptoms supported by laboratory capability." She noted that the current test for Zika only diagnoses acute illness, but that a lot of Zika testing is inconclusive, particularly with asymptomatic cases. Danielle Fernandez, MPH, observed that the test commonly used in the United States, the Plaque Reduction Neutralization Test (PRNT), is more precise but admitted it does take a long time to get results. Dr. Zorrilla also pointed out that in places with high incidents of dengue fever (for example, Puerto Rico and Brazil) the test is less effective because it may not be able to clearly distinguish between dengue and Zika. Dr. Faria e Silva Santelli noted that while in Brazil there had been some cross-reactions with dengue initially, "PRNT assays were able to distinguish between the two diseases." She argued that Zika still needs to be better understood in order to develop more effective testing and treatment, because there are still questions about the timing of the disease and the variations in responses to it.

However, William Petrie, PhD, argued that "a PCR is pretty much definitive, and takes away all those [testing] problems or almost all of them." In the Cayman Islands, where his laboratory was already doing PCR testing for other things, they were able to begin testing immediately and had results within 24 hours. Dr. Petrie noted this "goes back to the advantage of having an already established mosquito control, research-based agency." However, he did note that the scope of the disease in Miami made PCR testing impractical and prohibitively expensive. Dr. Faria e Silva Santelli also suggested that PCR testing requires "exact timing . . . If your children are born with a birth defect . . . you cannot have a valid PCR on the virus, except during acute infection." She also noted the prohibitive cost for adopting PCR testing for "millions of cases." These difficulties highlight that what might be possible in the relatively affluent Cayman Islands may not be feasible on a larger scale.

Dr. Faria e Silva Santelli also raised the point that it is important to have "more people with this kind of scientific thinking and approach to public health issues which is very important at the local level." She described Brazil's use of the network of Field Epidemiology and Laboratory Training Programs (FELTP) throughout the world. In response to the Zika outbreak, Brazil created

a pyramidal system at the local level with a large FELTP team “with this kind of epidemiological training that has the capability to catch trends in the field.” She asserted that having teams already in the field and trained in epidemiology would help with managing future epidemics.

A final note about laboratory and surveillance capacity was made by Dr. Gelpi over the question of repeated testing. She noted that Florida governor Rick Scott had announced during the epidemic that pregnant women could be tested as many times as they wanted for free, and there were concerns from local obstetricians that this was not only costly but unbeneficial. However, Dr. Zorrilla noted that the policy in Puerto Rico for pregnant women with Zika was to test every

trimester, allowing health workers to follow the fetus’ and then the infant’s development: “My point is that – . . . if you don’t look for it you will not find it. If we don’t test we will not be able to provide counseling, we will not be able to follow these infants; even though they’re normal size and everybody thinks they’re okay, they might not be.”

5/

Sexual and Reproductive Rights

While much of the discussion about surveillance and laboratory capacity expanded upon ideas and information already present in the report, some participants stressed the importance of a stronger focus on another recurring theme, sexual and reproductive rights. Dr. Ocampo suggested that sexual and reproductive rights were fundamental to the Zika public health crisis: “In South America, there are a lot of cases where women don’t have rights to make decisions and . . . have been left alone and isolated,” and therefore during the Zika epidemic they may not have received timely information. Dr. Ocampo cited one case where a woman didn’t find out until the 8th month of her pregnancy that her fetus had microcephaly. Throughout the meeting conversations about reproductive rights often highlighted the different policies and laws in effect throughout the Americas. For example, Dr. Jorge Saavedra noted that the medical interruption of pregnancy is prohibited in many countries of the Americas.

During the discussion on “Multisectoral Collaboration,” Dr. Ocampo encouraged more consideration of “strengthening women’s organizations, [and] alliances with community organizations that work on issues related to

sexual and reproductive health.” Dr. Gelpi discussed the role of Planned Parenthood’s public information campaign in Miami during the Zika epidemic, encouraging condom use for pregnant women. Dr. Saavedra mentioned the role of municipalities, and in particular a case in Broward County, Florida, in which a billboard featuring a condom to promote the use of condoms to prevent Zika transmission had to be removed at the request of city authorities reacting to a complaint by a single citizen who expressed concern that her child would see the billboard.

Condom use was further discussed when considering the sexually transmission of Zika. Dr. Saavedra, MD, MPH, MHPH, referenced the CDC recommendation notices at Miami International Airport which advise anyone travelling from a country where Zika is present to delay pregnancy or use condoms. He noted that there is still a lack of definitive evidence about how long men or women diagnosed with Zika should continue taking such precautions. Dr. Szapocznik, referencing a study that indicates that six months after exposure many men still have the virus in

their semen (Mead et al., 2018), suggested that couples should be tested for Zika before having unprotected sex. However, Dr. Zorrilla observed that this was unrealistic, citing an earlier conversation about irrational decision-making and behavior change (from the discussion of Chapter I): “We’re still adolescents in regards to sex. Sexual activities mostly aren’t planned, to the extent that I’m going to test my semen . . . That will not happen.”

Finally, there was some discussion about the relationship between breastfeeding and Zika transmission. Currently there is no conclusive research in this area; Dr. Zorrilla noted that in the literature there is a report of a small number of women in Polynesia with asymptomatic Zika who

appeared to have transmitted the disease to their infants through breastfeeding. However, these appear to be the only documented cases to date. Dr. Petrie noted that Zika has been identified in breastmilk, and Dr. Zorrilla explained that there could be a risk of transmission, but it remains uncertain at this time.

6/

Stigma

Related to the theme of reproductive rights were concerns about the stigma around Zika felt by women in various countries and communities in the Americas, which prevented many of them from speaking out. Both Ms. Beth Murphy and Dr. Zorrilla discussed the difficulty in getting pregnant women with Zika to speak publicly about their situation and be part of information campaigns. While conducting interviews for her documentary work, Ms. Murphy noticed “a clear distinction . . . in who was willing to talk openly,” and found that pregnant women with Zika who were considering having an abortion “didn’t want to have their names out in the public.” In Puerto Rico, Dr. Zorrilla worked with women who were abandoned by their partners after they were diagnosed with Zika, and recognized that it was a real fear for many of those women to be open with their diagnosis. This led to a lack of representation in public information campaigns.

Dr. Petrie observed that this stigma was not felt consistently throughout the Americas. In the Cayman Islands “there was no stigma associated with Zika with pregnant women . . . [they] contacted [health authorities] immediately and we contacted them. It was a lot of interaction and interplay.” He posited that the smaller size and population of the Cayman Islands might

explain the difference in how stigma affected the community. However, Dr. Zorrilla considered not only the size of the population but also the number of cases in relation to the total population, suggesting that when the epidemic was more widespread within the community, such as in Brazil, there might be more stigma, whereas “if you have one [case] in a hundred, . . . it might not be stigmatizing because for most people it doesn’t apply to them.” In a place like Miami-Dade County, where the epidemic was largely contained to particular areas, Dr. Zorrilla wondered if the stigma was also contained to areas where the population and businesses felt more threatened by impact of Zika.

Dr. Adriane Gelpi also noted that socioeconomic factors could affect the issue of stigma, with “the emergence of microcephaly [being] more concentrated” in lower socioeconomic classes where women do not have the same access to reproductive decisions. Dr. Faria e Silva Santelli concurred, noting that birth rates already differ between various socioeconomic classes because of access, and Dr. Gelpi reiterated that “in terms of long-term consequences, that’s something we have to be aware can happen.”

CONCLUSION:

The Path Forward

The meeting closed with a session entitled “The Path Forward,” in which participants discussed the difficulty of keeping organizations and individuals engaged as the crisis waned. As Dr. Faria e Silva Santelli noted, “One of the challenges going forward is how to sustain [public awareness and response] when the fear dies down?”

One of the primary suggestions for moving forward was to continue the types of conversations taking place at this meeting in a regular forum, but in an even larger context. Dr. Beier, proposed “that we have a continuing dialogue, in every year, and even more frequent than that,” and suggested Metro Lab in Miami as an example of an “umbrella for bringing people from different institutions together.” Dr. Szapocznik noted “that one of the very valuable experiences from this meeting is bringing very different perspectives together.” Looking ahead to future meetings he observed “We may have experts from different parts of the world and from different sectors to keep the richness of the conversation.” There was discussion of the likelihood of periodic Zika outbreaks as occurs with dengue, particularly given the endemic nature of Zika in a number of countries in the Americas.

Various suggestions were made for future meetings, including expanding the focus beyond Zika since there was a recognition that the next public health crisis might stem from a different disease. Dr. Szapocznik suggested future meetings be focused on vector transmitted diseases more broadly, while Dr. Zorrilla and Dr. Beier suggested even more comprehensively a focus on “emerging epidemics.” It was also proposed to increase not only the size of the meeting to involve more participants, but the diversity of specialties and areas of concern. Dr. Ramos suggested including a neurologist, while Dr.

Ocampo suggested inviting representatives from those societies directly affected by the diseases; for example, “women and families of patients of Zika.”

The meeting closed with a recommendation to continue the important conversations of the day not only through regular meetings but also through this report. Dr. Saavedra reiterated his earlier suggestion that this current report be viewed as “a working document” in which the recommendations could be updated yearly as our understanding of Zika and other emerging epidemics continues to grow and evolve. Referring to a conversation he had with Dr. Ramos in Mexico prior to the meeting, Dr. Saavedra shared Dr. Ramos’ ideas from a “proposal for collaborative research priorities” involving three concepts: “emerging epidemics, re-emerging infectious diseases, [and] persistent infectious diseases and neglected infectious diseases.” Dr. Ramos emphasized including not only Zika but also “Chikungunya, yellow fever, Chagas disease, malaria, viral encephalitis, rickettsiosis, leishmaniosis and dengue.” Dr. Saavedra suggested that the current report serve as the basis for “a live policy-like document that can be updated every year.”

While the recent epidemic of Zika in the Americas has abated, there was a general consensus among the Stakeholder’s Meeting attendees of the likelihood of periodic Zika outbreaks as occurs with dengue fever, particularly given the endemic nature of Zika in a number of countries in the Americas. For that reason it is important to see the discussions of April 27, 2018, as on-going and evolving, and to view this report and its Recommendations as a vital part of these continuing conversations.

Appendix A:

List of Interviewees



Below is a list of people who generously spoke with the authors and researchers throughout the development of this report. Because of requests for confidentiality, some interviewees are not listed.

■ LIST OF INTERVIEWEES

Matthew DeGennaro, PhD

Assistant Professor
CDC Southeastern Regional CoE in
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Kimberly Green Latin American
and Caribbean Center
HHMI Faculty Scholar
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William Petrie, PhD

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U.S. Department of Health and
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U.S. EMBASSY - **Santo Domingo**

Ruth E. Brito

Division of Global HIV & TB
Centers for Disease Control and
Prevention (CDC)
U.S. Department of Health and
Human Services (DHHS)
U.S. EMBASSY - **Santo Domingo**

Beth Murphy

Director, GroundTruth Films
Founder, Principle Pictures
The GroundTruth Project
Boston, MA, USA

Mario Nuñez, MBA, MDes

Director, Department of Solid
Waste, *City of Miami*
Miami-Dade County

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Hotel Association (GMBHA)
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Jack A. Bobo

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Nzeribe Ihekweba

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Lisa M. Lee, PhD, MA, MS

Former Executive Director of the
Presidential Commission for the
Study of Bioethical Issues

Phil Goodman

Chairman, District 2, Florida Keys
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Marathon, FL, USA

Appendix B:

Stakeholder Meeting Attendees, April 27, 2018



Below is the alphabetical list of participants at the Stakeholder Consultation Meeting on April 27, 2018, who provided their expertise and feedback on an earlier draft of this report and its recommendations:

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Appendix C:

Summary of Deliberative
Forum: Zika 2017:
Where Do We Go Next?

Adriane Gelpi



Synopsis of Presentations

On April 6, 2017, the University of Miami Institute for Bioethics and Health Policy hosted a forum on the future and past of the Zika outbreak and response in Miami. The discussions held during the event served as an important source of information for the broader Zika Public Policy Project. Given the relevance of this forum as a preliminary source of stakeholder feedback, the following synopsis of the day's discussion is included as an appendix.

The day began with welcoming remarks by the organizer of the event, **Adriane Gelpi, PhD, MPH**, who laid out the rationale for the event and the goals for the day. Then **Lisa M. Lee, PhD**, former Executive Director of the Presidential Commission for the Study of Bioethical Issues under President Obama, opened the forum followed by a presentation on the role of public health ethics and public deliberation for better policymaking. Dr. Lee spoke about public health ethics as the driving force behind what we should do, complimenting science and law, which provide us with what we are able to do and what we are permitted to do. She stressed the need to shift from a focus on the personal moral compass to dealing with the public good in order to ensure an ethical decision-making process about public policies.

Additionally, Dr. Lee explained the goal of a deliberation as a way to address dilemmas as a method to address an open question, utilizing reasonable support to back opinions. When applying these methodologies to the Zika outbreak, it is essential to consider the reflective and participatory nature of a deliberation, and the importance of bringing together a group of people with varied perspectives. After Dr. Lee's presentation, a participant asked how we could possibly bring together all 2.7 million people in Miami to come to collective decisions and partake

in a public deliberation. Dr. Lee suggested and reinforced the importance of including the representation of perspectives because people share perspectives, so representing 2.7 million people would in fact be feasible if these perspectives were engaged in a discussion. She concluded by stating that the ability to articulate values that were taken into consideration during a deliberation would ultimately be the ethical foundation for dealing with the public good, carried out by a collaborative effort.

The first panel included presenters who were actively engaged in the local Zika response in Miami. The conversation began with **Stephanie Tashiro, PhD**, Deputy Resilience Officer from the Office of Resilience and Sustainability for the City of Miami, and **Mario Nuñez**, Director of the Solid Waste Department for the City of Miami, discussing the specifics and timeline of the outbreak in Wynwood and Miami Beach. They went on to discuss the breakdown of the operational response led by the City Manager's office that developed a multi-department **Zika Task Force**. Mosquitoes, the primary vectors that carry the Zika virus, breed in open standing water that forms as a result of a wet, tropical climate. Standing water can be found on the street, on homeowner's properties, or anywhere that can collect water from a rainstorm. As a result of this, the role of the Solid Waste Department was critical in leading the efforts to eliminate standing water and uphold the highest sanitation standards. Emergency response teams, parks and recreation officials, and code compliance officers were among the many others involved in the efforts to contain Zika.

Dr. Tashiro and Mr. Nuñez concluded their presentation with policy recommendations to address the hardships small business owners faced resulting from the heightened fears keeping customers away during the outbreak. They mentioned Senator Marco Rubio's effort to alter the provisions under Senate Bill 154 to include "communicable diseases in which the federal government has to issue a travel

"Who is responsible
for the patient?"

"Can we develop
vaccines for pregnant
women and children?"

Dr. Morain

warning” as part of the criteria for small businesses to receive loans to assist with economic losses associated with unexpected emergencies.

To complement their presentations, additional perspectives from **Amy Driscoll**, Health Editor for the *Miami Herald*, **Sarah K. Saunders, MPA**, Code Compliance Manager from the City of Miami Beach, and **Paul Mauriello**, Deputy Director of Waste Operations in Miami-Dade County, were incorporated into the conversation. During the Zika outbreak, it was imperative that enforcement arms, such as Code Compliance and Waste Operations, shifted jobs from everyday issues to focus on Zika. It was through these concentrated efforts that Zika could be contained so quickly, with teams working around the clock to eliminate standing water and mobilize people to follow in suit. Amy spoke on behalf of the public opinion, voicing the concerns and inquiries the Herald faced as a major news outlet in Miami-Dade County. Much of the surveillance, compliance and operational work done by local government agencies were instrumental in facilitating an effective response, and we discussed how we could improve communication and collaboration between these agencies and the media in the future.

Jeffrey Brosco, MD, PhD, introduced the forum’s keynotespeaker, Florida’s State Surgeon General, **Celeste Philip, MD, MPH**, to deliver her keynote address to the afternoon sessions. Dr. Philip’s address focused on the role of improving communications in public health emergencies.

Steven G. Ullmann, PhD, began the afternoon session discussing the impact of Zika on Miami’s tourism industry and local businesses, health care costs associated with the virus’ complications, and the overall economic burden on Miami and its potential implications for the future. During the months of August & September, hotel reservations dropped in Wynwood and Miami Beach,

resulting in major financial losses during tourist months. Additionally, local businesses such as restaurants and bars in the affected zones were forced to lay off employees due to the loss of customers following the travel bans and warnings issued by the CDC. When put into perspective, these economic setbacks were minor; now that Zika has become endemic, the potential for major damage is great, especially when the extraordinary health care costs associated with abnormal pregnancies and congenital Zika Syndrome are taken into consideration. Establishing a collaborative relationship between the private and public sectors is critical to managing a disease outbreak.

Christine L. Curry, MD, PhD, then discussed the challenges she faced as an OB-GYN leading the Zika Response Team in both private and public health hospitals. Zika has disproportionately affected lower socioeconomic populations, consisting of people who did not have access to the same resources and information as those who visited private health care facilities. Dr. Curry expressed the difficulty of disseminating information across both of these populations of women, in addition to providing options for infected pregnant women based on their insurance, if any. Another major challenge she discussed was that patients and providers get information at the same time but interpret it very differently. This is a huge challenge to overcome, and something that we need to address moving forward as part of communication efforts within and across both private and public health care systems and public health disease outbreak teams.

Susan E. Morgan, PhD, expert on health communications, expanded on the importance of changing the way we communicate risk in light of a disease outbreak. She discussed how raising awareness is a great step towards community mobilization, but not the most important component. The importance of social influence in engaging community members to take action and be held accountable should be the focal point of a

successful communication campaign, while targeting specific campaigns at appropriate audiences. Synthesizing Dr. Morgan's risk communication strategies could perhaps strengthen public and private partnerships, improving health care access, knowledge, and utilization of services as we move forward reducing costs and decreasing disparities associated with Zika and future diseases.

In the final panel session, **Roderick King, MD, MPH**, discussed health equity and the barriers we face addressing it in regards to Zika. He began by referring back to Dr. Curry's point that although some populations here in Miami have access to means of communication, some do not. Perhaps the underlying problem is not necessarily a question of access to information, but rather how certain populations process and synthesize that information, if at all. Dr. King referenced Abraham Maslow's Hierarchy of Needs to emphasize the fact that certain groups simply cannot address issues such as standing water or engage in prevention efforts until their basic needs are met first. In this case, how can we effectively create and target specific communication efforts to these populations in a manner that will make an impact? We need to change the way we address the ethical considerations regarding vulnerable populations, especially when thinking about Zika.

The final panel consisted of guest speakers from Texas. **Amy L. Fairchild, PhD, MPH**, presented the history of panic, and why panic serves an important purpose when facilitating ethical discussions around public health issues. **Stephanie Morain, PhD, MPH**, represented Baylor University as she shared her Zika research progress, in addition to her perspective on working in Texas, the state with the second highest burden of Zika cases. Houston is the fourth largest city in the United States, with a high volume of travelers, making it a prime location for a disease outbreak. Her team's ultimate deliverable was to develop a Zika toolkit for clinical settings to assist with better ethical policymaking. Dr. Morain stressed the importance of increasing clinical

resources following the Zika outbreak in 2016, addressing important questions like, "Who is responsible for the patient?" and "Can we develop vaccines for pregnant women and children?" Additionally, two of the biggest challenges in Texas during the outbreak was confusion amongst pregnant women coming in for care and the lack of coordination between health care providers and systems. One result of the forum was advancing plans for future collaborations between Dr. Morain's Houston-based team and the Miami-based project that compares and contrasts the two cities' response to Zika.

Dr. Gelpi and **Kenneth Goodman, PhD**, Director of UM's Institute for Bioethics and Health Policy, concluded the event with remarks focused on looking towards the future of integrating public health ethics into public deliberation and disease outbreak responses.

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