

## Zika in Puerto Rico, 2016-2017: I Perspectives on the Social Crisis and Health Care Concerns

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**The social reaction to the Zika epidemic in Puerto Rico reached a confrontational climax regarding aerial fumigation with an organophosphate insecticide. The public drama has obscured multiple simultaneous controversies. This and a companion paper, based mostly on print and digital news reports, provide a context and description of the major controversies and examine the outcomes and their lessons for the protection of the public's health. Part I describes the social and sanitary environment, the first three months of the epidemic, and the debates related to religious, demographic, economic, political, and health care concerns. [P R Health Sci J 2018;37(Special Issue):S15-S23]**

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The social reaction to the Zika epidemic in Puerto Rico (PR) reached a climax in July 2016, regarding aerial fumigation with an organophosphate insecticide (dibrom, commercial name Naled). Despite unprecedented communication efforts from federal authorities, there was widespread belief that aerial fumigation was an experiment imposed by a metropolis on colonial citizens. The outcome, no spraying, was considered a victory for community agency, health, and the environment. This public drama has obscured multiple simultaneous controversies. Sustained improvement in public health is achieved by combined scientific and social advances. It is important for public health to frame the Naled confrontation broadly, to include the political tensions, the economic limitations, environmental concerns, and diminished government and health care services that also reached a flash point. This and a companion paper provide a context and description of the major controversies and examine the outcomes and their lessons for the protection of the public's health. Part I covers the social and sanitary environment, the first three months of the epidemic, and the debates related to religious, demographic, economic, political, and health care concerns. Part II covers the questions related to disease surveillance, health communication, epidemic control, and the outcomes from such public discussions (1).

### Methods

This is a chronicle from the perspective of an external observer with experience in dengue epidemics (transmitted, like Zika, by *Aedes aegypti* mosquitoes) (2). It examines the Zika outbreak based on news media: mostly print (predominantly a major newspaper), some radio and digital. Television and an ample crop of caricatures are not covered. The identification of journalistic sources is considered essential as a guide for future

analyses of these events, as the Archivo General de Puerto Rico holds essentially no documents from the Puerto Rico Department of Health (PRDH).

### Context of controversies

#### Political

Puerto Rico, a Spanish colony since 1493, became a United States (US) possession in 1898. Ultimate authority over the colony was vested in Congress. Constitutional adjustment to imperial power was provided by Supreme Court decisions that limited civil and electoral rights for residents of a territory categorized as "unincorporated" (not destined for statehood). Puerto Ricans were granted American citizenship in 1917, are subject to the military draft, and have served in all US conflicts since that time. American citizens in PR cannot vote for the President; they elect a Resident Commissioner with voice but no vote in the Chamber of Representatives. Successive acts of Congress structured the island's government and gave increasing participation (not control) to Puerto Ricans. A locally drafted constitution (which Congress amended, then approved) defined a new political status in 1952. "Commonwealth" was show-cased internationally as non-colonial. The elections of 2016 resulted in new administrations in both the PR and US governments.

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### Economic

From about 1935, government-sponsored development of infrastructure, public health, industrialization, and emigration to the US resulted in marked improvement in living standards and life expectancy. Outside capital was attracted by cheap labor, federal and local tax loopholes, and local government assistance. This economic model never provided full employment and came to an end in 1996 with repeal of federal tax code chapter 936 exemptions.

From 2001 to 2017, an estimated 50% of manufacturing jobs have been lost. In 2016, tourism contributed over \$8 million (8%) of the island's gross domestic product, and 68,500 (6.9%) of the jobs. A temporary government shutdown in 2006 (from lack of funds, and political disagreement between executive and legislative branches) marked the beginning of the present economic depression and massive emigration to the states. The lowest median household income for a state is \$40,000; for PR, \$19,000. Subsequent administrations, of different parties, have declared "state emergencies" to bypass regulatory procedures, to "fast track" measures said to reduce government employment and expenditure, improve infrastructure, and forestall a declaration of bankruptcy, given debts to bond-holders (ca. \$74,000 million) and pension plans (ca. \$49,000 million). Nevertheless, prominent members of government continued to authorize disbursements to benefit acquaintances and party supporters (3).

In 1984, for unexplained reasons, Congress excluded PR from US bankruptcy law. In June 2014, the territory legislated to regulate its declaration of bankruptcy, but the federal district court declared the law unconstitutional (*Franklin California Tax-Free Trust vs. Commonwealth of PR*, 6 February 2015). The ruling was appealed to the circuit court, and after defeat there, to the Supreme Court.

### Ecologic

An important component of the economic crisis is the energy supply network: heavily indebted, costly (with high carbon footprint), and fragile. To maintain service, recent administrations proposed environmentally aggressive solutions at great expense that came to naught and provoked widespread opposition, e.g., the northern and southern gas ducts, carbon and waste burning plants. The island environment has been subject to experiments (e. g., Agent Orange) or destruction (e. g., Navy bombing in Vieques and Culebra) by federal or private agencies, resulting in many Superfund sites, slated for cleanup at an undetermined future. There are ongoing confrontations between communities and developers in several locations, for example, regarding a waste-burning plant in Arecibo, a coal-burning energy plant in Guayama, and the disposal of its waste in Peñuelas and Humacao (4).

### Suspicion of large corporations and federal and local governments

A review of twentieth-century Puerto Rican history will identify events that justify the public's mistrust of large

corporations and federal and local governments, for example, legal tax-avoidance in sugar industries, with high dividends for investors and starvation wages for workers during the 1930s; the tactics of for-profit health insurance companies to maintain a return on investment; the "Rhoads case" (1931-1932), in which an investigator from Boston wrote a letter confessing having injected cancer and killed some patients (never appropriately investigated by government authorities, who considered it a bad "joke"); the early trials of oral contraceptives (1956-1960), in which deaths in study participants were not adequately followed-up; and the governments' tolerance of environmental damage, mentioned above (5).

It must be said there is a less known history of ethical, beneficial experiments, for example, the Anemia Clinics for treatment of hookworm infestation (early twentieth century); the clinical trials of isoniazid for prophylaxis of clinical tuberculosis (mid-century); the use of locally-produced polio vaccine in the 1963 vaccination campaign; the Veterans Administration study of anti-hypertensive medication to prevent cardiovascular complications; the first palliative treatment for pediatric AIDS; the interruption of perinatal HIV transmission; and a new rotavirus vaccine (6).

### Public health

A public network of clinics and hospitals, developed over sixty years, was privatized after 1994. Its patients became beneficiaries of a government-funded health insurance program, which covers 49% of the population and consumes 24% of PR's budget. The system's conversion and maintenance have become the overriding concerns of a PRDH with diminished prevention resources that depend on federal funding. Privatization of hospitals reduced the number of specialists (e.g., obstetricians) who train and stay in PR. Migration and the economic crisis have aggravated their scarcity. In 2014, infant mortality on the island (7.1) ranked with the ten highest state rates (US average, 5.9) (7).

The chikungunya (CHIK) epidemic of 2014, transmitted by *Ae. aegypti* mosquitoes, showed the weakness of PRDH in the face of a new disease. For CHIK's invalidating pain, no care protocols were produced; diagnostic tests were difficult to integrate into the practice of laboratories and physicians; the minimal vector control resources in existence were not reinforced – citizens were given responsibility for breeding-site elimination and mosquito-bite avoidance. The epidemic infected 24% of the population (over 800,000 persons), as suggested by the detection of CHIK virus or antibodies among blood donors (8).

### Announcement and first three months of the Zika epidemic

On May 30, 2015, the PRDH asked citizens to take preventive action against the foreseeable arrival of Zika virus. The year was marked by a severe drought and water-rationing, the administration's inability to stimulate the economy or tax revenues, the governor's declarations that public debt was

unpayable, and that he would not run for office in 2016 (also an electoral year in the US). On 31 December, the PRDH, through a media release from the US Centers for Disease Control and Prevention (CDC), reported the first confirmed autochthonous case of Zika in PR. According to later statements, the patient, an 80-year old man with multiple pre-existing medical conditions, had onset of symptoms on 23 November. Another 8 confirmed cases became ill in November and December (9).

The first three months of the epidemic set the stage for the major controversies that followed. The number of confirmed cases reported by government was only one (n=1) through most of January, as testing systems and surveillance for microcephaly were set up, international spread of the virus was announced, and CDC alerted travelers to the Caribbean of the risk of infection (10). On January 26, Secretary of Health Dr. Ana Ríos confirmed another 18 cases, decried the minimal impact of truck-mounted, ultra-low volume (ULV) fumigation (“5% of prevention”) and assigned the majority effort to citizens in their homes. The same news article reported the accumulation of over half a million used tires (well-known mosquito breeding sites) despite a November 2015 declaration of emergency by the Environmental Quality Board. The newspaper also presented news of Brazil’s mobilization of the army to fight the mosquito. That day, a former Secretary of Health (Dr. Johnny Rullán) proposed a multi-agency (National Guard included), public-private coalition to eliminate breeding sites. The following day, Secretary Ríos declared an influenza epidemic (5,699 cases, 492 hospitalizations, 5 deaths), but also announced a campaign for (ULV) fumigation in the municipalities with more Zika cases, alerted pregnant women to prevent mosquito bites, and advised postponing pregnancies “in the next months” (a position supported by a major newspaper’s editorial and a well-known columnist) (11).

On 1 February, the World Health Organization declared a public health emergency of international concern due to Zika’s highly suspected link with congenital malformations and neurologic complications (namely, Guillain-Barré syndrome, GBS). The PRDH issued a response protocol, the government opened five used-tire collection centers, and convened a meeting of agencies, with work to be synchronized under Rullán. Nevertheless, the government’s “Steering Committee against Zika”, was eventually led by the chief of the Emergency Management Agency, Fire Chief Ángel Crespo. That week, the president of the Hotel and Tourism Association reported some room cancellations, especially on destination weddings. On 5 February, government announced the first confirmed Zika infection in a pregnant woman and the first case of Zika-related GBS, and the newspaper provided information about sexual transmission. The governor declared a public health emergency, to reduce “foci of contagion” in 45 days. The Secretary advised citizens to also consider Zika as a sexually-transmitted disease, and to take the corresponding precautions. Condoms were added to price-control regulations for items related to Zika prevention and treatment. On 8 February, the government

sponsored a “plenary session” to provide information to health professionals and announce the arrival of CDC experts to support the Zika prevention efforts. President Obama asked Congress for a \$1,800 million appropriation to combat the disease, including at least \$250 million destined to supplement Medicaid funds for the health care system in PR (12).

An early mention of the “abortion dilemma” centered on its illegality in El Salvador and Brazil. Abortion is legal in PR, as decided by the US Supreme Court in *Roe v. Wade*, but is rarely discussed publicly. The Roman Catholic Archbishop in PR advised the faithful to reject the use of abortion to avoid the birth of affected children, and prophylactics to prevent pregnancies. Since Zika is a global problem, the issue was soon posed to Pope Francis, who considered the use of contraceptives a “lesser evil” when the baby had a high risk of birth defects (13).

Blood donations were suspended on 16 February. Meanwhile, diagnostic testing continued to present limitations in geographic and risk-group coverage and timeliness of results. Cuba also mobilized its army to fight Zika. At the end of February, private fumigation companies reported that ULV spraying had been “limited” (in an unspecified way) to comply with federal and local regulations. Nevertheless, citizens were encouraged to report mosquito breeding sites through internet and 3-1-1 (the telephone number to request government action). *The Washington Post* published an article (“Zika is expected to infect 1 in 5 Puerto Ricans”) which framed the epidemic as a “threat” to the US, and quoted CDC scientists on the need to test new insecticides, because those in use were ineffective. An editorial in the weekly *Claridad* denounced the “hysteria” of continental news media and revisited the history of experimentation with chemicals in PR (14).

The director of CDC (Dr. Thomas Frieden) visited PR in early March, by which time 157 cases had been confirmed, and anti-Zika prevention kits were being distributed to pregnant women. He published an op-ed column in Spanish, explaining the effects of the disease and the federal efforts to assist in its control, and was quoted as predicting 700,000 infected persons (20% of the population) and advising pregnant women not to visit the island. At the same time, the president of the PR chapter of the American College of Obstetricians and Gynecologists called for health insurance plans to cover contraceptives. It took a month for an executive order of the Secretary of Health to make such coverage mandatory (Administrative Order 350, 7 April). On March 16, Secretary Ríos announced the birth of a healthy baby to the first Zika-positive pregnant mother, and assured the child’s development would be followed by the PRDH. By the end of that week, 249 cases (including 24 pregnancies) had been confirmed, and CDC recommended the use of the insecticide deltamethrin for fumigations. Another article in a major US newspaper called PR the US’ “front line in a looming epidemic,” and described the difficulties encountered to control Zika. By the end of March, 350 confirmed cases (including 40 pregnancies) had been reported. A new screening method for blood collections allowed resumption on 4 April (15).

## Major controversies and unresolved questions on social and health care concerns

### Disease prevention vs. demography and religion

Zika's association with microcephaly placed the focus of public health action on pregnancy prevention and the protection of pregnant women. Its transmission through sexual contact was a surprise, as it is unknown in dengue and CHIK. Discussions of sexual relations, avoidance of conception, or pregnancy termination produce social controversy, and Secretary Ríus' advice to postpone pregnancies for an undefined period went against ongoing concerns about an aging, decreasing population (16). The Pope's reaction, mentioned above, was more nuanced than the archbishop's, but still a restatement of church teaching.

In August, the PR archdiocese organized parish teams to promote a Zika information and prevention campaign in neighborhoods. In September, after the media interviewed Zika-infected pregnant women, a columnist criticized the caution or silence with which the PRDH treated the option of abortion. Later that month, an article reported three spontaneous and three therapeutic abortions (induced for medical reasons) in pregnancies in which fetal abnormalities had been detected. The discussion of abortion policy that some international analysts posited did not emerge. *Love in times of Zika*, a play advertised in October and November, was a comedy about a marriage beset by trials: politics, economy, and epidemics (17).

### Public health vs. the economy

Early in February, the Hotel and Tourism Association noted the cancellation of some destination weddings. Hotel occupation was considered normal in March, but CDC's travel alert, and its projection of an 80% (sic) infection rate, which the industry considered "exaggerated," were blamed for the loss of over \$15 million in two months, mostly due to the relocation of conventions and corporate meetings. In May, two Major League baseball games were moved to Miami due to the players' concern about infection. The governor questioned their intelligence, the mayor of San Juan considered the decision based "on facts that are not reasonable." The loss of income was estimated at \$5 million. Angry fans expressed disbelief over the radio; a reporter asked government to demand more responsibility from CDC in its statements on PR; sports commentators wondered why this had not been a concern in previous dengue epidemics, why the games would move to Miami (where a Zika state of emergency had already been declared), and why the August Olympics in Brazil had not been cancelled. *Caribbean Business* asked its readers "Is the Zika virus an epidemic in Puerto Rico?" and 74% responded "No." Two weeks later, it published a column by the president of the Hotel and Tourism Association, asking CDC to "stick to just facts," because "Zika messaging with its editorial embellishment has moved into fear mongering." At that time, the total economic burden of the epidemic, including loss of tourism revenue, cost of hospitalizations and reduced productivity, was predicted at \$12 million. While the Caribbean hotel industry noticed decreased performance in the first four months of

2016, the local loss for that period was later estimated at \$44.5 million. Moody's Investors' Service was reported to have warned of a prolonged epidemic's negative impact on tourism (and the island's economy) (18).

On 12 August, the federal Department of Health and Human Services (DHHS) declared a public health emergency for PR. A major resort hotel advertised its longstanding mosquito control efforts using traps and fumigation with an "organic, non-toxic product." In September, the collegiate basketball "Puerto Rico Tip-Off," scheduled for November, was cancelled, at an estimated \$8 million loss for the economy. The exclusion of PR (attributed to Zika) from the first-round locations of the World Baseball Classic in March 2017 was estimated to have cost another \$10 million. Other cancellations are likely to have occurred. At the end of the year, the executive director of the PR Tourism Company stated, surprisingly, that the industry "had kept its upward momentum in 2016;" the cruise ship segment was the "star player." Another spokesman claimed a loss of \$56 million and a 5.5% reduction in hotel occupancy (19).

### Who is in charge?

On 9 June 2016, the US Supreme Court ruled that Congress, not the people of PR, is the ultimate source of the island government's power (*Sánchez Valle vs. Commonwealth of PR*). Four days later, it upheld a lower court ruling that federal law preempts any Commonwealth statute on debt restructuring (*PR v. Franklin California Tax-Free Trust*). On 30 June, president Obama signed the PR Oversight, Management, and Economic Stability Act (with the provocative acronym PROMESA), which established a Financial Oversight and Management Board appointed by Congress and President, to restructure debt and expedite the approval of critical infrastructure projects, with sovereign power over all branches of government. After a century of negotiation, PR's dependence on Congress had not changed since 1898, and the rights and obligations of island residents were still bound by the Supreme Court's decrees a hundred years before. These developments further eroded public trust in federal agencies and the governing party in PR, currently involved in a corruption scandal, and creator of the political status framed by the 1952 constitution (20).

At the same time, the response to the Zika epidemic often showed a federal face. The first case was announced by CDC. The direction of the local public health effort seemed initially divided between Dr. Ríus (Secretary of Health), Dr. Rullán (former Secretary), and Emergency Management Chief Crespo; then between PRDH and CDC. Its director, the secretaries of DHHS and Veterans' Affairs, and the Surgeon General visited PR (while Congress debated legislation for emergency funds) and addressed the public about the severity of the situation and its importance for the respective agencies (21). Their response to an epidemic in PR was unprecedented but, given the context and the absence of a local counterpart with the necessary expertise and public trust, underscored the asymmetry of colonial relationship.

### What is standard health care?

News on the medical attention for infected pregnant women and their offspring were only one facet of a discussion on the standard of health care in PR from pre-conception to infancy. Advice to defer pregnancy and to use barrier contraception to prevent transmission during intercourse was not easy to follow. Most birth control methods were not routinely covered by health insurance. A CDC study, released 25 March, cited 2008 data indicating that in PR, approximately 2 out of 3 pregnancies were unintended (compared with 1 out of 2 in the states). Contraceptive coverage faced unexpected obstacles: lack of supplies, delivery sites and trained providers; insufficient knowledge among women and men; and financial and administrative barriers for providers and patients. PRDH issued Administrative Order 350 (7 April 2016) to mandate coverage. A month later, and the day before the cancellation of Major League baseball games, the New York City Department of Health announced it would donate a million condoms to PR for Zika prevention efforts. In August, the announcement of a new program to provide free access to contraceptives (“Zika Contraception Access Network”) mentioned continuing difficulties with health insurance coverage. By mid-October, the combined efforts of PRO-Gyn (a civic organization of citizens and health professionals), CDC and the CDC Foundation had resulted in the training of 170 physicians. Continuing funding by the CDC Foundation, and assumption of the program by PRDH were announced in April 2017 (22).

CDC’s recommendations for the clinical follow-up of pregnant women, released on 19 January 2016, included serial blood tests for diagnosis and, if Zika-infected, fetal ultrasounds every 3–4 weeks for early detection of congenital anomalies. Diagnostic testing, from sample collection to reporting of results, proved difficult and slow for a long time. It was five days after the first report of an infected pregnant woman that the PRDH ordered the public health care insurance system to cover ultrasounds, and an amniocentesis at 15 weeks of gestation. Concern with Zika’s effect on fetal development was mentioned in the announcement of the epidemic’s first case. The PRDH promptly asked health professionals to report cases of microcephaly seen in the years 2013 to 2015, to establish past incidence, and from 2016 into the future. In mid-April, news media highlighted what they called CDC’s “certification” of the link between Zika and microcephaly. A month later, a spontaneous abortion of the first local case of Zika-associated microcephaly was reported. Shortly thereafter, the World Health Organization expanded the range of viral effects to include neurologic, auditory, and visual anomalies. The PRDH, in turn, included these manifestations in its congenital disease surveillance, announced a more specific protocol for infant measurement, and mandated the use of the metric system (Administrative Order 357, 28 September 2016) (23).

As the number of infected pregnant women increased (901 by 21 July), there was more discussion on the severity of the outcomes. A columnist complained of alarmism, noting that

media coverage implicitly equated pregnancy with contagion. Rullán warned repeatedly that many pregnant women were not getting tested, and stressed the need for more intensive mosquito control and prevention of sexual transmission. He provided a forecast of 640 births from Zika-infected mothers between October and December. At the same time, the PRDH prepared for “the worst scenario:” 100–270 infants with microcephaly born by mid-2017, although most babies born so far were “healthy”, or had “no cerebral damage”. At the end of August, with 1,244 infected pregnancies reported, the PRDH’s data came into question when the Secretary recognized that information on 3 infants and 9 fetuses with Zika-related malformations had “not reached our surveillance systems.” Officials of the PRDH quickly met with perinatologists and clarified its protocols (24).

In mid-October (2,231 infected pregnancies), Secretary Rius indicated that the first delivery of a pregnancy under surveillance with suspected congenital Zika syndrome (CZS) was due in November. She later announced a joint PRDH-CDC system for “active” surveillance to study the relationship between Zika infection in pregnant women and adverse effects during gestation, birth and infancy. Rullán questioned the PRDH’s data, and nine days later, the PRDH reported an unexpected birth, “in the last two weeks,” of a child with Zika-associated microcephaly. The mother, a migrant with visa but no health insurance, had not received prenatal care until late in the second trimester, and microcephaly was detected at delivery. No details on Zika diagnostic testing were provided. The infant’s mother allegedly found only one neurologist who accepted patients from the public health care insurance system, and the first available appointment was for ten months later. The disclosure produced a quick response from medical institutions and patient support groups. Nevertheless, follow-up by the media, four months later, revealed that, to get care, this and another child faced “endless vicissitudes” (25).

At the end of 2016, the discrepancy between almost 3,000 infected pregnant women and only 10 reported cases of congenital malformations was “full of mystery” for Rullán, who pointed to a lack of transparency in the government’s communications. Three months later (24 March), UPR School of Medicine researchers presented 44 infants born with Zika-related complications. The same day, a US-based news service for obstetricians and gynecologists revealed that “CDC stopped reporting adverse pregnancy outcomes in PR and the other US territories in early October,” that is, since the inception of the surveillance system announced by Secretary Rius, because PR was “not using the same inclusion criteria.” The PRDH indicated (according to an ambiguous newspaper text) that it was evaluating the criteria for microcephaly and other central nervous system problems, to determine if babies met them. The Department then reported 1,924 babies born of Zika-infected mothers, 12 with birth defects, 58 pregnancy losses, and about 800 pregnancies under surveillance (26).

In contrast, Rullán offered his prediction for the burden of CZS. He postulated a total 9,305 affected pregnancies, and

558 (6%) fetuses with CZS, of which half (279) would survive to delivery (close to the PRDH's August estimate of worst scenario: 270). He recommended diagnostic Zika testing for all infants whose mothers were not tested prenatally, so babies would benefit from early diagnosis. As the PRDH continued to "evaluate the metrics and other factors" for diagnosis, the number of cases with congenital defects increased from 16 to 38 in surveillance reports issued 7 April-2 June 2017 (data to 25 March and 20 May, respectively) (27).

Regarding the disagreement with CDC, a stateside article highlighted a personality clash between CDC and PRDH officials. Local-federal tensions are so common in complex outbreak investigations they can be considered part of the process. The fundamental divergence is more likely found in the choice between a sensitive or a specific case definition. The CDC approach in an epidemic is to "cast a broad net" with a sensitive case definition, to include all manifestations of disease and later separate the confirmed from the probable and the negative; as Rullán described it, "invite everyone to the party, and later choose who comes to the dining room." (28). A more specific, restrictive case definition will assure that all those labeled as cases are truly cases. This is not a trivial dispute; the options are constrained by the resources available for detection (public health surveillance and clinical assessments), and have consequences to be measured in dollars spent in health care coverage.

On 8 June, CDC released an analysis of pregnancy outcomes after maternal Zika infection in US territories, including PR, for all of 2016 and up to 25 April 2017. The data were aggregated, so no locality's results could be identified. The 2,549 completed pregnancies with laboratory evidence of recent possible Zika infection resulted in 97% liveborn infants and 3% pregnancy losses; 5% resulted in a fetus or infant with possible Zika-associated birth defects. When analysis was restricted to confirmed (nucleic acid test) Zika virus infection in the first trimester, 8% of fetuses or infants had a possible Zika-associated birth defect. A local report of these findings cited the PRDH's chief epidemiologist's explanation that data had been presented in the aggregate "by request of the territories, especially those with smaller populations, where it might be easy to identify the affected children." Another report added CDC's indication that from 22 June, all US territories, including PR, would use the same case definition for Zika-associated birth defects (29).

The official reports of cases with congenital defects increased by 1 to 4 cases every 2-3 weeks thereafter, to 47 reported on 4 August (data to 22 July). The small numbers prompted some columnists to regard the concern for birth defects as overblown, while clinicians warned against overconfidence, as reports would be influenced by delays in obtaining results, and lack of testing of pregnant women, especially after the expiration of the order for mandatory Zika testing in pregnancy. There is consensus that Zika virus produces microcephaly and other congenital problems, but the range of defects, and the possible cofactors for risk or protection remain to be determined. The last arboviral

surveillance summary for 2017 (week 52, to 30 December, reported 19 January 2018) indicated a cumulative 2016-2017 total of 40,630 confirmed cases, 4,134 pregnancies, and a total of 5 deaths with positive Zika tests, not including the GBS cases. The report issued 11 August (to 29 July, week 30) was the last to include information on GBS. Of 72 cases reported (53 with Zika infection, 19 "flavivirus cases"), 2 died. The report at the end of 2017 presented 49 cases with birth defects, but the report for week 3, 2018 (dated 9 February), reduced the number to 46, because three cases were reclassified as neural tube defects. The last report available at this writing, to 17 Mar (week 11) 2018, shows 50 cases with birth defects, and 4 with neural tube defects (30).

The companion article will examine questions related to disease surveillance, public communication, and control of the Zika epidemic, and the outcomes and lessons for the future (31).

## Resumen

La reacción social a la epidemia de Zika en Puerto Rico alcanzó su clímax en una confrontación sobre la fumigación aérea de un insecticida organofosforado. El drama público ha opacado múltiples controversias simultáneas. Este artículo y su continuación, basados principalmente en informes de prensa en papel y digital, proveen un contexto, describen las principales controversias y examinan los resultados y lecciones para la protección de la salud pública. La Parte I describe el ambiente social y sanitario, los primeros tres meses de la epidemia, y los debates relacionados con asuntos religiosos, demográficos, económicos, políticos y atención médica adecuada.

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 CB – Caribbean Business, San Juan (weekly); ND – El Nuevo Día, San Juan (daily); PAM – Parés Arroyo, M.; Vocero – El Vocero de Puerto Rico, San Juan (daily, Monday-Friday).
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