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HEALTH CARE ORGANIZATION AS A TECHNOLOGY FOR RESPONDING TO DENGUE EPIDEMICS: AN EXPERIENCE REPORT*

ORGANIZAÇÃO ASSISTENCIAL COMO TECNOLOGIA PARA RESPOSTA A EPIDEMIAS DE DENGUE: RELATO DE EXPERIÊNCIA

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RESUMO

Objetivo: Descrever a organização assistencial como uma tecnologia de cuidado a ser considerada na elaboração de planos de contingência para a resposta a epidemias de dengue. **Método:** Este relato de experiência descreve a organização assistencial desenvolvida pelo estado do Rio de Janeiro durante a epidemia de dengue em 2008. **Resultado:** A organização assistencial implementada como tecnologia de resposta à epidemia de dengue de 2008 foi estruturada sobre um sistema de saúde já sobrecarregado, evidenciando fragilidades dos serviços assistenciais e iniquidades em saúde. **Conclusão:** A desestruturação das redes de atenção à saúde e as vulnerabilidades sociais ressaltaram a necessidade de uma estruturação contínua, interdisciplinar/intersetorial e adaptativa dos processos envolvidos na elaboração de planos de resposta a emergências de saúde pública, de modo a mitigar seus impactos sobre as populações atingidas.

Descritores: Dengue; Epidemias; Saúde Pública; Preparação em Desastres; Emergências.

ABSTRACT

Objective: To describe health care organization as a care technology to be considered when developing contingency plans in response to dengue epidemics. **Method:** This experience report outlines the care organization implemented by the state of Rio de Janeiro during the 2008 dengue epidemic. **Results:** The care organization adopted as a response technology during the 2008 dengue epidemic was built on an already overwhelmed health system. This exposed weaknesses in service delivery and health inequities. **Conclusion:** The breakdown of health care networks and existing social vulnerabilities highlighted the need for continuous, interdisciplinary, intersectoral, and adaptive planning processes when designing public health emergency response plans. Such an approach is essential to minimize the impact on affected populations.

Descriptors: Dengue; Epidemics; Public Health; Disaster Preparedness; Emergencies.

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INTRODUCTION

Dengue epidemics are recognized as Public Health Emergencies (PHE) and natural disasters of biological origin. Their impact on morbidity and mortality is significant, both in Brazil and worldwide. These events exacerbate the challenges faced by health systems, which are often already strained by daily demands, and further compromise their ability to respond effectively[1]. Disasters should be seen as social phenomena because they are not purely natural events—they are shaped by human actions[2–4].

In social sciences, dengue epidemics have been described as syndemics—a term that refers to how diseases interact with each other in certain populations, often reflecting social and economic inequalities. This approach challenges the traditional view of diseases as separate issues and instead highlights how they are linked to social, economic, and environmental conditions[5-6].

Many health-related factors influence the rise in dengue cases in Brazil. These include the country's economic model, fragile health systems, poor urban planning, and lack of basic infrastructure. When combined with the high population density in urban areas, these conditions increase the spread and recurrence of arboviruses[7].

Between Epidemiological Weeks 01 and 24 of 2024, Brazil reported 5,987,599 probable dengue cases and 3,963 deaths. These numbers confirm that dengue remains a serious and persistent threat, and they show that the country's situation has barely changed since 2008[8].

Dengue care usually does not require expensive or complex technologies. It mainly involves basic care tools, such as clinical assessments and laboratory tests that are available at all levels of the health system. In this context, Primary Health Care (PHC) plays a vital role during dengue epidemics, especially when it is well-structured and supported by the broad coverage of the Family Health Strategy (FHS)[9–11]. This contribution depends on the efficient organization of services[9-10].

This study reports the lessons learned from the response to the 2008 dengue epidemic, which introduced an innovative care model as a health care technology aimed at reducing both the direct and indirect effects of the outbreak. It also encourages a rethinking of contingency plans, emphasizing the use of evidence-based technologies and clinical innovations. The experience described here focuses on the care strategies implemented by the State Department of Health and Civil Defense of Rio de Janeiro (SESDEC) in the city of Rio de Janeiro (MRJ). It highlights the processes and approaches used to strengthen preparedness and response measures for future epidemics, as outlined in formal contingency planning.

At that time, there were political disagreements about whether a dengue epidemic was taking place. The federal and state governments recognized the epidemic, but the municipal government denied it, arguing that only certain areas had epidemic-like conditions. This situation shows that governance plays a key role in epidemic response. It requires coordination across different sectors and the active involvement and engagement of communities.

This study aims to describe key elements of health care actions that should be included when developing contingency plans to respond to dengue epidemics.

METHOD

This is an experience report based on the authors' direct involvement in the 2008 dengue epidemic. One author coordinated the Hydration Centers (HC), while the other served as the nursing coordinator. These centers were created by the SESDEC as a care measure during the outbreak.

To place this practical experience within a theoretical context, the study is based on the idea that theories help analyze events or phenomena to better understand the real world. However, "no theory, no matter how well developed, can fully explain all phenomena and processes"[12]. The theoretical approach used here does not aim to provide a complete explanation. Instead, it focuses on understanding the phenomenon and reflecting on the practices used to respond to dengue epidemics.

RESULTS

During the 2008 dengue epidemic, the state of Rio de Janeiro (ERJ) reported 254,315 cases and 299 deaths. Of these, 51.7% of cases and 56.2% of deaths occurred in the MRJ[13].

The MRJ held 62.7% of the state's population and had a high population density. As a result, the city faced unequal access to services, housing shortages, unregulated growth of informal settlements, environmental degradation, depletion of natural resources, unemployment, marginalization, and social exclusion[14].

At the time, MRJ had 7,447 general hospital beds and 393 intensive care unit (ICU) beds. These were distributed across 16 emergency hospitals — eight municipal, five state, and three federal — and 11 state Emergency Care Units (UPAs)[15]. By December 2008, coverage by the Family Health Strategy (FHS) reached 3.7% of the population with fully staffed teams and 8.1% with partially implemented teams[16-17]. The dominant dengue serotype during that period was type 2, found in 81% of the samples tested in MRJ[18].

The large number of dengue cases caused a surge of patients at the main entry points of the health system. This led to overcrowding and long waiting lines, where dengue patients had to compete for care with others seeking routine services. In response, SESDEC began to plan actions that could directly improve the care response to the epidemic, together with the logistics needed to put those measures into practice[19]. The average monthly cost of these care actions was about R$ 6,127,880.04. This amount does not include the human resources provided by the Janeiro State Military Fire Department (CBMERJ) or the Armed Forces (FA)[19].

History and planning of care actions developed in response to the 2008 dengue epidemic

On March 19, 2008, the Minister of Health created a crisis committee in ERJ. It included representatives from the Health Surveillance Secretariat of the Ministry of Health, SESDEC, local health departments from ERJ, and subject-matter experts. On March 24, the State Government declared a state of emergency in the areas affected by dengue, through Decree No. 41.233[20].

On March 28, the Internal Crisis Management Office

(GIGC) for Dengue Response was activated under a structure set up by CBMERJ. The care operations at the HCs were led by a general coordinator, a CBMERJ officer, with support from logistics and nursing coordinators. These roles were held by civilian nurses from SESDEC[19].

At first, a 30-bed ward was opened at Getúlio Vargas State Hospital to care exclusively for dengue patients. The number of doctors and nurses at the Santa Cruz and Campo Grande UPAs was also increased, with extra support from CBMERJ personnel on additional shifts. However, these initial actions were not enough to significantly expand care capacity or meet the growing demand for treatment and hospitalization.

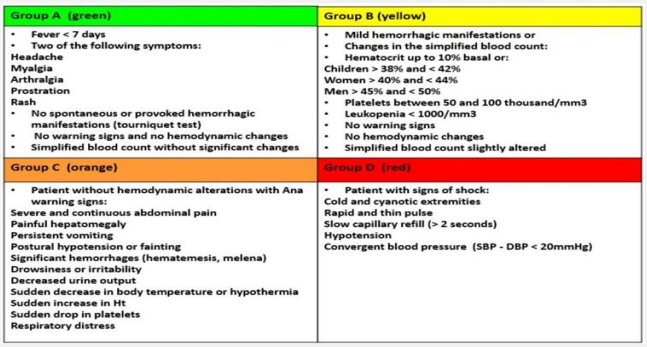
As a result, an emergency care model was created and put into action through the setup of HCs in strategic locations, guided by data from Epidemiological Surveillance. The size of each unit, number of chairs, lab tests, and intravenous hydration (IVH) services were planned based on the expected number of patients. The aim was to expand and support the care provided at the entry points of the health care network in ERJ and MRJ.

The first three HC were opened in tent format on March 24, 2008, in the neighborhoods of Jacarepaguá, Santa Cruz, and Campo Grande[19]. Additional centers were opened as staff became available. In total, 17 HC were established. Ten of them were hydration tents — temporary octanorm structures with canvas coverings — set up in Jacarepaguá, Santa Cruz, Campo Grande, Duque de Caxias, Penha, Angra dos Reis, Hospital do Andaraí, Gávea, Méier, and Belford Roxo. Seven others were set up inside existing health facilities, including units at Fiocruz, São João de Meriti, Mesquita, Campos, and the State Hospitals Eduardo Rabello, Albert Schweitzer, and Alberto Torres. The use of chairs was intended to expand observation areas and increase the number of IVH stations.

On March 31, 2008, the crisis committee, in coordination with the Ministry of Defense, set up the HCAMPS. Three units were opened: one operated by the Army and one by the Air Force, both located in MRJ, and one by the Navy, in Duque de Caxias[19].

The strategy aimed to expand access and reorganize the entry points of emergency services by redirecting patients to the HC and HCAMPS. This approach was designed to speed up the assessment of suspected dengue cases, allow early diagnosis and IVH in severe cases, and ensure daily clinical and laboratory monitoring. The goal was to prevent cases from worsening, reduce deaths, and lower the demand for hospital beds[19].

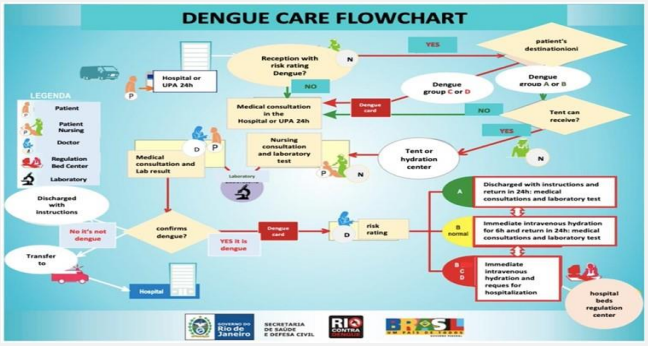
To redirect patients, dedicated medical triage areas were set up within the units. These areas referred probable dengue cases to the HC, using sanitary transport previously authorized by the nurse responsible for intake at the HC. At the HC, patients were first registered by administrative staff and then assessed by nurses. Nurses collected the clinical history, performed the tourniquet test, requested a complete blood count—with sample collection and processing done on-site—and classified cases as green, yellow, orange, or red, based on a dengue-specific protocol, different from the one used for other routine conditions (Figure 1). Nursing technicians were responsible for checking vital signs, weighing patients, and collecting blood samples[19].



Source: Adapted from SESDEC, 2008.

Figure 1 – Dengue: clinical management and risk classification. Rio de Janeiro, Brazil, 2008

Patients classified as green or yellow waited for their blood test results before seeing a physician. During this time, they received oral hydration and guidance on dengue prevention, while remaining under continuous observation and reassessment by nurses. Patients classified as orange or red were taken directly to treatment chairs for immediate IVH and medical evaluation. The care flowchart is shown in Figure 2[19].

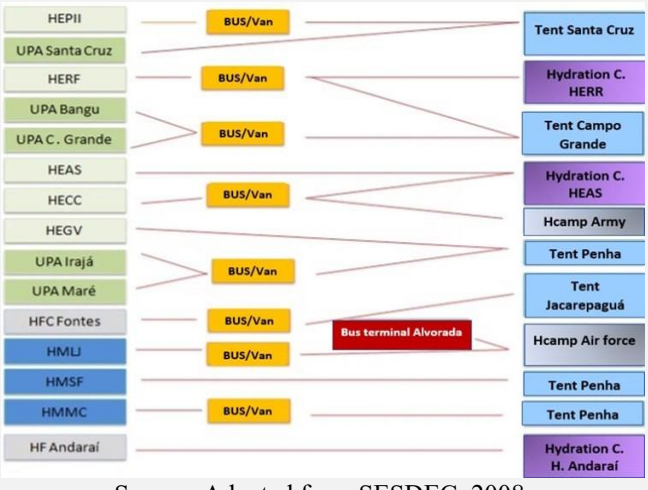


Source: Adapted from SESDEC, 2008.

Figure 2 – Flowchart for dengue patient care. Rio de Janeiro, Brazil, 2008

All patients received a dengue follow-up card and were assigned to an HC, with guaranteed daily clinical and laboratory reassessment until discharge[19].

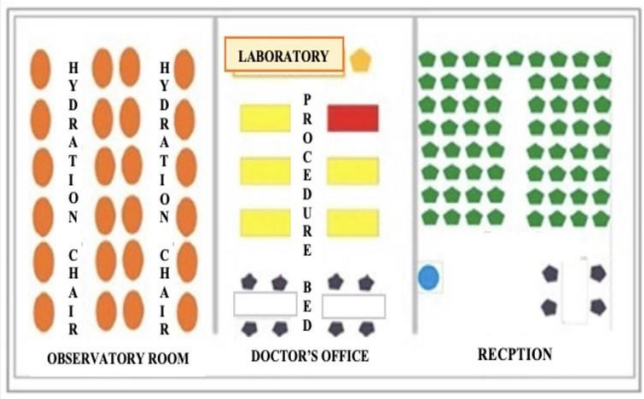
Sanitary transport from health units to the HC and HCAMPS was provided by buses and vans, serving all public health units in MRJ. The route is illustrated in Figure 3[19].



Source: Adapted from SESDEC, 2008.

Figure 3 - Sanitary transport route: health units and Hydration Centers. Rio de Janeiro, Brazil, 2008

The HC were organized into three main areas: one for registration, intake, and waiting; a second for medical care, lab test collection, and clinical laboratory operations, which included one resuscitation bed and three to four observation beds for procedures; and a third area used exclusively for IVH, equipped with IVH chairs. Each center had an on-site laboratory offering tests such as complete blood count and basic biochemistry. The goal was to ensure that blood count results were available within 3 h, making it possible to detect hemoconcentration and diagnose severe cases early, so IVH could begin immediately, as illustrated in Figure 4[19].



Source: Adapted from SESDEC, 2008.
Figure 4 – Schematic layout of the Hydration Centers. Rio de Janeiro, Brazil, 2008

The number of backup beds for dengue patients — provided by ERJ, MRJ, and the Ministry of Health — was expanded and managed through the Bed Regulation Center, operated by SESDEC. Patients were transported by ambulances from the Mobile Emergency Care Service (SAMU) or by CBMERJ[19].

The HC and HCAMPS had a combined daily capacity of 6,500 patient visits, 1,809 IVH procedures, and 13,000 laboratory tests. These numbers varied depending on the capacity of each unit, ranging from 300 to 800 patient visits, 72 to 240 IVH procedures, and 600 to 1,000 laboratory tests per unit.

Several measures were taken to expand the health workforce. CBMERJ reassigned staff from its health units and suspended physician dismissals. The ERJ government canceled vacations and leave, and returned health professionals who had been assigned to other agencies back to SESDEC. SESDEC also hired temporary staff, mainly nurses, and requested support from other states. In the HCAMPS, the workforce was provided by the military forces responsible for operating each unit. MRJ also suspended elective appointments to extend the operating hours of its health centers.

On average, each HC had a team of four physicians, four nurses, and one nursing assistant or technician for every seven IVH chairs.

The entire care structure was funded by the Ministry of Health, along with financial resources from the state and municipal governments.

As part of the risk communication strategy for dengue prevention and control, a website called *Rio Contra a Dengue* was launched. It provided information about the disease, including weekly updates on cases, hospitalizations, and deaths. The website also shared updates on other response actions, allowing the public to track the progress of the epidemic.

To ensure coordination, daily meetings were held among HC coordinators, and weekly meetings were organized by SESDEC with participation from the Armed Forces, HC coordination teams, and Epidemiological Surveillance.

As case numbers declined in some areas, the HC were either relocated to other regions or had their hours of operation reduced. All units were closed by May 30, 2008[19].

DISCUSSION

Lessons learned

Because there was no prior planning in 2008, emergency measures had to be created and implemented to reduce the effects of the epidemic. As a PHE, the outbreak had the potential to disrupt both social and health care routines. The level of social and health system impact is often linked to how well a society is organized to build resilience[10,21–23].

Dengue epidemic responses are still mostly reactive, rather than forward-looking or focused on reducing risk by addressing socio-environmental and economic vulnerabilities. These include poverty, inequality, violence, poor urban infrastructure — especially in informal settlements — inadequate waste collection, and irregular water supply. Together, these conditions create a cycle of insufficient prevention, recurring crises, losses, and rising demand for emergency responses. In most cases, reactive measures bring more visibility and quicker political gains to governments than preventive strategies[24–27].

In 2008, lack of coordination among political leaders delayed the response efforts, which may have contributed to the severity of the epidemic[28-29]. To plan and carry out the multisectoral and interdisciplinary actions needed at all levels, strong governance is essential. It must be able to coordinate logistics, manage human resources, and connect different actors within permanent spaces for strategic planning. The key question is not only what must be done, but also who will do it, with what resources, and how it will be implemented[28,30–32].

To support this process, the crisis committee — an important management tool — acts as a strategic planning structure that brings together different agencies and services. Its purpose is to coordinate emergency management actions jointly, both during the response phase and after the crisis, in the recovery phase[4,33]. The committee established by the Ministry of Health in 2008 made it possible to implement and legitimize dengue control efforts. It also served as a space for continuous monitoring and strategic planning.

Preparing contingency plans in advance is essential for organizing an effective response and plays a central role in managing PHEs. These plans help connect the different actors involved in planning, which can improve health care actions when an emergency occurs[4,34-35]. Municipal plans, developed based on guidelines from the Ministry of Health and reviewed by state health departments, support joint, coordinated, and aligned efforts — especially because dengue often extends beyond local and health system boundaries[10].

Joint efforts to develop coordinated and effective plans are essential, since the mere existence of pre-established plans does not guarantee the success of the actions taken. When planning is insufficient, the response tends to

be equally limited[36]. In this context, the Ministry of Health released support materials such as the *Guide for the Development of Contingency Plans*[37], the *Action Plan for the Reduction of Dengue and Other Arboviruses*[38] and the *National Contingency Plan for Dengue, Chikungunya, and Zika*[39].

In contingency planning, the care model developed in 2008 was later used in other PHEs. In 2009, ERJ and MRJ were prepared for another dengue outbreak and responded quickly to the Influenza A (H1N1 subtype) epidemic by adapting previously air-conditioned centers into naturally ventilated and open-air structures[40]. During the 2012 dengue epidemic in MRJ, intake centers were set up within existing health units, helping to reduce the cost of the temporary octanorm structures. The model continued to be adapted over the years and was used again in the 2024 dengue epidemic, under the name *Polos de Atendimento de Dengue*. Ten centers were opened, each operating 12 hours a day, to support the PHC system, which had already been expanded[41]. Other states also adopted this model, with technical support from ERJ, and it became the basis for the Ministry of Health's service organization manual[9-10]. During the COVID-19 pandemic, the same cohort-based model — with structured intake and effective, qualified care — was once again used in ERJ and MRJ[42].

Another key issue in planning is how to address case underreporting[29]. Data from epidemiological surveillance help guide actions that strengthen comprehensive health care. These actions are territory-based and aim to reduce socio-environmental and health inequalities, promoting more equitable access to care[4]. In 2008, health professionals working in the tents did not report cases directly, which likely led to data loss. Attendance spreadsheets and bulletins were sent to SESDEC epidemiological surveillance team for later reporting. This issue can be resolved by assigning staff specifically for this task, avoiding added responsibilities for the care teams[43].

Another important issue concerns the health workforce, which is often a critical factor in PHE. Such professionals, usually trained in similar institutions and disciplines, may be highly specialized but still require specific training for the care tasks demanded in emergency situations[4,21,23,28]. Using standardized protocols — developed by specialists from different fields and grounded in the best available scientific evidence — can play a direct role in reducing disease mortality[21,28-29,32,44-46].

The implementation of care actions in 2008 required multiple strategies to recruit health professionals. These actions were based on a multidisciplinary care model, with nurses taking the lead in identifying and managing potentially severe cases early—before patients were seen by a physician—using an adapted risk classification tool. Among the health professionals needed to start operations in the tents, physicians were the most difficult to recruit. To address this shortage, SESDEC asked other state health departments to send physicians to support ERJ. This recurring need to expand the health workforce during PHEs led the Ministry of Health to propose the creation of the National SUS Force (FNSUS) in 2008. It was officially established by presidential decree in 2011[47], following the socio-environmental disaster in the mountainous region of ERJ that year. Since then, FNSUS has been used by the Ministry of Health in several emergency situations across Brazil.

Risk communication and social mobilization are also essential components of contingency plans. These strategies help build trust between public officials and communities by sharing information and encouraging the exchange of health knowledge. When well coordinated, they can reduce fear and uncertainty, prevent infodemics and misinformation, humanize the emergency response, and strengthen local operations by involving the community in designing and validating response actions[48-50]. In 2008, poor communication between authorities and the public led to mistrust of official data on dengue cases and deaths. This contributed to fear and insecurity, as many people believed the situation was out of the government's control[21,28,30,32,45].

The tents used in 2008 were created to fill the gap left by the lack of PHC. At that time, urgent procurement and hiring processes were needed to support care operations. These processes were often expensive, complex, and more exposed to external interference. Today, that model has been replaced by a more organized and qualified structure, supported by better-designed contingency plans. In this new context, tools that streamline case monitoring have become importante — such as the arbovirus case update portal[51], the e-SUS electronic medical record system[52], and mobile or web-based apps that help classify risk and guide clinical management, replacing printed desk or pocket materials. One example is the app developed by the Rio de Janeiro State Health Department, available on its official website[53]. This progress is supported by better advance planning for procurement and hiring, and by PHC units taking the lead in delivering care.

PHC is recognized as the main entry point and coordinator of health services across the territory, with local governments serving as its main managers[23,54]. Over time, accumulated knowledge and experience have helped develop better ways to care for dengue patients, reducing the need for exceptional measures and strengthening PHC as the first point of care. As a result, PHC now plays an integrated role in the broader Health Care Network (RAS), activating other levels of care when needed.

Another key aspect of planning is the role of public policies, which connect the State, government officials, and the public. These policies are meant to serve the population. To be effective in preparing for and responding to PHEs, such policies must consider the territory as a whole and be carried out in a cross-sectoral way. The goal is not just to define a starting point, but to understand and address the many factors that make people vulnerable in their social environments[22,55-56]. Ultimately, planning must move beyond ideas and become part of social practice. It must go further than global guidelines and consider local needs and conditions[1,23].

CONCLUSION

In line with the aim of this study, the analysis of the actions implemented shows that the care model developed can be applied to other dengue epidemics, including those with pre-established response plans.

Grounded in evidence-based practices, this model can be further improved and incorporated into contingency plans in a proactive and structured way — rather than relying solely on reactive and emergency-driven approaches. Reactive responses are not only outdated but also place additional

strain on an already overburdened public health system.

There is a need to rethink how care is delivered during PHEs, highlighting the importance of a multiprofessional approach, with a particular emphasis on the role of nursing — not just on medical care. Team-based work helps reduce wait times and enables faster interventions in conditions that pose a risk to life.

It is not possible to say whether the epidemic would have followed a different course or duration without the actions that were taken. This study did not aim to assess the effectiveness of the model but rather to understand how it worked in practice. Since the focus was not on preventing illness but on controlling the epidemic and reducing severe cases and deaths, the care strategies adopted appear to have aligned with those goals. By expanding the entry points of the RAS through the implementation of HCs, the response helped shorten wait times, speed up care, support quick risk classification, and allow for early detection of severe cases. These patients received immediate IVH and were transferred in a timely and regulated manner for hospital admission. These strategies have the potential to reduce dengue mortality.

The impact of the 2008 epidemic on the population was shaped by both existing vulnerabilities and the health system's response capacity. Despite the many public policies adopted over the years, society continues to feel the effects of how PHEs have been normalized. Current dengue case and death rates suggest that, nationally, little has changed.

Long-term solutions — such as investing in healthy housing, building sustainable and resilient cities, advancing new vector control technologies, and developing vaccines suitable for large-scale use — could help change this scenario.

Although there are already viable contingency strategies, this issue remains open. The greatest challenge now may be turning ideas into concrete action. This is the task facing decision-makers, public policy, science in general, and, above all, public and collective health.

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CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

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