

## **Governance of Emergency Health Networks: Tackling the Zika Epidemic and Microcephaly<sup>1</sup>**

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### **Abstract**

Emergency health networks are vital for rapidly identifying and responding to the health risks reported in the third Sustainable Development Goal, particularly for the capacity for rapid mobilization and response to risks. This study, based on the network formed to face the Zika epidemic in Brazil from 2015, aims to identify and describe the distinctive characteristics of the processes of constitution and governance of emergency health networks. From the study of the case and information collected in depth interviews with 12 experts who participated in the network at different times, the study analyzes the distinctive characteristics of the governance of this network, using the typology proposed by Provan and Kenis (2008). The results obtained brought new perspectives to know the challenges of such networks, such as the coordination of institutional and individual actors, conflicts, network leadership, learning and mobilization to face health emergencies, when proving the causality of the effects of the virus challenges the need for urgency in the responses.

**Key words:** governance; emergency health networks; Zika; case study

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## 1. Introduction

In 2000, the 191 member countries of the United Nations identified the need to promote global sustainable development, which led to the definition of a set of eight macro-objectives to be achieved by 2015, defined as the Millennium Development Goals, deployed in 22 goals and 48 indicators. In 2015, these goals were revisited around 17 Sustainable Development Goals (SDG), reorienting their reach to the year 2030.

The construction of these international agreements, materialized in the SDG proposal, reflects a need for global coordination to face the major challenges that, by their nature, do not allow unique national solutions. Pollution, peace, sustainability, sanitation, and even employment and health are examples of the need for coordinated international confrontation. More specifically in the case of health, the intensity of world trade, migration, tourist flow and speed of movement show the difficulty of combating health problems, and especially health crises, only through national policies or attempts (harmless) of creating barriers.

Among these objectives, the third refers to "Ensuring a healthy life and promoting well-being for all, at all ages", which presents a particularly complex challenge for emerging countries. In these, fragilities in health care networks, health infrastructure, food and education, among many others, are barriers to achieving a healthy life for the population. These fragilities also present an additional challenge, which is also unique due to the difficulty of responding to national and global health risks, with early warning and risk reduction. The epidemic of Zika virus, which has spread in the country since 2015, as well as several other recent epidemics associated with arboviruses (dengue, Chickungunha, yellow fever) has shown the difficulties of mitigating impacts and risks.

The study of the Zika case also reveals the development of a mechanism to cope with the epidemic that has aligned countless public and private actors in articulated and aligned actions in a non-hierarchical system, characteristic of networks. Unlike typical interorganizational networks, the network formed had its nature associated with an emergency, when the roles of the actors and the coordination mechanisms are not clearly defined, and the sanitary problem, which brings an urgency and criticality that, at times, can approach social panic situations. The possibility of rapid training of a network to respond to health threats, with the mobilization and participation of relevant actors, is a fundamental condition for an effective response, but this training presents unique challenges.

Networks represent adequate training to deal with the contemporary problems of public administration, allowing tacit and non-hierarchical agreements between various instances of public administration, private companies and third sector organizations, also involving transnational actors. For Osborne (2006), the networks represent a relevant instance in the dynamics brought by New Public Governance, a paradigm that includes distinct solutions for state action against previous managerial models.

However, the study of networks still shows many challenges and gaps. If the Agranoff and McGuire (2001) analysis allowed a better understanding of its formation and operation, network governance, as well as other non-hierarchical structures, is less well known. As leaderships and centralities are formed, how small networks join a larger network, the role of informal ties to the network's formation and governance, are examples of questions that persist in the field. Another important dimension, which

distinguishes a particular configuration from the networks, is the nature of its constitution, whether permanent or constituted to deal with or respond to a specific situation, such as emergency networks. In these cases, they are often oriented to situations that require innovative responses, with less possibilities of prior organization; their governance also shows distinct characteristics brought by the greater centrality of public organizations and, as in the case of health, by overlapping with permanent international academic networks, capable of articulating responses to events.

## **2. Theoretical framework: networks description, topology and governance**

Networks can be defined as "a set of nodes (e.g. persons, organizations) linked by a set of social relationships (e.g. friendships, transfer of funds, overlapping membership) of a specified type" (Laumann et al., 1978, p.458). Agranoff & McGuire (2001, p.296), in one of the reference texts in the descriptive line on the subject, define network as "multi organizational arrangements for solving problems that cannot be achieved, or achieved easily, by single organizations". Involving different actors and organizations or nodes, linked around common goals, also represent a possibility of decentralization of state action.

Brooks, Bodeau, & Fedorowicz (2012, p. 913) corroborate the importance of a collaborative process in the governance of emergency networks by stating, "effective response to emergencies or other forms of crisis depends on collaboration between public and network agencies - formal and informal". However, they point out that the management of emergency networks and response to crises is still a poorly studied area.

The role of network governance involves the use of institutions and structures of authority or collaboration necessary for resource allocation, coordination and control of joint action (Provan & Kenis, 2008), as well as management of formal and informal network structures. The network is seen as a coordination mechanism, or what has often been called network governance.

Provan and Kenis (2008) identify three possible types of network governance: (i) governed by the participants, which can be highly decentralized, involving the majority or all network members interacting relatively evenly in a shared governance process of participants, generally operating with a strong consensus on the objectives; (ii) governance by conducting organization, when key decisions and activities of the network are coordinated by a particular member, and network governance becomes highly centralized and intermediated, with power asymmetries; and (iii) managed network, when a separate entity, not a member of the network, acts to govern the network and its activities, so that the network becomes externally governed. These three forms, for the authors, would follow an increasing function in terms of the number of participants that would be accommodated in the networks.

Networks are fundamental to dealing with unstable or emergency situations, although in these cases their formation and governance may have other logics. No government is immune to crises and chaos in situations of major disasters that can cause failures in physical systems or even political changes (Farazmand, 2007). According to global data from the Center for Research on the Epidemiology of Disasters, in 2017 a total of 335 natural disasters affected more than 95.6 million people, killing an additional 9,697, with costs totaling \$ 335 billion. Although Asia accounted for 44 percent of all disasters, 58 percent of all deaths and 70 percent of the total number of people affected, the Americas

recorded the greatest economic losses, accounting for 88 percent of the total cost of 93 disasters (Wallemacq, Below, & Mclean, 2017).

If in the case of mass disasters potential damages can be mitigated with adequate emergency planning (Herzog, 2007), this is not always possible in other critical contexts, such as epidemics and health crises. Particularly in these contexts, the sociopolitical role of networks is still poorly understood, varying from a view that asserts that very political polarization is increasing and an alternative view that proposes to broaden harmony and tolerance (Elmedni, 2016).

Health threats can justify the mobilization of an international health care network, connecting local politicians to numerous multilateral agencies and other actors. For Han et al. (2008) these networks, in addition to bringing knowledge, standards and material resources, guide the speed and depth of the involvement of the authorities with this new knowledge and norms, depending on the centrality of the country in the network, and amplifies access to a more diversified range of information and perspectives.

### **3. Research design, approach and method**

The study of the formation and governance of the emergency network constituted to confront the Zika virus epidemic in Brazil was the basis of the methodology, developed following a sequence of steps involving: the synthesis of the literature on emergency network governance; interviews; construction and evaluation of the categories associated with the phenomenon; and theorization.

Thus, initially, a review of the theoretical framework was carried out focusing on the main characteristics of network governance, and on the constitution and operation of emergency networks. Differently from the descriptive and topological nature predominant in network studies, which generally do not consider the network itself as a unit of analysis (Provan & Kenis, 2008), it was sought to identify the characteristics of networks as a mechanism of coordination or governance. This reference allowed elaborating the research questions that guided the study.

Once the selection of Zika case for analysis, due to the emergency nature of formation and coordination of the network, the next step was the analysis of documentary material from Fiocruz, Ministry of Health (MOH), Pan American Health Organization (PAHO), and academic texts related to the epidemic. With this, it was possible to reconstitute the trajectory of the sanitary crisis brought by Zika; to identify the role and action of the main actors in their confrontation; and to understand the main elements of the constitution and functioning of the emergency network formed.

Subsequently, a semi-structured interview script was developed and applied to twelve specialists who participated in the network at different times. Each interview was transcribed and analyzed by more than one researcher, based on the coding methods proposed by grounded theory (Corbin & Strauss, 1990).

The material was submitted to Open Coding, with the organization of the data in similarities and differences; followed by Axial Coding, in which provisional hypothetical relationships between the data are identified. The interviewees' speeches were then classified into categories and their convergences or divergences were analyzed. Then, the Selective Codification was carried out, in which it was sought to unify the preliminary

categories into a single "central" category, which synthesizes the phenomenon under study. Subsequently, knowledge gaps were highlighted and described.

Both in the interview phase and in coding and analysis phase, at least two researchers performed each activity, individually, as a way to reduce potential trial biases. The evaluations of the researchers were discussed and consolidated in work meetings, seeking the convergence of the categories elaborated and the analysis.

In the end, a workshop was held with the researchers and guests, where the material of the interviews, classified into the categories and the analysis of the convergences, was discussed in search of its meaning.

#### **4. Case description: the Zika virus epidemic**

In Brazil, at the end of 2014, an outbreak of an acute exanthematous disease, characterized by low or no fever, exanthema, intense pruritus, sometimes accompanied by arthralgia, joint edema and conjunctivitis (BRAZIL, 2015) emerged in the Northeast of the country. At that time, hundreds of cases filled the clinical and private emergencies that, guided by official epidemiological surveillance systems, reported as a milder form of dengue, "mild dengue" or "denguinho" (Luz, Santos, & Vieira, 2015). The rapid spread of the disease, in different northeastern cities, simultaneously suggested the possibility of vector-borne disease. Clinicians and infectious disease specialists insisted that this was a different clinical picture of dengue and chikungunya, arboviruses circulating in the Brazilian Northeast. In March 2015, the clinical hypothesis of Zika was confirmed in blood samples. In May of this year, MOH confirms the circulation of the Zika virus in Brazil (PAHO, 2015).

It is possible to consider three major phases in this confrontation: the first one, when the hypothesis revolved around classical Zika, a disease already known and that did not present great risks to the health of those affected; a second phase, when the relation of the disease with neurological problems was confirmed; and a third phase, when the disease was related to cases of microcephaly (Brito, 2017).

In the first phase, the mobilization of an informal network, via WhatsApp, made up of infectious disease specialists, initially prevailed. This network was constituted because of the investigation of the chikungunya epidemic in the State of Bahia, Northeast of Brazil. Due to the characteristics of a new case, which did not have any relation with known cases in its set of symptoms and geographic disposition of the occurrences, the professionals of the assistance forwarded the samples that confirmed the diagnosis of circulation of the virus in the country, also informally, to the Reference Laboratories.

The second phase, in the second quarter of 2015, was characterized by an increase in the number of cases of patients with neurological manifestations, with possible viral etiology, confirming the association with Zika in June 2015 (Araújo, Ferreira, & Nascimento, 2016). At this stage, the interaction of care physicians (neurologists and infectious disease specialists) fostered suspicion and referral of samples for diagnosis (Brito, 2017).

The last phase was characterized by the microcephaly epidemic. In October 2015, the State Department of Health of Pernambuco (SES) notified the MOH about the occurrence of a number of cases of babies born with microcephaly much larger than the average of the last few years, in a short period. The MOH organized a team of several institutions to

investigate such occurrences and, at the beginning of November, the MOH declared Emergency in Public Health of National Importance (ESPIN) for altering the pattern of microcephaly occurrence in Brazil (BRASIL, 2015). Later that month, a physician specialized in Fetal Medicine of Paraíba, Northeast of Brazil, identified signs of microcephaly in pregnant women in the 5th month of pregnancy, and the presence of the Zika virus was confirmed in the examination in the amniotic fluid (Melo et al, 2016). Then, there was intense national mobilization, both in management spheres, as well as in research institutions and in different channels of communication, given the social impact of the epidemic (Diniz, 2016). In February 2016, the World Health Organization announced the Public Health Emergency of International Importance, based on cases of microcephaly and other neurological disorders reported in Brazil (PAHO, 2016), which arouses the interest of the international scientific community to participate on investigations in progress in Brazil.

## 5. Main findings

A first step in the analysis, based on both the literature review and a preliminary reading of the interview reports, was oriented towards understanding the scope of the study: there are differences between health emergency networks and networks to attend to disaster situations, more studied in the literature. The analysis and discussion of interview material allowed identifying common points among these emergency networks, highlighting the importance of communication among network actors, breaking intra and interorganizational hierarchical chains, pre-established processes and flows to streamline emergency responses, with possible negative consequences and "fissures" in later relationships and in the success and effectiveness of the response. In fact, the differences predominate, as summarized in Table 1.

**Table 1: Differences between disaster response networks and health emergencies**

<b>Disasters</b>	<b>Health Emergencies</b>
Networks in part previously organized by the institutions: network formed "hierarchically" by the command of the disaster.	Networks have a pre-existing organization formed by researchers and by the official health institutions (SUS): actors from the institutions that form the network.
Ending: There is a point generator fact.	Continuity: the emergency is not exhausted in the generating fact, requiring a continuity of attention.
Response to society: brief and immediate.	Response to society: intense and might be prolonged depending on the consequences for an undetermined period; to be continued.
Generator suit brings strong social commotion.	Social concerns can grow, according to the perception of risk, from fear to panic.
Objective: organize actions related to the event. Correct the Past.	Objective: To avoid propagation of the emergency. Prevent the future.
Disaster visible, concrete and unquestionable.	Less visible, requires construction (accumulation) of evidence, usually based on scientific research. Sometimes it is not possible to identify and show severity of impacts and causality. Not all consequences are known. Different critical point

	to trigger the network, except if the critical illness is known (e.g. Ebola).
Communication strategy: transparency and actions taken.	Communication strategy: raising awareness, preventing against greater panic; information.
Short and immediate political impact.	Long-term political impact (possibly growing).
Impacts and foreseeable consequences.	Consequences not fully understood or predictable (social dynamics). Other possible long-term significant impacts (e.g. microcephaly).
Disaster preparedness and response plan can be designed previously, usually already existing.	Plan of preparation and response more contingent, with difficulty to be drawn ex-ante in unknown diseases.
Critical point to form the obvious network.	Critical point to form the network needs proof, and mainly shows itself influenced if the evidence is collected in emerging countries.

In the next step, with the development of open coding, 17 analytical categories were identified, rearranged in the axial coding phase for five categories, the results of which are summarized below.

The governance of the network was of an emerging nature, to the point of declaration of health emergency by the government. The discourse of the interviewees, on the other hand, points to a less discussed side in the networks, that is, the fundamental role of networks and personal interactions, among researchers of several institutions, which began to communicate with great frequency, mainly via WhatsApp, mapping the occurrence of the epidemic since the beginning of its identification. There are numerous researchers, physicians and administrators reported by the interviewees, who have established intense communication and ample coverage.

The interviews carried out revealed that, in the process of forming the networks, two main aspects were highlighted: i) the informal relationship between the actors, who communicated preferably through WhatsApp; and ii) the performance of international institutions and organizations, which was based on formal instruments that marked the actions. In the informal network, direct communication between the actors, care workers, researchers and heads of Reference Laboratories working in the field of arboviruses (dengue and chikungunya were occurring in other Brazilian states) already had some level of interaction. Thus, in the Zika case, both the clinical suspicion of the circulation of the virus in the country and its confirmation occurred because of a discussion between the care physicians, via WhatsApp, with the subsequent referral of the blood samples for analysis and diagnostic confirmation.

As the network became more formalized, assuming an institutional character, conflicts of objectives and responsibilities began: *“They are my patients, I assure my”* ... (E3), or *“I will tell you, whenever there is an outbreak, there is a conflict between those who are seeing the patient and the surveillance”*(E9).

As mentioned by most of the interviewees, the reports revealed the existence of conflicts of interest among the participants of the network, such as competition between

researchers, groups and research institutions, in search of prestige and recognition, a scenario that is characteristic of the research universe: *"It's a lot of vanity ... research brings that a lot"* (E4). The same informants, however, pointed out that this conflict was overcome by the common goal of knowing and offering answers to society. The advance of the epidemic also confronted the responsibilities of the actors, and the academic side versus public management has been highlighted several times. *"If you put two researchers who have similar objects of study in common from the point of view of object, method, access to resources and so on, you have to remember that this network is a cooperating and disputing network"*(E6).

In general, from the interviewees' reports, three aspects can be highlighted regarding conflict management and coordination: (i) the common objective of those involved in responding to society, which seemed to overcome the preexisting differences; (ii) the relevance of the coordination role of MOH to research actions, considering the peculiarities of a network that cooperates and contests; and (iii) the conflict of interest with political bias, where the hierarchy prevailed.

From the interviewees' speeches, one can also see the complexity of the network formed, mixing national and international institutions, public and private, researchers and individual actors, and the internal networks themselves, forming a network of networks:

*So, the Network is a hierarchical network as well. It has national reference laboratory, regional reference laboratory and laboratories, which are state and central laboratories....* (E2)

The nature and complexity of the internal network was registered with the Oswaldo Cruz Foundation (Fiocruz), a research institution with a fundamental role in the operation of the network, in a process that also generated its own conflicts:

*Fiocruz is not exactly unique in a sense. It is unique institutionally, but its units have autonomous character as decision-making processes and the nature of our work ...* (E4).

*I am just wanting to say what is next, what does it mean to network coordinate? I am not coordinating a network of ... technicians, I am coordinating a network of qualified professionals with a high degree of autonomy within units, and there I am speaking organizations that themselves have autonomy and cooperate and dispute* (E6).

A somewhat unusual aspect that emerged in the interviewees' reports was the resistance, or doubts, about the knowledge and findings of the Brazilian researchers, which brought barriers to communication and the balance of cooperation, and this resistance occurred at both the national and international levels. This skepticism may also indicate attempts to monopolize the knowledge associated with the information and coping with the virus.

*For me, the main problems were the internal resistance of some scientific societies, which I spoke about earlier, internally and with WHO itself with this reasonable and expected skepticism ... At the moment WHO declared an international emergency, there were still very important people in the Brazilian scientific*



*community who questioned that this was all a bluff, that it was something else (E3).*

The activation of the network is also a challenge to governance, since it usually marks the moment when informal negotiations are filed and disciplined, a role assumed by the MOH with the participation of the Presidential Civil House. In fact, declaring a sanitary emergency has significant political, economic and social impacts, including on the international flow of trade and tourists with the country. In addition, the interviewees pointed out the difficulty of establishing the causality between Zika and microcephaly:

*To demonstrate causality, we have to have a series of criteria, studies, basic research, finally, a series, we all know this ... when an outbreak is declared if the emergency system is activated, the person in charge of the emergency in the country has the direct contact with the country. (E3).*

It was also highlighted the role of the government assuming coordination of the network. This leadership allowed not only mobilizing resources from various public agents, but also coordinating the relationship with international health institutions:

*Quickly the ministry tried to set up the national network, I remember taking part as a representative of Fiocruz in some meetings, that ended up to be held in the Planalto Palace and not in the Ministry of Health due to the severity of the situation. There he brought together in this network sponsors, technology providers and so on. (E3).*

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*Fiocruz it is not exactly unique in a sense. It is unique institutionally, but its units have autonomous character as decision-making processes and the nature of work ... (E4).*

*What I want to say is what does it mean to be a network coordinator? I am not coordinating a network of technicians; I am coordinating a network of qualified professionals with a high degree of autonomy within units. I am talking about organizations that themselves also have autonomy, cooperate, and dispute (E6).*

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The interviewees' report showed that, when officially decreed a public health emergency, there is a greater flexibility of the bureaucracy existing in the Public Administration for the provision of financial resources to the areas in need. In the case of the emergency related to Zika, this facilitated, for example, the hiring of professionals to act in the emergency, the provision of inputs for reference laboratories and the mobilization of resources for research investment, obtained more quickly from other sources financing. In this case, some forms of resource allocation for research in the area were mentioned. One of them was, according to interviewee E3, "when the Ministry of Health, through the Pan American Health Organization (PAHO), puts funds in terms of cooperation."

Although well documented the process of formation of the network, less characterized is its demobilization. An important event in this regard, as highlighted in the interviews, occurred in May 2017, when the Ministry of Health announced the end of the national emergency for Zika and microcephaly - the measure occurs due to the decrease in the number of cases of Zika and microcephaly. Actions to confront the *Aedes Aegyptus*

mosquito and assistance to children and mothers will be maintained, according to Mr. Adeilson Cavalcante, Secretary of Health Surveillance (Brazil, 2017).

The communication and information systems played a fundamental role in the emergency network that was formed for the Zika case, according to interviewees. A first aspect to be highlighted in the consolidation of these interviews was the influence of the media and public opinion as elements of strong social pressure in decision-making, by researchers, institutions and instances of the health system. At the center of the debate, some questions were raised: how and when to communicate society so as not to cause panic? How to respond to strong pressure for answers that do not yet exist?

*Anyone who has to say that an epidemic is occurring, regardless of the epidemic, is the sanitary authority, the health authority. It is not a newspaper, it is not a television. (...) Today, what do you see? The media walks up, showing the full units, one day the guy says, "Yeah, I do not know what," and he admits he is. It cannot be so. It is a mistake, because denying reality, you demobilize the governmental machine, you do not buy the inputs, you do not organize the network, you do not train professionals, and you do not ask for help from the population ... (E11).*

One difficulty arose with what E3 called "rumors". *"Rumor is so important. (...) in the situation room we have a specific person to capture rumors and answers"*E10. He also underscores the strategy used by PAHO:

*In Washington, PAHO has a media monitor that collects in real time all things (...). Who gives the warning was the media. With the social pressure, the centrality of the communication of the network with the media was carried out by the MOH. We could only do any kind of press conference, for example, when we were connected to MOH, with the consent of MOH ... We had to combine, be aligned with MOH (E10).*

In computer systems, the complexity of notification systems was also great. It was clear that in the Zika case the notifications did not correspond to the exact number of occurrences, since there was no mandatory notification. Many reports of the disease were made as dengue, disease already existing in the system:

*So you see some counties notifying, but most, we probably had millions of cases of Zika, official notification in the end got with 70 thousand cases. And probably we must have had millions of cases, really, because the number was too big, and we ran out of history. So, what happens today? Everyone who consults the official database notified to the World Health Organization sees 70,000 cases of dengue. And people even draw conclusions from the scientific point of view, wrong, because of information in this data (E8).*

The latter aspect refers to the information process between the parties and knowledge acquired and accumulated by the network. For those interviewed, these aspects still represent important gaps:

*I mean, normally we were not prepared for the epidemics, although they happen in similar proportions, as with dengue, but every time it happens, the system is not prepared from the point of view of structure, of people. So, when the epidemic happens every 3 or 4 years, which is the natural history of epidemics, the system is not organized to receive an epidemic, even though the history repeats itself (E8).*

## **6. Discussion**

According to the typology proposed by Provan and Kenis (2008), the emergency network formed to deal with the epidemic can be classified as governance by lead organization, given the central role represented by MOH in the network, centralizing and mediating procedures. However, several findings are not in line with the authors' proposals, allowing to bring new perspectives to the knowledge of these networks.

Thus, although Provan & Kenis (2008) acknowledge that this governance is constructed mainly from dyadic ties, to some extent confirmed in the interviews, they do not refer to the overlap of individual actors over organizational / institutional ones, especially in the moments of formation and activation of the network, as observed in the study. The role of technology in the WhatsApp network has also brought new perspectives to the understanding of a parallel network, just as the interviews have shown the importance of network networks when the very fragmentation of objectives and interests internally into the institutional needs to be considered.

It should also be highlighted the conflict between academic responsibilities and public servants, both legitimate, bringing different pressures and responses. Activation and deactivation also brought important learning. The nature of the health emergency network, because of its severity and continuity, requires evidence of causality - in this case, between Zika and microcephaly - sometimes difficult to prove or requires long and time-consuming tests, confronting the need for evidence and speed of response. The political impact of the emergency declaration amplifies the conflicts between the actors of the network itself, also giving rise to rumors and misleading news (including fake news), even with a risk of panic.

Another important aspect that emerged from the interviews was the fragility of knowledge and accumulated learning. Again, the personalization of learning - including the strengthening of personal networks - predominated in view of its low incorporation into institutional systems. Although with disagreements among respondents, the network still appears to represent an instrument with weak ability to accumulate learning.

## **7. Final comments**

This article aimed to understand the distinctive characteristics of the constitution and governance of emergency health networks, based on the case study of the emergency network formed to cope with the Zika virus epidemic. The main motivation, lined Agenda 2030, was to deepen the knowledge about a fundamental governance tool to bring together stakeholders in the health sector, given the nature of present challenges. The ability of countries to produce early warning, risk reduction and management of national and global health risks certainly involves the ability of networks between institutions to operate effectively, a challenge explored in this study.

The literature on network governance is still not very expressive (PROVAN; KENIS, 2008), particularly that related to health emergency networks. In addition, as identified in the text, there are innumerable characteristics that differentiate these networks from the other networks of attention to disasters, mainly due to the silent nature, and sometimes not evident, of the proof of its necessity and of the activation and involvement of the actors.

When dealing with a specific case, this study allowed the identification of new features not much discussed in the literature on networks, besides advancing in the knowledge of health emergency networks. The World Health Organization's website shows the many epidemics that have been plagued in recent years, such as Ebola, Polio, Measles, Influenza, Cholera, among many others (<https://www.who.int/emergencies/news/highlights/en/>). In this sense, a better understanding of the operation of these networks becomes a challenge compatible with the objectives of the Agenda 2030.

Future studies may advance the understanding of other emergency networks formed in Brazil (or abroad), such as to combat Yellow fever and Measles, as well as other diverse arboviruses.

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