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Health network management in public administration: the Zika case

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Abstract

Combating the Zika epidemic in Brazil was marked by the articulation and cooperation of several national and international organizations, forming an emergency health network coordinated by the Brazilian Ministry of Health (MOH). The objective of this article is to present the description and analysis of the formation, structuring, functioning, and demobilization of this arrangement, based on the network management sequences of activation, framing, mobilizing, and synthesizing. As it is a recent and properly documented historical event, and because it is possible to understand it from the perspective of the main actors involved, the research adopted the longitudinal case study approach. The findings suggest the usefulness of the Agranoff and McGuire's sequences in the analysis of the network functions, allowing to identify possibilities for improvement.

KEYWORDS: Networks. Health emergency. Zika virus. Longitudinal case study.

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Gerenciamento de redes em saúde na administração pública: o caso zika

Resumo

O enfrentamento à epidemia de zika no Brasil foi marcado pela articulação e cooperação de diversos atores nacionais e internacionais, configurando uma rede de emergência em saúde coordenada pelo Ministério da Saúde (MS). O objetivo deste artigo é apresentar a descrição e análise sobre a formação, a estruturação, o funcionamento e a desmobilização dessa rede, tendo por base as funções propostas pelo referencial de ativação, enquadramento, mobilização e síntese. Por ser um evento histórico próximo, adequadamente documentado, e pela possibilidade de compreender o evento também sob a perspectiva dos principais atores envolvidos, utilizou-se a abordagem de estudo de caso longitudinal. Constatou-se a utilidade do referencial na análise das funções da rede, além de permitir identificar possibilidades de melhoria.

PALAVRAS-CHAVE: Redes. Emergência sanitária. Zika vírus. Estudo de caso longitudinal.

Gestión de redes de salud en la administración pública: el caso del zika

Resumen

El enfrentamiento de la epidemia de zika en Brasil se caracterizó por la articulación y cooperación de varios actores nacionales e internacionales que configuraron una red de salud de emergencia coordinada por el Ministerio de Salud. El objetivo de este artículo es presentar la descripción y análisis de la formación, estructuración, funcionamiento y desmovilización de esta red basados en las funciones propuestas por el marco de activación, encuadre, movilización y síntesis. Por tratarse de un evento histórico cercano, debidamente documentado, y por la posibilidad de entender el evento también desde la perspectiva de los principales actores involucrados, se utilizó el enfoque de estudio de caso longitudinal. El análisis indicó la utilidad del marco referencial en el análisis de las funciones de la red, además de permitir la identificación de posibilidades de mejora.

PALABRAS CLAVE: Redes. Emergencias sanitarias. Virus del Zika. Estudio de caso longitudinal.

1. INTRODUCTION

During the preparation for the Rio 2016 Summer Olympics, the international media expressed several doubts and concerns regarding the risks of the Zika virus epidemic for Brazilian and foreign tourists. Also, there was a growing apprehension regarding the association of the virus with a high incidence of microcephaly cases (PUFF, 2016).

Throughout 2015, after hosting the 2014 FIFA World Cup and welcoming a high flow of international tourists for the event, a growth of exanthematic manifestations (skin redness) and itching was registered in the population of some northeast states. These manifestations showed to be associated with Zika, a new virus transmitted by the same mosquito (*Aedes aegypti*) that has spread dengue throughout the country. The severity of the Zika virus caught the attention of Brazilian society due to the association of fetal infection with cases of microcephaly. The observations and doubts shared by an initial group of doctors and researchers multiplied and formed the basis for a broad collaborative network to face the epidemic. This network included researchers, public and private actors, civil society organizations, and institutions from various countries, coordinated in Brazil by the Ministry of Health (MOH).

However, the formation and configuration of this network did not follow a linear process, as a later historical analysis may indicate. Some of the additional difficulties in the operation of the network included individual initiatives that affected collective movements, such as disputes over resources, conflicts between federal agencies and segments of society, coping strategies, and prioritizing alternatives.

The international spread of the Zika virus and the growing cases of microcephaly and other congenital malformations led the World Health Organization (WHO) to declare a Public Health Emergency of International Concern (PHEIC) on February 1, 2016. The PHEIC is the highest WHO alert level, as provided for in the International Health Regulations. The declaration aims to facilitate improving global coordination, cooperation, and solidarity to stop the virus spread (WHO, 2016). In WHO International Health Regulations 2015, the PHEIC is a declaration to address an extraordinary, severe, sudden, unusual, or unexpected event that threatens public health of other nations due to the global spread of diseases, and requires a coordinated international response.

This was the fourth time in history that the WHO declared the PHEIC. This measure was taken before for the H1N1 pandemic on April 25, 2009, the international spread of poliovirus, on May 5, 2014, and the Ebola outbreak in West Africa on August 8, 2014.

According to McGuire and Agranoff (2011), coordination and cooperation strategies to face epidemics and pandemics are expected to generate knowledge to be accumulated and later used by international health emergency networks. The authors recognize, however, that research on network structures rarely address network formation, evolution, and deactivation (i.e., when the network is demobilized). Accumulated knowledge should encompass the information on instruments and dynamics involved in the creation and mobilization of a network. In the case of public networks, accumulated knowledge should be able to clarify the role of the state entity.

This article presents the results of a longitudinal case study that followed formation, structuring, functioning, and demobilization of the emergency health network that was

formed in Brazil to face the Zika epidemic, led by the Ministry of Health with the support of international institutions. As it is a recent historical event, and considering that the formal network is already demobilized, the case study allows observing aspects that, at the height of the emergency, were difficult to view or treat. This analysis contributes to retaining the knowledge about the process and highlights elements to be considered when forming future networks.

The article is divided into six parts, including this introduction. The second section presents the references on networks and network management in public administration and the synthesis of the proposals of Agranoff and McGuire (2001) to analyze the functions of the networks. In addition, it addresses the differences between emergency health networks and those dealing with natural disasters or established to tackle significant accidents. The methodology is presented in the third section, including the steps and procedures followed. The fourth section describes the case study, based on the analyzed documentation, privileging aspects related to the emergency network formed. The next part consolidates, analyzes, and discusses the results of the interviews and the historical review, based on the analytical categories proposed by Agranoff and McGuire (2001). The authors presented a set of functions that characterize and describe the public network management, similar to the POSDCORB (Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting) proposed by Luther Gulick, in 1937 for the traditional management. The last section presents the final considerations that seek to synthesize the study's learning and present suggestions for future studies.

2. NETWORKS AND EMERGENCY NETWORKS: CHARACTERIZATION AND CONCEPTUAL DISTINCTION

2.1 Networks in Public Administration

The recent public administration paradigms, in particular the managerialism and the new public management, have faced problems and criticisms, which suggest the need for more comprehensive perspectives in public administration, capable of dealing with a more plural perspective of society. For Osborne (2006), the new public governance movement is a response to this need. The assumption behind this perspective is that multiple interdependent and interconnected actors need to contribute to delivering public services based on numerous processes, which capture different demands and feedback from the policy-making system. Therefore, the new focus of public administration shifts to interorganizational relations and process governance.

Contrary to the legalistic, economic, or managerial views of the previous paradigms, New Public Governance is based on organizational sociology and network theory. Concepts such as networks, trust, and relational contracts are fundamental in the new paradigm since they presuppose the configuration of a plural state, where multiple interdependent actors contribute to the delivery of public services, and a pluralist state, where multiple processes feed the policymaking system. For Kissler and Heidemann (2006), this marks a change from

a hierarchical, active, and producing state, characterized by a significantly differentiated and oversized public sector, to a cooperative and activating state, “which mostly act on the private and nonprofit sector to mobilize resources and activate the civil society assets” (KISSLER and HEIDEMANN, 2006, p. 485, our translation).

The ability to effectively manage complex partnerships is gaining relevance as organizations are redesigned. Organizations are increasingly connected in complex networks of value creation, in which their boundaries are unclear, and functions are integrated. According to McGuire and Agranoff (2011), private organizations must develop other competencies to operate in network environments. These include the ability to form partnerships integrating internal and external groups, build alliances and coalitions, form and reform teams considering the functions and the organization’s boundaries, as well as collaborating to actively manage interdependencies.

If for organizations in general, hierarchical structures allow more control over access to the inputs needed for their production process to replace the market – as analyzed by Alfred Chandler (McCRAW, 1998) – then networks emerged in response to changing environmental conditions that produced impacts on specific asset benefits, task complexity, and frequency of interactions (JONES, HESTERLY and BORGATTI, 1997).

Processes, decisions, or even implementation itself do not always occur under the command of hierarchical structures, characterized by the power of enforcement to unify interests and guarantee the decision’s outcomes. What is often observed, however, are collective action processes – understood as decision and implementation – associated with different organizations, such as public-private partnerships, networks of organizations, meta-organizations, and alliances. The absence of a hierarchical structure of command complicates defining goals and enforcing their implementation.

Intergovernmental and interorganizational networks can be conceptualized as “structures of interdependence involving multiple organizations or parts thereof, where one unit is not merely the formal subordinate of the others in some larger hierarchical arrangement” (O’TOOLE JUNIOR, 1997, p. 45). For Laumann, Galaskiewicz and Marsden (1978), in one of the most cited definitions of ‘network,’ this is “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, GALASKIEWICZ and MARSDEN, 1978, p. 458). McGuire and Agranoff (2011) understand networks as a form of collaborative activity that facilitates operation in multi-organizational arrangements to solve problems that cannot be (easily) solved, using single organizations. Public management networks include government agencies and non-governmental organizations, connected via involvement in a public policymaking or administration structure, that plan, design and deliver information and public goods and services. For the authors, network structures can be formal or informal and are typically intersectoral, intergovernmental, and functionally based on a specific policy or policy area.

According to Balestrin, Verschoore and Reyes Junior (2010), there is a constant discussion about the role of cooperation networks, especially in the development of organizations and society. Notes on the absence of a single theoretical body that explains the phenomenon are also recurrent, so that the scope of the studies becomes comprehensive and, in general, often linked

to the reasons that led to the arrangement. This idea is complemented by Capaldo (2014), who highlights the need to better investigate the networked processes that generate strategic benefits and results. In addition to the need for theoretical research, there is a lack of empirical studies on the topic (DEKKER, 2004) and, consequently, the absence of a robust operational definition that characterizes the studied field (LEWIS, 2011).

In an article with the provocative title “Treating networks seriously,” O’Toole Junior (1997) argues that public managers needed to start incorporating the concept of ‘network’ in their administrative efforts. The author also argues, however, that more research would be required to illuminate this neglected structure of contemporary administration. In this sense, issues such as a more systematic assessment of the scope of networks and their use in public administration are worth attention. These assessments migrate the unit of analysis of policies and programs to public administration and identify the critical characteristics of the network structure related to the state, particularly in networks that help to explain and understand the outcomes obtained. Almost a decade later, the title of O’Toole’s study was revisited by Robinson (2006). The author observed that “subsequent research unfolded beyond the basic question of whether collaborative networks exist and are common – they clearly are” (ROBINSON, 2006, p. 597).

This rapid growth in research focused on networks in public administration may have confused the terminology and approaches to research in the field (LECY, MERGEL and SCHMITZ, 2014). One of the questions that currently receives insufficient attention in the public administration literature is:

- How do political issues appear on the agenda through network mechanisms?

2.2 Agranoff and McGuire’s perspective for network analysis

When analyzing networks in public management, Agranoff and McGuire (2001) observe that, often, the formation process is *ad hoc*, started by individuals or by public or private organizations. For the authors, network analysis starts from the ‘activation,’ which is the identification of participants needed to work on a given situation. The activation also involves identifying other stakeholders and skills, knowledge, resources, as well as the parties’ motivations. This moment defines who should participate or be excluded from the network.

Therefore, a public network is different from a traditional hierarchy because, despite the power of participant selection and the coordination of resources, the public network involves not only state actors with subordinate ties, but also other public and private actors who are autonomous in the relationship with the coordinating entity. These actors have multiple interests, different missions, but they converge regarding the aim and orientation of the network.

Another element of network analysis is the function of ‘framing,’ which is the moment where the network’s values, norms, and operational rules are established, influencing the participant’s perception. Unlike hierarchies, the rules of interaction in networks are fluid, malleable, meaning that framing enables the conception of a shared vision, allowing flexibility

at the same time as maintaining a common orientation to align efforts and motivations. The function of framing is similar to the definition of vision in organizations. It reflects the direction of how the network operates, working as a catalyst for actions or an element of reference for the actions to be effective.

The third network's function of Agranoff and McGuire's (2001) analysis is 'mobilizing.' This is the moment of inducing individuals and entities in the network to commit to a joint endeavor and, especially, to maintain this commitment over time. Thus, the vision can be deployed to identify a set of common goals based on the view of the strategic whole. The authors note that the ability to manage networks is related to the internal support received and the cooperation of the manager's organization. This reinforces that organizations are not a homogeneous set of interests and orientations. Public managers responsible for the network's coordination need to ensure both the mobilization and the actors' urgency as well as those who support the network's operation, strengthening cooperation, and trust. As in any public policy, resources are scarce, and priorities are defined and rearranged according to political interests and time. In this sense, 'mobilizing' deals with how managers maintain support for the network's activities, considering, particularly, the engagement of the other public actors.

The fourth function proposed by the authors is synthesizing, which means aligning or converging the different interests and conflicting goals, the different perceptions about the scenarios, the routes or the solutions, or even the values that support organizations in order to fulfill the network's strategic goals.

The autonomy that distinguishes networks from hierarchies is the main advantage of this model, offering, for instance, speed of response and reorganization. Such autonomy may also induce conflicts, distrust, and prioritize self-interests. It is up to the network manager to promote cooperation between participants and remove possible obstacles to collaboration. As in the prisoner's dilemma of game theory, individual strategies and their outcomes are influenced by the patterns of relationships and interactions developed within the network. There is a cost (and a risk), implicit in the interaction of the actors, and the function of synthesizing must reduce this cost, facilitating and promoting such interaction. It also acts on communication and the exchange of information, to reduce the asymmetries and reduce the complexity and uncertainty, making changes in the position, relationships and roles of participants, and incentives for participation.

However, as it often happens with management functions when they manifest simultaneously, network functions may not be clearly separated from each other. Agranoff and McGuire (2001) use the example of the network's manager, who can seek to improve the interaction by changing the incentives (synthesizing) or redefining functions (framing). The attempt to describe the functions in a network should be considered a static picture of a situation. It is useful to better understand the functions before advancing in the analysis of the network's complex dynamics.

According to Lecy, Mergel and Schmitz (2014), the studies led by Agranoff and McGuire (2001) tend to privilege the managerial challenges of operating in a networked environment, favoring the broader idea of collaborative public management, in which networks are just one of the constituent dimensions. This assessment can be related to another dimension of the

networks related to their formation process. While there are networks in public administration built following well-defined steps, others are formed to deal with emergency situations, in anticipation or in response to an event.

2.3 Networks versus emergency networks

A significant dimension to distinguish the networks' configurations and their management refers to the nature of their constitution, whether permanent, of continuous or singular operation, or formed to respond to a specific situation. Networks formed to meet typical social demands, managed by either the public or private sector, usually follow a constitution process based on the interactions among various actors over time, working in continuity. These characteristics allow participants to act to improve operations over time, working, and adjusting expectations. However, networks such as those created to respond to disasters, accidents, and similar events have different structures and are considered as emergency networks. They are formed and inserted in the structure of the state apparatus, and their members are only activated, and needed.

An example of an emergency network is the one formed in response to Hurricane Katrina in August 2005, in the US. This case summarizes the challenges in the formation and governance of emergency networks, which aim to respond to specific crises (FARAZMAND, 2007). In Brazil, Souza Júnior and Fontes-Filho (2012) analyzed the challenges of this type of network in the case of the accident of the Air France-447 flight in 2009, departing from Rio de Janeiro bound for Paris. The authors pointed out that although the various countries involved in the event had their structures prepared to deal with an air disaster, the Brazilian structures had difficulties in working in the endeavor. It was challenging for them to delimit responsibilities and align their different norms to the needs related to procedures such as searching and identifying victims.

Different from the permanent networks and emergency networks to respond to disasters, the third type of network addresses emergencies. Still, it demonstrates less capacity for previous organization, which is the case of arrangements related to health. While the networks formed to respond to disasters have an unquestionable triggering fact, in health, the signs leading to declare a health emergency can be difficult to determine. They usually require the accumulation of evidence – and it is not always possible to identify how severe a disease is and the extent of its impacts. Thus, a preparedness and response plan takes on a more contingent nature, that is unlikely to be designed ex-ante on the unknown disease.

Effective crisis and emergency governance require some key elements to be successful. For Farazmand (2007), preventive planning and preparation, and institutionalized and well-coordinated response systems are essential. There should also be a strong central command structure, decentralized at the local level with some flexibility, a specialized emergency management team, and the presence of specialists in the different areas of the situation. Brooks, Bodeau and Fedorowicz (2012) highlight the relevance of the public manager's responsibility for orchestrating collaboration between a vast network of organizations and participants in efforts for each specific emergency.

According to Granovetter (1985), the trust built on interorganizational relationships, supported by interpersonal reliance based on common interests, and personal, ethnics, and historical commonalities, strengthen the networks' operation. However, public management networks have a high level of formalization. In general, the relationship between members is defined by specific norms and attributions, so that working in networks represents a great challenge for the state. Public administration structured as a network must consider the coordination among government institutions and the relationship with private actors, offering society more participatory and democratic management. These connections are more complex when they involve several national states, often observed in emergency networks. Each state brings to the relationship its idiosyncrasies, bureaucracies, and histories, sometimes added to the characteristics of private actors.

Networks built to deal with emergencies, no matter if they are emergencies resulting from air, climate, or health incidents (as in the case of the Zika pandemic), still are not enough studied. Therefore, there is a lack of theories and objective proposals to deal with the many variables involved.

If in the case of mass disasters, potential damage can be mitigated with adequate emergency planning (HERZOG, 2007), this is not always possible in other critical contexts, such as epidemics and health crises. In these contexts, the socio-political role of networks is still poorly understood, ranging from a view that they increase mass political polarization and a view that these networks increase harmony and tolerance (ELMEDNI, 2016).

In addition, health threats can justify the mobilization of an international health care network, connecting local politicians to numerous multilateral agencies and other actors. For Han, Koenig-Archibugi and Opsahl (2018), as well as bringing knowledge, standards, and material resources, these networks guide the speed and depth of the authorities' involvement with this new knowledge and standards, depending on the country's centrality in the network, and expands the access to a more diverse range of information and perspectives. However, as noted by Provan and Milward (2001), a network tends to be less effective with increasing coordination costs related to the growing number of institutions involved.

3. METHODOLOGY

The network characteristics were identified based on the four categories of proposed by Agranoff and McGuire (2001) (activation, framing, mobilizing, and synthesizing). A longitudinal case study (YIN, 2018) was carried out, describing, monitoring, and analyzing how the network formed to face the Zika epidemic in Brazil was developed. The study used a deductive methodology, seeking to identify the events related to the analytical categories.

The case study followed two parallel processes. First, the research consulted official Brazilian and international sources, collecting publicly available data. The main sources were the Ministry of Health, the Oswaldo Cruz Foundation (Fiocruz), and the Pan American Health Organization (PAHO), and the material obtained was used to describe the process of fighting the epidemic and identifying and characterizing the main actors involved. Interviews were conducted with network members (researchers, specialists, and public managers) to

record their understanding of the process. This data allowed the longitudinal construction of the case and its analysis.

The interviews used open-ended questions to encourage the interviewees to report their knowledge about how the network was constituted and operationalized. A total of 12 interviews were conducted, considered sufficient since they registered the perception of the prominent network actors identified in history. It is important to highlight that several of the researchers involved in this study were linked to Fiocruz, which facilitated the interview process and the document collection. In order to avoid potential bias, the transcribed interviews were analyzed (and the findings reported) by at least two of the authors. Subsequently, the material from the interviews was validated in a panel.

The collection of documentary information took place, mainly from March to July 2018, and the interviews were conducted between October 2018 and March 2019.

4. HISTORY AND CONTEXT OF THE ZIKA VIRUS EPIDEMIC

At the end of 2014 and in the first quarter of 2015, in some states in the Northeast of Brazil there was an outbreak of an acute exanthematic disease, characterized by low or nonexistent fever, red rash, and severe itching, sometimes accompanied by arthralgia, joint edema, and conjunctivitis (BRASIL, 2015a). At the time, hundreds of cases filled the public and private emergency rooms that, guided by the official epidemiological surveillance systems, reported the disease as “mild dengue” (LUZ, SANTOS and VIEIRA, 2015). The rapid spread of the disease in different cities in the region, simultaneously, suggested the possibility of a vector-borne disease. Clinicians and infectologists insisted that it was a different clinical picture from dengue and chikungunya, arboviruses that circulated in Northeast Brazil. In March 2015, the clinical hypothesis of Zika was confirmed in blood samples. In May of that year, the Brazilian Ministry of Health confirmed the circulation of the Zika virus in the country (PAHO, 2015).

Three major phases occurred in the progress of the disease. First, the hypothesis revolved around classic Zika. This already known disease did not present high risks to the health of those affected. In a second phase, a relationship between the disease and neurological problems was observed. In the third phase, a correlation between the disease and cases of microcephaly was established (BRITO, 2017).

In the first phase, an informal network was created via WhatsApp, composed of infectologists. This network had been previously established due to the investigation of the chikungunya epidemic in the state of Bahia. As the characteristics of the new case had no relationship with symptoms and geographic location observed in diseases already known, healthcare professionals forwarded samples, even though informally, to specialized laboratories that then confirmed the circulation of the virus in the country. 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. In June 2015, these neurological cases were confirmed to be associated with the Zika virus (ARAÚJO, FERREIRA and NASCIMENTO, 2016). In this stage, the interaction among neurologists

and infectologists led to diagnostic hypotheses that required further analysis of the samples (BRITO, 2017).

The microcephaly epidemic characterized the last phase. In October 2015, the Secretariat of Health of the State of Pernambuco (SES-PE) notified the Brazilian Ministry of Health of the occurrence of an abnormally high number of cases of microcephaly identified in newborn babies. The Ministry of Health organized a team with participants from several institutions to investigate the event. In early November, the ministry declared a Public Health Emergency of National Concern (PHENC), in response to the change in the pattern of occurrence of microcephaly in the country (BRASIL, 2015b). In that same month, a doctor specializing in fetal medicine in the state of Paraíba identified signs of microcephaly in a fetus of a patient in the fifth month of pregnancy and confirmed the presence of the Zika virus in an examination of the amniotic fluid (MELO, MALINGER, XIMENES et al., 2016). There was a subsequent and intense national mobilization, both in the spheres of management and in research institutions. Different communication channels were also mobilized, given the social impact of the epidemic (DINIZ, 2016). In February 2016, the WHO announced a Public Health Emergency of International Concern (PHEIC), based on the cases of microcephaly and other neurological disorders reported in Brazil (PAHO, 2016b). The situation caught the attention of the international scientific community, willing to participate in the investigation underway in Brazil.

One of the measures of the federal government was to launch a national plan to fight microcephaly related to infection by the Zika virus. The plan was an example of a networked and multilevel governance model, both for reaching different organizations and agents that were not part of the state hierarchical network, and because the initiative involved different levels of government, subject to other instances of command and political orientation. At the same time, Fiocruz created the Office for Confronting the Epidemiological Emergency in Public Health to consolidate the institution's actions in the face of the PHEIC and coordinate the activities in cooperation with other institutions.

Table 1 presents a historical synthesis of the main aspects related to the identification, formation, operation, and demobilization of the network to face the Zika epidemic in Brazil.

BOX 1

Synthesis of the main aspects of the Zika epidemic in Brazil

Period	Event	Main aspects
End of 2014 and beginning of 2015	Unknown exanthematic disease, with cephalocaudal rash, itching, low or absent fever, joint pain, and conjunctivitis, affecting a large number of people	Rapid spread throughout the states in Northeast Brazil, especially Rio Grande do Norte (RN), Pernambuco (PE), and Alagoas (AL), suggesting vector-borne disease; Clinicians and infectologists insisted that it was a different clinical situation than dengue and chikungunya, arboviruses that circulated in Northeast Brazil; Dr. Kleber Luz (RN) launches the hypothesis of Zika and sends samples to the Carlos Chagas Institute (Fiocruz Paraná)

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Period	Event	Main aspects	
May 2015	Evidence of Zika virus circulation in Brazil	On April 30, researchers at the Virology Laboratory of the Institute of Health Sciences (ICS/UFBA) identified the virus in the analysis of blood samples from patients in Camaçari-BA; On May 15, the Ministry of Health (MH) confirms the circulation of Zika virus in Brazil (samples from the RN were sent to the Carlos Chagas Institute – Fiocruz Paraná)	OPAS (2015); Zanluca, Melo, Mosimann et al. (2015)
Second-quarter of 2015	Several cases of patients with neurological manifestations, possibly associated with the Zika virus, including the Guillain Barré syndrome	Doctors share case reports; Pernambuco presented about 120 neurological cases with possible viral etiology, without a diagnosis, in the period from January to May 2015; On June 14, 2015, researchers of the Laboratory of Virology and Experimental Therapy (LAVITE) of the Ageu Magalhães Institute, reported that isolation and PCR were positive for Zika in six patients	Brito (2017)
October 2015	The State Secretariat of Health Pernambuco (SES-PE) notifies the MH of an abnormally high number of cases of microcephaly in a short period of time	Notification to the Ministry of Health of a significant increase in cases of microcephaly in the state of PE; Some pregnant women with a history of pruritic rash in early pregnancy; A team with technicians from the MH, PAHO, and SES-PE investigate the cases.	Pernambuco (2015)
November 3-4, 2015	Seminar on Dengue and Zika: Challenges for Health Surveillance and Care	Evidence of the circulation of the three viruses in Brazil; A large number of newborn babies with microcephaly in the Northeast, possible viral etiology (Zika?)	Fiocruz (2015)
November 11, 2015	The MH declares PHENC due to changes in the pattern of occurrence of microcephaly in Brazil	MH declares PHENC; Establishes the Health Emergency Operations Center (CEOS), headed by the Secretariat of Health Surveillance (SVS); Activates the National Health Force	Brasil (2015b)
November 17, 2015	Identification of the Zika virus in the amniotic fluid of a pregnant woman from Paraíba	Dr. Adriana Melo, a specialist in fetal medicine, in Paraíba, identifies signs of microcephaly in a fetus of a pregnant woman in the 5th month of pregnancy, confirmed by examination of the amniotic fluid (RT-PCR), at the Flavivirus Laboratory, of the Oswaldo Cruz Institute (IOC)	Melo, Malinger, Ximenes et al. (2016)

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Period	Event	Main aspects
January 2016	Fiocruz's Plan for Combating the PHENC was sent to the Ministry of Health	The institutional Plan's main goal was to contribute to PHENC, in the following strategic dimensions: technological development and reference laboratories; scientific knowledge; health care; health surveillance; teaching; social mobilization; information and social communication; and international cooperation Fiocruz (2016)
February 1, 2016	WHO declares Microcephaly (PHEIC)	"The recent cluster of microcephaly cases and other neurologic disorders reported in Brazil, following a similar cluster in French Polynesia in 2014, constitutes a public health emergency of international concern" (Margareth Chan, WHO director). OPAS (2016b)
November 18, 2016	WHO declares that the Zika virus and its associated consequences no longer represent a PHEIC	"Zika virus and associated consequences remain a significant enduring public health challenge requiring intense action but no longer represent a PHEIC as defined under the IHR [...] The Public Health Emergency of International Concern (PHEIC) declared by the Director-General of WHO has led the world to an urgent and coordinated response, providing the understanding that Zika virus infection and associated consequences represent a highly significant long-term problem that must be managed by WHO, States Parties and other partners in a way that other infectious disease threats are managed" OPAS (2016a)
May 11, 2017	The MH declares the end of PHENC for Zika, microcephaly and other neurological disorders	<i>"The measure is due to the drop in the number of cases of Zika and microcephaly. Actions to combat the Aedes Aegypti mosquito and assistance to children and mothers will be maintained"</i> (Adeilson Cavalcante, Secretary of Health Surveillance, our translation). Brasil (2017)

Source: Elaborated by the authors.

5. RESULTS AND DISCUSSION: THE NETWORK'S FUNCTIONS

Agranoff and McGuire (2001) summarize the functions that characterize the formation and operation of networks in four categories: a) activation; b) framing; c) mobilizing; and d) synthesizing. The study uses these categories to present, based on documents and interviews, the case of the emergency health network to fight the Zika epidemic in Brazil.

5.1 Activation

Activation refers to the constitution of the network, selecting participants, and critical resources.

The function of activation could be easily identified in the statements of several interviewees. They pointed out that the Brazilian Ministry of Health is responsible for assessing and declaring a Public Health Emergency of National Concern (PHENC). In this specific case, it called on PAHO to collaborate in the assessment, given the strong pre-existing partnership between the country and the multilateral organization (BRASIL, 2015b).

After declaring PHENC, the Ministry of Health (MH), through the Secretariat of Health Surveillance (SVS), began to coordinate and encourage actions to expand a diagnostic network, train personnel, and increase research related to the Zika virus and its implications. The MH played the role of coordinating pre-existing networks working in areas such as the diagnostic support (National System of Public Health Laboratories), research on arboviruses, training of personnel (UNASUS, distance education platform), and support to new rehabilitation structures. This coordination followed the National Plan to Combat PHENC (BRASIL, 2020a).

The interviewees highlighted the formation of a network involving the MH, PAHO, and the Microcephaly Epidemic Research Group (MERG), from Fiocruz Pernambuco. The interviewees also stressed the participation of SES-PE in the processes of surveillance and notification (PERNAMBUCO, 2015).

The interviews brought to light elements related to how participants were approached, according to their skills and expertise (including potential funding partners). The coordination of the MH and the Office of the Chief of Staff of the President for the tasks related to activation stood out in the interviews. They were significant players to identify and connect key participants that would be crucial to structure and operate the arrangement. As an example, the event led by Fiocruz – Seminar Chikungunya, Dengue, and Zika: Challenges for Health Surveillance and Care, which counted on the participation of actors from different spheres and areas of activity, including players operating at the international level (FIOCRUZ, 2015). The success of the event in terms of participation, for the interviewees, revealed a clear interest and mobilization of the actors to tackle the crisis.

The following aspects were also highlighted in the context of activation: a) the role of the MH in the activation of the national network; b) formation of the National Network of Specialists in Zika and Related Diseases (RENEZIKA), promoted by the MH; c) the role of the Fiocruz crisis office in strengthening the network internally and facilitating the coordination with the MH; and d) Fiocruz's participation in the Public Health Emergency Operations Center (COES, acronym in Portuguese), even if informal.

The interviews revealed, even if less often, informal aspects of the period when the network was being formed, such as conversations via communication applications, in particular WhatsApp. Doctors in the field, especially infectologists, started to communicate intensively through such applications, discussing cases and defending with managers whether it was a new disease. This group formed in an informal network exchanging clinical and diagnostic information was the first to propose the hypothesis of the occurrence of the Zika virus, whose vector is *Aedes aegypti*. This mosquito also transmits dengue and chikungunya, other arboviruses circulating in Brazil.

Another aspect raised in the interviews through examples and comments was the competition for prestige and recognition between researchers and research groups, an element that potentially inhibits collaboration. Finally, interviewees closer to the central nucleus of the MH mentioned that, at a certain point in the developments, there was a suggestion for the intervention of the Ministry of Defense to guarantee order.

In summary, the function of activation in the case studied showed the establishment of a public network, headed by the Office of the Chief of Staff of the President and under the leadership of the Public Health Emergency Operations Center (COES). The process of forming this network relied on the action of the public manager. Still, other networks were formed around the issue, and they were later incorporated. They were integrated ad hoc, by the aggregation of actors interested in the theme, spontaneously, and even informally. Some of these actors were research groups in contact since the beginning of the epidemic or part of the network formed within Fiocruz to combat the Zika outbreak. The public network was formed by actors with and without subordination to the public administrator managing the network, such as Fiocruz, MS, States Secretariats of Health, and groups such as MERG, as well as non-state actors, such as the multilateral agency PAHO, reflecting the existence of multiple competencies, resources, and interests at stake, but converging, in some way, around facing the epidemic.

5.2 Framing

Framing delimits the performance and defines rules, values, and norms of operation of the network.

One of the aspects to highlight in the analysis of the documents collected is the relevance of the Public Health Emergency Operations Center (COES) to fight Zika. The COES was a managerial tool gathering a team of several areas of health surveillance and care of the MH, representatives of PAHO and Fiocruz, researchers, representatives of reference laboratories for arboviruses, and other actors, joining according to the demand. COES met weekly, offering a space for planning, organizing, coordinating, and assessing the ongoing activities. During the meetings, the participants discussed and agreed upon the activities and developments in the field (BRASIL, 2014).

With the advancement of the network's operation, the epidemiological bulletins of the MH (BRASIL, 2020b) began to inform not only the number of cases of the diseases but also the advances in knowledge and guidelines for action to fight Zika. This practice contributed to maintaining a standard of operation and response of the network.

The relationship of the Brazilian case with occurrences of Zika and microcephaly in French Polynesia, in 2014, led the WHO to declare a Public Health Emergency of International Concern (PHEIC), in February 2016, indicating the need to engage in international efforts (PAHO, 2016b). As a consequence of the PHEIC, international development agencies started to fund research on the Zika virus.

The frequent meetings between different areas marked the peak of cases and the period of constant scientific discoveries. However, this dynamic and the large network around the Zika epidemic gradually changed and demobilized as the number of cases reduced, diagnostic kits were made available, and the transmission channels and clinical situation became clear. Thus, in November 2016, the WHO declared that the Zika virus, and its implications regarding public health, no longer represented a PHEIC. The disease, therefore, started to be treated like other infectious diseases (PAHO, 2016a).

In Brazil, the MH declared the end of the PHENC for Zika in May 2017. According to the MH, the end of the PHENC “is due to the drop in the number of cases of Zika and microcephaly. Actions to combat the *Aedes Aegypti* mosquito and assistance to children and mothers will be maintained” (BRASIL, 2017).

The interviewees mentioned the network’s operational rules when discussing the governance under the leadership of the Office of the Chief of Staff of the President. The interviewees talked about the definition of the participants, the dynamics, and the frequency of meetings. It was possible to identify that, different from the concept by Agranoff and McGuire (2001) who consider the interaction rules in networks as something fluid and malleable, the public network studied had a clear “hierarchy” or coordination, exercised by the Office of the Chief of Staff of the President and the Ministry of Health. This dynamic can also be observed for rules applied to communication to the press and the population in general. All communication had to be previously discussed and aligned with the MH. All official communication by other public actors in the network needed consent.

The process of establishing and implementing the rules did not occur without conflicts, which indicate the difficulties the network’s management faced in the function of framing. For example, interviewees told that two protocols for dealing with the crisis were being developed at the same time, without uniformity, one produced by SES-PE and the other by the MH.

It is worth noting that the network coordinated by the MH was also an umbrella of other smaller networks that operate with different rules, expectations, and coordination processes. As an example, the network formed under the leadership of Fiocruz was part of the broad network managed by the MH. However, the political-institutional coordination of the first was carried out directly by Fiocruz’s president. Its operation offered a common guideline to align efforts and motivations of other actors, working as a catalyst in favor of the broader network coordinated by the MH. In this sense, Fiocruz’s Plan for Combating the Public Health Emergency of National Concern sent to the Ministry of Health was used as a guide for the Ministry’s actions (FIOCRUZ, 2016).

In the case of the health surveillance network, the interviews clarified that the operation of the national notification process has particular rules. This process is fundamental for communication and information within the larger network coordinated by the federal government. In this network, the rules are also clear, and not much flexibility was observed among the participants.

There were also reports from research groups that started to organize themselves in networks. They defined their rules of operation and interaction in more fluid and malleable ways, maintaining flexibility. At the same time, they keep their commitment to the common goals and motivations uniting the larger group, as was the case with MERG.

Therefore, the function of framing can be summarized by considering that, while in the umbrella network, the interaction rules were well defined, there was formal and hierarchical conduct and clear centralization. The reports about what happened in the smaller networks incorporated in the umbrella arrangement indicate the existence of fluid and flexible rules, favoring collaboration. In both cases, however, it is possible to say that the common orientation and goals were crucial, if not the most significant element for aligning the actors' efforts and motivations.

5.3 Mobilizing

The function of mobilizing seeks the alignment of the network participants' motivations around common goals.

Unlike activation, the function of mobilizing refers to human relationships and individual motivations. In this sense, the interviewees stressed the importance of the Ministry of Health in the governance of the research network and the groups involved, seeking convergence and playing a relevant role as a coordinator. In some interviews, RENEZIKA's role in promoting knowledge coordination and integration stood out, formulating and discussing research and technological development in the fight against the *Aedes aegypti* mosquito.

The interviewees highlighted the role of "command" of the Office of the Chief of Staff of the President in the mobilization of different resources and, in association with the Ministry of Health, the role of inducing the entities to work together. The role played by the Fiocruz crisis office was also mentioned, assuming a role of governance within the institution and catalyzing the networks structured around its units to the broader endeavor.

As for the negative aspects of the network's governance mentioned in the interviews, the handling of the difficulties such as the WHO skepticism, the need to declare the epidemic, and the internal resistance of some scientific societies stood out. Regarding the epidemiological surveillance by comparative criteria, the interviewees mentioned the underreporting in African and French Micronesia countries.

The interviews revealed the need for the Fiocruz crisis office to take on very specific management issues, mediating expectations of research groups spread across its different units. The unprecedented nature of the research – considering that the studies were dealing with a disease still poorly mapped – motivated a coordinated effort and stimulated publication in a very short time. However, there were conflicts in the process of publication. On the one hand, the main international journals require non-disclosure of research results before publishing. On the other hand, the findings were crucial to tackle the health emergency in place. Therefore, even though they risked international journals refusing to publish their research, the research groups had to share their findings in the network before publishing.

Thus, the function 'mobilizing,' as an act of "inducing" actors, and a task linked to support, cooperation, and trust, was observed through the recognition of the efforts and success of the

network's management, particularly the performance of the Ministry of Health, as the Office of the Chief of Staff of the President's guiding arm in maintaining the actors' commitment. In this regard, the interviewees considered that the network's hierarchical and centralized approach did not hinder the function of mobilizing. In addition, as in any public policy, this endeavor faced the scarcity of resources and had to deal with conflicts between technical priorities and political timing. In this sense, the hierarchy of this specific network may have contributed to maintaining the network's mobilization because the coordinating agency linked to the Presidency of the Republic gave legitimacy to guidelines and priorities established.

5.4 Synthesizing

Synthesizing happens through the creation of the environment and the promotion of conditions and practices for cooperation among the network's members.

Several interviewees mentioned that participants had different interests, both in the umbrella networks and the incorporated ones. In most cases, the different views were aligned to the common goals.

In a network of researchers studying the theme, the convergence and aggregation of goals among actors were reported to occur naturally. Although there was competition among researchers, the network helped the strengthening of existing partnerships, as well as closer ties with entities and representatives of civil society. It is worth mentioning that there was no assertive measure from the network's managers to stimulate such interaction.

In the interviews, an example of successful action related to the function of synthesizing, was the role of the MH as a coordinator of the research network, connecting the existing research groups and those that emerged during the experience. Even with competition among researchers, the MH coordinated and integrated knowledge toward a common goal, enhancing the results of the studies.

Notwithstanding, the interviews pointed out the need to work convincing the PAHO and the WHO that there was an epidemic. A synthesis action was needed to align different perceptions about the context, showing that there was a bigger problem, and agreeing on the steps to face it.

Another conflict reported was the case of defects in the diagnostic kits for the disease, which, according to an interviewee, was a problem of coordination between different actors in the network. In addition to the technical difficulties in applying the kits, the case had consequences for the institutional image of some of the parties involved. In this case, it is possible to observe a gap in performing the function of synthesizing on the part of the network's managers. The events suggest that the promotion of communication and the exchange of information to reduce asymmetries between the actors could be strengthened.

Therefore, the observations regarding the function of synthesizing indicate that the flexibility of the network model can lead to conflicts, mistrust, and prioritization of self-interest. There were examples of situations in which the network manager was successful in resolving these conflicts, performing the function satisfactorily. However, there were other cases where the function was not properly conducted, particularly regarding the exchange of information to reduce asymmetries. According to the perception of the interviewees, perhaps this was the function the network's managers had more difficulty to perform out of the four proposed by Agranoff and McGuire (2001).

6. FINAL CONSIDERATIONS

In concluding the reflections presented in this article, written in May 2020, it is essential to mention that the world is currently facing the COVID-19 pandemic. In addition to the profound impacts on the health and quality of life of the population of practically all countries, the financial repercussions resulting from this pandemic and social isolation is comparable to the great international economic crisis of 1929. The current PHEIC also provides conjuncture and structural changes in relationships and behaviors regarding technologies, transport, and well-being, among many other aspects.

The impact of COVID-19 concerns its global spread. On May 4, 2020, just over four months after the virus was identified in Wuhan, China, the pandemic has reached more than 190 countries worldwide, with more than 3,4 million cases and 231,400 deaths identified (CORONAVIRUS, 2020). An article published in *The Economist* magazine pointed out that, in February and March of this year alone, the effects of the virus had destroyed a total of USD 23 trillion of the global market value (MUCH, 2020).

However, the dimensions of these impacts did not unleash collaborative movements and international emergency networks. On the contrary, several countries (and the USA is an example), are undertaking individualistic measures to supply their population – qualified as modern piracy – such as interrupting negotiations between countries by offering more money for products (medical supplies, ventilators, and personal protection equipment), or even diverting shipments of planes destined for other countries (WILLSHER, BORGER and HOLMES, 2020). Certainly, joint efforts remain, but there are doubts raised from these actions about the ability to respond via emergency health networks.

In the face of emergencies, these actions jeopardize a critical success factor for the networks: trust between the parties. Kapucu, Garayev and Wang (2013) identified that interorganizational trust is responsible for most of the variance in the sustainability of the network, representing about 83% of the sustainability structure, and its impact was statistically assessed as more than eight times greater than the impact of other variables. According to the authors, institutions operating in interorganizational arrangements should consider developing policies that seek to establish trust between individuals working in different organizations, which may include periodic meetings, workshops, and training for emergencies, among other activities.

Lakoff (2020) analyzes that, contrary to a movement of greater international collaboration, health emergencies can reinforce the prospect of defense of sovereignty against the coordination by a supranational entity. Consequentially, the formation of a global alliance involving humanitarian assistance, sharing of inputs, scientific collaboration, and the connection of political leaders on collective responses is challenged by nationalist tendencies that defend closing borders, xenophobia, and the accusations against countries and their inhabitants. According to Lakoff (2020, our translation) “countries are always selfish in the event of a health emergency.”

This discussion, and what is observed in the global and national dynamics for confronting COVID-19, shows how much progress is needed to understand emergency networks, mainly when applied to health threats brought by epidemics and pandemics. It is also necessary to understand the role of the State and how the public sector creates and supports conditions for the operation of emergency networks. The contribution of this article is limited to pointing

out, from a descriptive perspective, how the functions performed in the management of public networks can be understood, bringing the focus to an emergency health network. Thus, several other aspects of the construction, dynamics, and governance of these networks need to be studied further.

Finally, an aspect that can be highlighted is the need for better targeting of studies on emergency health networks. Unlike other experiences, the emergence of these networks is less evident, as it is structured according to the severity of the problem. In addition, they are also different from disaster response emergency networks since their impacts are not limited geographically or by sector, which can be a source of opposition to the strategies proposed by the networks' managers.

The four functions proposed by Agranoff and McGuire (2001) to analyze network management are useful references to describe these arrangements, their formation, and operation, which allow accumulating knowledge on the subject, particularly in the case of public administration. The new challenges posed by the pandemic currently faced worldwide will show how much we have learned from the Zika case and how we can prepare for a better future.

REFERENCES

- AGRANOFF, R.; MCGUIRE, M. Big questions in public network management research. **Journal of Public Administration Research and Theory**, v. 11, n. 3, p. 295-326, 2001.
- ARAUJO, L. M.; FERREIRA, M. L. B.; NASCIMENTO O. J. Guillain-Barré syndrome associated with the zika virus outbreak in Brazil. **Arquivos de Neuro-Psiquiatria**, v. 74, n. 3, p. 253-255, 2016.
- BALESTRIN, A.; VERSCHOORE, J. R.; REYES JUNIOR, E. O campo de estudo sobre redes de cooperação interorganizacional no Brasil. **Revista de Administração Contemporânea**, v. 14, n. 3, p. 458-477, 2010.
- BRASIL. **Plano de Resposta às Emergências em Saúde Pública**. 2014. Available at: <https://bvsms.saude.gov.br/bvs/publicacoes/plano_resposta_emergencias_saude_publica.pdf>. Accessed on: Apr. 20, 2020.
- BRASIL. Febre pelo vírus zika: uma revisão narrativa sobre a doença. **Boletim Epidemiológico**, v. 46, n. 26, p. 1-7, 2015a.
- BRASIL. **Portaria GM/MS n. 1.813, de 11 de novembro de 2015**. Declara Emergência em Saúde Pública de Importância Nacional (ESPIN) por alteração do padrão de ocorrência de microcefalias no Brasil. 2015b. Available at: <http://bvsms.saude.gov.br/bvs/saudelegis/gm/2015/prt1813_11_11_2015.html>. Accessed on: Jan. 21, 2019.
- BRASIL. **Ministério da Saúde declara fim da Emergência Nacional para Zika e microcefalia**. 2017. Available at: <<https://www.saude.gov.br/noticias/svs/28348-ministerio-da-saude-declara-fim-da-emergencia-nacional-para-zika-e-microcefalia>>. Accessed on: Apr. 22, 2020.
- BRASIL. **Microcefalia: perguntas e respostas**. 2020a. Available at: <<http://www.saude.gov.br/saude-de-a-z/microcefalia/perguntas-e-respostas>>. Accessed on: May 03, 2020.
- BRASIL. **Boletins epidemiológicos**. 2020b. Available at: <<https://www.saude.gov.br/boletins-epidemiologicos>>. Accessed on: May 06, 2020.
- BRITO, C. Investigação de um surto: aprendizado para a comunidade assistencial e a saúde pública. In: BRASIL. **Vírus zika no Brasil: a resposta do SUS**. Brasília, DF: Ministério da Saúde, 2017. p. 27-40.
- BROOKS, J. M.; BODEAU, D.; FEDOROWICZ, J. Network management in emergency response: articulation practices of state-level managers – interweaving up, down, and sideways. **Administration & Society**, v. 45, n. 8, p. 911-948, 2012.
- CAPALDO, A. Network governance: a cross-level study of social mechanisms, knowledge benefits, and strategic outcomes in joint-design alliances. **Industrial Marketing Management**, v. 43, p. 685-703, 2014.
- CORONAVIRUS tracked: the latest figures as countries fight to contain the pandemic. **Financial Times**, London, 4 maio 2020. Available at: <<https://www.ft.com/coronavirus-latest>>. Accessed on: May 04, 2020.
- DEKKER, H. C. Control of inter-organizational relationships: evidence on appropriation concerns and coordination requirements. **Accounting Organizations and Society**, v. 29, n. 1, p. 27-49, 2004.
- DINIZ, D. **Zika: do sertão nordestino à ameaça global**. Rio de Janeiro: Civilização Brasileira, 2016.
- ELMEDNI, B. Death of rationality: the social networks' factor in policy response to ebola. **International Journal of Public Administration**, v. 39, n. 12, p. 917-926, 2016.

FARAZMAND, A. Learning from the Katrina crisis: a global and international perspective with implications for future crisis management. **Public Administration Review**, v. 67, p. 149-159, 2007.

FUNDAÇÃO OSWALDO CRUZ – FIOCRUZ. Fiocruz promove debate sobre as doenças virais chikungunya, zika e dengue. **Rede Dengue, Zika e Chikungunya**, Rio de Janeiro, 14 dez. 2015. Available at: <<https://rededengue.fiocruz.br/noticias/36-fiocruz-promove-debate-sobre-as-doencas-virais-chikungunya-zika-e-dengue>>. Accessed on: Jan. 20, 2019.

FUNDAÇÃO OSWALDO CRUZ – FIOCRUZ. **Plano Fiocruz para Enfrentamento da Emergência em Saúde Nacional**. Rio de Janeiro: Ministério da Saúde, 2016. Available at: <<https://portal.fiocruz.br/documento/plano-fiocruz-para-o-enfrentamento-da-emergencia-em-saude-publica-de-importancia-nacional>>. Accessed on: Jan. 20, 2020.

GRANOVETTER, M. Economic action and social structure: a theory of embeddedness. **American Journal of Sociology**, v. 91, n. 3, p. 481-510, 1985.

HAN, L.; KOENIG-ARCHIBUGI, M.; OPSAHL, T. The social network of international health aid. **Social Science & Medicine**, v. 206, p. 67-74, 2018.

HERZOG, R. J. A model of natural disaster administration: naming and framing theory and reality. **Administrative Theory & Praxis**, v. 29, n. 4, p. 586-604, 2007.

KAPUCU, N.; GARAYEV, V.; WANG, X. Sustaining networks in emergency management. **Public Performance & Management Review**, v. 37, n. 1, p. 104-133, 2013.

KISSLER, L.; HEIDEMANN, F. G. Governança pública: novo modelo regulatório para as relações entre Estado, mercado e sociedade? **Revista de Administração Pública**, Rio de Janeiro, v. 40, n. 3, p. 479-499, 2006.

JONES, C.; HESTERLY, W. S.; BORGATTI, S. P. A general theory of network governance: Exchange conditions and social mechanisms. **Academy of Management Review**, v. 22, n. 4, p. 911-945, 1997.

LAKOFF, A. Países são sempre egoístas no evento de uma emergência de saúde, diz professor. [Entrevista concedida a] Fábio Zanini. Folha de São Paulo, São Paulo, 26 abr. 2020. Available at: <<https://www1.folha.uol.com.br/mundo/2020/04/paises-sao-sempre-egoistas-no-evento-de-uma-emergencia-de-saude-diz-professor.shtml>>. Accessed on: May 07, 2020.

LAUMANN, E. O.; GALASKIEWICZ, J.; MARSDEN, P. V. Community structure as interorganizational linkages. **Annual Review of Sociology**, v. 4, n. 1, p. 455-484, 1978.

LECY, J. D.; MERGEL, I. A.; SCHMITZ, H. P. Networks in public administration: current scholarship in review. **Public Management Review**, v. 16, n. 5, p. 643-665, 2014.

LEWIS, J. M. The future of network governance research: strength in diversity and synthesis. **Public Administration**, v. 89, n. 4, p. 1221-1234, 2011.

LUZ, K. G.; SANTOS, G. I. V.; VIEIRA, R. M. Febre pelo vírus zika. **Epidemiologia e Serviços de Saúde**, v. 24, p. 785-788, 2015.

MCCRAW, Thomas K. (org.). **Alfred Chandler: ensaios para uma teoria histórica da grande empresa**. Rio de Janeiro: Ed. FGV, 1998, p. 247-260.

MCGUIRE, M.; AGRANOFF, R. The limitations of public management networks. **Public Administration**, v. 89, n. 2, p. 265-284, 2011.

MELO, M. A. O. et al. Zika virus intrauterine infection causes fetal brain abnormality and microcephaly: tip of the iceberg? **Ultrasound in Obstetrics & Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology**, v. 47, n. 1, p. 6-7, 2016.

MUCH of global commerce has ground to a halt. 21 mar. **The Economist**, New York, 21 mar. 2020. Available at: <<https://www.economist.com/business/2020/03/21/much-of-global-commerce-has-ground-to-a-halt>>. Accessed on: May 04, 2020.

ORGANIZAÇÃO PANAMERICANA DE SAÚDE – OPAS. **Confirmada a circulação do vírus zika no Brasil**. 2015. Available at: <https://www.paho.org/bra/index.php?option=com_content&view=article&id=4838:confirmada-a-circulacao-do-zika-virus-no-brasil&Itemid=812>. Accessed on: May 03, 2020.

ORGANIZAÇÃO PANAMERICANA DE SAÚDE – OPAS. **OMS declara fim de Emergência de Saúde Pública Internacional, mas diz que resposta ao zika e suas consequências deve continuar**. 18 nov. 2016a. Available at: <https://www.paho.org/bra/index.php?option=com_content&view=article&id=5297:oms-declara-fim-de-emergencia-de-saude-publica-internacional-mas-diz-que-resposta-ao-zika-e-suas-consequencias-deve-continuar&Itemid=812>. Accessed on: Jan. 22, 2018.

ORGANIZAÇÃO PANAMERICANA DE SAÚDE – OPAS. **Organização Mundial da Saúde anuncia emergência de saúde pública de importância internacional**. 2016b. Available at: <https://www.paho.org/bra/index.php?option=com_content&view=article&id=4991:organizacao-mundial-da-saude-anuncia-emergencia-de-saude-publica-de-importancia-internacional&Itemid=812>. Accessed on: May 03, 2020.

OSBORNE, S. P. The new public governance? **Public Management Review**, v. 8, n. 3, p. 377-387, 2006.

O'TOOLE JUNIOR, L. J. Treating networks seriously: practical and research-based agendas in public administration. **Public Administration Review**, v. 57, n. 1, p. 45-52, 1997.

PERNAMBUCO (Estado). **Nota Técnica 43/2015**. Possível alteração no padrão de ocorrência de microcefalia (anomalia congênita) em nascidos vivos no Estado de Pernambuco. 2015. Available at: <https://docs.wixstatic.com/ugd/3293a8_9dd502333c274e359226be4cd95598b7.pdf>. Accessed on: Jan. 23, 2019.

PROVAN, K. G.; MILWARD, H. B. Do networks really work? A framework for evaluating public-sector organizational networks. **Public Administration Review**, v. 61, n. 4, p. 414-423, 2001.

PUFF, J. Zika e Olimpíada: duas visões científicas sobre riscos a atletas e turistas. 10 jun. **BBC Brasil**, Rio de Janeiro, 10 jun. 2016. Available at: <<https://www.bbc.com/portuguese/brasil-36504916>>. Accessed on: Mar. 15, 2020.

ROBINSON, S. E. A decade of treating networks seriously. **Policy Studies Journal**, v. 34, n. 4, p. 589-598, 2006.

SOUZA JÚNIOR, A. A. M.; FONTES-FILHO, J. R. A formação de rede para o atendimento de desastres de massa – o caso do acidente aéreo Air France-447. In: ENCONTRO DA ASSOCIAÇÃO NACIONAL DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO, 36., 2012, Rio de Janeiro. **Anais...** Rio de Janeiro: ANPAD, 2012.

WILLSHER, K.; BORGER, C.; HOLMES, O. US accused of ‘modern piracy’ after diversion of masks meant for Europe. **The Guardian**, London, 04 abr. 2020. Available at: <<https://www.theguardian.com/world/2020/apr/03/mask-wars-coronavirus-outbidding-demand>>. Accessed on: May 03, 2020.

WORLD HEALTH ORGANIZATION – WHO. **International health regulations 2005**. 3. ed. Geneva: WHO, 2016.

YIN, R. K. **Case study research and applications: design and methods**. 6. ed. Los Angeles: SAGE, 2018.

ZANLUCA, C. et al. First report of autochthonous transmission of zika virus in Brazil. **Memórias do Instituto Oswaldo Cruz**, v. 110, n. 4, p. 569-572, 2015.

WEBSITES AND ADITONAL REFERENCES:

BRASIL. **Vírus Zika no Brasil: a resposta do SUS**. Brasília, DF: Ministério da Saúde, 2017. Available at: <http://bvsms.saude.gov.br/bvs/publicacoes/virus_zika_brasil_resposta_sus.pdf>. Accessed on: May 08, 2020.

INSTITUTO BRASILEIRO PARA EXCELÊNCIA EM SAÚDE – IBES. **Ministério da Saúde lança a RENEZIKA, Rede Nacional de Especialistas em Zika**. IBES, São Paulo, 30 nov. 2016. Available at: <<http://www.ibes.med.br/ministerio-da-saude-lanca-a-renezika-rede-nacional-de-especialistas-em-zika/>>. Accessed on: May 08, 2020.

VARGAS, G. Artigo atesta o destaque internacional da Fiocruz na pesquisa sobre o Zika vírus. **Observatório da Fiocruz em Ciência, Tecnologia e Inovação em Saúde**, Rio de Janeiro, 03 jun. 2019. Available at: <<http://observatorio.fiocruz.br/noticias/artigo-atesta-o-destaque-internacional-da-fiocruz-na-pesquisa-sobre-o-zika-virus>>. Accessed on: May 08, 2020.

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