

# The health systems resilience: notes for a research agenda for the SUS

## *A resiliência de sistemas de saúde: apontamentos para uma agenda de pesquisa para o SUS*

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**ABSTRACT** The COVID-19 pandemic highlighted the resilience of health systems. In this paper, we seek to explore elements to support a research agenda on resilience for the Unified Health System (SUS). First, based on a scoping review, we analyzed the conceptual and methodological development of resilience applied to health systems research both at international and national levels, identifying who the formulating groups are and what they propose as analytical frameworks. Then, we propose an analytical framework adapted for the Brazilian health system features. The framework underpinned the pointing out of critical issues to be investigated in research on SUS resilience, based on four dimensions: governance and leadership, financing, resources (workforce, infrastructure, medicines, and technologies), and service provision. Finally, we discuss opportunities and challenges for implementing a research agenda on resilience for the SUS.

**KEYWORDS** Health system research. Health system resilience. Resilience. Unified Health System.

**RESUMO** A pandemia provocada pela Covid-19 deu relevância à resiliência dos sistemas de saúde. Neste artigo, buscou-se explorar elementos que subsidiem uma agenda de pesquisa sobre resiliência para o Sistema Único de Saúde (SUS). A partir de revisão de escopo, analisou-se o desenvolvimento conceitual e metodológico da resiliência aplicada à pesquisa sobre sistemas de saúde em nível internacional e nacional, identificando quem são os grupos formuladores e o que propõem como modelos de análise. Em seguida, apresentou-se uma proposta de modelo de análise de resiliência adaptada às características do sistema de saúde brasileiro. O modelo embasou o apontamento de questões-chave a serem investigadas em pesquisas sobre a resiliência do SUS, a partir de quatro dimensões: governança e liderança, financiamento, recursos (força de trabalho, infraestrutura, medicamentos e tecnologias) e prestação de serviços. Ao final, discutem-se oportunidades e desafios para implementação de uma agenda de pesquisas de resiliência para o SUS.

**PALAVRAS-CHAVE** Pesquisa em sistemas de saúde. Resiliência em sistemas de saúde. Resiliência. Sistema Único de Saúde.

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## Introduction

Responsible for more than 6.5 million deaths registered worldwide by September 2022<sup>1</sup>, the COVID-19 pandemic highlighted the need for countries to strengthen their health systems to have greater resilience in the face of public health emergencies<sup>1-3</sup>. On the other hand, the poor performance in the response to COVID-19 by countries previously considered to have resilient health systems<sup>4</sup> has called into question how the concept of resilience has been used to analyze health systems by international classifications<sup>5,6</sup>.

Resilience is a physics concept that characterizes the elasticity of materials. It was adapted for studies in engineering that sought to explore the safety and general functioning of complex sociotechnical systems in extreme situations<sup>7</sup>, as well as in positive psychology for analysis of how individuals deal with traumatic experiences<sup>8</sup>. In recent years, there has been an increase in research using resilience as a concept for analyzing how health systems respond to shocks – caused by political, economic and humanitarian crises (for example, forced migration), natural disasters and epidemics (such as Ebola, COVID-19) – that damage the health of the population or the functioning of health services<sup>9-12</sup>.

It appears, however, that studies on the resilience of health systems are concentrated in the context of high-income countries – which, in general, have well-structured social welfare and health systems – and low-income countries, often devoid of social protection mechanisms and with very precarious health systems<sup>2,13,14</sup>. However, there is a gap in the research literature that explores the resilience of health systems in the context of middle-income countries<sup>14-16</sup> such as Latin America. In this region, the countries are characterized by high socioeconomic inequality, fragility of the social protection system and health systems with great segmentation and fragmentation in financing and service provision<sup>17</sup>.

Among middle-income countries, Brazil is a case that deserves more attention in health systems resilience studies. The implementation of the Unified Health System (SUS) enabled substantial advances in the country's capacity to prepare and respond to public health emergencies<sup>18</sup>. However, structural fragilities of the SUS, such as low public funding, fragile regional governance and coordination between the public and private sectors, and inefficient allocation of resources – aggravated by the prolonged political and economic crisis – have been deteriorating its functioning and limiting its resilience<sup>19-21</sup>. As a result, since 2016, the country has been registering a deterioration in several health indicators, such as a drop in vaccination coverage, stagnation in the downward trajectory of infant mortality and an increase in maternal mortality<sup>22</sup>. By surpassing 685 thousand deaths caused by COVID-19 in September 2022, Brazil accumulates 11% of the world's deaths from the disease, being the second country most affected by the pandemic in absolute number of deaths in the world<sup>1</sup>.

The present study sought to explore elements that contributed to the construction of a research agenda on resilience applied to the SUS. Initially, we carried out a scope review that analyzed the conceptual and methodological development of resilience applied to health systems at the international and national levels, identifying who the formulating groups are and what they propose as analysis models. Next, we present a proposal for an analysis model adapted to the characteristics of the Brazilian health system. The model was the basis for pointing out key issues to be investigated in research on the resilience of the SUS, based on four dimensions: governance and leadership, financing, resources (workforce, infrastructure, medicines, and technologies) and provision of services. In the end, we discuss opportunities and challenges for implementing a resilience research agenda for the SUS.

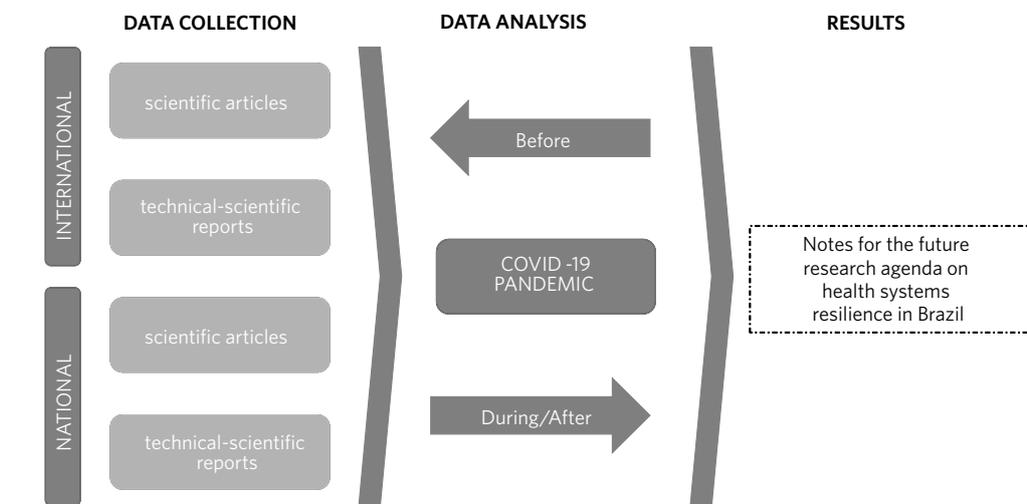
## Material and methods

To meet the objectives established in this study, a scoping review was carried out by consulting the national and international literature on resilience of health systems. The search focused on the main international (Web of Science, Scopus and PubMed) and national (SciELO) scientific databases, in addition to technical-scientific reports prepared by institutions or initiatives, both international (World Health Organization – WHO) and national (Oswaldo Cruz Foundation – Fiocruz). The terms used in the database search fields were “health system” and “resilience” and “*sistema de saúde*” and “*resiliência*”, with a

filter so that the terms are found in the title, abstract or keywords.

After this first search, the articles found went through the reading of the authors and application of the selection criterion to discuss resilience in health systems. Then, to better organize the analysis of the findings the work divided them into a perspective before and after the COVID-19 pandemic, with a final proposal for a research agenda on resilience of health systems adapted to the Brazilian reality. It is worth mentioning that this article has the character of a theoretical essay and, therefore, does not aim to carry out an integrative systematic review. *Figure 1* summarizes the methodological process used.

Figure 1. Summary of the methodological process used



Source: Own elaboration.

## Results

### Health systems resilience in the world

Research that used the concept of resilience to study health systems in the world before

the COVID-19 pandemic can be divided by public health emergencies caused by specific contexts, such as economic crises, epidemics, humanitarian crises or due to natural disasters<sup>15</sup>. The first works, between 2012 and 2014, sought to understand the concept of resilience applied to the health system in a post ‘global economic crisis’ period, with emphasis on European countries or those linked to the

Organization for Economic Cooperation and Development<sup>15,23,25</sup>. It was at that moment that the concept of resilience gained relevance and direction for the analysis of the capacity of health systems to absorb certain types of shock, preserving their vital functions, such as maintaining the provision of essential services to the population<sup>10,24</sup>.

As of 2015, an increase in the number of publications that use the concept of resilience to analyze the structure of health systems due to the Ebola virus epidemic can be observed<sup>11,25,26</sup>. The Ebola virus epidemic reached countries in West Africa, encouraging studies that used the concept of resilience to analyze health systems in the context of low-income countries<sup>25,26</sup>. In addition to updating the concept of resilience of health systems, the studies emphasized the need for key players in the health system to seek to adopt measures of response preparation, maintenance of essential health system activities and learning from the experience of coping with the public health emergency<sup>11</sup>.

More recently, the humanitarian crisis, when large migratory movements of refugees are observed, comes as a shock to the health system<sup>27,28</sup>. A novelty presented by these studies is the type of shock, which becomes not just another external shock, but also an internal one, caused by the rapid increase in demand for health care services<sup>27</sup>. At the same time, it is also possible to observe the use of the concept of resilience to analyze the response of health systems in situations of natural disasters and risk management<sup>29-31</sup>. These studies reinforce the resilience of a health system as the ability to prepare, absorb and learn from key actors, including the general population, to deal with internal and external shocks<sup>29,30</sup>.

The literature prior to the COVID-19 pandemic therefore collaborates with the development of the concept of resilience applied to health systems by highlighting the need to prepare for absorption and maintenance of essential health services in times of external and internal shocks<sup>15</sup>.

Another point worth mentioning in the development of health system resilience analysis models is the relationship with the health systems evaluation model<sup>32-35</sup>. In 2000, the WHO proposed a model for evaluating the performance of health systems based on dimensions of governance (stewardship), financing, generation of resources and provision of services<sup>33,34</sup>. Seven years later, WHO updated this assessment methodology to building blocks, including: service delivery, workforce, information; medical products, vaccines and essential medicines; financing; and governance and leadership<sup>32,35</sup>.

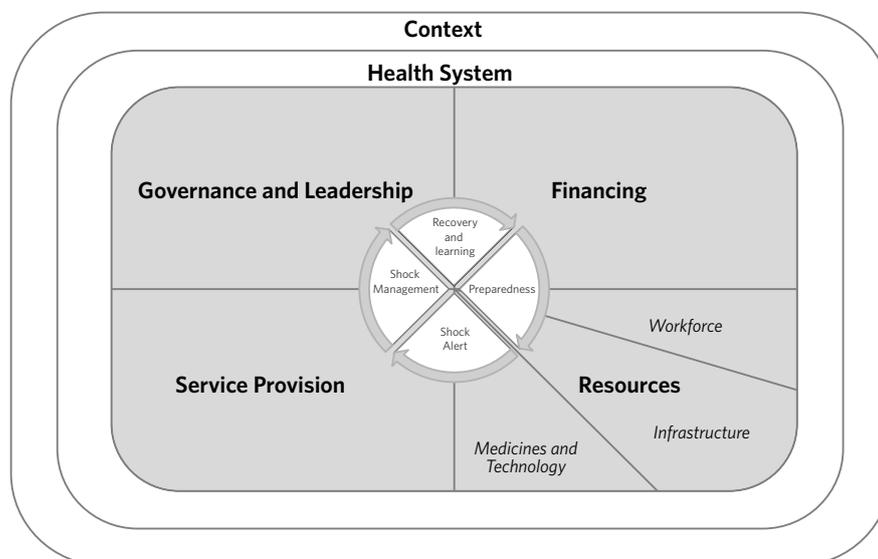
In 2013, Thomas and other authors, motivated by the financial crisis that impacted European countries and with the aim of understanding how it affected their respective health systems, proposed the following formats for evaluation: financial, adaptive and transformative<sup>10</sup>. Later, this typification was adapted for four types of resilience: adaptive, absorptive, anticipatory and transformative<sup>36</sup>. It is, therefore, a model that emphasizes the analysis of the health system's response to the different stages of the shock<sup>10,37</sup>. On the other hand, initiatives of analysis models have also emerged that value the analysis of the structure of the health system and its response capacities, in order to adapt the dimensions previously used for evaluating health systems, such as governance, resources and service delivery<sup>31,38</sup>.

The COVID-19 pandemic opened up a demand for opportunities for the development of health system resilience studies, making it possible to improve its conceptual<sup>3,39</sup> and analytical<sup>40,41</sup> development. The analysis of the broader context in which health systems are inserted came to be seen as a key point for analyzing the resilience capacity in the face of COVID-19<sup>42</sup>. In this way, health system resilience configures the ability to prepare, manage and learn from shocks, internal and external, based on the understanding of the context of application<sup>43-46</sup>.

The models for analyzing the resilience of health systems, in turn, were also consolidated, with a clear division of the forms of evaluation. On the one hand, there are assessments of the stages of resilience of the health system in the face of external shock, namely: preparedness, shock alert, shock management and its impact,

and recovery and learning<sup>41,47,48</sup>. On the other hand, there is a strong expansion of works focusing on the resilience of the dimensions of health systems<sup>12,49,50</sup>, with emphasis on the technical reports of the European Observatory of Health Systems and Policies<sup>40,41</sup>.

Figure 2. Health systems resilience analysis models



Source: Own elaboration.

Based on the analyzed literature, therefore, *figure 2* summarizes the stages and dimensions of resilience in a health system. As can be seen, the health system's response stages act as a cycle within the health system's resilience dimensions, influencing and being influenced by the context<sup>40,41,51</sup>.

### Resilience of the Brazilian health system

Although Brazil has a tradition of studies evaluating programs, policies and health systems, with emphasis on the Health System Performance Assessment Project (Proadess)<sup>52</sup>,

studies that use the concept of resilience to analyze the health system had a different trajectory from that observed internationally. Before the COVID-19 pandemic, three lines of study can be observed.

The first line uses the concept of resilience to analyze aspects of health policies and programs, such as mental health, health promotion and workers' health<sup>53-55</sup>. The second seeks to understand how the daily resilience of health systems are affected by organizational changes in service delivery models<sup>56</sup>, behavior of health professionals<sup>57</sup> and socioeconomic conditions of the population<sup>7,57</sup>. Finally, the third uses the concept of resilience of health systems to

analyze the effects of political and economic changes on the SUS, which are close to the dimensions already studied internationally<sup>19,20</sup>.

Studies focused on resilience in mental health and workers' health sought to understand people's individual capacity to respond when exposed to emotional or even physical shocks<sup>54,55</sup>. In a complementary way, the works with the theme of health promotion were aligned with the public health policies implemented at that time in Brazil, such as the Family Health Strategy (ESF)<sup>53</sup>.

Along the same path, other resilience studies have tried to understand the impact of organizational changes<sup>56</sup> and sociodemographic characteristics<sup>7,57</sup> on the performance of health professionals, such as the performance of general practitioners and community health agents in a given context. Regarding the resilience of pre-pandemic health systems, there is a transition and adaptation of health systems studies to the inclusion of the word resilience, with emphasis on works that analyze the impact of fiscal austerity measures on the SUS<sup>19,20</sup>.

In the Brazilian case, the COVID-19 pandemic was a public health problem that gained greater proportion due to the complex political and institutional context experienced in the country. Thus, studies on the response of the health system valued a more macro perspective, boosting the dimensions of governance and leadership<sup>58,59</sup>.

In this sense, the studies found from the pandemic period sought to understand the resilience of the Brazilian health system<sup>20,21,60</sup>. At first glance, it is important to highlight the technical reports developed by the Pan American Health Organization and Fiocruz. These studies raise the debate on the actions and policies needed for the Brazilian health system to become more resilient, such as

intersectoral financing of systems and protection of advances in public health care<sup>61-63</sup>.

Next, the scientific articles developed and published on resilience of health systems are presented. Massuda and other authors presented, in 2021, an analysis of the resilience of the Brazilian health system in the face of the COVID-19 pandemic, using an analysis model proposed by international studies and adapted to the Brazilian reality<sup>60</sup>. Complementarily, Rocha and authors analyzed the effects of Brazilian inequalities and vulnerabilities in preparing the health system in response to the COVID-19<sup>21</sup> pandemic. As for the provision of services, Bigoni and authors analyzed the impact of the COVID-19 pandemic on the functionality of the system, that is, on the resilience of the SUS to maintain the services provided<sup>64</sup>.

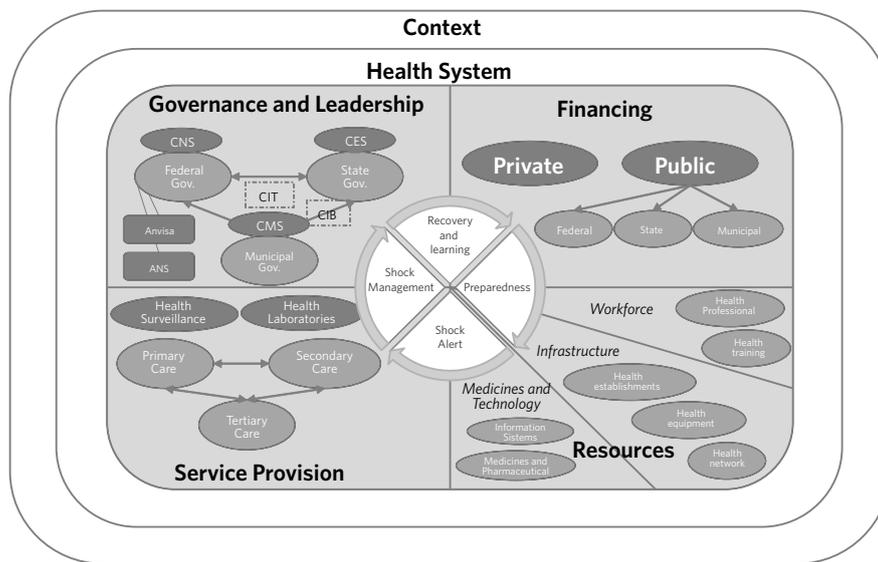
## Discussion

### Notes for research on the resilience of the SUS

It is understood that the concept of health systems resilience can add new analytical elements to health systems evaluation models, valuing the analysis of the dynamics of the system and its capacity to respond to different types of shocks. In addition to structural and organizational capacity, the resilience analysis highlights elements such as leadership, decision-making, coordination of actions, availability and mobilization of resources, which are key elements for managing the health system<sup>60,65,66</sup>.

Thus, *figure 3* presents a proposal for a resilience analysis model adapted to the characteristics of the Brazilian health system.

Figure 3. Adaptation of the health systems resilience analysis model to the Brazilian reality



Source: Own elaboration.

Considering the structural and management challenges of the health system, we point out key questions to be investigated in research on the resilience of the SUS, based on four

dimensions: governance and leadership, financing, resources (workforce, infrastructure, medicines and technologies) and provision of services.

Table 1. Research questions on SUS resilience

Questions for a research agenda	
Governance and leadership	<p>In view of the governance and leadership of preparedness, response and recovery from shocks:</p> <ol style="list-style-type: none"> <li>1) How is/should be the articulation between federative spheres in a decentralized system for the municipal scope?</li> <li>2) How is/should be the use by the SUS management spheres of information and evidence in decision-making in crisis situations?</li> <li>3) How is/should be the participation of key players in the system, including service providers and civil society, in crisis management?</li> <li>4) How is/should be the coordination of the response between the public and private sectors of the health system in crisis situations?</li> </ol>
Financing	<p>In view of the financing preparedness, response and recovery from shocks:</p> <ol style="list-style-type: none"> <li>1) How is/should public and private resources be allocated in response to emergencies? How do public and private funding inequalities influence the resilience of the SUS?</li> <li>2) How is/should the participation of government spheres be in the response to emergencies? How does greater proportional growth in municipal spending influence system resilience?</li> <li>3) How are/should the criteria for resource allocation in crisis situations be defined? How does the growth in spending on parliamentary amendments the the federal budget influence the resilience of the system?</li> <li>4) How is/should the flow of financial resources be between the federative spheres in response to the crisis situation? How did pre-COVID-19 fiscal austerity policies affect the resilience of the SUS when the crisis hit?</li> </ol>

Table 1. Research questions on SUS resilience

Questions for a research agenda	
Resources	<p>Considering the resources needed for shock preparedness, response and recovery:</p> <ol style="list-style-type: none"> <li>1) How are/should the preparation of contingency plans and support between spheres of government for the provision of personnel, supply of strategic inputs and maintenance of the supply chain for crisis situations be?</li> <li>2) How are/should the formation and existence of the workforce (increase/relocation) be between different regions of the Country and in the public and private sectors when the system faces a crisis?</li> <li>3) How is/should health professionals be trained to work in crisis situations?</li> <li>4) How is/should be the incorporation of new technologies necessary to respond to the crisis?</li> <li>5) How are/should the availability and integration of information between spheres of government and the public and private sectors be like for monitoring and projecting crisis scenarios?</li> </ol>
Service Provision	<p>Considering the service provision for preparedness, response and recovery from shocks:</p> <ol style="list-style-type: none"> <li>1) How is/should the distribution of essential health services for crisis responses (primary, specialized and hospital care) be distributed in the different health regions in the country?</li> <li>2) What is/should be the capacity to maintain essential services not involved in the response to the crisis (diagnosis support, surgeries, etc.) in the different health regions in the country?</li> <li>3) How is/should care coordination be during the crisis to absorb demand shocks?</li> <li>4) How is/should PHC be able to relieve pressure from hospitals and the private sector to reduce the burden on the public sector?</li> </ol>

Source: Own elaboration.

## A) GOVERNANCE AND LEADERSHIP

First, it is necessary to consider the complexity that characterizes the governance and leadership structure of the Brazilian health system and the key actors that compose it. This is a health system that has developed over the last three decades with universality and comprehensiveness as guiding principles, under governmental responsibility shared between the three levels of government – federal, state and municipal – which have political, financial and administrative autonomy. In addition, the health system is equipped with mechanisms for social participation in all spheres of government and is open to the participation of the private sector.

The Ministry of Health (MS) is the authority responsible for the national coordination of the SUS. Agencies linked to the Ministry of Health regulate the functioning of the subsector of private health plans, with coverage of about 25% of the population (National Agency for Complementary Health – ANS), and the sanitary control of products and services, including the safety and efficacy of medicines, medical devices and vaccines (National Health

Surveillance Agency – Anvisa). At the local level, the health secretariats of the 5,570 municipalities have a mandate to provide services to their inhabitants. Municipalities have autonomy in the way they provide services, although they must follow national guidelines to receive federal funds from the SUS. The state health departments, in turn, are responsible for the regional coordination of the SUS, for strategic programs and for the provision of non-municipalized services, mainly specialized and hospital care. A well-established arrangement in the SUS, composed of Tripartite (CIT), Bipartite (CIB) and Regional (CIR) Interagency Commissions, as well as health councils and health conferences, guarantees governance mechanisms between government spheres and spaces for discussion with society about political priorities and the monitoring of the health situation.

Exploring the roles, responsibilities and performance of management instances between spheres of government in the face of crisis situations is a fundamental theme for the research agenda on resilience in a decentralized system for the municipal scope such as the SUS. Furthermore, in the face of crisis

situations, it is important to understand how the SUS management spheres use information and evidence for decision-making; how the participation of key players in the system occurs, including service providers and civil society; and how the response is coordinated between the public and private sectors of the health system.

#### **B) FINANCING**

Regarding the dimension of financing, it is essential to understand how the composition and flow of expenses in the health system occur. Since its inception, the SUS has been underfunded. In 2019, total health spending in the country was 9.6% of its GDP. Of this total, 59.1% are private and 41.9% public. In addition, since the 2000s, municipalities have had the highest percentage growth in health spending, offsetting the reduction in the federal government's share of the SUS funding. On the other hand, despite the reduction in participation, federal funding still maintains a great capacity to induce the way of service delivery at the local level. In addition, the creation of a fund-to-fund resource transfer system enabled a rapid flow of resources from the federal government to subnational spheres. This highly unequal funding structure has a major impact on the health system's responsiveness and needs to be further analyzed in resilience studies.

Thus, in the face of a crisis situation, it is important to explore how public and private financial resources are allocated and how inequalities in public and private funding influence the resilience of the SUS; how the flow of financial resources occurs between the federative spheres in response to the crisis situation; what criteria are used to allocate resources in this situation and how the growth of expenses with parliamentary amendments to the federal budget influences the resilience of the system. Finally, it is essential to understand how the different spheres of government participate in funding responses to emergencies, how the greater proportional growth in municipal

spending has influenced the resilience of the system and how the pre-COVID-19 fiscal austerity policies have affected the resilience of SUS when the crisis arrived.

#### **C) RESOURCES - WORKFORCE, INFRASTRUCTURE, MEDICINES AND TECHNOLOGIES**

As for the available resources, it is important to analyze how the distribution and allocation capacity of the workforce, infrastructure and medicines and technologies in the preparation, response and recovery of shocks. In the workforce, one of the main advances that have occurred since the implementation of the SUS has been the expansion of multidisciplinary teams. There was also an exponential growth of health schools, including medicine, driven by the opening of private institutions – some of very dubious quality. However, the geographic distribution of professionals, mainly physicians, is highly biased towards larger cities and richer regions of the country. With regard to infrastructure, there was a great expansion of the network of health establishments, mainly Primary Health Care (PHC) (Basic Health Units), emergency services (Emergency Care Units – UPA; and Mobile Emergency Care Service – SAMU); while the distribution of higher quality hospital beds remained concentrated in the richest regions of the country and in the private sector. Furthermore, in the area of medicines and technology, the country stands out for having a network of public laboratories with the capacity to produce medicines and vaccines. However, the technological and productive dependence for health products of the country is still very high.

Thus, the dimension of resources must have in its research agenda elements of the existence of contingency plans and support between spheres of government for the provision of personnel, supply of strategic inputs and maintenance of the supply chain for crisis situations; how the formation and existence of the workforce (increase/relocation) occurs

between different regions of the country and in the public and private sectors when the system faces a crisis; how are the training of health professionals and the incorporation of new technologies necessary to respond to crisis situations. Finally, with regard to information technologies, it is necessary to analyze the availability and integration of information between government spheres and public and private sectors for monitoring and projecting crisis scenarios.

#### D) SERVICES PROVISION

With regard to the provision of services, the implementation of the SUS made it possible to expand the basic care network in the country, however, specialized and hospital care remains a major bottleneck. In PHC, the ESF is the most efficient and appropriate model. In epidemics, the ESF teams are the most prepared to carry out testing, contact tracing, identification and protection of people in situations of greater vulnerability, as well as to maintain routine care and vaccination. However, the implementation of the model was uneven among Brazilian municipalities and regions. In addition, difficulties

in accessing services, highly variable quality of care and low integration into the care networks of health systems remain.

Thus, the research questions that make up the service delivery dimension should seek to study the distribution of essential health services for crisis responses (primary, specialized and hospital care) in the different health regions in the country; what is the support capacity of essential services not involved in the response to the crisis (diagnosis support, surgeries, etc.) in the different health regions in Brazil; how is the coordination of care during the crisis to absorb demand shocks and what is the ability of PHC to relieve pressure from hospitals and the private sector to reduce the burden on the public sector.

### Opportunities and challenges for a research agenda on resilience for the SUS

From the analysis of the international and national literature, it is possible to identify opportunities and challenges for the implementation of a research agenda on resilience for the SUS, observed in *table 2*.

Table 2. Opportunities and challenges for a research agenda on SUS resilience

Opportunities
Different international initiatives are seeking to expand the scope of analysis of studies on resilience of health systems in different countries
International collaboration for the development of studies that explore the resilience of health systems in the context of countries with socioeconomic inequalities and health systems with great fragmentation, as is the case in Brazil
Contributions from the Brazilian academy in the development of analysis models using references from collective health, particularly from the social and political sciences, and health management planning developed in the process of Brazilian health reform and the construction of the SUS
International collaborations can be of great value to update and strengthen national SUS evaluation initiatives
Challenges
Lack of international studies on the resilience of health systems with realities similar to the Brazilian one, such as Turkey, Mexico and South Africa
Complexity of the conformation of the Brazilian health system, which, despite having universality and comprehensiveness as principles of the SUS, coexists with chronic low funding, fragile regional organization and the presence of a strong private subsystem that competes with the public system
There is still no national consensus on the importance of studies on the resilience of health systems, in comparison with studies already developed on health systems.

Source: Own elaboration.

Firstly, it appears that there are different international initiatives seeking to expand the scope of health systems resilience studies in the world, as is the case of the Partnership for Health System Sustainability and Resilience (PHSSR) initiative<sup>67</sup>. In this way, the possibility opens up for the establishment of international collaborations in studies that explore the resilience of health systems in the context of countries with socioeconomic inequalities and health systems with great fragmentation, as is the case in Brazil. Therefore, opportunities can be opened for the Brazilian academy to contribute to the development of analysis models using references from collective health, particularly from the social and political sciences, and health management planning developed in the process of Brazilian health reform and the construction of the SUS. On the other hand, international collaborations can be of extreme value to update and strengthen national SUS evaluation initiatives.

As for the limitations, the lack of international studies that explore the resilience of health systems with realities similar to the Brazilian one, such as Turkey, Mexico and South Africa, is recognized as a challenge. In the Brazilian case, this reality is still driven by the great complexity of the conformation of its health system, which, despite having universality and comprehensiveness as principles of the SUS, coexists with chronic low funding, fragile regional organization and the presence of a strong private subsystem that competes with the public system. Finally, there is still no common sense among researchers and health managers in Brazil that the resilience of the health system is an important area that should be given attention in future research.

### Limitations

As limitations of the present study, we highlight the non-systematization of the process of

collecting scientific articles in the aforementioned databases, so as not to be characterized as a systematic review; and the focus of the discussion on the resilience of health systems in a more macro way, leaving aside articles on day-to-day resilience or on human factors in health and complex systems, which already have consolidated literature.

## Final considerations

By analyzing the international and national literature on health systems resilience, we identified the need to adapt analysis models on health systems resilience to the complexity of the context of Brazilian health systems. With partial advances in universal access to health and high fragmentation between the public and private sectors, inequalities between population groups produce unequal degrees of resilience in the health system. On the other hand, resilience analysis studies can bring important notes to the capacity of SUS to act in public health emergencies, but which can also serve to improve the Brazilian health system.

## Collaborators

Paschoalotto MAC (0000-0003-2276-8531)\*, Castro MC (0000-0003-4606-2795)\* and Massuda A (0000-0002-3928-136X)\* contributed to the design and conception of the work; revision and critical writing of the work; final approval of the submitted version to be published. Lazzari EA (0000-0002-4515-3655)\* contributed to the revision and critical writing of the work. Rocha R (0000-0003-0689-6963)\* contributed to the revision and critical writing of the work; and final approval of the submitted version to be published. ■

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