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PÓS-GRADUAÇÃO DINÂMICA DOS OCEANOS E DA TERRA UFF

STATE CAPACITY AND PUBLIC HEALTH COOPERATION NETWORKS IN CONTROLLING THE COVID-19 PANDEMIC

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ABSTRACT

If before COVID-19 the state's capacity to provide access and care to public services was already questionable in terms of effectiveness, with the rapidity of spread, contagion, and lethality caused by this pandemic disease, this has become an object of central concern related to the urban issue and urgent for public managers. In this context, this article aims to investigate the role of state capacity and public cooperation networks, specifically the Inter-municipal Health Consortia, in the contagion and lethality control of COVID-19. As a method, binomial logistic regression was used for modeling, considering 2,884 municipalities in Brazil. The main findings of the analyses were that the four hypotheses established revealed evidence for their acceptance, indicating that municipal participation in public cooperation networks, such as inter-municipal health consortia, is an effective urban management measure to mitigate the effects of the pandemic crisis. Finally, based on the Brazilian experience and the conclusions and contributions of the work, it was verified that the inter-municipal health consortiums are auxiliary but positive elements in controlling the contagion and lethality of COVID-19 at a regional level.

Keywords: Urban Public Management; Local Government; Interorganizational Relationships; Intermunicipal Consortia.

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INTRODUCTION

The literature on coping with health crises is technically abundant. However, when it comes to public policy management, the manifestation of disasters or epidemiological crises is categorical in highlighting how limited our coping capacity is (Lopez *et al*., 2020). Advances in this area are needed since there is a gap in the literature and insufficient comprehensive work, limiting organizational learning and our ability to address the inevitably recurring challenges in the field.

Concerning Coronavirus Disease 2019 (COVID-19), management in its multiple aspects has proven to be a determinant for control and resilience both in Brazil and other regions of the planet.

Aspects that point to weaknesses in state capacity, management quality, and institutional arrangements have been reinforced in the recent literature on COVID-19 and coping with public policies. The studies include Abrucio *et al*. (2020) on intergovernmental mismatch, Albuquerque and Ribeiro (2020) and Guimaraes *et al*. (2020), who discuss the challenges and the geographical and regional inequalities and their impact on the management of policies to address COVID-19, and Boin and Hart (2003) and Boin *et al*. (2013) who refer to the role of leadership in times of crisis. Added to this, there is an analysis of the mode of public crisis management in tourist destinations in the context of COVID-19 (Mediotte *et al*., 2021).

In this vein, Ali *et al*. (2020) discuss the rise in socioeconomic fragilities due to COVID-19, and Daumas (2020) discusses how differences in the formation of municipal capacities imposed limits on coping with the disease. Among these differences, primary health care recurs in much of the current literature (Sarti *et al*., 2020; Fernandes, 2019; Fernandez, 2021).

The studies have generally highlighted the need for three aspects: i) coordination and leadership; ii) state and institutional capacities; and iii) the arrangements, networks, and consortia built or strengthened for the synergistic response of governments and public administration in confronting COVID-19. However, from an empirical point of view, few studies have advanced in confirming these factors as management elements capable of attenuating the advance of the disease. This study sheds light on these questions of public management, and its main objective is to investigate the role of state capacity and public cooperation networks, specifically the Inter-municipal Health Consortia, in controlling the contagion and lethality of COVID-19.

Institutional arrangements and state capacity have been acclaimed as a conditioning factor in implementing public health policies with national scope (Macedo & Ferreira, 2020). The articulation capacities prior to the primary care response have also been evidenced in studies related to the COVID-19 pandemic (Fernandes *et. al.*, 2019; Fernandez *et. al.*, 2021). Technical coping capacity building is present in Rache *et al*. (2020), while socioeconomic factors were highlighted by Varkey *et al.* (2020), showing a need for exploration and interlocution between technical and management aspects.

The need for better exploring the role of cooperation networks and consortia was highlighted by the National Council of Health Secretaries (Santos, 2021), which requested effective responses from the public administration and the scientific community as a whole. The articulations and capacity building of primary care offer many lessons from several works produced by Jamielson (2020), Medina (2020), and Mendes *et al*. (2020), but still with little empirical advance to fill the existing gap. This reinforces the relevance of the findings in this work for the literature in the area and the constitution of public policies to face crises and challenges in public health.

Based on the crisis context caused by the COVID-19 pandemic, the theoretical background to discuss the object of this study was organized into two parts. The first deals with state capabilities and public cooperation networks for providing public services. The second focuses on state capacities and cooperation in health in Brazil.

State capacities, public cooperation, and coping with COVID-19

Seminal studies on state capabilities emerge from discussions on the role of the state in promoting development (Cingolani, 2013), which grant governments the autonomy to set policies and the capacity to implement them, even in adverse socioeconomic (Gomide *et al*., 2017) and chaotic environments such as COVID-19 (Abrucio *et al*., 2020).

Lindvall and Teorell (2016) point out that studies on state capabilities have focused on understanding the means (to achieve the capability) and/or the ends (produced by the capability). Therefore, it is important to clarify the focus of the study to avoid confusion and variability in the concept (Kocher, 2010) and to avoid weakening it in theoretical and practical terms. In this sense, based on the constitutional recognition that local governments, as in the Brazilian context, can provide protective measures in their territory, and corroborating with studies seeking to understand state capacities in achieving the

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results intended by their political choices in the solution of public problems (Andrews *et al*., 2017), it is intended to advance this understanding, facing COVID-19 as a contemporary issue resulting from the state capacity of local governments.

Thus, supported by work on state capabilities that examine networks and collaborative governance (Mayne *et al*., 2020), it is understood that the demand for political--relational capabilities by local governments, added to technical-administrative ones, aim to ensure the legitimacy of state interventions to make the results more effective in a coordinated manner (Gomide *et al.*, 2017). This requires local governments to build networks of interactions, dialogues, and consensus with public, private, and non-governmental stakeholders to implement public actions, especially social policies and essential urban services.

The specialized literature has treated public cooperation from various perspectives, such as a more state--centric process involving intergovernmental actions or a broader and more socio-centric process contemplating the formation of networks and public governance. The latter, however, is not exclusive to this theme and can occur horizontally among governmental and organizational entities at the same level, such as municipalities and local governments, and vertically, also involving state and federal entities.

These cooperative networks for public service delivery are used to leverage the organizational and operational capacity of the cooperating units. They have become a response to the economic and social constraints that municipalities have historically faced (Aldag *et al*., 2020). Thus, greater efficiency and effectiveness in delivering these services are sought through cooperation. Greater efficiency may result from taking advantage of economies of scale, assuming this is the primary goal of cooperation. In this way and hypothetically, adding one unit of consumption decreases the unit costs of production. Suppose these unit costs are reduced, the effectiveness of these services increases because they are available to many citizens. The smaller municipalities, geographically and demographically, can benefit the most from cooperation. Large urban centers, on the other hand, can improve their service delivery capacities through cooperation networks (Hefetz and Warner, 2012).

However, the effectiveness of the services provided through cooperative networks is questionable. Provan and Milward (2001) mention that cooperation requires adjustment among the cooperating units. Moreover, they conclude that this adjustment is difficult to achieve, leading to inefficient and ineffective services provided through networks. Aldag *et al*. (2020) state that the effectiveness of cooperation depends on the type of service and the socio-demographic conditions present, and it is not a rule that cooperation is effective in all sectors and circumstances.

For this article, the focus will be on the mechanisms or means of public cooperation to face problems of common interest, such as the provision of universal access to health care, specifically, inter-municipal health consortia. In Brazil, access to health services is foreseen as a constitutional right, and the state must ensure its provision through the Unified Health System (SUS).

Public cooperation networks in health in Brazil

The SUS brings together a complex and broad set of services of "primary care of medium and high complexity, emergency and urgency services, hospital care, actions and services of epidemiological, sanitary, and environmental surveillance, and pharmaceutical assistance" (Brazil, 2022).

This system's coordination has fostered the use of managerial instruments within the SUS to promote intergovernmental public cooperation (Lopez *et al*., 2020, p. 8), such as the "conditional transfer of government resources, a mechanism commonly used by the Union to encourage the implementation of new programs and public services by subnational entities, particularly by municipalities.

In this sense, it is noted that "municipalities more often consort in the health area to deal with scale problems, the high costs of medical-hospital care, and avoid burden transfers from one federated entity to another" (Lopez *et al*., 2020, p. 8), such as state and federal governments. Thus, in agreement with Ribeiro (2015) and facing regional issues such as health, local governments have established public cooperation agreements through inter-municipal consortiums to meet the municipalities' demands.

These consortia (contractual networks) have been a public management solution employed for healthcare service provision in Brazil. They are the object of several studies (Flexa & Barbastefano, 2019). However, in light of COVID-19 as an urban problem, what has been the influence of this state's capacity toward public cooperation through health consortia in confronting this pandemic? In this direction, the explicitness of the elements influencing certain events, or the factors causing the phenomenon of interest to researchers, is necessary (Kocher,

2010) for a better understanding and response from public managers regarding this urban issue.

Among the various factors discussed in the literature as conditioning factors of COVID-19 spread and lethality, three stand out: i) state capacity comprised of infrastructure and resources applied in the health sector (Lopez *et al*., 2020); ii) local government nucleation and consortium capacity in solving public health problems (Flexa and Barbastefano, 2019); and iii) demographic (Dowd *et al*., 2020), economic, and social (Qiu *et al*., 2020) capable of aggravating or slowing down the epidemiological processes.

Demographic factors associated with the municipality's socioeconomic levels and human development conditions are recognized in the literature (Mondal & Shotan, 2014) as determinants or interveners of health conditions in municipalities (Miranda *et al*., 2017). However, empirically there was still little evidence of the COVID-19 process in Brazil. Thus, it is assumed that age, development level, education, and household purchasing power play a significant role among other elements in the spread and lethality of diseases with the characteristics of COVID-19, which affect people and social strata differently, especially because of social inequalities (Bowleg, 2020).

However, although relevant, demographic factors on a larger scale, and socioeconomic factors on a smaller scale, are beyond the ordinary managerial scope of the public sector, particularly in the short term (Dowd *et al*., 2020). On the other hand, state capacity and the cooperation process by the consortium can be interpreted as managerial actions intrinsic to the role of public administration, particularly local governments, with immediate responses.

The term "ordinary" is employed above since the actions taken to control the spread and lethality of COVID-19 extraordinarily acted directly on many variables. Indeed, actions such as lockdown (Alvarez *et al*., 2020), social isolation, and trade restrictions (Hale *et al*., 2020) operated on variables that would normally not be in the domain of local governments, as did dozens of other actions, less visible beyond the municipal territory, applied by these governments (Mendes *et al*., 2020) within their capacities and creativity in the face of the pandemic crisis.

Research hypotheses

The hypotheses were based on the fact that, although much has been investigated about COVID-19, there are still several questions with open questions, especially in the face of the war of narratives in the political field. These responses will equip people to deal with future pandemics or emergency health crises, filling a gap in the literature. According to Castro *et al*. (2021, p. 4.), "no single narrative explains the spread of the virus among the states of Brazil. Instead, layers of complex scenarios intertwine, resulting in various and simultaneous Covid-19 epidemics across the country."

In this tonic, the work has as its empirical proposal to test the following investigative hypotheses, aiming to better understand the role of the State in the formation and articulation of its capacities in the epidemiological confrontation.

- H1 = Demographic, economic, and social factors are significant conditioning factors in controlling COVID-19 spread.
- H2 = Demographic, economic, and social factors are important conditioning factors in controlling the lethality by COVID-19.
- H3 = State capacity positively influences the process of controlling the spread of COVID-19.
- H4 = Public consortia positively influence the process of controlling the lethality of COVID-19.

Hypotheses H1 and H2 deal with a theme already recurrent in the literature, but whose importance in the public administration facing this urban issue cannot be underestimated since the excessive responsibility placed in the hands of public managers and local governments may be unfair as several factors of propagation and lethality are theoretically beyond the competence of the municipal executive power. Restriction of commercial activities and measures of social isolation are far beyond the ordinary competence of the public manager or local government in this process, particularly in federative countries like Brazil.

Hypotheses H3 and H4 depend fundamentally on the everyday management actions of municipal public power. Hypothesis H3 is justified by the fact that the contamination process can be slowed down by local government decisions involving the structure and capacity of articulated measures among local governments in the same geographical area. Possible actions that positively affect the spread of the disease include previous vaccination campaigns, sanitary barriers, and rapid detection and isolation tests. Hypothesis H4 is justified because, in the case of contamination, it is precisely the local structure

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(financial resources, doctors, and equipment) associated with the capacity to use networks of greater complexity via consortiums and partnerships that will facilitate the confrontation and reduction of fatalities. At this point, the existence of consortiums and a well-founded public health capacity can decisively influence the rates of mortality control.

In this strand, the central argument of this research is developed as follows: Local governments were encouraged to promote distancing, prevention, and social isolation (Hale *et al*., 2020), aiming at flattening the contagion spreading curve. The goal was to avoid the bottlenecking of the hospital care network and to gain time for the municipalities to be prepared with emergency actions of the state to mitigate the pandemic effects and minimize the lethality promoted by COVID-19 (Alvarez *et al*., 2020).

However, considering that there are different state capacities, mechanisms of public cooperation, and social, economic, and demographic conditions for the various local governments, it is expected that the municipalities with the best conditions will be more successful than the others in implementing their strategies, such as the consortia, to control the spread and lethality.

Knowing the real effect of these conditioning factors will enable better exploration of these elements both by academia in the construction of models through scientific investigations with an empirical approach and by political leaders, policy analysts, and urban managers who will be able to guide their actions based on the findings and search for better theories (Sabatier, 2007) to deal with public problems.

RESEARCH METHOD

This article followed the ethical precepts in research in the area of human and social sciences, according to the guidelines of the National Health Council, Resolution No. 510, of April 7, 2016. The period of the data is from February 25 to October 25, 2020. These data were collected in epidemiological bulletins on the municipalities published by the state health secretariats of the country (Brasil.io, 2021).

About the municipalities, financial information collected from the Information System on Public Health Budgets (Brazil, 2019c) and National Treasury Secretariat (Brazil; FINBRA/SICONFI, 2019a) was gathered. Data were also collected from the National Registry of Health Establishments (Brazil, 2019b), which counted the number of organizations providing health services in each local government, along with the existing human resources in the SUS; the number of SUS inpatient beds and complementary beds, in addition to the number of municipal medium- and high-complexity hospitals. Socio-demographic information, such as an estimate of resident population, population density, and municipal development index, were also considered from IBGE (2015, 2017) and the Atlas of Human Development in Brazil, organized by the United Nations Development Program (UNDP), the Institute of Economic and Applied Research (IPEA), and João Pinheiro Foundation (FJP) (2013).

The data of spread and lethality were collected and analyzed in relative daily measures (rates, proportions, and indices), considering two moments throughout the eight months of the COVID-19 pandemic - first wave: T1 (1st to 4th month) and T2 (5th to 8th month). A cross-section database containing the data for the two periods was built to compare spread and lethality results. The purpose was to capture the behavior of spread and lethality among the different municipalities between the two time periods as the local interventions materialized in two proxies of spread and lethality control. The motivation for constructing two time periods was to contain the effects of registration lag and other biases of different bureaucratic structures across municipalities. Idiosyncratic lag effects are minimized by comparing the municipality to itself in the two periods.

Outcome Measures

To test the hypotheses, two constructs were used as dichotomous response variables in the statistical models, as follows: I) Contagion control: 1 for municipalities that achieved better performance in contagion control comparing the two periods relative to peers and 0 for the remaining municipalities; ii) lethality control: 1 for municipalities that achieved better performance in lethality control comparing the two periods relative to peers and 0 for the remaining municipalities. The performance cutoff considered the mean minus 1/3 standard deviation of the interest variable versus the remainder for the successful composition. Given the high coefficient of variation, this measure was created using a sensitivity analysis.

The initial universe was the 5,570 Brazilian municipalities, but due to the availability and consistency of the information available, the sample was reduced to 2,884 municipalities covering all regions and states of Brazil. For the operationalization of the analyses, models were built with qualitative dependent variables by the binomial logistic regression technique, with the following response characterization: Y = 1: success, and Y = 0: failure.

According to official data, success is qualified as the relative performance of the municipality in controlling the spread or lethality of COVID-19. For the positive performance measure (statistical success), it was considered to be in the stratum of the mean minus standard deviation, between the two time periods, for contagion and death, which represented 36.37% and 74.17% of the municipalities, respectively. According to **Table 1**, the remaining municipalities with values greater than this cutoff (mean minus standard deviation) were classified as having poor performance (Statistical Failure).

We highlight the increasing use of risk prediction models in public health and urban policies, such as studies by Acheampong and Avorgbedor (2017) and Montez (2020), in methodological contexts similar to the one described in this study. For risk prediction associated with COVID-19, studies have confirmed the potential of the technique, and it is appropriate to highlight the works of Xiong *et al*. (2020) and Zhou *et al*. (2020).

Because it generates qualitative procedural responses of a given attribute's presence or absence type, logistic regression is a qualitative selection econometric model (Pindyck & Rubinfeld, 2018). Logit is based on the cumulative logistic probability function:

$$Pi = F(Zi) = F\left(\alpha + \sum_j \beta_j . X_{ij}\right) = \frac{1}{1+e^{-Zi}} = \frac{1}{1+e^{-\left(\alpha+\sum_j \beta_j . X_{ij}\right)}}$$

In this equation, Pi is the probability of occurrence of an event given the occurrence of X*ij* in observation i, where k is the number of existing observations, F(.) is the cumulative distribution function, β*j* is the coefficient of the independent variable, and X*ij* and Zi are continuous theoretical indices determined by the explanatory variables X*ij*. From algebraic transformations on equation (1), we obtain the function that names the logistic regression, linearized as:

$$LN\left(\frac{Pi}{1-Pi}\right) = Zi = \alpha + \sum_j \beta_j . X_{ij}$$

The dependent variable in the above equation is the logarithm related to the probability of occurrence of a given event. The parameters are estimated using the maximum likelihood method, recommended when we have individual observations of the occurrence or non-occurrence of a given event. Considering the model's application to the analysis conditions, the coefficients of the explanatory variables offer their effect on the variation of the log odds ratio of the outcome variables, in this case, the spread and lethality control.

Results Analysis

Table 2 presents the variables employed in the models and their respective basic descriptive statistics.

The data properly outline the great statistical variability among the municipalities and show the completeness of information for most municipalities. Thus, it is possible to advance to prediction models that aid in analyzing results.

Forecasting models and results analysis and discussions

The first model presents the conditioning factors for contagion control. **Table 3** shows that the adjustment measures confirm the overall significance of the model (Prob > LR: 0.00) despite a weak Pseudo R2 (0.07). We highlight that the main measure of interest – prediction success rate – shows that the model had a hit prediction rate of 66.75% of the cases.

It is noted that the social, economic, and demographic variables in this model were determinants in predicting control, confirming the H1 hypothesis. The GDP per capita proves that the municipalities with a larger geographical area and better income and purchasing power positions were the most affected and showed the worst performance in controlling the contagion. This is because the level of economic activity influences the flow of people, especially in trade and services, which feed the economies of these municipalities. However, positively, the more ruralized municipalities had lower contagion from COVID-19.

Table 1. Model results variables

Variables	Positive	Negative	Total	Positive Perc.	Negative Perc.
Contagion Control	1,049	1,835	2,884	36.37	63.63
Mortality Rate Control	745	2,139	2,884	25.83	74.17

Source: Elaborated by the authors with research data

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Table 2. Descriptive analysis of the model variables

Variable	Note	Medium	Standard Deviation	Min	Max
Consortia Participation	2,884	.4934119	.5000433	0	1
Contagion Control	2,884	.3637309	.4811559	0	1
Lethality Control	2,884	.2583218	.4377877	0	1
Total Municipal Expenses	2,884	8.46e+07	3.76e+07	2.10e+07	5.06e+08
Total own expenses	2,884	5.02e+07	3.18e+07	8676212.00	4.35e+08
Total expenditure with human resources	2,884	4.04e+07	1.99e+07	49198.00	1.89e+08
Life Expectancy	2,881	7341401	2725416	65.3	78.64
Aging rate	2,881	8533252	2386769	1.5	19.83
GDP per capita	2,884	22928,74	22098,15	3285.04	344847.2
Area	2,884	1457782	5296109	3565.00	122461.1

Source: Elaborated by the authors with research data

Table 3. COVID-19 contagion control prediction model

Performance in contagion control	Coef.	Std. Err.	z	P>|z|
Participation in Consortia	0.4473639	0.0983072	4.55	0.000
Total municipal expenses	1.19E-08	3.38E-09	3.53	0.000
Total spending on human resources	-1.25E-08	4.75E-09	-2.63	0.008
Per capita GDP	-0.0000205	4.60E-06	-4.46	0.000
Rural population	0.000019	2.63E-06	7.25	0.000
Total SUS professionals	-0.0004975	0.000142	-3.5	0.000
Municipality area	-0.0000423	0.0000152	-2.78	0.005
_cons	-0.4530395	0.1914214	-2.37	0.018

Source: Elaborated by the authors with research data

Note: LR chi(7) = 187.32 Prob > chi2 = 0.000 Pseudo R2 = 0.0702. Correct Forecast: 0.6675.

Regarding the variables of interest, it is evident that both state capacity and consortium networks positively affect controlling contagion. This evidence indicates the purpose expected and produced by state capacity (Andrews *et al*., 2017), including through public cooperation via health consortia, as highlighted in this study. It should be noted that the proxy for state capacity (total municipal expenditures) demonstrates how responsiveness was better in municipalities with higher financial responsiveness, indicating a positive effect on contagion control, which corroborates the theoretical expectations of hypothesis H3.

Additionally, spending on human resources is one of the main elements of state capacity because public facilities without technical bureaucracy have no power to react, revealing that this spending was counterproductive in controlling contagion. Surprisingly, where there are a higher proportion of SUS professionals, performance is lower. There are two probable answers to this finding.

On the one hand, this may signal that the high specialization of preventive health has failed to adapt to or prove productive in this pandemic context, which denotes a lack of articulation and response capacity on the part of the state. On the other hand, the high specialization in health care may reflect a better operational capacity with the application of more tests and, thus, the discovery of more contaminated people. As testing was generally low during this period, the first proposition was more credible, although not definitive. The second model presents the conditioning factors for lethality control. **Table 4** shows that the measures of fit confirm the overall significance of the model (Prob > LR: 0.00) and, despite a weak pseudo-R2 (0.08), the main measure of interest shows that the model had a 66.27% accurate prediction rate.

Table 4. Covid-19 lethality control prediction model

Performance in lethality control	Coef.	Std. Err.	z	P>|z|
Participation in Consortia	0.3780221	0.1022387	3.7	0.000
Total own expenses	7.03E-09	3.15E-09	2.23	0.025
Longevity MHDI	-343.6535	169.7816	-2.02	0.043
Expenditure on primary care	-5.29E-09	2.47E-09	-2.14	0.032
Life expectancy	5.757119	2.829647	2.03	0.042
Total SUS professionals	-0.0006988	0.0001443	-4.84	0.000
Rural population	0.0000188	2.91E-06	6.48	0.000
Aging rate	0.1159077	0.0240253	4.82	0.000
Per capita GDP	-0.0000197	4.96E-06	-3.97	0.000
_cons	-146.6176	70.74667	-2.07	0.038

Source: Elaborated by the authors with research data

Note: LR chi(7) = 202.66 Prob > chi2 = 0.000 Pseudo R2 = 0.076. Correct Forecast: 0.6627.

Throughout the pandemic, there was a polarized discussion in political circles and the media about the dichotomy between COVID-19 control and negative economic impacts. In this sense, an attempt was made to shed light on this issue. In both the control and lethality models, the economic factors had a negative impact, reinforcing that the economic dynamics of the municipality have a negative relationship with contagion control and death. Municipalities with a higher GDP per capita were less successful in both models. However, as **Figure 1** shows, there was a large marginal impact for lethality when moving between the smaller ranges (the decreasing part of the curve) and a slight decrease and stability between the middle and higher GDP per capita ranges. As the ranges grew, it was noted that there was not so much difference. This proves that the limitations imposed by economic activity are indistinguishable after a certain size of the economy.

This is partly explained by the fact that, although these cities have higher rates of infection, they have better infrastructure, which works as a counterweight at this moment. By covering the elderly, such a care infrastructure can positively influence the control of contagion from COVID-19, contrary to expectations that municipalities with higher aging rates could be more susceptible to the contagion and lethality of the pandemic.

Regarding the variables of interest, the findings partially corroborate the acceptance of hypothesis H4. In this sense, the state capacity variables—total expenditure on human resources and expenditure on primary care—negatively affect lethality control. It is inferred that the operational capabilities and the specific public equipment are more relevant in lethality control, especially regarding access and sharing of beds and structures. In any case, this finding opens space to explore better the effective nature of spending and the quality of public spending, elements under wide debate at the juncture of the analysis of these data, corroborating studies by Lopez *et al*. (2020). Also confirming the theoretical expectations, global cooperation, manifested in the form of health consortia, had a positive effect on lethality control, corroborating hypothesis H4 and emphasizing that municipalities with greater discretion and power of reaction have greater discretion and power of reaction.

Table 5 proves, by the Chi-square association at the 5% significance level, that the lethality control was lower than expected (322<377) where there are no consortiums; however, lethality control was higher (423>368) where consortiums are present. This fact proves unequivocally at the 1% significance level that the consortium of municipalities was one of the most effective measures in controlling the COVID-19 pandemic.

Thus, based on the forecast models applied and the confirmation of the hypotheses defined in this study, it is possible to affirm that the municipalities whose local governments have better demographic and socioeconomic conditions, in other words, fewer inequalities, tend to be more successful than the others in implementing their strategies, such as public cooperation through consortiums to control the spread and lethality. The theory that emerges from the analyzed empirics corroborating Sabatier (2007) can complement the knowledge already existing in the field and be employed for understanding the phenomenon under analysis and expanding knowledge to deal with complex public problems shrouded by uncertainties increasingly present in contemporary public management.

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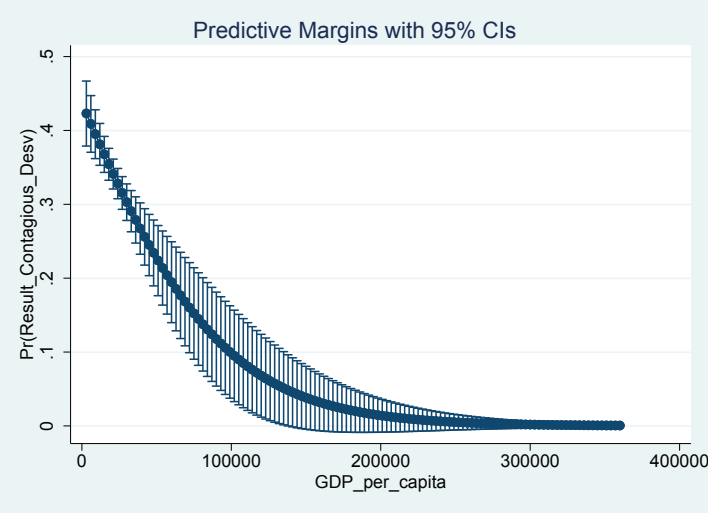

Figure 1. Marginal effect of GDP per capita on COVID-19 lethality
Source: Elaborated by the authors with research data

Table 5. Association between the presence of consortia and lethality control

Lethality (death) control	Cooperation – Consortia		
	No	**Yes**	**Total**
Increase	1,139	1,000	2,139
	1,084	1055	2139
Control	322	423	496
	377	368	745
Total	1,461	1,423	2,884

Source: Elaborated by the authors using survey data.
Note: The first row has frequencies, and the second row has Pearson expected values: chi2(1) = 22.2285; Pr = 0.000.

This is relevant because after more than three decades of SUS existence, although many health problems have been minimized or solved, the provision of health services has still proved problematic in several municipalities (Lopez *et al*., 2020). Moreover, consortia have been an effective management strategy in inland municipalities (Hefetz & Warner, 2012). This tends to contribute to tackling COVID-19, corroborated by Santos' study (2021).

This does not mean investing in the health system in this pandemic context is unnecessary. On the contrary, with integrated actions involving the provision of essential urban services, and inducers of development, it is possible to invest, above all, in a response from a public management to new needs emerging from demographic and epidemiological transformations. This emphasizes the importance of public investments that promote equitable behavior and recognize health as an urban territorial issue to achieve a possible healthy demographic density in municipalities. According to Gadelha *et al*. (2011, p. 3004), such consideration implies challenges and the need for insertion of this issue as "a driver of development in its regional dimension, whose importance is guided by the marked territorial cut of national socioeconomic inequities."

Thus, based on the municipalities studied in the Brazilian experience, it was confirmed that inter-municipal health consortiums, as networks of public cooperation and expressions of local government state capacity, proved to be supportive but positive elements in the regional control of COVID-19 contagion and lethality. Supporting elements are understood as those that assist in developing and reaching the agreed purpose, exercising a function that can be directly or indirectly related to the observed result.

Therefore, it is argued that these elements make up an emerging urban issue. It is important for municipal public management to consider the outcomes of current public policies in order for them to be equitable and integrated, but most importantly, effective (Lopez *et al*., 2020)

in favor of territorial development. This can inspire and serve as a reference for multi-year plans (PPAs), intra- and supramunicipal cooperative policies, and actions in a post-pandemic society after the establishment of the COVID-19 pandemic.

CONCLUSIONS

If before COVID-19, political leaders and managers had concerns about coordinating their public actions at the local level, with this pandemic, joining health consortia, which was an optional choice for public managers, turns out to be a management solution of a cooperative nature pertinent to its confrontation. Aparte a análise reportar um momento específico e particular, é possível verificar a resposta da capacidade estatal por meio das redes públicas de cooperação para a prestação de serviços de saúde. Assim, confirmam-se as crenças de que a cooperação é, de fato, o arranjo passível de utilização, tendo em vista a maior efetividade (Aldag *et al*., 2020), possivelmente, para além da saúde.

Thus, in the COVID-19 context, the underlying theory of health consortia as a form of public cooperation for local governments relocates the planning and control of essential services such as water, sanitation, electricity, and housing to an urban territorial issue. The term "territorial" is justified because it involves more than just a single municipality and may not be restricted to a region previously delimited by government agencies. The term can contemplate different geographic scales. Added to this, the territorial issue raises the need for social equity, recalling historical aspects of inequalities in essential services still present in Brazil's different municipalities. In this sense, epidemic or pandemic situations involving aspects related to state capacity and public cooperation networks for controlling contagion and lethality can reveal themselves as a new urban territorial issue for public actors. This means that epidemic diseases such as COVID-19 must be treated as an intersectoral urban management issue at different territorial scales.

It was also noted that the state capacity's use as an analytical category becomes relevant. Such capacity may be constituted by the governance of technical-administrative and political-relational resources capable of achieving results in the face of agreed institutional objectives. One way for local governments to have greater state capacity to meet this challenge is through public cooperation networks.

This sheds light on new urban and public policy studies that address categories such as state capabilities, multilevel public governance, and the effectiveness of actions to provide for the common good. To this end, four recommendations and propositions were presented for immediate reflection and action:

Work on urban planning from a networked and inter-municipal/regional perspective because what affects a city or local urbanity can also affect its surroundings;

For a municipality to become a resilient and healthy territory (and achieve the Sustainable Development Goals (SDGs) of the United Nations) in a pandemic context, it will need public, private, and mixed-cooperation actions, including those of other municipalities, especially the bordering ones;

The potential for collaboration between public health and urban management expands with health and epidemiological crises, which can be part of the "new normal" in the daily lives of municipalities;

Invest in actions to encourage housing and the preservation of rural areas because this study revealed that municipalities with larger ruralized populations indicated less contagion, revealing that the demographic density, when centered in the urban area, tends to be more vulnerable to health crises such as the COVID-19 pandemic. It also demonstrates the importance of deconcentrating the supply of public services from urban areas and investing more in modal initiatives with health security, which can bring such services to more ruralized areas, a characteristic of hundreds of municipalities in the interior of Brazil.

Finally, if the experience observed in the health sector regarding the capacity of state-owned companies and public cooperation networks to control COVID-19 were systematically treated through the expansion and integration with other essential urban services on an inter-municipal level, it is inferred that the results could be more positive and effective. Therefore, awareness must be raised among public and urban managers that municipalities cannot be treated as islands, i.e., something isolated and independent from their surroundings, but as a local normative territory that can build bridges of cooperation to face increasingly complex, global, and humanitarian public problems.

Finally, suppose the experience observed in the health sector regarding the capacity of state-owned companies and public cooperation networks to control COVID-19 was systematically treated through the expansion and integration with other essential urban services on an inter-municipal level. In that case, the results could be more positive and effective. Therefore, awareness must be raised among public and urban managers that municipali-

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ties cannot be treated as islands, i.e., something isolated and independent from their surroundings, but as a local normative territory that can build bridges of cooperation to face increasingly complex, global, and humanitarian public problems.

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