An Assessment of Brazilian States and State Capitals Remote Public Education Programs during the COVID-19 Pandemic

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Abstract

School closures were one of the policies adopted worldwide for containment of the COVID-19 pandemic. While this type of non-pharmaceutical intervention has proven to be an effective policy to reduce virus transmission, there has not been a systematic investigation to verify if governments implemented remote education programs to continue to deliver education to students. In Brazil's case, due to the lack of effective control of the pandemic, schools remained closed for in-person schooling over a prolonged period for the majority of the 2020 academic year. In developing countries, such as Brazil, this can increase education inequalities, especially if access to remote learning technologies is limited for vulnerable populations.

In this working paper, we report the results of a novel effort to collect data to document the types of programs adopted by state and state capitals' governments to deliver remote schooling during the pandemic. We measure the duration, scope, and coverage of remote public education programs through quantitative indicators and an index that measures the overall quality of remote education programs in early childhood, primary and secondary education in Brazil in 2020. Our research reveals that there were significant delays in the adoption of these programs by both state and municipal governments. Furthermore, our findings confirm that the programs dedicated insufficient attention to ensuring access to technologies that would encourage learning, interaction and supervision of students remotely. We then show that remote education programs are correlated with previous economic and educational conditions and use survey data collected from households across Brazil to show that remote education programs affected educational outcomes. We conclude by noting that the evidence collected in our report underscores that greater attention must be directed to the challenges and problems encountered in implementing remote education programs. The available evidence suggests that policies must be designed to address the preexisting, now augmented, unequal access and unequal provision of education for vulnerable groups.

1 Introduction

School closures were one of the main policies adopted worldwide for containment of the COVID-19 pandemic. While this policy is an effective non-pharmaceutical intervention to reduce virus transmission, it assumes that those institutions providing education services implement remote education programs for students (World Bank 2020). In this study, we depart from the premise that greater efforts need to be undertaken to measure and evaluate the effect of remote education programs more generally across and within countries. Thus far, there are no systematic country-wide studies that have been undertaken in sufficient depth to provide an overview of public remote education programs during the pandemic. This study seeks to address this gap by measuring the types of remote education programs that were adopted in public schools by state and state capital governments in Brazil.

To do so, we propose a set of indicators that measure the timing, duration, and types of government remote schooling programs that were implemented during the COVID-19 pandemic in Brazil in public schools. Specifically, we code the date of introduction and the duration of remote education programs and the broadcasting means adopted (e.g., internet, radio, and television). We also examine whether investments were made to provide access (provision of phones, mobile chips, tablets, books to students and teachers and internet subsidies), whether policies were enacted to guarantee the supervision of students (e.g., whether by teachers or by education departments) and, finally, the scope of coverage of these programs (e.g., kindergarten, elementary and high-school education). We then use these indicators to create a Remote Education Program Index (REP Index) that captures the multiple dimensions of remote education programs' overall quality. We code the programs of the 27 states of the Brazilian federation and all 26[4] state capitals from March 1 to October 6, 2020.

[4]Brasilia, the capital of the country, does not have a mayor. The governor of Distrito Federal is both the governor and mayor.

There are three key findings from our study. First, we show that the decentralized structure of public education in Brazil resulted in many different plans being introduced across the federation. The Ministry of Education did not adopt large-scale, national efforts to utilize technology in support of remote learning, distance education and online learning during the COVID-19 pandemic. Instead, plans were proposed by 26 of the 27 state governments and by 21 of the 26 capitals. Governments introduced remote education programs at different moments, and thus students have participated in remote education programs at different periods of duration across Brazil during the pandemic. Some governments adopted a remote program at the same time of school closure enactment; in other cases there was substantial delay. Moreover, in some regions students received no instruction via remote education programs during the pandemic.

Second, remote education programs were poorly designed. Most programs were introduced with limited consideration for access and for the supervision of students. The generalized absence or inadequacy of attendance supervision mechanisms is an example of a crucial element of remote education, as it ensures retention while guaranteeing increased interactions that can address students' specific needs, that was vastly undermined by governments' policies.

Finally, our research underscores that few programs mitigated or reduced the impact of both the pandemic and school closure policies for vulnerable populations. Our research shows that the quality of remote education plans is correlated with preexisting economic and education conditions. Wealthier states that were better pre-pandemic performers in public education were more likely to introduce better plans. Based on survey data reporting the number of hours students reported studying and attending classes, we show there are further reasons for concern. We conclude this report suggesting that distance education programs are most likely exacerbating preexisting inequalities.

Before presenting our indicators, and findings, we want to issue a caveat. There has been significant controversy surrounding whether prolonged school closures were warranted and should remain in effect, and whether school re-openings are increasing infections in specific communities (World Health Organization et. al 2020; Iwata, Doi and Miyakoshi 2020; Viner et al. 2020; Centers for Disease Control 2020). This working paper should not be interpreted as taking a position on these crucial debates and the ongoing research that seeks to identify impacts across and within countries. Instead, this study provides concrete evidence to allow us to assess the quality of remote education policies implemented during 2020 in Brazil. The evidence in this report can help to identify problems that must be addressed regardless of whether schools remain closed for in-person classes or education continues to be planned to either concurrently offer remote and in-person classes or remote education exclusively. The problems we identify are sufficiently serious to warrant discussion and, hopefully, policy interventions. For this reason, we advance policy recommendations with the hope of alerting decision-makers that there must be greater deliberation and discussion about the programs that were implemented in 2020 and their effects.

2 Background

Governments across the world have adopted a wide range of policies to control the spread of SARS-CoV-2 (Hsiang et al. 2020). In the absence of treatment and vaccines, non-pharmaceutical interventions to increase social distancing were adopted at varying intensities and across several sectors in an attempt to slow the spread of the pandemic. Given its effectiveness in containing the dissemination of contagious disease outbreaks in the past, the closure of schools was among the policies that were quickly adopted to increase physical distancing (Azevedo et al. 2020).

Research studies have documented evidence showing positive effects on virus spread from school closures based on earlier pandemics. (Cauchemez et al. 2009), for example,

cites the experience of France and the U.S. during the 1918 Spanish Flu Pandemic. He concludes that "in an optimistic scenario, closure of schools during a pandemic might have some effect on the total number of cases (maybe a 15% reduction), but cause larger reductions (around 40%) in peak attack rates.". However, he also alerts that this reduction will be substantially undermined if children are not sufficiently isolated or if the policy is not well implemented.

During the COVID-19 pandemic, the closing schools has also proven to be an effective tool for reducing transmission of SARS-COV-2 (Klimek-Tulwin and Tulwin 2020). However, in order to avoid the interruption of education, school closures also require the design of programs and policies to provide remote schooling to students who are advised to "stay at home." Not only as a way of ensuring the fundamental right to schooling, but also as an essential method to keep students home, remote education programs are indispensable when COVID-19 makes closing schools necessary. As most programs are delivered using the internet and television, the introduction of remote schooling programs in developing countries may increase preexisting inequalities in education and society. Additional concerns have been further raised that the cancellation of complementary interventions that occur within schools (school nutritional meal programs, for example) also negatively impact student learning especially for vulnerable and marginalized populations (Van Lancker and Parolin 2020).

In Brazil's case, state governments are responsible for high school education, and municipalities are responsible for early childhood care programs and kindergarten education. Elementary schooling is a shared responsibility between states and cities. These subnational governments in Brazil responded to the pandemic by mandating school closures in the first month after the first person was diagnosed to have been infected with SARS-COV-2 (Barberia et al. 2020). By March 23, 2020, state governments throughout the country had passed decrees to close schools at the primary, secondary, and tertiary levels. The federal government and its education ministry did not centralize school closures. This is partly because the federal government plays a limited role

in providing education (Brasil 1988)[5] and partly because the Brazilian Supreme Court (Supremo Tribunal Federal) decided that states and municipalities had the power to establish their isolation measures to control the spread of the COVID-19 virus.[6] Thus, the decision of closing schools was decentralized and put in the hands of the sub-national executive representatives.

Although state governments mandated school closures in March, this reports confirms that remote education programs were not simultaneously adopted. Instead, as we document in the subsequent sections, various types of programs were adopted by governors and mayors in a decentralized and heterogeneous fashion. Programs were introduced for different student populations, and the duration and modality of these services varied significantly across Brazil. With few exceptions, remote education programs continued to be in operation until October 2020, which is the period analyzed in this report.

Given the diffuse and fragmented response to the pandemic in the Brazilian Federation (Barberia and Gómez 2020), it is crucial to look at the efforts and actions of state and municipal governments in order to understand what plans and resources were in place for students in different parts of the country. The index, calculated for both state's and state capital's programs, aims to provide a novel measure of the aggregate impact of the policies adopted by governments.

3 Data and Methods

The Remote Education Policy (REP) Index is based on the coding of documents published from official government sources. The data collection was primarily based

[5]The 1988 Brazilian Constitution establishes that the federal government will aid states financially for education. However, it is only responsible for some college education institutions directly.

[6]"STF decides that states and municipalities have the power to establish rules about social distancing." Available at: https://g1.globo.com/jornal-nacional/noticia/2020/04/15/stf-decide-que-estados-e-municipios-tem-poder-para-estabelecer-regras-sobre-isolamento.ghtml. Last access in 12/09/2020.

on decrees published by state and capital governments and remote education program information as published by their education departments. In many cases, official channels published limited information. For this reason, secondary sources, such as newspapers or press releases, were used when these sources referred government and education departments as their main source in reporting. In the case in which there was no official information that was published, we assumed that the local government did not implement a remote education program.

The Remote Education Policy (REP) Index is composed of four policies:

BROADCAST TECHNOLOGIES (B1): The media channels used to offer remote education, videos, or educational content to students, such as radio, television, and internet;

MEANS OF ACCESS (A1): The materials, gadgets, and technologies provided to students and teachers to access classes and content, such as cellphones, tablets, textbooks, or any subsidies for internet access;

SUPERVISION OF STUDENTS (S1): The attribution of responsibility for supervising and guaranteeing that students are attending classes and doing activities if attributed to teachers, institutions, or both;

COVERAGE (C1): The educational levels covered, such as kindergarten, elementary and high-school or *EJA*[7] for state capitals.

Each component was scored from 0 (no policy) to 1 (policy offered). An aggregate index was calculated for each unit-day. using the following formula:

$$\text{REP Index} = \frac{B1 + A1 + S1}{3} \times C1$$

The three indicators (B1, A1, and S1) are measures of the broadcast, access, and supervision of students in remote education programs, while C1 is a measure of the population's overall coverage. The first three indicators are weighted equally, and this

[7] *EJA* stands for *Educação de Jovens e Adultos*, which means "Education for Youth and Adults". It is an education program that provides high-school or elementary level education for those who did not finish it beforehand.

Table 1: Remote Education Policy (REP) Index

Indicator	Name	Components	Score
B1	Broadcast Technologies	0 = No Broadcast Offered + 1/3 = Internet Broadcast + 1/3 = Television Broadcast + 1/3 = Radio Broadcast	0 - 1
A1	Means of Access	0 = No Access Offered + 1/3 = Printed Materials + 1/3 = Gadgets Distributed + 1/3 = Internet Subsidy	0 - 1
S1	Supervising of Students	0 = No Supervision Planed + 1/2 = Teacher Supervision + 1/2 = Education Department Supervision	0 - 1
C1	Coverage	0 = No Coverage Offered + 1/3 = Kindergarten Coverage + 1/3 = Elementary School Coverage + 1/3 = High-School/EJA* Coverage	0 - 1
REP Index	Remote Education Policy Index	(B1 + A1 + M1) x C1	0 - 10 (re-scaled)

Note: *EJA refers to programs for youths and adults who are attempting to complete their studies.

Source: CGRT-BRFED.

average is then multiplied by the share of the population covered by the program. The REP Index is then re-scaled so it ranges from 0 to 10 and has a value for each unit-day for states, state capital units, and the national capital, the Federal District of Brasilia. The lowest score is 0 (no program) and the highest possible score is 10.

In the next sections, we briefly describe some of the major trends revealed for each policy and the overall REP index across states and state capitals based on the data analyzed for this study.

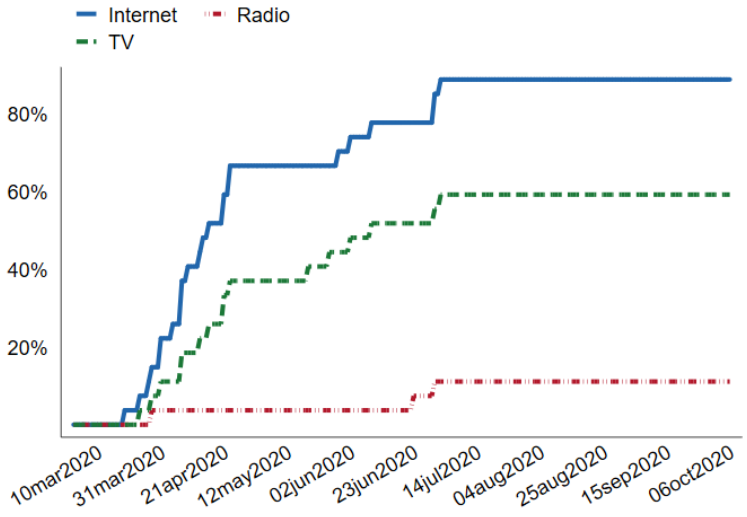
3.1 Remote Education Programs in States and Capitals

In this section, we provide descriptive statistics on the adoption and timing of programs by type of (a) broadcast, (b) access, (c) student supervision, and (d) coverage during the eight-month period from March 1 to October 6, 2020. This cutoff point was chosen as this is the period in which remote education programs were the exclusive and dominant means of instruction across most of Brazil.

3.2 Technologies Employed for Broadcasting Classes

Classes were offered by three means of broadcast: (a) online streaming or videos posted on social media and official websites, (b) public TV channels broadcasts, and/or (c) radios. We coded whether classes were broadcast in each of these modalities as we understand that it each provides an important level of access to specific populations within the territory. It should be noted, we measure the means of broadcast, not the extent to which actual learning and participating take place. There are important differences between the means in which classes are broadcast and a remote learning model (World Bank 2020).

Figure 1: Percentage of States using each Broadcast Technology, March-October 2020



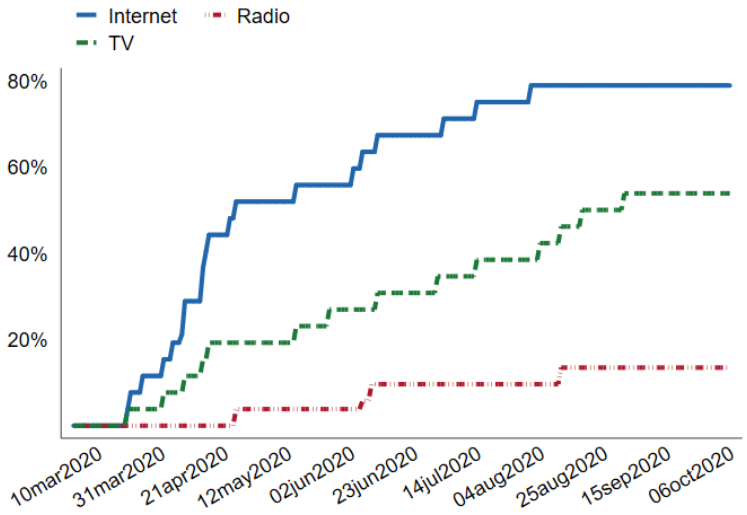
Source: CGRT-BRFED

Figure 1 plots the evolution of the percentage of states offering broadcasting classes by the internet, radio, and TV from March to October 2020. By March 23rd, all public schools under state or municipal control had been closed for in-classroom education. The main strategy adopted by states to provide remote education was the streaming of classes via the internet. However, these types of programs were offered by only 50% to 60% of states by the end of April. Over the coming months, there was an expansion

reaching approximately 90% of states by July. Televised classes, a more inclusive channel considering 95% of Brazilian households have a television against only 71% with internet access (*TIC Domicílios* 2019), were offered by more than 50% of states. Still, these programs were also introduced with greater likelihood several weeks after the cancellation of classes. Indeed, less than 40% of states were providing televised education programs by the end of May. The broadcasting of education programs by radio was adopted only in four states: Acre, Maranhão and Tocantins.

State capitals exhibited similar trends regarding broadcast technologies. Nevertheless, the rate of adoption was much slower at this government level, as shown in Figure 2. While the internet was the preferred means for offering distance education programs, its adoption for educational purposes in state capitals took longer than it did in states.

Figure 2: Percentage of State Capitals using each Broadcast Technology, March-October 2020



Source: CGRT-BRFED

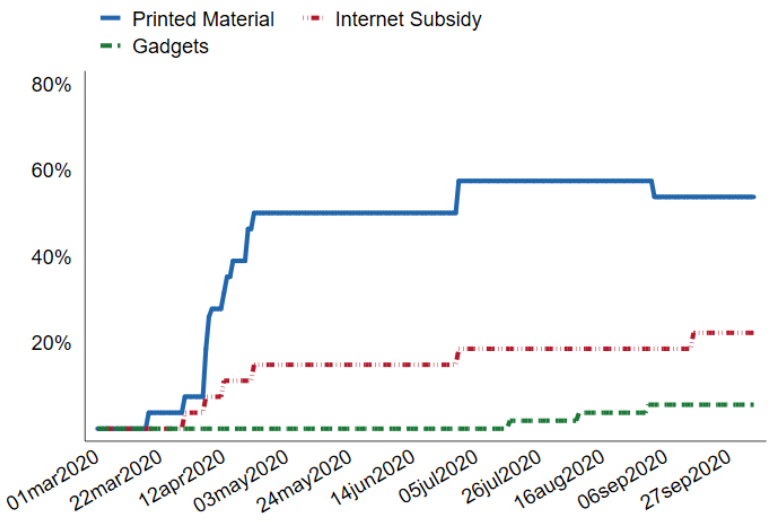
Capitals only reached the 80% mark by July, while states had arrived at this percentage in June. Similarly, 50% of states offered televised classes by the end of June, but by this month, only 30% of state capitals provided programs through television as

an option for students.

3.3 Means of Access

By closing schools and moving to remote schooling, government officials and their education departments face the challenge of providing access to wide portions of the population that would otherwise be unassisted, bringing devastating increases in already concerning school inequalities in Brazil. Figure 3 shows that, even though almost all states decided to broadcast classes online, only about 15% ro 20% subsidized internet access and less than 10% provided gadgets. Moreover, the states that distributed devices did so by collecting donations from the population, thus achieving minimal coverage compared to students requiring access. The main instrument provided by states to help students study at home were printed materials, and still, only about 55% of states provided these materials.

Figure 3: Percentage of States per Means of Access Offered, March-October 2020

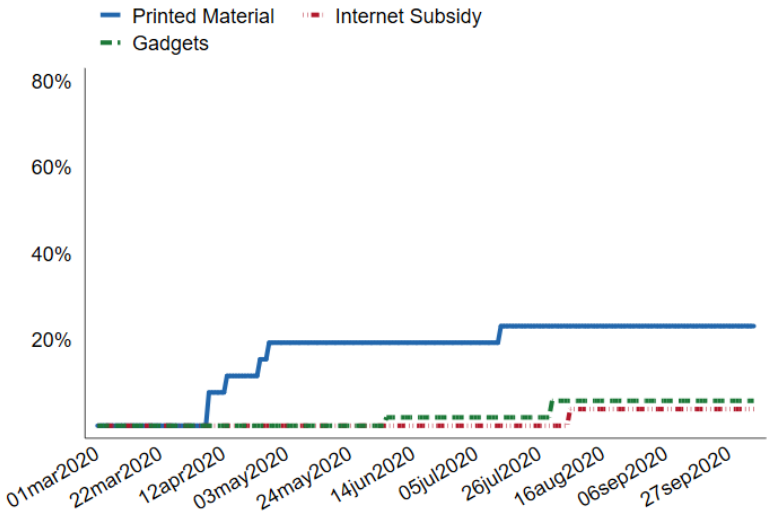


Source: CGRT-BRFED

Municipal governments in state capitals directed even lesser efforts than did states to ensure access to students' remote education programs. Figure 4 shows that only

about 20% of state capitals provided students with printed materials. State capitals did not provide Internet subsidies and gadgets. For almost three months, no capital provided resources to increase student access to remote internet learning, and when some did, only about 10% of states offered one of the options. Students, in Brazilian public schools, especially those in elementary schools, can either attend a municipal or a state-run school. As a result, there are also inequalities within a city. A student enrolled in a state school in a capital city can not take advantage of the programs offered by its municipality for municipal schools, and the same applies in the case of students enrolled in a municipal school and restrictions on their ability to access state-run distance learning programs.

Figure 4: Percentage of Capitals per Means of Access Offered, March-October 2020



Source: CGRT-BRFED

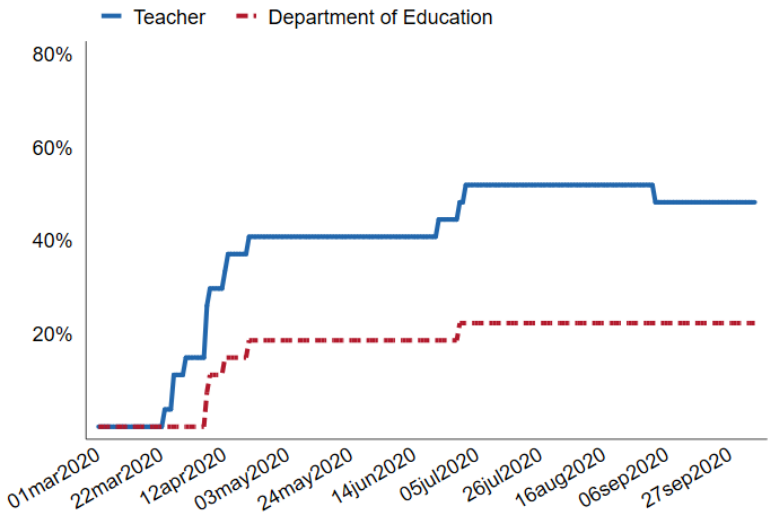
Ensuring access also affects the degree to which students can be closely supervised and how often they can interact with instructors and administrators, which is fundamental to education. Furthermore, the access to means to interact with instructors as part of remote education programs also affects the extent to which schools can be more proactive in enacting efforts to target students at risk of dropping out of school with special attention. Here too, responsibilities are split between state and municipal au-

thorities, depending on which controls each school. For many reasons, supervision is an essential feature of providing education in Brazil, much more so in the pandemic and during times of social distancing. The next section shows how the plans of states and capitals contemplated this front.

3.4 Supervision of Students

Figure 5 shows the evolution of the proposals for supervising students in state remote schooling plans. States either left supervision to teachers[8], or the department of education. In several cases, no mention is made of how supervision will take place. Most states gave teachers the role of supervising attendance, with up to 50% of states doing so, while only about 20% of states planned for its department to play an active role in student supervision.

Figure 5: Percentage of States per Supervising Option Chosen, March-October 2020



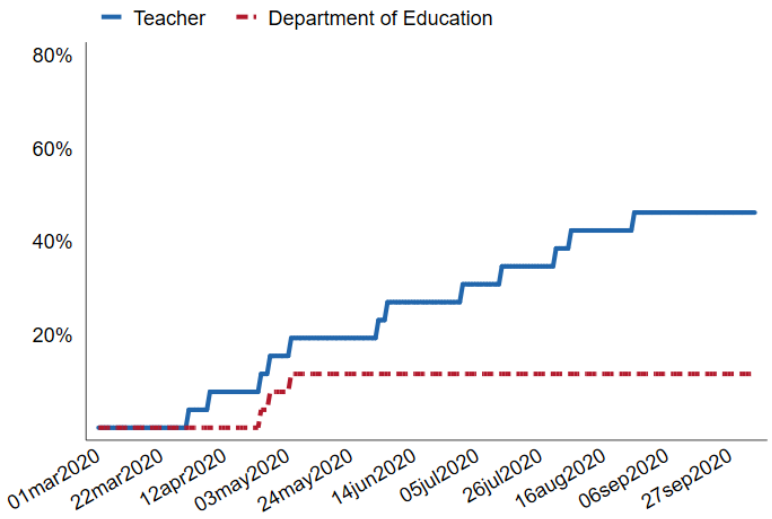
Source: CGRT-BRFED

Figure 6 shows that municipal authorities developed policies regarding supervision

[8]The supervision of students is, in some cases, highly informal: teachers were instructed to keep up with students via Whats App. No structured plan or guidance dictated how these would work.

much later than state programs, with only around 30% of capitals having implemented plans specifying how supervision would occur during distance education programs.

Figure 6: Percentage of Capitals per supervising Option Chosen, March-October 2020

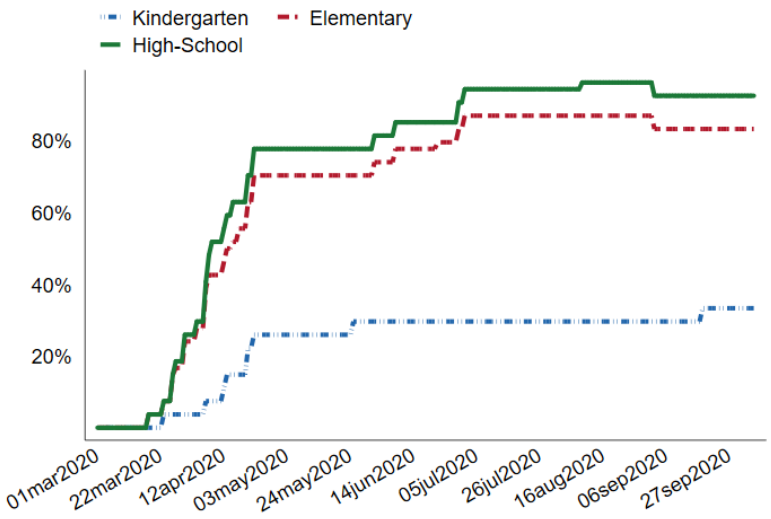


Source: CGRT-BRFED

3.5 Coverage

The previous sections described our findings concerning the policies that pertain to the quality and access provided to students enrolled in state and municipal public education schools. We now focus on the proportion of students that are effectively covered by these programs. To do so, governments that developed programs for all levels of study (kindergarten, elementary, and high-school students) received higher scores compared to those who limited their distance programs to a subset of their student populations. Elementary schools are an area of shared responsibility between states and cities. States are exclusively responsible for high-school, and kindergarten is a core responsibility of municipalities.

Figure 7: Percentage of States Offering Each Coverage Level, March-October 2020

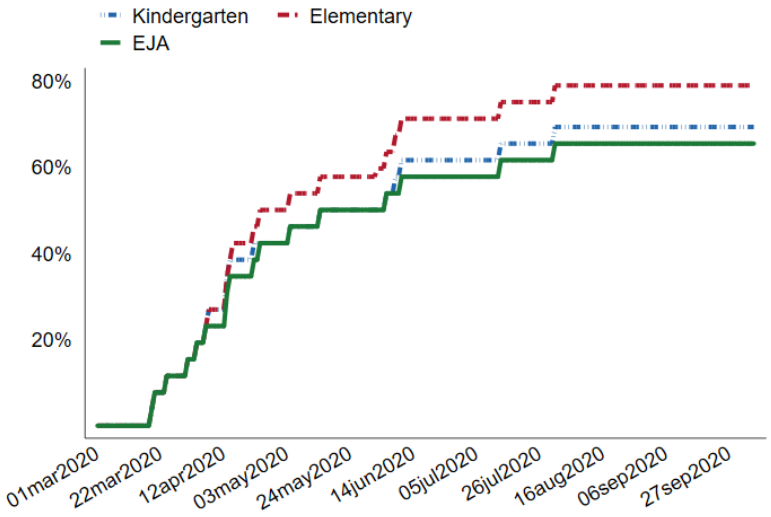


Source: CGRT-BRFED

Figure 7 shows that all states, except for Bahia with no structured plan, introduced high-school distance education programs as part of their public education remote plans. This is expected not only since it is their exclusive domain but also because national high-school exams are coming in January, and providing a means of study for its applicants may have important electoral impacts. State capitals, which are not responsible for high-school education with the exception of technical education for young and adults (*EJA*) programs, did not structure high-school distance learning programs.

Figure 8 shows the percentage of state capital programs focused on providing kindergarten, elementary and high-school programs. Twenty-two capitals introduced remote schooling plans for elementary education. There were, however, five capitals with no elementary school programs. There was far less coverage of kindergarten distance education programs. Roughly 60% of capitals offered kindergarten or *EJA* programs.

Figure 8: Percentage of Capitals Offering Each Coverage Level, March-October 2020



Source: CGRT-BRFED

While most municipal governments analyzed in this study designed plans to provide public education services for most of their students, a significant number of capitals chose not to provide any programs for students. Some mayors, such as the mayor of Belo Horizonte, capital of the state of Minas Gerais, worked actively to stop schools from providing remote education, under the argument that this was the most appropriate policy to avoid inequality in access.[9] Even though state capitals' plans covered most education levels, they were considerably weaker in providing access for poor students and had fewer details on supervision than states.

Overall, our results after coding state and municipal distance programs suggest that students in municipal schools received programs with more limited scope than those in state schools. It should be noted that our study is limited to cities that are state capitals, which tend to be the richest and biggest cities in each state. For this reason, this may signal an even more serious problem with students in smaller municipalities facing an even worse situation.

[9]Mayor Alexandre Kalil discarded online classes arguing that inequalities are too high in the country for such a system to work. See more about the subject in (Almeida 2020) and (Oliveira 2020).

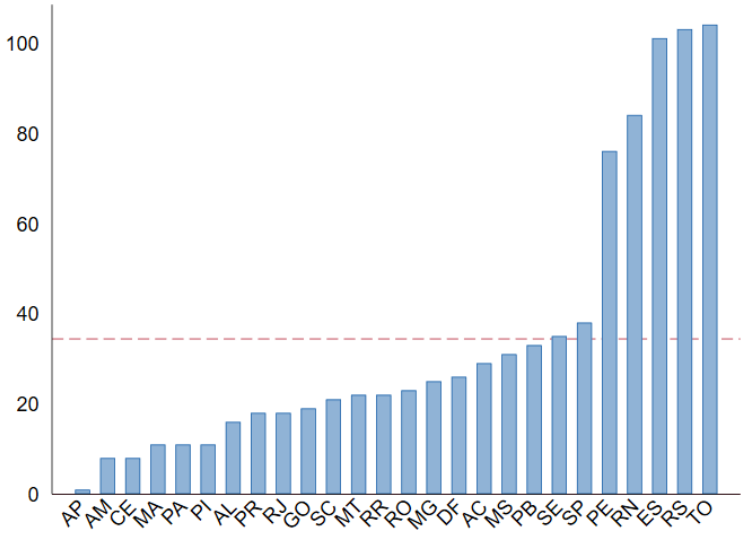
4 Why did the pandemic increase educational inequalities?

With the decision to close schools to contain the spread of SARS-COV-2, remote education programs became vital to the continuation of education during the pandemic. Based on our coding of remote education programs, we identify that there is evidence that suggests preexisting inequalities were augmented during the pandemic. Specifically, we highlight three important findings in this section. First, there were significant delays in introducing remote education programs at the state and state capital level in Brazil. Second, plans were poorly designed. Finally, the types of programs that were introduced exacerbated preexisting education inequalities.

4.1 Delay in the Implementation of Remote Education Programs

One of the most striking findings from the data we collected is the significant delay that occurred in providing structured education programs to students depending on public schooling across Brazil. We calculated the implementation speed by measuring the number of days following the announcement of school closures until a structured education program was implemented in each locality. In mid-March, schools were in the middle of the first semester of the academic year. Schools were closed all over the country by the 23rd of March and every day after the closing of schools was a lost day of education for students. In some cases, governments anticipated the winter holiday break and resumed classes in late April and May. Figure 9 shows the number of days students had no remote schooling after schools were closed in each state. The dotted line represents the overall mean across states. On average, there was a delay of 34.4 days between the decree of a school closure and the creation of a remote education program.

Figure 9: Days without distance education after school closures in state public education programs, March-October 2020*

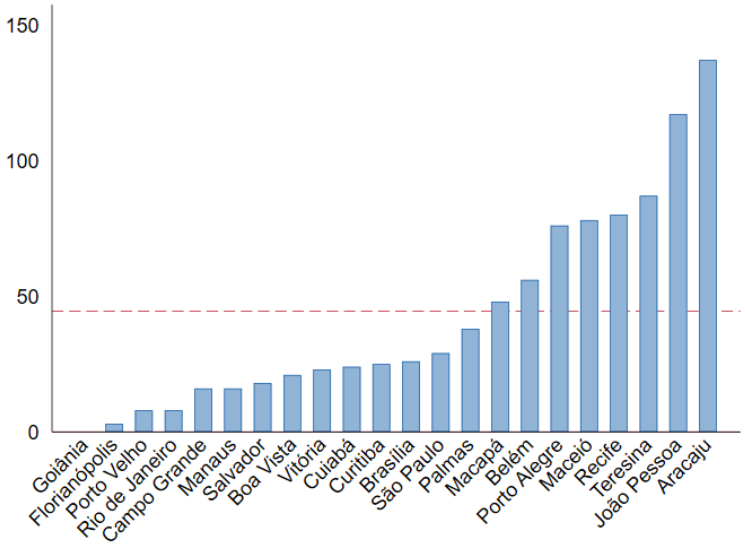


Source: CGRT-BRFED.
*The state of Bahia does not show in the figure since it did not present a plan between March and October, which implies that students in state-run schools were left without classes for the entire period.

While Amapá presented a distance education program the day after schools were closed for in-person education, Tocantins, Rio Grande do Sul, and Espírito Santo took more than 100 days to enact programs. As a result, students living in these states were left without public education for more than three months. In capitals, the situation is even worse. Many local governments took several months to enact and offer remote schooling to their students. Figure 10 shows that capital cities took between two to four months to implement a program. Again, the dotted line in the figure represents the overall mean for state capitals. On average, there was a delay of 43.2 days between the decree of a school closure and the creation of a remote education program in a state capital. It should be noted that the schooling interruption occurred during what would have been the first semester of the school year.

An additional and important point should also be emphasized concerning the sig-

Figure 10: Days without classes after school closures in state capitals public education programs, March-October 2020



Source: CGRT-BRFED

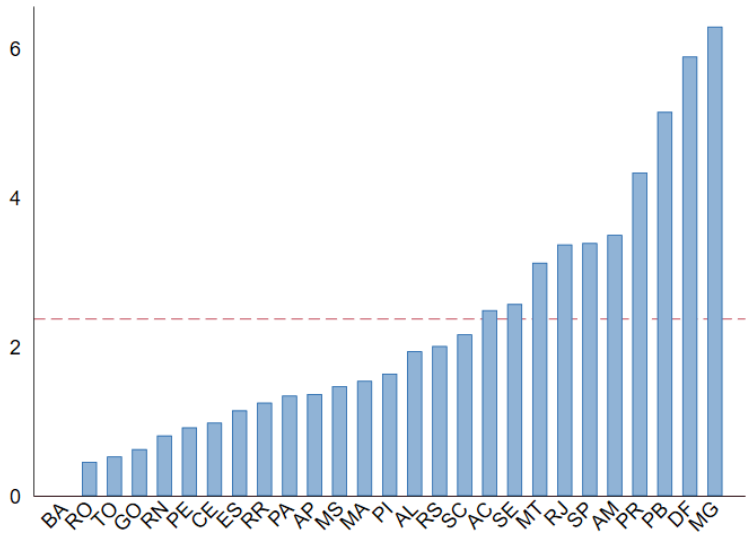
nificant delays in the implementation of remote education programs. Schools were closed to prevent the virus spread. However, the fact that no education programs were in operation in some states and capitals means that students' likelihood to "stay at home" could have been reduced during this period. This is because students enrolled in public schools without programs did not have the types of assignments and activities that normally occur during weekdays that could have encouraged them to occupy their time at home with schooling. In the worst case scenario, thus, the lack of education programs could have increased the risk of infection for poorer populations dependent on public education programs as students were less likely to have a reason to remain at home.

4.2 Under-performance of Remote Education Programs

In addition to the significant delays in the speed at which the remote education plans were adopted, our coding of policies allows us to assess the relative quality of programs. Figure 11 shows the overall average score for state plans. States or capitals that implemented a good plan quickly received higher grades in the overall REP index

for a longer period and therefore received a higher score in the figure. This is the case, for example, of two states (Paraíba, and Minas Gerais) and the Distrito Federal, which introduced the most comprehensive plans relatively quickly. The dotted line in the figure represents the mean value in the period. The mean score of the state plan is 2.38 out of a maximum score of 10. States with lower scores enacted poorer quality plans, implemented during shorter periods in most cases. Overall, the figure confirms that few states promptly designed adequate plans and the overall scores are relatively low.

Figure 11: Mean REP Index for States and the Federal District (March - October 2020)



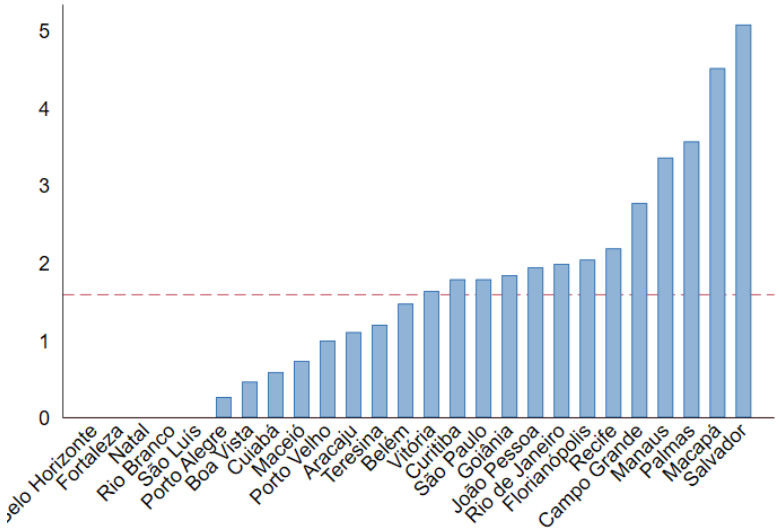
Source: CGRT-BRFED

The data we collected for this report underscores that the situation in state capital public education programs is worrisome. Figure 12 shows that a large number of capitals adopted plans that scored relatively lower than state plans. Indeed, the mean score for the 26 state capitals and the federal district is 1.6 out of a score of 10. Those capitals with a score above the dotted line introduced programs that scored above the capital average. Notably, there are cities that failed to introduce an remote education program. These cities received an overall index score of 0.

Furthermore, the existence or absence of plans at the capital-level does not seem

to be necessarily related to whether weaker or stronger plans were enacted at state-level. Similarly, some capitals that adopted relatively well-structured programs did so in states that adopted poorly structured plans. Salvador, Bahia's capital, for example, implemented a relatively high quality plan in comparison to other capitals, while the state itself presented no remote education plan for during the entire analyzed period.

Figure 12: Mean REP Index for State Capitals (March - October 2020)



Source: CGRT-BRFED

The mean REP Index achieved during the period ranges from zero to 0.6 for states and capitals. In other words, the average score was far below an ideal score of 1. In the case of states, the highest scores were graded with 0.6, but most state plans scored 0.3. On average, capitals scored 0.2. Thus, the index confirms that the remote plans were relatively poorly structured, not only in terms of their quality and the timing of their introduction but also to the degree to which they prioritized coverage across all students and guaranteeing access for all public education students.

Education departments were late in presenting plans, and when finally enacted, these programs lacked adequate investment and quality. Governments' concerns with the provision of means of access to remote classes appear to be one of the most seri-

ous problems. Furthermore, this situation reinforces the perception that limited efforts were directed at attending to the needs of the most vulnerable students in public education programs. In the early months, this orientation might have been prevalent due to governments' expectations of quickly reopening schools. However, as the pandemic's toll remained persistently high, governments were slow to enact policies to increase internet access. Besides, programs neglected to provide details on how students would be supervised. As a result, students were left mostly on their own to follow the content offered. Most public education programs displayed limited efforts towards both the recording of class attendance and the grading of activities.

4.3 Limited efforts were directed at access to technologies and infrastructure for remote learning

As we showed in this report, remote classes were most often transmitted using the internet (*TIC Domicílios* 2019). The plans were adopted under very different social, economic, and educational conditions. According to *TIC Domicílios* (2019), only 71% of Brazilian households have access to the internet, but these figures vary across regions. Access is lower in the Northeast region (on average, 65%) and higher in the Southeast region (75%). Similarly, only 51% of households in rural areas and only 55% of households earn up to one minimum wage.[10] The limited access of households to these resources is due to the high share of the poor in these regions and the persistently high inequalities in Brazil (Barros, Henriques and Mendonça 2000).

Table 2 shows the percentage of households with internet access in each macroregion of the federation. The numbers are all under 75%, which means that a significant share of the population all over the country lack the means to access the internet. Furthermore, there is a considerable difference between regions, with a 10% gap be-

[10]The Brazilian minimum wage is 1,045 *reais* monthly, which is approximately 184 dollars. 23,9% of Brazilian families live with an average of 1,245 *reais* (Silveira 2019).

tween the Southeast of the country (where states like São Paulo and Rio de Janeiro are located) and the Northeast (where states like Bahia, Ceará, and Pernambuco are located).

Table 2: Percentage of Households With Access to Internet by Region (2019)

Region	Households with Internet Access
Southeast	75%
Northeast	65%
South	73%
North	72%
Center-West	70%

Source: TIC Domicílios

Table 3 shows the percentage of the population that owns a cellphone in the 27 states of the federation. Moreover,it shows the type of access to data these individuals have. The information is organized in ascending order considering the percentages of cellphone-owning individuals to highlight the underscoring inequalities. Pre-paid recharge cellphone plans provide users with data capped to a certain limit depending on the price paid in advance, and users' access is blocked when limits are reached. These plans are cheaper and mostly used for basic features including SMS and chat apps. They are insufficient for watching videos or downloading high-volume content. Individuals who hold unlimited plans have greater access to streaming and data, which is what is required, access to videos, and higher-volume content, as they pay based on usage. In poor households, cellphones are also more likely to be shared among multiple household members.

The table shows considerable differences in the percentage of the population with access to the types of internet plans that permit high-volume data usage. In some states, such as Rio Grande do Sul, 32% of individuals have unlimited plans. However, in other states, such as Amazonas and Pernambuco, only 13% of individuals hold these types of plans.

The issue of access to means of broadcast is of crucial importance for the quality

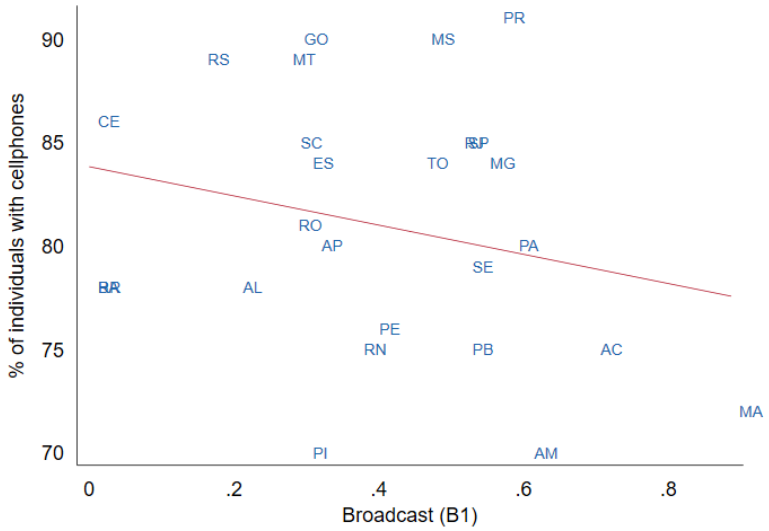
Table 3: Percentage of owners of cellphones on each state by internet package

State	Cellphone	Pre-Paid	Unlimited
AM	70%	55%	13%
PI	70%	55%	9%
MA	72%	57%	10%
RN	75%	56%	12%
AC	75%	57%	16%
PB	75%	51%	9%
PE	76%	48%	13%
AL	78%	58%	11%
BA	78%	54%	16%
RR	78%	59%	15%
SE	79%	56%	18%
AP	80%	68%	11%
PA	80%	63%	15%
RO	81%	59%	17%
TO	84%	54%	21%
ES	84%	45%	37%
MG	84%	50%	30%
RJ	85%	54%	29%
DF	85%	60%	25%
SC	85%	56%	28%
SP	85%	53%	30%
CE	86%	67%	14%
RS	89%	55%	32%
MT	89%	62%	26%
MS	90%	60%	29%
GO	90%	62%	28%
PR	91%	62%	27%

Source: TIC Domicílios.

of remote education plans. As the population's unequal internet access were known to decision-makers before the onset of the pandemic, those programs that accounted for these issues were more inclusive than others. Figure 13 compares the means of broadcast re-scaled as an index ranging from 0 (no broadcast means adopted) to 1 (all broadcast means adopted) with the mean percentage of individuals with cellphone in each state.

Figure 13: Percentage of inhabitants with cellphones and the means of broadcast



Source: CGRT-BRFED.
Note: $R^2 = 0.06$.

The figure confirms that states with lower access to phones tended to offer classes on TV or radio more often. This is encouraging evidence. Nevertheless, as most remote education programs emphasized the internet as the means of access, these programs effectively excluded significant shares of students. Some regions were more adversely affected than others, but the most vulnerable students were excluded in most regions of the country.

4.4 Remote Education Programs were less-developed in poorer and under-performing States

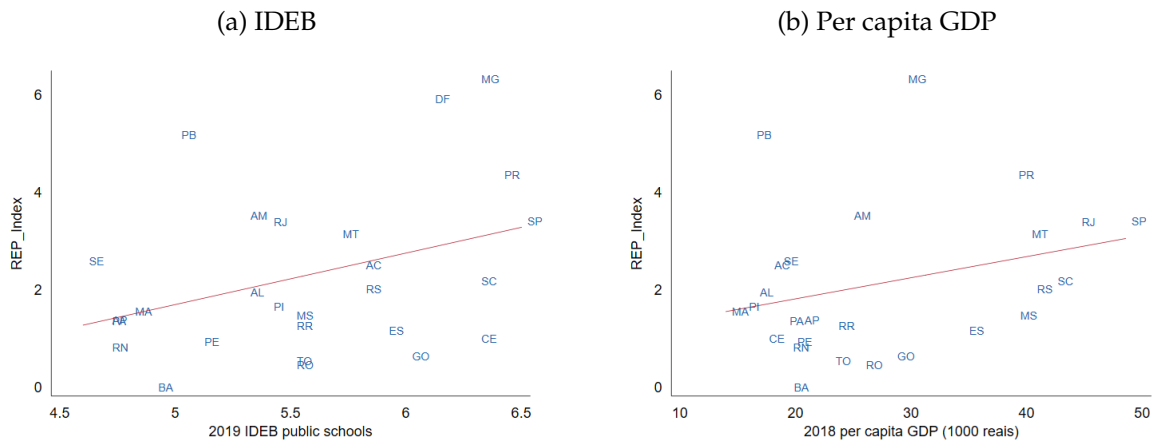
This section explores how the remote education plans that were adopted are related to previous economic and educational conditions in each state. First, we explore the association between the REP index and education performance measured by the IDEB 2019 which compares public school grades across states.[11] Secondly, we contrast the index with 2019 state per capita GDP.

[11]IDEB is the national grading system. The acronym stands for the Basic School Development Index.

The Brazilian federation states vary widely in social and economic conditions, the quality of the education provided, and national exam outcomes. There are good reasons to imagine that richer states, or states with better previous education standards, would be more likely to implement better remote education plans.

States that have developed better educational systems should be at an advantage in using existing capacities to structure better distance education programs. Education departments in states with better national exam performance tend to have better education performance overall and better-prepared teachers and facilities. Thus, these states should have been more prepared for the challenges of introducing new means of teaching and learning during the pandemic. This is confirmed in panel a of Figure 14, which shows that a state's public school performance in 2019 in the IDEB is positively correlated with better remote education plans.[12]

Figure 14: Preexisting Inequalities and the Mean REP Index in 2020 in the States of the Brazilian Federation



Sources: CGRT-BRFED for REP; GDP per capita data from IBGE (2018) and IDEB from INEP (2019).

Richer states ought to be more capable of introducing better plans when compared with poorer states. Good remote education programs demand states to spend addi-

[12]The correlation (R^2= 0.14) is positive, but suggests a relatively weak correlation. In the appendix we provide further analysis including the confidence intervals for the correlations between the REP and the IDEB and some additional factors.

tional resources on distributing means of access, developing online platforms, recording classes, preparing educators, and informing parents and students. Panel b of Figure 14 presents the correlation between 2018 real per capita GDP and the REP index.[13] Richer states presented, as expected, better plans for students to study at home.

Together, these two figures underscore that the already considerable education inequalities were worsened during the pandemic. Students in poorer performing educational programs and poorer states received lower-quality remote education programs. In the next section, we present evidence that further confirm these findings using survey data collected during the pandemic by IBGE.

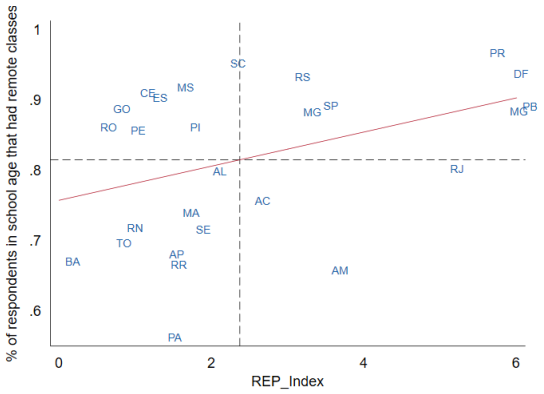
4.5 The Outcomes of State Plans: Correlations between Remote Education Programs and Findings from the PNAD-COVID National Survey

The PNAD-COVID national survey presents an opportunity to test the outcomes of remote education plans. The nation-wide survey asked respondents of all ages if they had remote classes during the pandemic and the average amount of hours they studied by week. Unfortunately, respondents were not asked to report if they were receiving public or private schooling in the survey waves analyzed in this report. This is problematic since private schools offered plans independently of what governments did, and we have no data to separate these two populations in each state during the same period in which remote learning programs were the dominant public education service in most states and capitals. Furthermore, the survey did not ask if participants were enrolled in municipal or state-run schools. Thus, the findings presented below have these limitations. We use the survey data to examine if families in states with better remote education plans reported having a greater proportion of students with access to remote classes and studying for a greater number of hours.

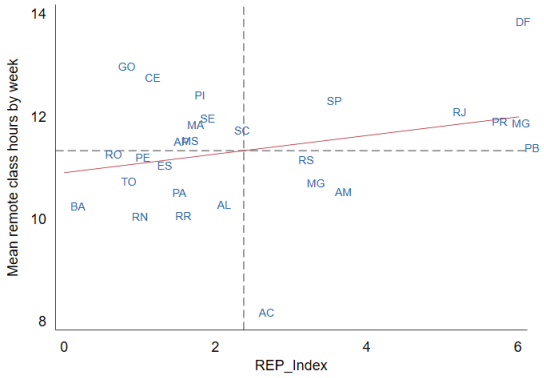
[13]The correlation (R^2= 0.27) is positive and relatively stronger.

Figure 15: REP Index and Educational Outcomes during the Pandemic
(Data from PNAD-COVID September 2020 survey)

(a) Percentage with Remote Classes



(b) Mean Number of Hours



Sources: CGRT-BRFED and IBGE (2020).

Figure 15a shows a positive correlation between REP index and the percentage of students that reported having remote classes during the pandemic in each state of the Brazilian federation.[14] The dotted lines represent the mean values for each variable. There are states, such as Bahia, with no program, which translated into a lower share of students reporting that they had remote classes. The estimated effect of going from no plan to the best possible REP index is estimated to increase the percentage of students receiving remote classes by 25%. Furthermore, Figure 15b confirms that the REP Index is positively correlated with the average number of weekly hours studied in each state.[15]

Given that the PNAD survey does not permit us to differentiate between those in public and private schools, there are limited conclusions that we can draw from these positive correlations. Overall, the results corroborate that the percentage of students accessing remote programs and the number of hours studied is higher in states with a better structured remote education program that was offered for a longer period. Nevertheless, the PNAD survey findings further underscore that there is a need to ex-

[14]The correlation between the REP index and the percentage of students who reported having remote classes is positive (R^2= 0.15).
[15]The correlation between the REP index and the number of hours studied is positive (R^2= 0.08).

amine the issues we have raised in this study in further depth. These more in-depth studies are tremendously important to help identify what occurred and, more importantly, help identify interventions that might be important to design for specific groups of students in specific localities.

5 How Budgetary Decisions Influenced States Remote Learning Programs

In early 2020, with the onset of the coronavirus crisis, states predicted a decrease in tax revenue, and, as a result, proceeded to cut spending. Even though the crisis poses unprecedented challenges to states' education system, including the demand for remote learning strategies, states have heavily cut back on education spending. On average, state spending on education fell by a dramatic 9.1% compared with 2019 figures, a decrease that is not compatible with the behavior of tax revenue (which, in contrast, experienced a 2.1% decrease).

In Brazil, as with the municipalities, states are constitutionally required to reserve 25% of their tax revenue for education. State constitutions may earmark an even higher share of the tax revenue to fund education (for instance, in the state of São Paulo, this percentage is as high as 30%). Therefore, at least in theory, state spending on education and tax revenue should have followed similar paths during the pandemic, but they did not. While almost half the states (13) saw an increase in tax revenue, the entirety of the states trimmed down education expenditures. Furthermore, the education budget has fallen 4.3 times more than the tax revenue, implying a deliberate re-orientation of resources towards other areas.

Some states, however, diverted more than others. While allocations for education shrunk by 0.1% in the state of Pará (against an 8.7% increase in the tax revenue), they dropped by an astounding 38.3% in the state of Goiás, where the tax revenue grew

by 0.3%. Did this budgetary choice influence the quality of state distance learning programs?

To answer this question, we estimate the following model:

$$REP\ Index_i = \beta_1 Net\ Decrease_i + \beta_2 GDP\ pc_i + \beta_3 SPDS_i + \beta_4 IDEB_i + \beta_5 \%Students\ enrolled\ in\ state\ schools_i + u_i \quad (1)$$

where:

- REP$_i$ is the mean value of the Remote Education Policy Index in state i in 2020;
- Net Decrease$_i$ is defined as the reduction in education budget that exceeds the reduction in tax revenue in state i in 2020 (constant 2018 R$);
- GDP pc$_i$ is the GDP per capita in state i in 2018;
- SPDS$_i$ is the mean value of the Social Distancing Policy Stringency Index in state i in 2020;
- IDEB$_i$ is the value of the Basic Education Development Index (IDEB) in state i in 2019;
- u$_i$ is the error term.

We expect a negative sign for Net Decrease, meaning that the sharper the reduction in education budget that surpasses that of tax revenue, the lower the REP Index.

The expected sign of the remaining variables is positive.

Higher GDP per capita should lead to increased REP. Indeed, developing and implementing remote learning programs investment on the part of states, and richer states are best placed to undergo a major investment program.

Increased values of SPDS imply a stronger commitment to contain the COVID-19

pandemic and therefore should be linked to better remote learning programs (greater REP).

Lastly, IDEB is supposed to capture the base quality of a state's education system, which is also expected to be positively correlated to REP.

IDEB ranges from 0 to 10, and integrates information on 1) the average pass rate, and 2) student performance on national mathematics and reading tests at the end elementary (4/5th grades), middle (8/9th grades) and high school (11/12th grades). These three scores are calculated at the school level but can be aggregated by type of school (public – comprising federal, municipal, and state schools –, private, municipal or state schools). Here, we consider an average of IDEB results for all three levels of basic education but solely for those schools under states' administration.

Next, we describe in detail each of the independent variables in the model.

Variable	**N**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Net Decrease	27	10.74	8.56	-1.18	38.62
GDP per capita	27	28.23	16.21	0.00	85.66
IDEB	27	4.59	0.50	3.80	5.43
SPDS	27	41.86	6.34	33.15	60.90

The mean of Net Decrease is 10.74, meaning that, on average, states reduced education budget 10.74 pp. more than the fall in tax revenue. The Northeastern state of Sergipe was the only one where Net Decrease took a negative value (i.e., the cut in the education budget was less severe than the fall in tax revenue). In contrast, Goiás, a state in the Center-West region of Brazil, is an upper outlier exhibiting the highest value of Net Decrease among Brazilian states, i.e., 38.62.

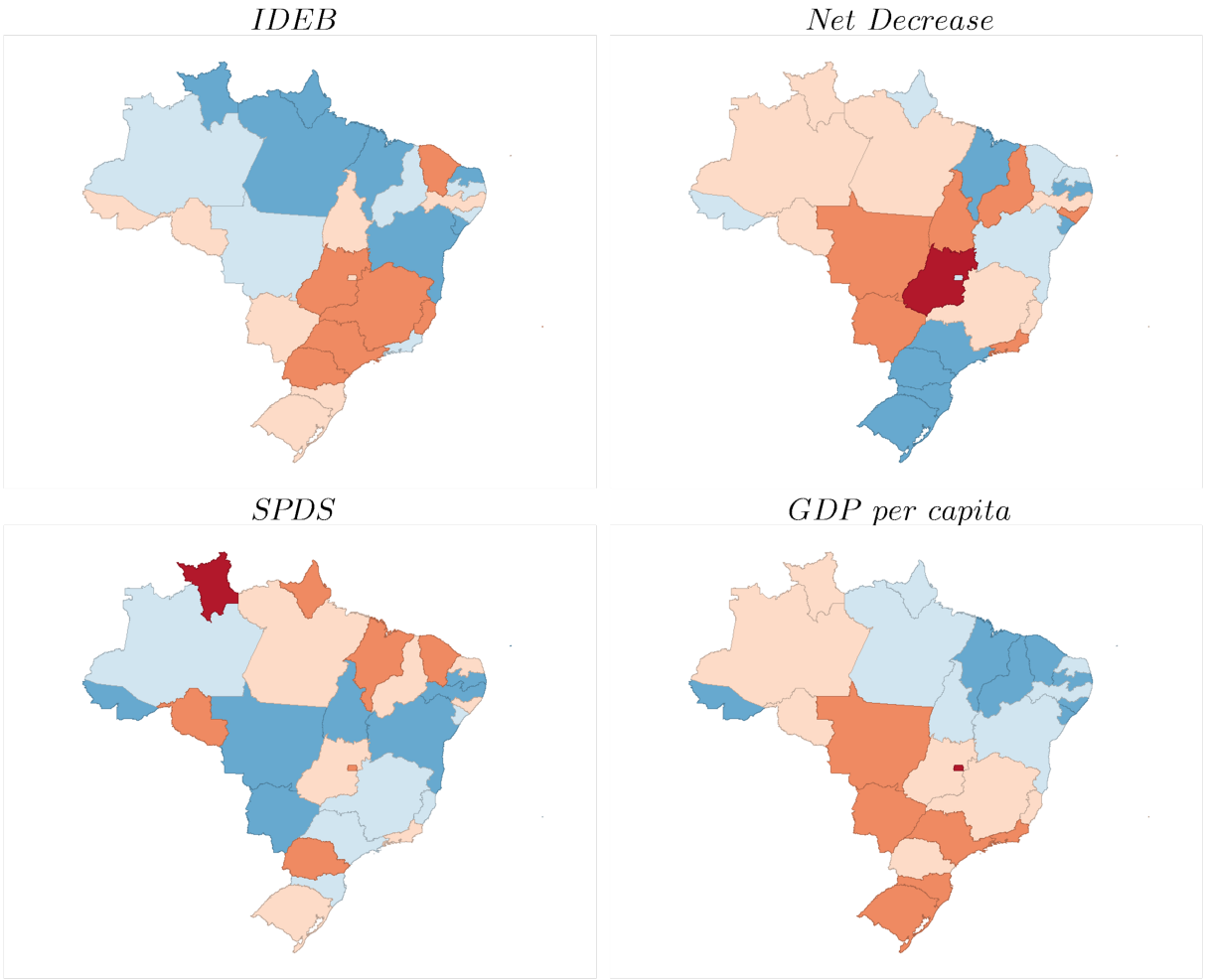
The average GDP per capita is approximately R$ 15,370. The Northeastern state of Maranhão is the poorest state in Brazil, with a GDP per capita of R$ 13,955.75 and the wealthiest is the Federal District, with a GDP per capita nearly 6.14 times higher (R$ 85,661.39).

The average SPDS is 41.86. The Northern state of Rondônia is an upper outlier, with

an SPDS of 60.90 (around 9.1 points over runner-up Amapá, also in the North region). Mato Grosso, in the Center-West region, had the lowest SPDS in Brazil – 33.15.

The average value of IDEB is 4.59. The lowest value of IDEB is held by Roraima (3.80) in the North region, while Paraná (in the South) and Goiás (in the Center-West) hold the highest values (5.43).

Figure 16: Caption



6 Policy Implications

In this study, we have introduced quantitative measures of remote learning programs and an aggregate index to measure the adoption of public policies on remote

education. The data presented underscores that state and municipal governments were slow to implement programs. As this report is being written at the end of the second semester of 2020, governments and their education secretariats can not afford to make the same mistakes in 2021. We recommended that the findings produced in this report be used to guide greater discussion at the state and municipal level across Brazil about what was accomplished and some of the key problems with the types of remote education programs provided in 2020.

Due to the failure to adequately control the pandemic, Brazil has experienced high infection levels and deaths since May. There is no treatment that has been scientifically proven to be effective. At the same time, there has yet to be any vaccine approved or distributed in Brazil. The available evidence suggests that the Brazilian federal government will not distribute the vaccine in 2021 to children. Thus, in the near and medium-term, plans must be designed to improve remote education programs during the current pandemic, as it is likely that there may be reasons to continue with remote learning in 2021. Better planning for 2021 will also contribute to emergency preparedness for future pandemics.

We used the indicators and the proposed index to conduct exploratory analysis mapping how remote education, as adopted by states and state capitals, impacted preexisting education inequalities. Our results underscore several important findings. With respect to coverage, there was less attention directed to developing remote education program for early childhood education. Although state governments proved to be more proactive in introducing these programs, this age group was clearly not adequately served with distance education programs.

As the principal means of providing remote education was via the internet and no significant investments were made to increase access, government education programs did not address the issue of unequal access to education during the pandemic. Since access was not resolved over the many months of 2020, students country-wide who

lacked access to the internet were effectively abandoned by their public schools. This raises concern not only because the evidence presented in this report suggests that inequalities increased during the pandemic but also because the announced returns to in-person public education have thus far neglect or devoted sufficient attention to this issue.

The lack of national coordination concerning remote education programs demands urgent attention and greater oversight. The national government and its education ministry could have played an important role, and greater efforts must be made in 2021. There is also a role for states and capitals to coordinate efforts together. For example, states and capitals share concurrent responsibility for elementary education. Consequently, in the same city, some students were lucky to have been enrolled in a school controlled by a government that delivered a solid remote education plan early on in the pandemic; others were far less lucky. States could cooperate more closely with municipal governments to avoid duplicating efforts in resource-constrained settings. State plans were, on average, much better than state capital plans. Almost all plans offered internet classes, many offered televised classes, and some also offered radio as a broadcast option. Most plans distributed printed materials, but very few invest in gadgets and subsidies for the internet. Teachers mainly did the supervising, and most plans had good coverage of educational levels. These programs could have easily been expanded to include students in municipal schools, especially in those cases where municipal governments failed to introduce plans.

This report has also underscored that remote education program quality is correlated with preexisting inequalities and past educational performance in states. These results show that besides the increase in inequality expected from a lack of concern with access, regional inequalities will also be considerably worsened by unequal programs being adopted by poor and rich states and states that already performed well in national exams and those that did not. Plans were weak or negligent in providing access for vulnerable students, which impacts the capacity of plans to increase the per-

centage of students attending remote classes. Without increasing access, better plans only increase education for those already covered.

References

Almeida, Ana Tereza. 2020. "Ministério Público de Minas Gerais apura suspensão dos alvarás das escolas em Belo Horizonte." *G1 Globo* .
URL: *https://g1.globo.com/mg/minas-gerais/noticia/2020/10/01/ministerio-publico-de-minas-gerais-apura-suspensao-dos-alvaras-das-escolas-em-belo-horizonte.ghtml*

Azevedo, João Pedro, Amer Hasan, Diana Goldemberg, Syedah Aroob Iqbal and Koen Geven. 2020. "Simulating the potential impacts of covid-19 school closures on schooling and learning outcomes: A set of global estimates.".

Barberia, Lorena G and Eduardo J Gómez. 2020. "Political and institutional perils of Brazil's COVID-19 crisis." *The Lancet* 396(10248):367–368.

Barberia, Lorena G., Natalia Moreira, Luiz Cantarelli, Maria Letícia Claro, Fabiana Pereira, Isabel Rosa, Pedro Schmalz and Marcela Zamudio. 2020. "Falta de coordenação entre o governo Federal e estados enfraquece a política de distanciamento social. A flexibilização sem critérios pode agravar a pandemia." *Rede de Pesquisa Solidária em Políticas Públicas e Sociedade* .
URL: *https://redepesquisasolidaria.org/nao-categorizado/falta-de-coordenacao-entre-o-governo-federal-e-estados-enfraquece-a-politica-de-distanciamento-social-a-flexibilizacao-sem-criterios-pode-agravar-a-pandemia/*

Barros, Ricardo Paes de, Ricardo Henriques and Rosane Mendonça. 2000. "Desigualdade e Pobreza no Brasil: retrato de uma estabilidade inaceitável.". Revista Brasileira de Ciências Sociais, 15(42): 123-42,.

Brasil. 1988. "Constituição da República Federativa do Brasil.". Artigo 211° da Constituição. Brasília, DF: Senado Federal: Centro Gráfico, 1988.

Cauchemez, Simon, Neil M Ferguson, Claude Wachtel, Anders Tegnell, Guillaume Saour, Ben Duncan and Angus Nicoll. 2009. "Closure of schools during an influenza pandemic." *The Lancet* .

Centers for Disease Control. 2020. "Operating schools during COVID-19: CDC's Considerations.".

Hsiang, Solomon, Daniel Allen, Sébastien Annan-Phan, Kendon Bell, Ian Bolliger, Trinetta Chong, Hannah Druckenmiller, Luna Yue Huang, Andrew Hultgren, Emma Krasovich et al. 2020. "The effect of large-scale anti-contagion policies on the COVID-19 pandemic." *Nature* 584(7820):262–267.

IBGE. 2018. "Sistema de contas regionais : Brasil : 2018 / IBGE - Instituto Brasileiro de Geografia e Estatística, Coordenação de Contas Nacionais.". Rio de Janeiro. available at: `https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=2101765`.

IBGE. 2020. "Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios - PNAD COVID19.". available at: `https://covid19.ibge.gov.br/pnad-covid/`.

INEP. 2019. "IDEB - Indíce de Desenvolvimento da Educação Básica.". Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. available at: `http://ideb.inep.gov.br/resultado/`.

Iwata, Kentaro, Asako Doi and Chisato Miyakoshi. 2020. "Was school closure effective in mitigating coronavirus disease 2019 (COVID-19)? Time series analysis using Bayesian inference." *International Journal of Infectious Diseases* 99:57–61.

Klimek-Tulwin, Monika and Tytus Tulwin. 2020. "Early school closures can reduce the first-wave of the COVID-19 pandemic development." *Journal of Public Health* pp. 1–7.

Oliveira, Cynthia. 2020. "Kalil descarta ensino remoto: 'Tem gente que não tem água e luz, não é sobre internet'." *Hoje em Dia* .
URL: *https://www.hojeemdia.com.br/horizontes/kalil-descarta-ensino-remoto-tem-gente-que-não-tem-água-e-luz-não-é-sobre-internet-1.794781*

Silveira, Daniel. 2019. "23,9% das famílias brasileiras vivem com R$ 1.245 mensais em média, aponta IBGE.".
URL: *https://g1.globo.com/economia/noticia/2019/10/04/239percent-das-familias-brasileiras-vivem-com-r-1245-mensais-em-media-aponta-ibge.ghtml*

TIC Domicílios. 2019. `https://cetic.br/pt/tics/domicilios/2019/domicilios/A4`.

Van Lancker, Wim and Zachary Parolin. 2020. "COVID-19, school closures, and child poverty: a social crisis in the making." *The Lancet Public Health* 5(5):e243–e244.

Viner, Russell M, Simon J Russell, Helen Croker, Jessica Packer, Joseph Ward, Claire Stansfield, Oliver Mytton, Chris Bonell and Robert Booy. 2020. "School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review." *The Lancet Child & Adolescent Health* .

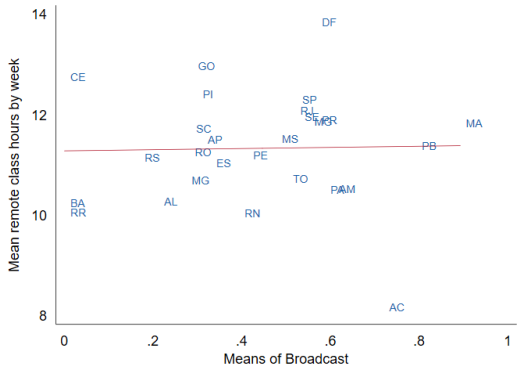
World Bank. 2020. Guidance Note: Remote Learning and COVID-19. Technical report.

World Health Organization et. al. 2020. Considerations for school-related public health measures in the context of COVID-19: annex to considerations in adjusting public health and social measures in the context of COVID-19, 14 September 2020. Technical report World Health Organization(WHO).

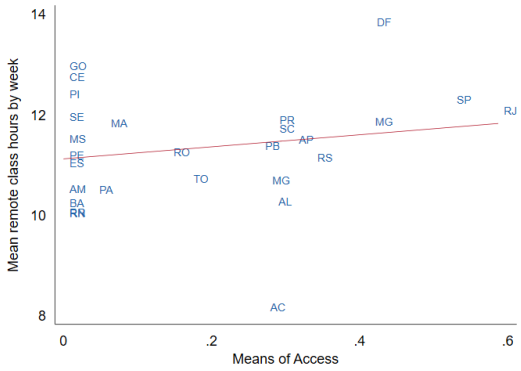
A Supplementary Figures

Figure 17: Correlation of REP Index components and educational outcomes

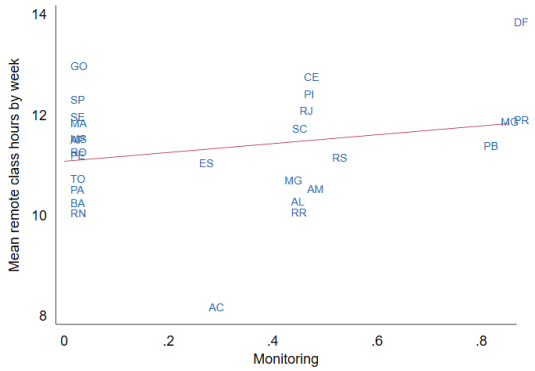
(a) Means of Broadcast



(b) Distribution of Access Material



(c) Supervision by Teachers or Departments



(d) Education Level Coverage

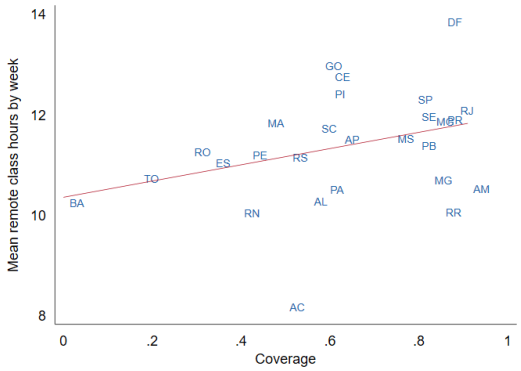


Table 4: Mean REP index and components for States (Março - Outubro 2020)

	Broadcast	Access	Supervision	Coverage	REP_index
AC	.6941896	.2660551	.2431193	.4801223	2.50085
AL	.2003058	.2782875	.4174312	.5412844	1.948692
AM	.6024465	0	.4518349	.9036697	3.514271
AP	.3088685	.3088685	0	.617737	1.372749
BA	0	0	0	0	0
CE	0	0	.4449541	.5932722	.988787
DF	.559633	.3746177	.8394495	.8394495	5.912334
ES	.2966361	0	.2224771	.2966361	1.153585
GO	.2844037	0	0	.5688074	.6320082
MA	.8853211	.045107	0	.4426606	1.550714
MG	.5412844	.5412844	.8119266	.8119266	6.314985
MS	.4602447	0	0	.7155963	1.478084
MT	.2691132	.2691132	.4036697	.8073394	3.139653
PA	.5810398	.0275229	0	.5810398	1.352362
PB	.5168196	.2584098	.7752294	.7752294	5.168196
PE	.3883792	0	0	.4159022	.924227
PI	.2966361	0	.4449541	.5932722	1.647978
PR	.559633	.559633	.8394495	.559633	4.352702
RJ	.5061162	.5810398	.4357798	.5810398	3.384302
RN	.3669725	0	0	.3669725	.8154944
RO	.2767584	.1383792	0	.2767584	.461264
RR	0	.2262997	.3394495	.4525994	1.257221
RS	.1513762	.3027523	.4541284	.3027523	2.018349
SC	.2798165	.2798165	.4197248	.559633	2.176351
SE	.5168196	.2584098	0	.7752294	2.584098
SP	.5107034	.5107034	0	.766055	3.404689
TO	.4541284	.1513762	0	.1200306	.5334693
Mean	.3891721	.1991732	.2793918	.5460981	2.243978

Table 5: Mean REP index and components for State Capitals (Março - Outubro 2020)

	Broadcast	Access	Supervision	Coverage	REP_index
Aracaju	.1788991	0	.1536697	.3073394	1.108563
Belo Horizonte	0	0	0	0	0
Belém	.4434251	0	0	.6651376	1.478084
Boa Vista	.1399083	0	0	.8394495	.4663609
Campo Grande	.5565749	.2782875	.4174312	.5565749	2.782875
Cuiabá	.5321101	0	0	.2660551	.5912335
Curitiba	.5382263	0	0	.8073394	1.794088
Florianópolis	.6146789	0	0	.9220183	2.04893
Fortaleza	0	0	0	0	0
Goiânia	.4602447	0	.0940367	.766055	1.847605
João Pessoa	.2599388	.1299694	.1949541	.3899083	1.949541
Macapá	.4525994	.2782875	.7110092	.7110092	4.531091
Maceió	.3302752	0	0	.3669725	.733945
Manaus	.5779817	0	.4334862	.8669725	3.37156
Natal	0	0	0	0	0
Palmas	.6024465	.2522936	.7568807	.5045872	3.58138
Porto Alegre	.1926606	0	.2889908	.0963303	.2675841
Porto Velho	.2996942	0	0	.8990826	.9989807
Recife	.2821101	.0940367	.2821101	.5642202	2.19419
Rio Branco	0	0	0	0	0
Rio de Janeiro	.3608563	.0948012	.1422018	.9174312	1.992864
Salvador	.4342508	.351682	.7431193	.853211	5.09684
São Luís	0	0	0	0	0
São Paulo	.2691132	.2691132	0	.8073394	1.794088
Teresina	.3608563	0	0	.5412844	1.202854
Vitória	.2675841	0	.2247706	.8027523	1.641183
Mean	.3136321	.0672489	.1708716	.5173489	1.595148