

# Strategy for The Containment, Mitigation, And Suppression of The Covid-19 Pandemic in Fragilized Communities on The Periphery of a Large Brazilian City

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## Abstract

We aimed establish measures to contain and suppress the spread of COVID-19, associating education and humanitarian aid in two needy communities in Brazil. The adherence to the measures and evolution of the number of cases was verified during the project. The target population consisted of approximately 1300 participants (350 families). A collection of epidemiological data was performed on family members registered for the project. Scientific information through audio-visual materials, educational pamphlets were written in colloquial language, food parcels, masks, hygiene, and cleaning materials were provided directly to family nuclei.

The common needs faced by families were food inputs and/or ready-to-eat food, mentioned by 91.4 % (233) of the people, and hygienic and cleaning materials, mentioned by 30.6 % (78) of the people. Only 34.9 % (84) of families had 70 % rubbing alcohol or hand sanitizer gel at home. The most frequently cited sources of information on COVID-19 were television [cited by 82.4 % (210) of the people]; social media [25.5 % (65)]; friends, neighbours, or family members [13.7 % (35)]; and radio [11.4 % (29)]. The reported use of masks every time they leave their houses increased [43.1 % vs. 62.7 % ( $p < 0.001$ )] and the percentage of erroneously classified symptoms decreased [27.5 % vs.

10.6 % ( $p < 0.001$ )]. A total of 83.7 % (175) stated that the actions helped them to avoid leaving the community. Our data suggest that local interventions may positively impact vulnerable communities. Thus, this approach proved to be a viable method to combat misinformation and help these communities to better understand their symptoms and behave during the pandemic. Educational actions combined with humanitarian aid are objective forms of aid that are well evaluated by these populations as promoting community isolation.

**Keywords:** epidemics, health inequalities, health policies, health education

## Introduction

The COVID-19 pandemic is an ongoing pandemic of an acute respiratory disease caused by the new severe acute respiratory syndrome coronavirus (SARS-CoV-2) [1]. The disease was first identified in Wuhan, Hubei Province, People's Republic of China, on 1 December 2019, and the first case was reported on 31 December of the same year [2, 3]. It is believed that the virus has a zoonotic origin because the first confirmed cases were mainly linked to the Huanan Wholesale Market, which also sold live animals [4, 5, and 6]. On 11 March 2020, the World Health Organization declared the outbreak a pandemic [7, 8]. In Brazil, the emergency alert was raised to level 2 (out of 3) on 28 January 2020, meaning it was considered an 'imminent danger' to the country [9]. The notification of cases of COVID-19 is managed by the Integrated Health Surveillance Platform of the

Ministry of Health. We currently have had 3,501,975 cases and 112,304 deaths in Brazil [10]. Prevention measures are highly important to poor communities because surveillance and access to health care may be limited [11]. However, preventive measures such as frequent hand hygiene and social distancing are suboptimal in these populations. The lack of water and cleaning products hinders frequent hand washing and sanitizing of objects [12, 13, and 14]. A modelling study concluded that social distancing in a respiratory virus pandemic is 60 to 70 % less effective in reducing the attack rate in an underdeveloped population than in a developed population [15]. This lower effectiveness is attributed to greater numbers of people in the same household, which implies a higher proportion of intradomicile transmissions of the virus - which are not prevented by social

distancing – out of the total transmissions [15]. In addition, low-income individuals may be more averse to social distancing due to the need to work to provide food for their families, their lower flexibility in finding/changing jobs, their fear of losing their jobs, and their lack of formal jobs with working conditions set by law [12] [16, 17]. The lack of knowledge about the disease may also cause lower adherence to prevention measures. Knowledge about the disease is positively correlated with education and the adoption of prevention practices for both COVID-19 [18] and other diseases caused by respiratory viruses [19, 20]. There are several strategies to control an outbreak: containment, mitigation, and suppression. The containment measures are performed in the early stages of the outbreak and aim to locate and quarantine cases of infection, in addition to vaccination and other measures to control the infection to stop it from spreading to the rest of the population. When it is no longer possible to contain the spread of the disease, the measures focus on delaying and mitigating its effects on society and the health system. Containment and mitigation measures can be performed simultaneously [21]. Suppression measures require that more extreme measures be taken to reverse the pandemic by decreasing the reproductive number to less than 1 [22]. Part of the management of an outbreak of an infectious disease consists of trying to reduce the epidemiological peak, a process called ‘flattening the epidemiological curve’ [23]. This reduces the risk of overburdening health services and gives more time for new vaccines and treatments to be developed. Among the non-

### Overall Objectives

This study aimed to establish measures to contain and suppress the spread of COVID-19, associated with education and humanitarian aid in two needy communities in the metropolitan region of Curitiba, Brazil, involving medical students from the Federal University of Paraná (UFPR) and volunteers. It also aimed to verify the effects of these measures on the outcome of adherence to the measures and evolution of the number of cases detected during the project. The general idea was to conduct a program that could be globally reproduced and applied in any pandemic outbreak in fragile communities based on two basic and non-exclusive principles: education and humanitarian aid.

### Materials and Methods

This was a short cohort study in which participants were followed for eight weeks. Epidemiological data were collected in the beginning of the study. We compared answers to the same questionnaire on COVID-19 knowledge at weeks 0 and 8. During the in-between time, participants were instructed on COVID-19 through individual oral teaching, educational pamphlets, and audio-visual materials. The study protocol was approved by the Ethics Committee from the Federal University of Paraná. The target population of the present interventional study consisted of needy populations from the periphery of the municipalities of Curitiba (Caximba neighbourhood) and Araucária (Jardim Israelense neighbourhood), totalling 350 families (approximately 13,00 participants). The Caximba

pharmacological interventions that control the outbreak are personal prevention measures, such as washing hands, wearing face masks, and voluntary quarantine; community prevention measures, such as closing schools and cancelling events that gather large numbers of people; environmental measures, such as cleaning and disinfecting surfaces; and measures that promote social adherence to these interventions [24]. Among the suppression measures taken in some countries are quarantines of several cities travel bans, [25] mass screening, financial support for infected individuals, so they isolate themselves, fines for those who break isolation, criminalization of stocking up on medical materials [26], and compulsory reporting of flu-like symptoms. The literature shows that the population's knowledge about infectious diseases can often be insufficient concerning signs and symptoms and disease prevention [19, 20]. The population's knowledge is expected to affect directly the precautions taken by the public. Thus, the hypothesis of the study was that educational initiatives can raise the understanding of the public about COVID-19. The effects of containment, suppression, and mitigation strategies when assessed within less favoured communities, as well as the effectiveness of health education measures in these populations have not yet been clarified. In this article, we report the experience obtained with educational measures associated with the attempt to mitigate COVID-19 through community aid in two poor communities in Brazil.

community is located south of Curitiba. It has a population of predominantly European origin and an area of 8.22 km<sup>2</sup> [27]. In 1989, a sanitary landfill was created in this region, which received waste from Curitiba and the metropolitan region [28]. After the landfill stopped being used in mid-2009, ‘Vila 29 de Outubro’ was formed, the largest village in the region of the Caximba neighbourhood. Considered an irregular settlement area, since the land belongs to the Institute of Waters of Paraná, the community was built on flooded land, without basic sanitation [29]. At least 1.1 thousand families inhabit these places unfit for dwelling [30].

The Caximba neighbourhood has 767 households, with an average of 3.29 inhabitants per household. This makes this community more crowded than Curitiba, which has an average of 2.76 inhabitants per household [27]. Thus, the site highlights the risk of spreading infectious diseases. In addition, only 4.44 % of the households of this neighbourhood are connected to the general sewage network, raising the propensity to spread diseases that involve intestinal transmission [27].

In the Capela Velha neighbourhood of Araucária, there are two large communities that were formed by land invasion: the Jardim Israelense community and 21 de Outubro community. Capela Velha is to the northwest of Araucária and has approximately 25,000 inhabitants, 3.1 % of whom are over 65 years old [31]. The 21 de Outubro community was established in a portion of the Jardim Israelense affected by

flooding near the Passaúna River dam. More than 300 families lived in this flooded portion until the Jardim Arvoredo II subdivision was completed, enabling approximately 170 families to be relocated [32]. Data from the Department of Planning of the Araucária city hall show the poverty of the region: 60 % of the residents have an income between one and two minimum wages and 13 % of the residents an income below that amount [33].

The patient care, educational procedures, and collection were done by students enrolled in health and medical courses of the medical schools of Curitiba and other volunteers.

The following procedures were performed:

1. Collection of epidemiological data from the studied populations as well as data on their knowledge of COVID-19.
2. Provision of scientific information and answering the population's questions through audio-visual materials and educational pamphlets written in colloquial language,

### Humanitarian Aid

A Web Application was developed to capture donations of money, food, and hygienic and cleaning materials; to publicize the project with photos; to recruit volunteers; and post weekly updates on the activities of the team. The food or hygienic and cleaning materials that were donated in person were sorted and sanitized with hand sanitizer gel to prepare food parcels, which were distributed during produced by the group of volunteers and distributed during their activities.

3. Provision of food parcels, masks, hygiene, and cleaning materials directly to family nuclei to reduce the need for residents to go outside the community in search of humanitarian aid.

A questionnaire was applied in the form of a direct interview in the case of people with restricted or non-existent access to the Internet. Medical students received training in order to standardize the questionnaire

### Results Epidemiological Data

At the initial phase of this project (week 0), 344 people were. After eight weeks, in the retest, 89 people, representing 26 % of the initial number, did not attend. Therefore, their data were not considered, and these people only received our information content once. Because of this, in the retest, and

application and the oral instructions on COVID-19. As we did not find in the literature a COVID-19 questionnaire directed to the general population, the questionnaire was created by the authors of this study and was not tested beforehand. Its content was divided into three blocks:

- a. Epidemiological data: age, sex, number of people living in the same household, educational level, income, presence of risk factors, etc.
- b. Knowledge about the disease caused by SARS-CoV-2: main symptoms, measures for prevention and containment of virus transmission, where and when to seek medical care, etc.
- c. Identification of symptomatic individuals (thus suspected of having COVID-19): current flu-like symptoms or symptoms within 30 days. before the application of the questionnaire. Suspected cases were referred for medical care.

Statistical analysis questionnaire's answers were done using Stata/IC version 13. Epidemiological data were summarized using means, standard deviation, and proportions. The data collected on knowledge about COVID-19 and prevention measures were compared at 0 and 8 weeks after the beginning of the project. Participants who were present at week 0 but not at week 8 were removed from the study. Student's T-test was used for comparing means of right answers, and McNemar's test was used for comparing proportions of people who responded correctly to each question.

the on-site activities in the communities. From March to August, the project captured more than 50 tons of food, hygienic materials, masks, clothes, toys, and household utensils, in addition to raising approximately \$8,000 in cash donations. The donors learned about the project through social media and television.

consequently for the study, 255 people were evaluated. Each one represented a family registered for the project. A total of 79.6 % (n = 203) were women and 20.4 % (n = 52) were men, with a mean age of 39.9 (± 13.1) years [Table 1].

**Table 1.** Socio Economic and Educational Data

	N (%)
<b>People included</b>	255 (100,0)
<b>Sex</b>	
Women	203 (79,6)
Men	52 (20,4)
<b>Mean age</b>	39,9 (± 13,1)
<b>Mean number of people per family</b>	3,8 (± 1,6)
Children or adolescents up to 16 years old per family	1,6 (± 1,4)
<b>Elderly people per family</b>	0,2 (± 0,5)
<b>Monthly family income</b>	

No family income at the time	19 (7,4)
<b>Less than or equal to half the minimum wage</b>	139 (54,5)
Greater than half the minimum wage but less than or equal to one minimum wage	74 (29)
<b>Greater than one but less than or equal to two minimum wages</b>	16 (6,3)
Do not know	2 (0,8)
<b>Educational level</b>	
Illiterate	22 (8,6)
Literate	29 (11,4)
Elementary school	123 (48,2)
Incomplete secondary education	32 (12,5)
Complete secondary education	40 (15,7)
Incomplete higher education	4 (1,6)
Complete higher education	1 (0,4)
<b>Comorbidities found per family</b>	
Systemic arterial hypertension	68 (26,7)
Diabetes mellitus	42 (16,5)
Asthma	27 (10,6)
Rheumatological diseases	14 (5,5)
Neoplasms	10 (3,9)
Heart diseases	8 (3,1)
Other lung diseases	6 (2,4)
Neurological diseases	4 (1,6)
Nephropathies	3 (1,2)
Other comorbidities	2 (0,8)
Mean number of comorbidities per family	0,8 (± 1,0)

mean number of people per family was 3.8 (±1.6), the mean number of children or adolescents up to 16 years old was 1.6 (±1.3) per family and the mean number of elderly people per family was 0.2 (± 0.4). A total of 74.1 % (n = 189) of families had at least one person up to 16 years of age, and 14.1 % (n = 36) of families had at least one elderly person. A total of 8.6 % (n = 22) of the people were illiterate, 11.4 % (n = 29) had studied up to literacy, 48.2 % (n = 123) had studied through elementary school, 12.5 % (n = 32) had an incomplete secondary education, 15.7 % (n = 40) had a complete secondary education, 1.6 % (n = 4) had an incomplete higher education, and 0.4 % (n = 1) had a complete higher education. The monthly family income varied between zero and two minimum wages. A total of 7.4 % (n = 19) of the people reported not having a family income at the time,

**Table 2.** Sources of information on COVID-19

54.5 % (n = 139) had a family income less than or equal to half the minimum wage, 29 % (n = 74) had a family income greater than half the minimum wage but less than or equal to one minimum wage, and 6.3 % (n = 16) had a family income greater than one but less than or equal to two minimum wages. The most common needs faced by families were food inputs and/or ready-to-eat food, a need that was mentioned by 91.4 % (n=233) of the people, and hygienic and cleaning materials, mentioned by 30.6 % (n = 78) of the people. Only 34.9 % (n = 84) of families had 70 % rubbing alcohol or hand sanitizer gel at home. The most frequently cited sources of information on COVID-19 were television [cited by 82.4 % (n = 210) of the people]; social media [25.5 % (n = 65)]; friends, neighbours, or family members [13.7 % (n = 35)]; and radio [11.4 % (n = 29)] [Table 2].

	N (%)
<b>Television</b>	210 (82,4)
<b>Social media</b>	65 (25,5)
<b>Friends, neighbours, or family members</b>	35 (13,7)
<b>Radio</b>	29 (11,4)
<b>Health workers</b>	11 (4,3)

Websites	8 (3,1)
Government app	1 (0,4)
Other sources of information	9 (3,5)
No source of information	1 (0,4)

A total of 25.5 % (n = 65) of the participants reported leaving the community regularly, 8.8 % (n = 22) doing so at least three times a week [Table 3].

**Table 3.** Reasons for leaving the community

	N (%)
Essential purchases	29 (43,9)
Work	12 (18,2)
Medical care	12 (18,2)
Bank	11 (16,7)
Leisure	5 (7,6)
Other reasons	6 (9,1)

Do you leave the community regularly?	N (%)
<b>Yes</b>	65 (25,5)
Once a month	4 (1,7)
Twice a month	1 (0,4)
Once a week	28 (11,1)
Twice a week	10 (4,0)
Three times a week	7 (2,8)
More than three times a week	15 (6,0)
<b>No</b>	187 (73,3)

Do our actions help you avoid leaving the community?

	N (%)
<b>Yes, a lot</b>	175 (83,7)
<b>Yes, a little</b>	31 (14,8)
<b>No</b>	3 (1,4)

Among the people who reported leaving the community, 43.9 % (n= 29) mentioned essential purchases-food and alcohol, for example- and 18.2 % (n = 12) mentioned work as a reason. A total of 33.3 % (n = 22) of the people who regularly left the community took public

transportation. A total of 83.7 % (n = 175) stated that the actions helped them a lot, and 14.8 % (n = 31) stated that the actions helped them a little to avoid leaving the community.

### Community Knowledge About Covid-19

The mean number of COVID-19 symptoms correctly cited by the interviewees increased from 2.16 on the first test to 2.37 on the second test [Table 4].

**Table 4.** COVID-19 symptoms

	First test	Second test	Difference	Confidence interval	p
<b>Cough</b>	40,4	43,5	3,1	-5,1; 11,4	0,493
<b>Fever</b>	66,3	72,5	6,3	-1,5; 14,1	0,121
<b>Myalgia</b>	51,4	48,2	-3,1	-11,5; 5,2	0,501
<b>Difficulty breathing</b>	<b>56,5</b>	<b>47,5</b>	<b>-9,0</b>	<b>-16,7; -1,4</b>	<b>0,021</b>
<b>“I don’t know”</b>	4,3	5,1	0,8	-3,0; 4,6	0,824
<b>Wrong symptoms</b>	<b>27,5</b>	<b>10,6</b>	<b>-16,9</b>	<b>-23,9; -9,9</b>	<b>&lt;0,001</b>
<b>Mean number of COVID-19 symptoms correctly cited by the interviewees</b>	<b>2,2</b>	<b>2,4</b>	<b>0,2</b>	<b>0,0; 0,4</b>	<b>0,012</b>
<b>Number of interviewees who correctly cited at least one COVID-19 symptom</b>	92,2	93,7	1,6	-2,4; 5,6	0,523

The most cited were fever (from 66.3 % to 72.5 %), body pain (from 51.4 % to 48.2 %), dyspnoea (from 56.5 % to 47.5 %), and cough (from 40.4 % to 43.5 %). On the first test, 27.5 % of people cited symptoms that are not commonly found in COVID-19, and 4.3 % of people said they did not know any symptoms. In the second test, these percentages were 10.6 % and 5.1 %, respectively. A total of 47.5 % of people at the time of the first test and 62.7 % at the time of the second test knew that they would need to be quarantined for 14 days if they presented symptoms of COVID-19. The proportion of respondents who knew they did not need medical care in cases of mild symptoms of COVID-19 was 40.8 % at the first test and 33.3 % at the second test. In case of need, 36.7% of people at the first test and 58.8 % at the

second test would seek an emergency unit of the Brazilian Health System. Regarding the forms of transmission of COVID-19 the most cited were close contact between people (69.0 % on the first and 58.0 % on the second test), saliva droplets (36.1 %, 29.0 %), and contaminated objects or surfaces (36.1 %, 29.0 %). The mean number of forms of transmission cited per person decreased from 1.65 to 1.46. The most frequently mentioned forms of prevention were washing hands (63.9 % on the first and 63.1 % on the second test), sanitizing the hands with alcohol (57.6 %, 62.0 %), wearing a mask when leaving the home (43.1 %, 62.7 %), staying in the house (51.8 %, 46.7 %), and social distancing (40.8 %, 44.7 %) [Table 5].

**Table 5.** Forms of prevention

	First test	Second test	Difference	Confidence interval	p
<b>Sanitizing the hands with alcohol</b>	57,6	62,0	4,3	-3,8; 12,4	0,320
<b>Washing hands</b>	63,9	63,1	-0,8	-8,7; 7,1	0,919
<b>Wearing a mask when leaving the home</b>	<b>43,1</b>	<b>62,7</b>	<b>19,6</b>	<b>11,3; 27,9</b>	<b>&lt;0,001</b>
<b>Social distancing</b>	40,8	44,7	3,9	-4,2; 12,1	0,373
<b>Staying in the house</b>	51,8	46,7	-5,1	-13,6; 3,4	0,259
<b>Other correct forms of prevention</b>	<b>2,4</b>	<b>0</b>	<b>-2,4</b>	<b>-4,6; 0</b>	<b>0,031</b>
<b>“I don’t know”</b>	2,4	2,0	-0,4	-3,3; 2,5	1
<b>Mean number of forms of prevention correctly cited by the interviewees</b>	<b>2,6</b>	<b>2,8</b>	<b>-0,2</b>	<b>0,0; 0,4</b>	<b>0,049</b>
<b>Number of interviewees who correctly cited at least one form of prevention</b>	97,3	98,0	0,8	-2,0; 3,6	0,754

At the first test, 67.8 and 73.3 % of respondents correctly answered what social distancing and isolation were, respectively. At the second

test, these proportions were 71.8 % and 78.8 %.

## Discussion

Like transmission, mortality is higher in poor populations in a respiratory virus pandemic. In the 1918 and 1919 pandemics, mortality was seven times higher in poor regions, such as sub-Saharan Africa, Southeast Asia, and Latin America, than in developed regions, such as Europe and the United States [34, 35]. One study concluded that in a hypothetical pandemic like that of 1918, 96 % of deaths would occur in developing countries [35]. In addition, the mortality of an influenza pandemic is negatively correlated with per capita income, which alone explains approximately 50 % of the variation in mortality [35]. A 10 % increase in per capita income implies a 9 to 10 % reduction in mortality [35]. This higher mortality of a respiratory virus pandemic in needy populations may be due, at least in part, to the prevalence of comorbidities such as tuberculosis, AIDS, and chronic malnutrition [16][36]. Factors discussed above, such as higher population density and poor housing conditions may also contribute to increased mortality [37]. Needy communities are especially vulnerable to pandemics. Although there are still no studies on the transmission of coronavirus in these communities, a study on the hypothetical pandemic of a new influenza strain estimated that the attack rate in underdeveloped populations may be 50 % higher than the attack rate in developed populations, mainly due to the larger number of people living in the same household [15]. Under conditions of overcrowded housing, small houses with poor ventilation, and housing with a single room, social distancing is impractical, as is the isolation of people who show symptoms, which predisposes the residents of the community to the higher transmission of respiratory viruses [13] [38, 39]. Other factors that may contribute to the transmission of respiratory viruses among residents of poor communities are the sharing of utensils and the use of public transportation [16] [39]. In addition to the disease itself, poor communities face difficulties indirectly caused by the pandemic, such as reduction or annulment of their income and loss of support for possible social actions that help the community [14]. Thus, given the greater risks of COVID-19 transmission and mortality in needy communities, as well as the difficulties of implementing preventive measures and the aggravation of basic needs by the pandemic, the importance of actions specifically designed to help this population becomes clear, as the measures proposed for other populations are not efficient in these communities. Although most of the people interviewed had no income or had an income less than one minimum wage most had access to TV and social media, such as Facebook and Instagram, and obtained most of their information about COVID-19 from TV shows or national television news or from social media [Table 2]. The application created by the Ministry of Health was rarely cited, and only one person accessed pandemic information through this public website. This demonstrates that public initiatives in Brazil need to be better publicized by the government to the poorest sections of the population. As documented in the initial interviews

and in the reapplication of the survey, most residents were already afraid to leave the community, and in general, they only did so for work reasons or to make purchases essential to their family's subsistence. This facilitated our educational goal of emphasizing the need for residents to remain in the community during the pandemic. While implementing this project and according to the data obtained from the registration of more than 300 families, we noticed that there was a potential circulation of the virus from the third week. Thus, we decided to apply a second questionnaire to assess the residents' knowledge about COVID-19, as well as the reasons that led them to circumvent social distancing and expose themselves to the virus. In the fourth week, in addition to lunch boxes and food parcels, masks and bread were also distributed, which were obtained through partnerships with institutions that support movements and projects in fragile populations in Brazil. The second questionnaire was administered to residents already registered with the project. Furthermore, there was a significant difference between the two surveys in the percentage of the residents that reported the use of masks every time they leave their houses (43.1 % vs. 62.7 %;  $p < 0.001$ ). This highlights the importance and impact of the project on these communities' families. Other variables also showed a promising improvement, as the percentage of individuals who developed dyspnea which decreased significantly during the gap between the two sampling periods (56.7 % vs. 47.5 %;  $p = 0.021$ ). However, the causal relation of this deficit and the initiative's effort was not properly measured, being a known limitation of this study. An interesting event, which is more intrinsically related to the education given to these communities, was the decreased percentage of erroneously classified symptoms (27.5 % vs. 10.6 %;  $p < 0.001$ ). The sole presence of a project willing to help clarify their doubts and understand the severity of the pandemic may have greatly raised their awareness of differential symptoms and basic hygiene, corroborated by our findings. A model in which community isolation in fragile populations is desired must include humanitarian aid activities. The provision of basic needs and help with hygienic and cleaning materials helps prevent residents from leaving their community unnecessarily to seek basic supplies, exposing themselves to other infected communities [40, 41]. This is a pillar that we consider fundamental to the success of our project. Although the Brazilian government establishes a monthly basic aid for up to two members of the same family (approximately US \$120 monthly [42]), many did not have access to this amount because they needed to apply online, for which purpose a social security number would be necessary. Although we do not have the exact numbers, we found from community leaders in the two study areas that 10-20 % of the children born there still did not have birth certificates. Brazil is a country of inequalities, with citizens who earn salaries comparable to those in a developed country and citizens who live in absolute poverty according to the World Health

Organization definition. Thus, the actions it needs to take against a pandemic become complex and are not exhausted by public actions provided by the government at all levels: municipal, state, and federal. Rather, it must rely on the participation of members of organized civil society and non-governmental organizations for the success of the containment of pandemics. Brazilian public universities have a strong responsibility to enable aid programs because they have trained professionals to solve the various problems that a fragile population may face in a pandemic such as COVID-19.

We consider that the overarching goals of the study were fully met. The follow-up survey showed a higher percentage of mask use, better

understanding of hallmark COVID-19 symptoms and a better understanding of preventive measures. In addition, humanitarian support was greatly appreciated by both communities. Nonetheless, a potential shortcoming of our study was that we did not compare the impact of our actions on the spread of COVID-19 in other needy populations that did not have access to the same measures, near the locations where we operate. However, this was not our goal. Our goal was simply to know how much the population had improved in terms of their knowledge about the pandemic and how our activities improved their adherence to the containment measures.

## Conclusions

Our data suggest that local interventions may positively impact vulnerable communities. Thus, this approach proved to be a viable method to combat misinformation and help these communities better understand their symptoms and behave during the pandemic.

Educational actions combined with humanitarian aid are objective forms of aid that are well evaluated by these populations as promoting community isolation.

### Summary Box

1. What is already known on this subject?

Fragilized and poor communities are more susceptible to pandemics. Prevention measures are highly important to poor communities because surveillance and access to health care may be limited

2. What does this study add?

We propose a program that can be globally reproduced and applied in any pandemic outbreak in fragile communities based on basic and non-exclusive principles: Community isolation, education, and humanitarian aid.

## Policies Implications:

Our results could support the implementation of national policies in under developing countries to contain the spread of pandemics.

Humanitarian Aid, education, and effective health actions such as

testing are measures that should be taken by any underdeveloped country at the start of a pandemic.

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