Equity and the Cuban National Health System's response to COVID-19 Equity and the Cuban National Health System's response to the COVID-19 pandemic.

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Abstract

Cuba's National Health System has managed to guarantee an effective and equitable response to COVID-19. Universal and free health coverage, based on primary care, follows the principle of equity, and the greatest resource are allocated to areas of the lowest socioeconomic stratum (which concentrates the higher health risks), followed by those of medium and high strata, in that order. This allowed for similar mortality rates in the three strata, and Cuba national mortality rate was one of the lowest in the Region of the Americas. Before the first case was identified in Cuba, a Plan for Coronavirus Prevention and Control was elaborated with multisectoral participation, and when the first case was confirmed the Temporary Working Group to Fight COVID-19 was created as an advisory body of the government. The actions to face the pandemic began with preventive measures in the community, continued in the isolation centers and ended again in the community with actions of surveillance and follow up of recovered patients. Following the principle of territoriality, laboratories of molecular diagnosis were created in the provinces that did not have it. Free medical care and treatment; the preparation of a single national intersectoral government plan; the use of particular strategies for research, diagnosis and case tracing; and the implementation of a universal protocol for disease prevention and treatment of confirmed cases allowed to control the disease with a perspective of equity in health.

Figures (3)

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Equity and response of the Cuban National Health System to COVID-19

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RESUME

The Cuban National Health System has managed to guarantee an effective and equitable response in the face of COVID-19. Universal and free health coverage, based on primary care, follows the principle of equity, so that the greatest resources are allocated to the territories of the lowest socioeconomic stratum, which concentrates the greatest health risks, followed by those of the middle strata and high, in that order. This allowed for similar fatality rates in the three strata, and at the national level, Cuba's is one of the lowest rates in the Region of the Americas. Before identifying the first case in Cuba, the Plan for the Prevention and Control of Coronavirus was drawn up, with multisectoral participation, and upon confirmation of the first case, the Temporary Working Group to Confront COVID-19 was created as an advisory body to the Government. The actions to confront the pandemic begin in the community with preventive measures, continue in the isolation centers and end again in the community, with actions of surveillance and accompaniment of the recovered patients. Following the principle of territoriality, molecular diagnostic laboratories were created in the provinces that did not have it. Free medical care and treatment; the preparation of a single national intersectoral government plan; the use of particular strategies for th investigation, diagnosis and tracking of cases;

Keywords: Coronavirus infections, health equity, universal health coverage, primary health care, Cuba

The concept of equity has a long history and is complex, so over time it has had different definitions. The term, derived from the Latin *aequĭtas* , refers to equality of mind (1). Achieving equity in health means, at the present time, that people can develop their maximum health potential regardless of their social position or other circumstances determined by social factors. Equity in health implies that resources are allocated according to the need and fairness of the processes, and discrimination is avoided in the provision of health care (2 , 3).

Until October 1, 2020, the COVID-19 pandemic, a disease caused by the coronavirus known as SARS CoV-2, has generated more than 34 million confirmed cases and 1 million deaths, with a fatality rate (number of deaths of the total accumulated positives) estimated at 2.98%. In the Americas region, more than 16 million confirmed cases and more than 560,000 deaths have been reported, for a fatality of 3.33%; All of this has put the capacity of public healt systems around the world to the test (4).

This pandemic requires an adequate hospital and laboratory infrastructure, as well as health systems capable of carrying out contact tracing of confirmed cases and enough health personnel and equipment to provide care to a large number of patients at the same time. . On the other hand, as with other infectious diseases, inequities increas both the transmission of COVID-19 and the level of severity with which the disease transits within the poorest societies (5). Thus, the consequences of the disease fall disproportionately on groups that are in a situation of vulnerability and those that suffer from discrimination. Based on this, the Pan American Health Organization (PAHO has called on the countries of the Region to consider the perspective of equity, gender, ethnic characteristics, and human rights in their responses to COVID-19 (6).

For Cuba, equity, the promotion of social and human development, and social justice are basic pillars in the conception of its social policy (7) established in the Constitution of the Republic, which emphasizes that "... public health it is a right of all people and it is the responsibility of the state to guarantee access, gratuity and quality of care, protection and recovery services "(8)

made it possible to have a service organization favorable to coping with extraordinary situations and disasters, and its effectiveness has been proven in the particular case of the COVID-19 pandemic.

As of October 1, 2020, 5,670 cases had been confirmed in Cuba. Of these 5 078 had already recovered, 518 were st hospitalized and the death of 122 people positive for SARS-CoV-2 was regretted, for a fatality rate of 2.15, one of th lowest in Latin America (4).

The present work aims to show how the Cuban National Health System (SNS) managed to guarantee an effective ar equitable response in the face of COVID-19.

EQUITY OF THE HEALTH SYSTEM BASED ON PRIMARY CARE

The organization of the Cuban SNS assumes equity as a premise to guarantee the health of the population with efficacy and social satisfaction, under the principles of accessibility and free services, with preventive orientation, high community participation and intersectorality. This is a centralized system at the normative level and in the methodological order, but decentralized in the execution of its programs and actions, in which the advances of science and technology are applied; In addition, international collaboration is provided to countries that require an request it (11).

The universal coverage of the SNS is based on the primary health care (PHC) strategy and is based on a public mod unique and integrated into service delivery networks by levels of care, and on policies and programs focused on epidemiology, environmental health and medical care. In this network, actions are coordinated and the functions o public health are carried out based on the determinants of the health status of the population. Both within the sector and at the social level, emphasis is placed on health promotion and prevention, under the principle of intersectorality (12).

Another strength of the SNS is its programmatic base, which makes it possible to have procedures to guide patient in an assisted and regionalized way through the service network. There are 479,623 health workers distributed in three levels of care — interconnected through the referral and counter-referral system—, focused on the family doctor, who accompanies the patient on their way through the entire network with a permanent update (13).

Thus, the primary care system based on community family medicine clinics is joined by 150 municipal hospitals tha have all specialties - and make up the second level of care - and have 110 hospital intensive care rooms. The third level of care is made up of 12 specialized and research institutes with care functions. All citizens have free access tc all health instances, from primary care to those with a higher degree of specialization at the tertiary level of care. This set of institutions functions as part of a process of regionalization of services in general, from the point of view of geographic care and specialties, which is an expression of equity in access and opportunities (13).

The Cuban model of family medicine includes, among its key processes, dispensarization and analysis of the health situation, which makes it possible to identify vulnerable individuals and families. The most important aspect of this the ability to define resource needs in order to improve the health status of the community. Due to their authority and relationship with local government leaders and community organizations, the family doctor and nurse have tools to modify behaviors and influence the perception of risk in the population they serve.

However, there are socio-economic and cultural particularities within the country that cause territorial differences i living conditions. In previous studies (14), the 15 provinces of Cuba and the special municipality of Isla de la Juventud were classified according to the index of living conditions in three strata: low (<0.40), medium (from 0.41 t 0, 55) and high (> 0.55). Thus, the eastern provinces of the country (Las Tunas, Holguín, Granma, Santiago de Cuba and Guantánamo) are located in the lower stratum, while some western and central provinces (Pinar del Río, Mayabeque, Matanzas, Villa Clara and Sancti Spíritus) are located in the middle stratum and the others (Artemisa, Havana, Cienfuegos, Ciego de Ávila, Camagüey and the special municipality of Isla de la Juventud) are in the upper stratum.

The SNS maintains a continuous improvement of its human resources and its services, which has allowed it to continuously improve the main health indicators and the health status of the population (15). Consistent with the principle of equity, the greatest human and material resources are assigned to the territories of the lowest stratum which concentrates the greatest health risks, followed by those of the middle and high strata, in that order (**table 1** although, as can be seen, the transmission of the disease mainly affected the upper stratum, which includes the capital of the country.

TABLE 1.

National statistics related to COVID-19 by strata, Cuba, October 1, 2020

Stratum [a]	Population	Doctors per	Tests	Confirmed	Contacts	Positive	Deaths

Stratum [a]	Population	Doctors per 100,000 inhabitants	Tests performed [b]	Confirmed cases	Contacts studied	Positive contacts to COVID-19 [f]	Deaths positive for COVID-19
High [c]	4 335 512	71,2	478 106	4 603	72 660	5,4	88
Middle [d]	2 928 959	75,9	83 295	761	18 600	4,3	24
bajo [e]	3 937 082	93,9	59 779	306	11 457	1,1	10

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a Strata according to the index of living conditions: low <0.40; medium 0.41 to 0.55; and high> 0.55 (14).
b Real-time polymerase chain reaction (PCR) test.
c Artemisa, Havana, Cienfuegos, Ciego de Ávila and Camagüey provinces and the special municipality of Isla de la Juventud.
d Provinces Pinar del Río, Mayabeque, Matanzas, Villa Clara and Sancti Spíritus.
and Las Tunas, Holguín, Granma, Santiago de Cuba and Guantánamo Provinces.
f Average per confirmed case.

PREPARING TO FACE COVID-19 IN CUBA

In January 2020, the Cuban Government, together with the Ministry of Public Health and with the participation of al the economic and social sectors involved, activated the National Temporary Group to confront COVID-19 and begai the deployment of government-oriented management to mobilize the important scientific, technological and professional capacities to face the pandemic, which are included in the Plan for the Prevention and Control of Coronavirus (16). This plan defines the policies of government, communication, and science and technology, takin care to guarantee the equity of public health actions in the application of coping strategies; In addition, it establishe the preparation of human and material resources that accompany the implementation and the necessary adjustments to overcome this challenge (17).

When the first imported cases appeared in March, decisions and action plans were implemented in each economic sector, which included the activation of defense councils in all territories of the country (structure at the national, provincial and municipal levels, with a focus on intersectoral, to reconcile strategies and actions against natural disasters, epidemics and other extraordinary events that affect the community). Defense councils coordinate and control missions and actions in each entity and community to reinforce health promotion (information, education and communication), social distancing measures, border control and modification of risk factors. , as well as the protection of the most vulnerable populations (18).

On March 20, nine days after the first three imported cases from Europe were detected, the Government announce new measures to confront COVID-19 and the Temporary Technical Working Group to Confront COVID-19 was activated, made up of experts - academics and specialists from universities, research centers and healthcare servic -, with the mission of advising and collaborating with the first level of State management to identify the magnitude and spread of the disease in the country, its risk and its severity. This group provided criteria for evaluating interventions, planning resources, and analyzing the epidemiological situation in Cuba and in the international context. In addition, it collaborated in the analysis and proposal of measures to confront the disease,19-21).

In order to achieve equitable access to all information related to the epidemiological situation, a communication system was established for the population with duly updated information. Since March 11, the day the first importe cases were detected, the mass media and social networks broadcast daily the update conference offered by the national director of epidemiology of the Ministry of Public Health and television sessions in prime time, such as the Roundtable program, with the participation of the minister and other officials of the Ministry of Public Health, scientists, and senior government and state officials (22).

ACTIVE SEARCH, DIAGNOSIS, TRACE AND ISOLATION OF CASES

The active research has been carried out by the members of the basic health teams - a structure of the primary lev

with the training and preparation of human resources, which allowed for immediate action, incorporate skills for epidemiological research in the identification of direct contacts and vulnerable people, increase the capacity for motivation and incorporation into the community as the subject of actions, and manage the operation of services. These were key elements to achieve social efficacy and the satisfaction of the population even in such a complex situation.

The real-time polymerase chain reaction (PCR) test constitutes the essential confirmatory element of the case. The number of these tests increased as the epidemic evolved, with a relatively uniform distribution in most regions; the biggest difference occurred in the capital, which from the beginning became the epicenter of the epidemic in the country (Figure 1).

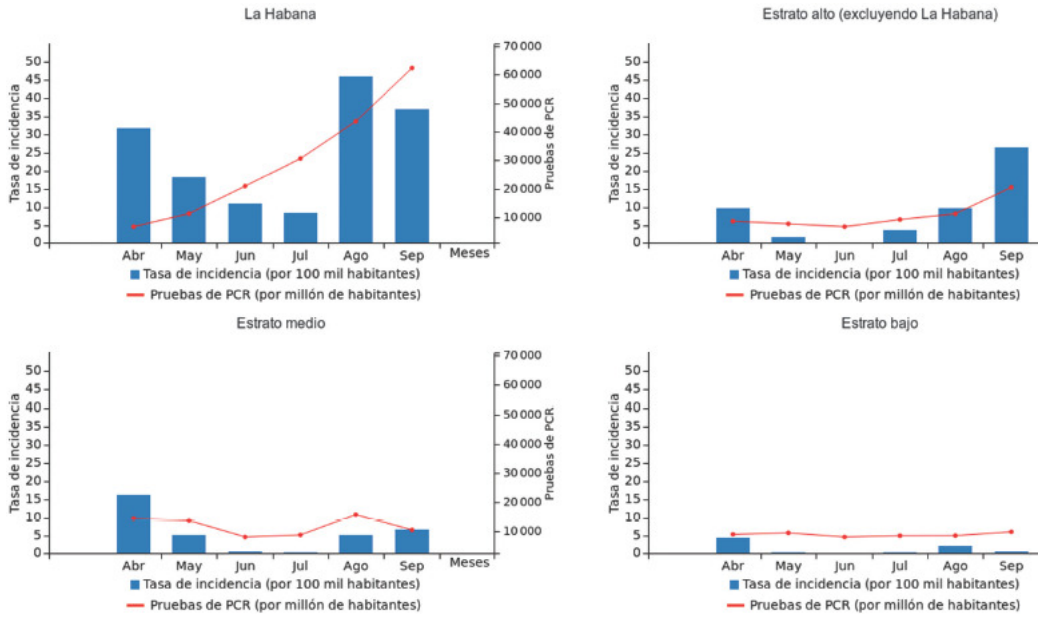

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FIGURE 1.
Distribution of confirmed cases of COVID-19 and number of tests by PCR [to] made, by stratum [b] and the index of conditions in Cuba, 1 October 2020

Source: Prepared by the authors on the basis of data taken from: https: ltcovid19cubadata.github.iof # cuba

Initially, there were three laboratories for real-time PCR tests, one for each region of the country: in Havana the samples collected in the west were processed (provinces of Pinar del Río, Artemisa, Mayabeque, La Habana and Matanzas, and the special municipality Isla de la Juventud), in Villa Clara those from the center (Villa Clara, Cienfuegos, Sancti Spíritus, Ciego de Ávila and Camagüey) and in Santiago de Cuba those from the eastern province (Las Tunas, Holguín, Granma, Santiago de Cuba and Guantánamo). Later, other laboratories were incorporated in Havana, Due to the complex epidemiological situation in the western region, a strategy to develop the country's diagnostic network was put into practice to meet the objective of having a molecular biology laboratory in each province. In the laboratories that already existed, the working day was increased to 24 hours, with rotating work shifts, the equipment was improved and the diagnostic capacity was increased with the training of the personnel. This allowed the number of tests required in each province to be carried out according to the epidemiological situation. Between March 11 and September 30, 2020, 621,180 samples had been analyzed (55,410 tests per millior inhabitants). The equipment was improved and the diagnostic capacity was increased with the training of the personnel. This allowed the number of tests required in each province to be carried out according to the epidemiological situation. Between March 11 and September 30, 2020, 621,180 samples had been analyzed (55,41(tests per million inhabitants). The equipment was improved and the diagnostic capacity was increased with the training of the personnel. This allowed the number of tests required in each province to be carried out according tc the epidemiological situation. Between March 11 and September 30, 2020, 621,180 samples had been analyzed (55,410 tests per million inhabitants).

Throughout the country, the first and second order contacts of each confirmed case were identified and isolated. A were tested for possible SARS-CoV-2 infection. As an intersectoral contribution to the situation created, in all the provinces and the special municipality of Isla de la Juventud, new health care facilities were set up outside the healt system facilities: 1 103 beds in care centers for suspected lower-risk cases , 3 636 beds in surveillance centers for

In addition, in order to study the spread of the disease in the country, a seroprevalence survey was carried out that involved all provinces, including municipalities that had not reported positive cases up to that time. This study, developed in four stages and still in progress, is based on a representative sample of the population with approximately 4,000 people and 1,400 households.

[a] PCR: Real-time polymerase chain reaction test.

[b] Strata according to the index of living conditions: low <0.40; medium 0.41 to 0.55; and high> 0.55 (14); see details in the footnote**table 1**.

INFECTION PREVENTION AND CARE FOR CONFIRMED PATIENTS

The confirmed patients were hospitalized until they tested negative for COVID-19 by real-time PCR and then went into a 14-day quarantine at home, under the supervision of the family doctor. All were treated according to the protocol adopted in Cuba for coping with the disease (23). This protocol is unique and has a normative character and national scope, that is, it is applied in all health institutions in the country at all levels of care. However, it is flexible so that it can be adapted according to the clinical status of each patient and their evolution, and it is systematically updated according to the new scientific evidence on SARS-CoV-2 and COVID-19 emerging in Cuba and the world.

The Cuban protocol establishes as priorities the prevention of infection, the control of the disease and the best management of cases, as well as the protection of health workers and the population. As shown in the**figure 2**, the actions to confront the pandemic in Cuba begin in the community with preventive measures, continue in the isolation centers of suspected cases, contacts of confirmed and suspected people, and travelers who arrive in the country and end up again in the community, with the surveillance and accompaniment actions for recovered patients.

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FIGURE 2.

Preventive and therapeutic actions adopted, from the investigation to the recovery of confirmed cases with COVID-19, Cuba, 2020 [to]

Source: Prepared by the Directorate of Science and Technology. Ministry of Public Health. Taken from: Presentation of the Temporary Working Group to the Government, October 8, 2020.

[b] Based mainly on drugs and biomolecules developed in Cuba.

The active house-to-house search for suspected cases and testing all the contacts of the cases have been unique characteristics of the Cuban strategy in the face of the epidemic. This has ensured more timely care, before complications appear. The groups with the highest risk in the Cuban population coincide with what is reported in the international literature: people residing in institutions, older than 60 years and younger than 60 years with chronic diseases, the most frequent of which are arterial hypertension, diabetes mellitus, ischemic heart disease, chronic obstructive pulmonary disease, and chronic kidney failure (24).

From the start of the pandemic until October 1, 625 cases of COVID-19 under 18 years of age had been detected in the country. The age-specific incidence rate increased significantly from 22.4 per 100,000 children under 1 year of age to 33.19 per 100,000 adolescents aged 15 to 18 years ($p = 0.02$). Although it is higher than that reported internationally (25), in most children the disease was uneventful or asymptomatic. The high number of cases detected in pediatric ages in Cuba may be due to the extensive investigation carried out in the country and the priority given by the SNS to the Maternal and Child Care Program. Thus, in Cuba a surveillance system was

Treatments for all diagnosed patients are available free of charge in all health institutions in the country, and the drugs used are mostly (14 of the 18 main products used) of national production; The Cuban biotechnology industr has been responsible for guaranteeing the accessibility of all the products contemplated in the Cuban protocol, including effective innovative therapies to prevent the passage of patients to serious forms of the disease (26 - 30)

MAIN RESULTS AND CURRENT SITUATION

The actions of the Cuban Government were undertaken from the beginning with an intersectoral approach aimed fundamentally at mitigating the effects of the disease and interrupting the transmission of COVID-19. All actions were carried out at the same time and in a uniform manner in all the country's provinces, through local governmer and state institutions.

Subsequently, depending on the evolution of the epidemic, these actions gradually and casuistically "de-escalated" by territory. The National Temporary Group has been in charge of approving these changes, always following established criteria, the same for all provinces, which is a sign of fairness in the management of the epidemic by th central government and the country's political leadership.

All of the above has been reflected in the Oxford rigor index, a tool developed by that university - known as the Oxford Stringency Index - to assess the degree of severity or restriction of governments' response to COVID-19 (31 As seen in the**figure 3**, the measures that were applied in Cuba according to the epidemiological behavior of the disease were maintained for a month after the decrease in the number of cases was verified in the month of May; i that period the highest rating on the scale was maintained. Subsequently, the measures were slowly softened, in a differentiated manner according to the specific situation of each territory. Once an increase in transmission was detected in early August, the measures were reinforced.

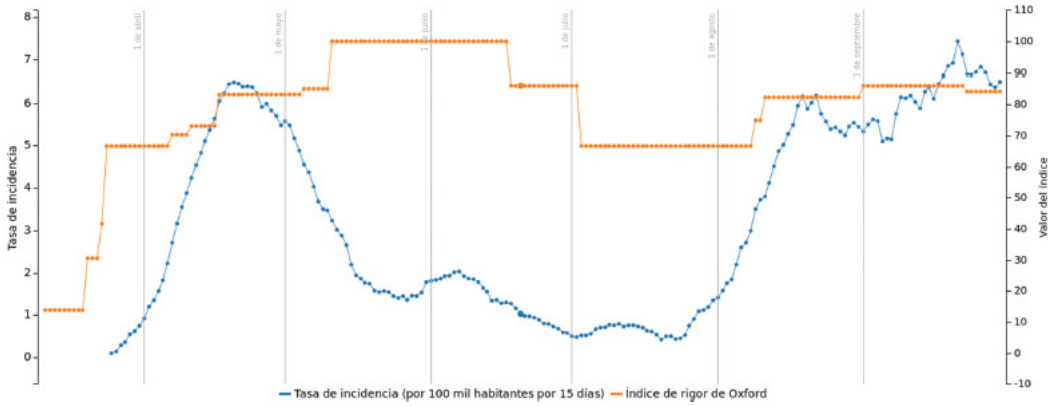

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FIGURE 3.

Incidence rate of confirmed COVID-19 cases and rigor index from Oxford [a] , Cuba, March 11-September 30, 2020

Source: Prepared by the authors from data taken from: https: ltcovid19cubadata.github.iof # cuba

The heterogeneous evolution of the epidemic in the provinces is related, above all, to factors that condition the transmission of the virus, such as the level of urbanization, population density, and greater or lesser mobility in eac territory, and it is not due to the fact that one territory has been given higher priority than another. This explains w the "de-scaling" - and even some "rescaling" - of the measures has been applied differently in the capital (and neighboring provinces) compared to the rest of the country.

It should be emphasized that the fatality rate registered in Cuba is similar in the three identified strata (low: 2.73; medium: 1.84 and high: 2.01; $p = 0.80$), which reflects, in addition to the quality of the treatment protocols used, tha their application has been the same in all the territories of the country.

In order to achieve sustainability and maintain equity in the control and treatment of COVID-19, it was required - ar still requires - to provide the entire SNS network with supplies for real-time PCR diagnosis, medicines, equipment and means of protection. , among other resources. The confrontation with the pandemic occurs at a time when the economic and financial blockade to which Cuba is subjected by the Government of the United States of America ha intensified, which prevents the entry of financial resources into the country and obstructs the importation of medicines and means necessary to combat the pandemic, which imposes an enormous additional challenge that h been necessary to overcome in order to maintain the conditions of equity in the face of the serious epidemiologica

inhabitants in September. The subsequent decrease in the incidence rate and the control of transmission are evidence of the ability of the Cuban SNS to withstand what is coming in the future: the persistence of the disease with the occurrence of outbreaks, or what is the same, a period in which we must learn to live with the disease and face challenges related to international sanitary control, isolating contacts in the primary care system; and obtainin and applying a vaccine at the population level. At the time of publishing this article, several vaccine candidates were being developed in Cuba, of which two were already in clinical studies in humans.

TABLE 2.

Lessons learned during the control and management of the COVID-19 pandemic in Cuba, 2020

Dimensions	Difficulties	Actions
Preparation	Spread of the SARS-CoV-2 epidemic in the world, as reported by the World Health Organization	• Political will of the government in confronting and controlling the disease • Preparation of the Plan for the Prevention and Control of Coronavirus • Creation of the Temporary Intersectoral Working Group to Confront COVID-19 under the principle of intersectorality of actions • Development of communication policies, which include the use of mass media and social networks for communication to the population • Adjustments in the allocation of existing material resources • Preparation of human resources
Epidemiological surveillance	Enfrentamiento a una enfermedad desconocida	• Despliegue del Sistema de Vigilancia Epidemiológica con puntos clave para la identificación del riesgo • Promoción de la participación comunitaria, la movilización social y el cambio de comportamientos para la prevención y el control de la enfermedad
Pesquisa activa	Gran transmisibilidad del virus Desconocimiento de la seroprevalencia en la población	• Movilización del sistema de atención primaria de salud y su fortalecimiento con estudiantes de medicina • Rastreo para la detección temprana y el aislamiento de los casos positivos y sus contactos

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Source: Prepared by the authors.

The experience lived in Cuba has allowed finding solutions to the problems and obstacles that have been appearing This learning from the difficulties generated a set of actions that allowed the control of the pandemic in Cuba and constitute lessons learned that may be useful in other similar contexts (table 2).

[a] PCR: Real-time polymerase chain reaction test.

[a] The Oxford Stringency Index assesses the degree of severity or restriction of governments' response to COVID-19 31).

CONCLUSIONS

The organization of the Cuban SNS and the effectiveness of its response in the confrontation of COVID-19 have respected the premise of guaranteeing equity in health systems and services, in an accessible and free way, to all it citizens. Because these conditions were already met before the pandemic reached Cuba, it was possible to achieve positive results in the confrontation with COVID-19 in the country from the first moments of the pandemic. This experience has also provided a group of lessons that enriched the strategy for coping with extreme situations in

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Footnotes

Authors' contribution.

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Conflicts of interest.

The authors declare that they have no conflicts of interest, although they have participated in the development of the strategies analyzed in the article.

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Abstract
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