

# Children and Adolescents during the COVID-19 Pandemic: Analysis of Some Protection Aspects of 10 Latin American and Caribbean Countries

Jesus D.C. Gil<sup>a</sup> Pedro Manuel Vargues Aguiar<sup>a, b</sup>

<sup>a</sup>NOVA National School of Public Health, Comprehensive Health Research Center, CHRC, NOVA University Lisbon, Lisbon, Portugal; <sup>b</sup>NOVA National School of Public Health, Public Health Research Center, Comprehensive Health Research Center, CHRC, NOVA University Lisbon, Lisbon, Portugal

## Keywords

COVID-19 · Pandemic · Children · Adolescents · Protection

## Abstract

**Background:** Latin America has registered cases in children under 14 years of age, which seem few compared to older age groups but are relevant since the child and youth population have been indirectly receiving the most decisive impact of the pandemic. Ensuring the most significant protection for this age group is essential. **Methods:** This is an ecological study of 10 Latin American and the Caribbean countries to study protecting children and adolescents during the COVID-19 pandemic. Using the information from UNICEF, a coverage analysis was done, and a new variable score was proposed. Also, a multiple linear regression model was tailored to evaluate the relationship between confirmed cases by 100k of COVID-19 (0–14 year population) and the performance of the countries and some key indicators. **Results:** A strong and statistically significant correlation ( $r = 0.79$ ;  $p$  value 0.005) between the increased coverage of child helplines and a greater number of school closures. Relationship of confirmed cases by COVID-19 and stringency index with a coef  $B = -2163.6$ , [CI  $-3122.1$ ;  $-1205.1$ ];  $p$  value = 0.010. Cases and healthcare access with a coef  $B = -17459.7$ , [CI  $-25630.1$ ;  $-9289.5$ ]. **Conclusions:** Experts say other pandemics will come, and this emergency must be turned into an opportunity. It is vital to strengthen protection

programs for the population, especially vulnerable people, such as children and young people.

Resumo

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## Crianças e Adolescentes durante a Pandemia da COVID-19: Análise de Alguns Aspectos de Proteção Em 10 Países da América Latina e Das Caraíbas

### Palavras Chave

COVID-19 · Pandemia · Crianças · Adolescentes · Proteção

### Resumo

**Contexto:** A América Latina registou casos em crianças menores de 14 anos, que parecem poucos em comparação com os grupos etários mais velhos, mas que são relevantes uma vez que a população infantil e juvenil tem vindo a receber indiretamente o impacto mais decisivo da pandemia. Assegurar a proteção mais significativa para este grupo etário é essencial. **Métodos:** Este é um estudo ecológico de 10 países da América Latina e das Caraíbas para estudar a proteção de crianças e adolescentes durante a pandemia da COVID-19. Utilizando a informação da UNICEF, foi feita uma análise de cobertura e foi proposta uma nova pontuação variável. Além disso,

foi adequado um modelo de regressão linear múltipla para avaliar a relação entre casos confirmados por 100k de COVID-19 (0 a 14 anos de população) e o desempenho dos países e alguns indicadores chave. **Resultados:** Uma correlação forte e estatisticamente significativa ( $r = 0,79$ ;  $p$ -valor 0.005) entre o aumento da cobertura das linhas de ajuda às crianças e um maior número de encerramentos de escolas. Relação de casos confirmados pela COVID-19 e índice de rigueur com um coeficiente  $B = -2163,6$ , [CI  $-3122,1$ ;  $-1205,1$ ];  $p$ -valor = 0.010. Casos e acesso aos cuidados de saúde com um coeficiente  $B = -17459,7$ , [CI  $-25630,1$ ;  $-9289,5$ ]. **Conclusões:** Os peritos dizem que outras pandemias virão e esta emergência deve ser transformada numa oportunidade. É vital reforçar os programas de proteção para a população, especialmente as pessoas vulneráveis, tais como crianças e jovens.

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## Introduction

During the fourth month of 2020, the Latin American region was ranked as the epicentre of COVID-19 infections globally, aggravating the already existing inequity and precariousness in healthcare in most countries [1]. The pandemic has been a threat to children and youth in Latin American and the Caribbean (LAC), affecting their correct development; one of the reasons is the decrease or alteration of protection programs and the increase in other diseases under control [2].

The marked social inequalities in the region and the weakened health services in some countries have hindered the effective implementation of containment measures, which has been reflected in high infections, added to the chronic diseases present in the regions like obesity, which further complicates a good prognosis for many infected [1]. Due to the containment and control measures of the pandemic, children and young people have lost spaces of protection and interaction, such as schools or parks, among others, which has led to the detriment of their physical, mental, and socio-emotional well-being [3]. Children and young are mainly considered vulnerable populations and sensitive to sudden changes, mainly in less favoured countries [4].

Years will be necessary to correctly assess the impact of the pandemic on the mental health of children and young people, even if the virus diminishes its power and strength, the damage to family stability, school failures, the lack of resources to maintain services, the experience

of living more than 2 years with negative emotions, make medium and long-term sequelae not only in those infected but in all spheres of life in which children and young people live and develop. Sixteen million adolescents live with some mental disorder in LAC; suicide is also the third cause of death [5].

It is essential to know how the coverage of child services has been disrupted during the pandemic because when schools and public spaces are closed, children and young people have been at home for a long time, a place where they do not necessarily have the necessary nutritional support and environmental tranquillity, added to the increase in violence and aggression suffered in some homes during the pandemic [6–8], for which social assistance becomes more relevant.

Faced with this adverse scenario, our main objective was to identify which protective factors could be associated with the number of confirmed cases of COVID-19 and to determine its dynamism with the secondary aim of highlighting them as social resources in a health crisis as the pandemic for a vulnerable population such as children and young people. Since these are subsequently derived in hospitalizations and deaths. Like most of the world, Latin America has registered cases in children under 14 years of age, which seem few compared to older age groups but are relevant since the child and youth population have been indirectly receiving the strongest impact of the pandemic. Ensuring protection for this age group is essential; these are the key questions that will be addressed in this study.

## Methods

This is an ecological study of 10 LAC countries to study protecting children and adolescents during the COVID-19 pandemic. The countries were selected due to the important variations among them in incidence for this age group and the availability of updated data.

### Data sources

- Global Health 50/50; Covid-19-project, from University College London, the African Population and Health Research Center, and the International Center for Research on Women [9].
- Ourworldindata.org; dataset uses updated official numbers from governments and health institutions [10].
- School Closures Database by income and region downloaded from UNICEF. The definition of school closure aligns with UNESCO's methodology [11].
- World Bank [12].
- Ministry Of Health and Wellness of Jamaica [13].
- Monitor the impact of the COVID-19 pandemic on women and children, UNICEF [14].

- The government Effectiveness Index refers to aggregate and individual governance indicators [15].

We used as outcomes the coverage of protection programs and services for children and adolescents during three time periods during the pandemic (Coverage of programs on social service visits, helplines, mental health, psychosocial assistance, and violence prevention); and the confirmed cases of COVID-19 by 100k, <14 years; last report (Jan 2022).

#### *Predictors*

- School closing weeks by country are calculated by the number of students from pre-primary education to upper secondary education per region/globally based on March 2020 to November 2021.
- COVID-19 stringency and Health Response index, which is based on policies response metrics (Cancel public events, restrictions, close public transport, public information campaigns, stay at home, restrictions on internal movement, international controls, school recommendations, testing, contact tracing, face coverings, vaccination, workplace closures: rescaled from 0 to 100 (100 = strictest)).
- Healthcare access score 2021, 0 to 100 (100 better performance).
- Rapid response score (rapid spread mitigation), 0 to 100 (100 better performance).
- Early detection score 2021 (early detection and reporting epidemics), 0 to 100 (100 better performance).
- Public health vulnerabilities score 2021, 0 to 100 (100 better performance).

## **Statistical Analysis**

### *Coverage*

To describe whether the coverage of programs and services for the protection of children and adolescents in the ten countries have been maintained, decreased, or increased during the pandemic, we only used the indicators referring to children and adolescents, not those of their parents; and according to the coverage percentage was reported, was attributed a value symbol as follows: ▲ – increase; ▼ – reduction; ○ – without changes; ● – not applicable or uncertain. The first period compares to pre-COVID status, the second compares to 30 January 2020, and the three corresponds to pre-COVID level.

### *Correlation Analysis*

We were interested in the relationship between the maintenance of coverage of protection programs for children and adolescents during school closure. There is a lack of face-to-face classes and being at home.

Using the information from the previous coverage analysis, a new variable score was proposed where if the program had increased, it was given a value of 3; if the program did not change a value of 2; if it decreased a value of 1; and if it did not apply or was uncertain a value of 0.

The score was elaborated using only period 3 (Oct 2021). The Pearson correlation test with significance was used to analyse this correlation with the number of weeks of total closure of educational places during the pandemic until October 2021.

### *Multiple Linear Models*

A multiple linear regression model was fit to evaluate the relationship between confirmed cases by 100k of COVID-19 (0–14 years population) and the performance of the countries and some key indicators like stringency index, healthcare access, rapid response, and early detection and public health vulnerabilities (Brazil and Uruguay were not considered in this sub-analysis because they did not report data on cases in the age group studied). The model's adjustment variables were selected considering correlations patterns and their possible relationship with cases plausibility within a context where there are few studies on the topic (other health systems variables were considered and tested previously, but due to their low correlation and data availability, were not included in the final model).

The model shows ( $F$  test  $p = 0.009$ ; adjusted R-squared = 98.7%), VIF = 4.9, and the residuals testing (Shapiro-Wilk test  $>0.05$ ) for all variables. The analyses were performed with Stata (StataCorp. 2017. Stata Statistical Software: Release 15.1. College Station, TX, USA: StataCorp LLC).

## **Results**

The sample characteristics are presented in Table 1; ten countries are under investigation from LAC understudy, with four economic levels, risk classification for COVID-19, and Gini coefficient. Most countries are classified as the medium risk for COVID-19, upper middle income, and variation in the Gini coefficient.

Table 2 describes the four child protection indicators by country. The symbols of these increased due to the pandemic, decreased, remained the same, or are uncertain during the three time periods since the pandemic's start. Regarding the coverage program of helplines for children and adolescents, we highlight that except for Jamaica, all countries reported active coverage in the 3 time periods without changes or an increase. Bolivia, Brazil, the Dominican Republic, and Ecuador reported a similar rise in all three time periods.

There is an alternation between increases and decreases regarding the social service visits program coverage. Brazil and Chile stand out, where a reduction in

**Table 1.** Sociodemographic characteristics of the countries studied – 2021 ( $n = 10$ )

Country	ISO	COVID-19 risk Class <sup>a</sup>	Income Group <sup>b</sup>	Gini coef <sup>c</sup>
Bolivia	BOL	Medium	Lower middle	55.3
Brazil	BRA	Medium	Upper middle	26.3
Chile	CHL	Low	High	50.0
Dominican Republic	DOM	Medium	Upper middle	55.3
Ecuador	ECU	Medium	Upper middle	44.7
Jamaica	JAM	Medium	Upper middle	44.7
Mexico	MEX	Medium	Upper middle	47.4
Suriname	SUR	Medium	Upper middle	13.2
Trinidad and Tobago	TTO	Medium	High	60.5
Uruguay	URY	Low	High	60.5

<sup>a</sup>UNICEF classification.<sup>b</sup> <sup>c</sup>World Bank classification 2019.

coverage was reported in the three period-times, and Trinidad and Tobago did not report changes in coverage in the three periods (Table 2).

Regarding the coverage of mental health and psychosocial assistance programs, we highlight that all the countries have active programs in the 3 time periods; Bolivia, Brazil, Surinam, and Trinidad and Tobago reported increases in the three periods (Table 2). Finally, regarding the coverage of protection programs against violence, Suriname and Trinidad and Tobago reported an increase in all three time periods; there is variation at different times for the other countries (Table 2).

Table 3 shows the correlation between the coverage of the protection indicators and the number of weeks of schools completely closed during the pandemic. We highlight the strong and statistically significant correlation ( $r = 0.79$ ;  $p$  value 0.05) between the increased coverage of child helplines and a greater number of school closures.

Regarding the multiple linear regression analysis (Table 4), we highlight the association between confirmed cases by COVID-19 and some predictors; cases and stringency index with a coef  $B = -2163.6$ , [CI  $-3122.1-1205.1$ ];  $p$  value = 0.010. Cases and healthcare access with a coef  $B = -17459.7$ , [CI  $-25630.1-9289.5$ ],  $p$  value = 0.012. Also, the association between cases and public health vulnerabilities with a coef  $B = -0.8319.7$ , [CI  $-14435.1-2186.4$ ];  $p$  value 0.028.

## Discussion

This study presents an approximation of ten countries in LAC in terms of coverage of child protection programs, COVID-19 incidence, and possible factors associated, with children and young populations from 0 to 14 years of

age during the COVID-19 pandemic across an ecological framework.

The COVID-19 pandemic began as a health crisis in LAC but is now considered a humanitarian crisis [16]. We found substantial differences between countries and variations in protection coverage for children and young people, the performance of health services, and their relationship with confirmed infections.

To highlight the scarcity of public information available on the status of minors during the pandemic, few updated reports on mortality, morbidity, hospitalizations, and ICU admissions for COVID-19 in minors in the countries of the region show the great lag in health monitoring in LAC [17]. We have considered the countries that have reported information on coverage of programs for children and adolescents during the pandemic; it is striking how difficult it is to find data for this age group in Brazil, Uruguay, and Bolivia.

The Gini coefficient of the countries studied shows great income inequality in LAC. This region has been hit hard by the global economic crisis that has impacted poverty and precariousness [18, 19]. Violence prevention programs, telephone support lines, mental health, and social services are essential for the well-being of children and young people during the harshness and multiple changes in their lives throughout the more than 2 years of the pandemic.

In LAC, each country has prioritized the coverage of its programs in different ways throughout the pandemic stages [20]. Ideally, these programs should have been increased or maintained during the pandemic, but the results show that this was not necessarily the case and that the coverage was sometimes reduced (Table 2). This could indicate that coverage was prioritized for older age groups with more significant comorbidities, affected to a greater extent by the virus, or due to failures in welfare services for minors.

**Table 2.** Dynamics of children programs coverage during the pandemic in 3 time periods

Indicator	Country	Time 1 Aug-Sep 2020	Time 2 Mar-Apr 2021	Time 3 Sep-Oct 2021
Coverage of programs on helplines	Bolivia	▲	▲	▲
	Brazil	▲	▲	▲
	Chile	○	○	○
	Dominican Republic	▲	▲	▲
	Ecuador	▲	▲	▲
	Jamaica	●	●	▲
	Mexico	▲	○	▲
	Suriname	▲	○	▲
	Trinidad and Tobago	○	○	○
	Uruguay	○	○	○
Coverage of programs on social service visits	Bolivia	▲	○	●
	Brazil	▼	▼	▲
	Chile	▼	▼	▼
	Dominican Republic	●	●	●
	Ecuador	●	▼	▲
	Jamaica	▼	▼	▼
	Mexico	▼	●	●
	Suriname	▼	▲	▲
	Trinidad and Tobago	○	○	○
	Uruguay	▼	▼	○
Coverage of programs on mental health and psychosocial assistance	Bolivia	▲	▲	▲
	Brazil	▲	▲	▲
	Chile	▼	▼	▼
	Dominican Republic	▲	▼	▲
	Ecuador	○	▲	○
	Jamaica	▲	▲	▲
	Mexico	▲	○	○
	Suriname	▲	▲	▲
	Trinidad and Tobago	▲	▲	▼
	Uruguay	○	▲	▲
Coverage of programs on violence prevention	Bolivia	▲	○	●
	Brazil	▲	▲	▼
	Chile	▼	▼	▼
	Dominican Republic	▲	○	▲
	Ecuador	○	▲	○
	Jamaica	▲	▲	▲
	Mexico	▲	●	●
	Suriname	▲	▲	▲
	Trinidad and Tobago	▲	▲	▲
	Uruguay	▲	■	■

▲ – increase; ▼ – reduction; ○ – without changes; ● – not applicable or uncertain. Estimations in the base of United Nations Children’s Fund, Tracking the Situation of Children during COVID-19, Q3 2021. New York: UNICEF; 2021(14). Time 1, compares to pre-COVID status. Time 2, compares to January 30, 2020. Time 3, compares to pre-COVID status.

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**Table 3.** Correlation between proposed coverage score of protection indicator and number of weeks of schools closed ( $n = 10$  countries), 2021

Indicator (coverage)	Time 3 (Oct 2021)
Coverage of programs on child helplines	
<i>r</i>	0.79
<i>p</i> value	0.005*
Coverage of programs on home visits by social service/justice workers	
<i>r</i>	-0.16
<i>p</i> -value	0.652
Coverage of programs on mental health and psychosocial support services	
<i>r</i>	0.18
<i>p</i> value	0.610
Coverage of programs on universal violence prevention programs targeting whole populations	
<i>r</i>	-0.40
<i>p</i> value	0.243
* <i>p</i> value <0.05.	

The correlation analysis focused on the logic that the higher increase or maintenance of coverage of protection programs during the pandemic, the better, since minors due to closed schools would need that support and accompaniment more than before since they would lose a safe space with benefits such as educational centres. In the ideal scenario, it would be expected that the greater the number of weeks of closed schools, the greater the coverage of the protection programs should be. This was only true for the helpline programs, with a high and statistically significant correlation (Table 3), different from what happened with the other programs where the correlation was low and even, as schools closed for longer, the protection programs will decrease; it is a sign of a critical problem in the safety and protection of this population. On the increase in the use of helpline programs, it is to be expected that the telephone guidance lines have been used more due to the limitations of movement. However, the most relevant thing is that most of the countries studied made available and expanded this resource, which was essential not only in terms of young people's concerns about their physical health or their families but also their mental health. The form of use of this resource varies from person to person and will surely be the subject of future research. Still, the essential thing is that it is an effective use that is real support, especially in times of real crisis, as it was for young people during the

pandemic. A health system can offer much if the helpline resources are optimized and expanded [21].

Regarding the closure of schools and their relationship with confirmed cases, it is now possible with robust scientific accuracy to indicate that educational centres are not and nor were niches for uncontrolled infections and that adults transmit the virus to children more than children to adults; in many scenarios and countries, the closure of schools was applied more as an empirical measure than based on solid scientific evidence [22–29].

The regression model (Table 4) shows us that containment measures, access to healthcare, and public health vulnerabilities in the countries studied are statistically associated with the number of confirmed cases of COVID-19; that is, the higher the score and performance in these indicators, which indicate better performance, the fewer cases of contagion in this age group. This information is very relevant to preventing current and future pandemics. Also, the higher the score in the rapid response, the lower the cases of contagion, although this association did not show statistical significance. But something very relevant is the early detection indicator. The better the performance, the greater the number of confirmed cases, supporting the importance of surveillance systems and mass testing. Finally, we highlight the result on the public health vulnerabilities variable; it is also fundamental since the higher the country's score in this variable, that is, the less vulnerable it is, the fewer cases of contagion, and this association is statistically significant (Table 4); all these estimates when adjusted for the other variables.

We must report some limitations; as this is an ecological study, we cannot ensure a causal association between the number of cases confirmed by COVID-19 and the predictors considered. One of the limitations that may also occur is that confirmed infection in children and adolescents is still not as common as in older ages. Therefore, there may not be enough variability to detect these associations.

Another possible limitation not only of this study but in general of all studies on COVID-19 that use the "Cases" as a variable is that the number of confirmed cases could be underestimated since it depends on the testing policies of the countries. However, the cases reported by governments are vital to understanding the virus's transmission level and speed of circulation.

This study also has strengths, like the use of the stringency index in the multiple linear models [10], since despite being considered a guide to evaluating the measures on the spread of COVID-19 cases by country, it considers the nine most important actions that governments have implemented, from mobility and internal and external restrictions, among others, already detailed in the methods section.

**Table 4.** Multiple linear regression (coefficient [coef B] and 95% CI) to assess the association between country services and response performance and confirmed cases by 100k in children and adolescents due to COVID-19 ( $n = 8$  countries), 2020–2022

Confirmed cases	Coef B	<i>p</i> value	95% CI	
			lower	upper
Stringency index	−2163.6	0.010*	−3122.1	−1205.1
Healthcare access	−17459.7	0.012*	−25630.1	−9289.5
Rapid response	−1912.2	0.095	−4644.3	819.9
Early detection	6784.6	0.006*	4471.7	9097.6
Public health vulnerabilities	−8310.7	0.028*	−14435.1	−2186.4

\**p* value <0.05; Model overall *F* test *p* = 0.009; Adj R-squared = 98.73%; Men VIF test collinearity 4.9. Shapiro-Wilk test >0.05.

Therefore, this study adds relevant evidence on the state and services that children and adolescents have during the pandemic; the scientific community and the health systems of the countries must not remain stuck in the initial trends of the virus; it is clear that the dynamism of transmission, containment, vaccination, vulnerabilities has changed and that will allow for guiding the actions of the health systems more precisely.

This study also obtains results consistent with other studies, where the closure of schools (not necessarily synonymous with protection), physical and mental well-being and government decisions are key to the safety of children and young people [30–33]. We must not also forget two key points in LAC; the higher poverty has induced a faster spread of the virus [34], and the current scenario where the omicron variant has triggered infections in all age groups almost without control; fortunately, deaths have not skyrocketed to the same extent. Experts say other pandemics will come, and this emergency must be turned into an opportunity [35]; it is vital to strengthen protection programs for the population, especially for vulnerable people, such as children and young people.

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### Statement of Ethics

Databases are anonymous, guaranteeing data confidentiality. Our analyses were based on public available secondary data. An ethics statement was not required for this study type as it is based exclusively on data from public secondary data.

### Conflict of Interest Statement

The authors declare no competing interests.

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### Author Contributions

J.D.C.G. proposed the study, prepared the analysis datasets, c, conducted research, and wrote the article's first draft. P.M.V.A. guided the framework, statistical approach, and the final manuscript's elaboration.

### Data Availability Statement

The data used in this study are public sources of information, and ethical approval was already obtained by the institutions responsible for its implementation in each country. Databases are anonymous, ensuring data confidentiality.

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