

# Review of Impacts on Sustainable Development in Ecuador of the COVID-19 Pandemic and Lockdown Measures <sup>†</sup>

Esther Matamoros Alcivar <sup>1</sup>, Daniela de Llano García <sup>2</sup> and Cristina Vaca Chanatasig <sup>3,\*</sup>

<sup>1</sup> School of Biological Sciences and Engineering, Yachay Tech University, Urcuquí 100119, Ecuador; esther.matamoros@sdsnyouth.org

<sup>2</sup> School of Chemical Sciences and Engineering, Yachay Tech University, Urcuquí 100119, Ecuador; garcia.dellano@yachaytech.edu.ec

<sup>3</sup> School of Physical Sciences and Engineering, Yachay Tech University, Urcuquí 100119, Ecuador

\* Correspondence: cristina.vaca@yachaytech.edu.ec

<sup>†</sup> Presented at the ICSD 2021: 9th International Conference on Sustainable Development, Virtual, 8–9 September 2021.

**Abstract:** The COVID-19 pandemic has put pressure on Ecuador's Government and affected its ability to achieve its Sustainable Development Goals. This literature review shows the impacts of the pandemic and lockdown measures on SDGs 1, 3, 4, and 8 in Ecuador, with an individual focus on poverty, health, education, and the economy. The timeline used to analyze the impacts of COVID-19 in Ecuador is the period 2015–2020. The results show that measures were not effective in controlling the pandemic, according to the ECE (Epidemy Control Efficiency) indicator. Unemployment, poverty, and extreme poverty increased. Ecuador faced Dengue disease at the same time as the COVID-19 pandemic. Efforts to establish tracking and early diagnosis of COVID-19 were hindered due to a shortage of testing. Furthermore, effective learning through virtual education was difficult for the 74.7% of households without an internet connection. In general, the pandemic set back Ecuador's progress towards the SDGs analyzed.

**Keywords:** COVID-19; Ecuador; health; SDGs; economy



**Citation:** Matamoros Alcivar, E.; de Llano García, D.; Vaca Chanatasig, C. Review of Impacts on Sustainable Development in Ecuador of the COVID-19 Pandemic and Lockdown Measures. *Environ. Sci. Proc.* **2022**, *15*, 38. <https://doi.org/10.3390/environsciproc2022015038>

Academic Editors: Cheyenne Maddox and Lauren Barredo

Published: 10 May 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

In March 2020, the Director-General of the World Health Organization (WHO) classified the COVID-19 outbreak as a global pandemic and asked countries to increase their actions to mitigate the spread of the virus and protect people [1]. As COVID-19 infections began to be reported worldwide, many countries responded by shutting down places such as schools, workplaces, and international borders to contain the spread of the virus. Based on this news, Ecuador took measures to safeguard and prevent possible widespread contagion in the population.

Due to the number of COVID-19 cases, the National Emergency Operations Committee (COE-N, in Spanish), on 16 March 2020, declared a state of exception due to public calamity throughout the national territory [2]. COE-N is the mechanism of the decentralized national risk management system, responsible for promoting, planning, and maintaining coordination and joint operation in emergencies or disasters with the different actors at a national level. It is directed by the President of the Republic of Ecuador or his delegate. Until 19 April 2021, there were 361,000 cases in Ecuador and 17,703 deaths due to COVID-19 [3].

On 17 March 2021, Ecuador received 84,000 doses of COVID-19 vaccines through the COVAX Facility [4]. The first vaccines to arrive were used to protect priority groups and those most at risk, such as health workers and older adults. To date, 27 July 2021, the total number of doses administered is 9,880,401, the fully vaccinated people 2,028,931, and the percentage of the population fully vaccinated represent 11.8% [5].

The COVID-19 crisis, linked to the implementation of health measures and social distancing to contain the spread of the virus, caused the total or partial closure of economic activities, affecting Ecuadorians' economy and daily life. The country's commerce industry, tourism, transportation, and health sectors have suffered the most. In addition, the loss of jobs and income increased the number of families living in poverty and extreme poverty. The present study consists of a review of the available literature on the impacts of the COVID-19 pandemic and lockdown measures on SDGs 1, 3, 4, and 8. The SDGs and the specific targets analyzed are 1.1, 1.2, 3.3, 3.D, 4.a, 8.1, and 8.5.

This research can serve different levels of government, so public policies are designed and executed that contribute to the protection of the vulnerable populations affected by COVID-19. In addition, this review contains valuable information available for academia, the private sector, and civil society in the different economic reactivation projects for the country.

## 2. Methodology

A bibliographic review was carried out in this work within the context of COVID-19 and the lockdown measures in SDGs 1,3,4, and 8. Data and information were taken from primary sources such as scientific articles and pertinent government entities. Theoretical foundations are structured to establish the possible effects on poverty, health, education, and the economy.

For a quantitative estimation of the efficiency of COVID-19 epidemic control in Ecuador [6], Epidemic Control Efficiency (ECE) was determined using Equation (1):

$$ECE = \left[ \frac{R_0 - ERR}{R_0} \right] - \left[ \frac{G_0 - G_t}{G_0} \right] \quad (1)$$

where,  $R_0$  is the basic reproductive number,  $ERR$  is the effective reproductive number, and  $G_0$  and  $G_t$  refer to the mobility factors. The time frame established for the calculation was the first 14 days after the first case of infection was confirmed.

## 3. Results

ECE determination is used in the 2020 Report of Sustainable Development to measure how mobility restrictions affected the infection rate in the early stages of the pandemic [6]. A similar estimation to this is presented in Table 1. The  $ERR$  value used was 3.95 [7], which corresponds to the period in which Ecuador confirmed 25 cases in the country. For the basic reproductive number, two values were used: 2.4, the mean used in the Development Co-operation Report 2020 for the Organization for Economic Co-operation and Development (OECD) [8] countries, and 2.93, a value estimated by Fernández et al. (2021) [9] by using maximum likelihood estimation. The mobility factor was calculated from Google Mobility Reports [10] in the first 14 days of March 2020 concerning mobility to workplace. Finally, the estimation of the epidemic control efficiency for Ecuador was calculated using Equation (1) and the results are reflected in the last column of Table 1. Additionally, in Table 1, the variables needed for the calculation  $ERR$ ,  $R_0$  and Mobility Reductions are listed along with their respective sources.

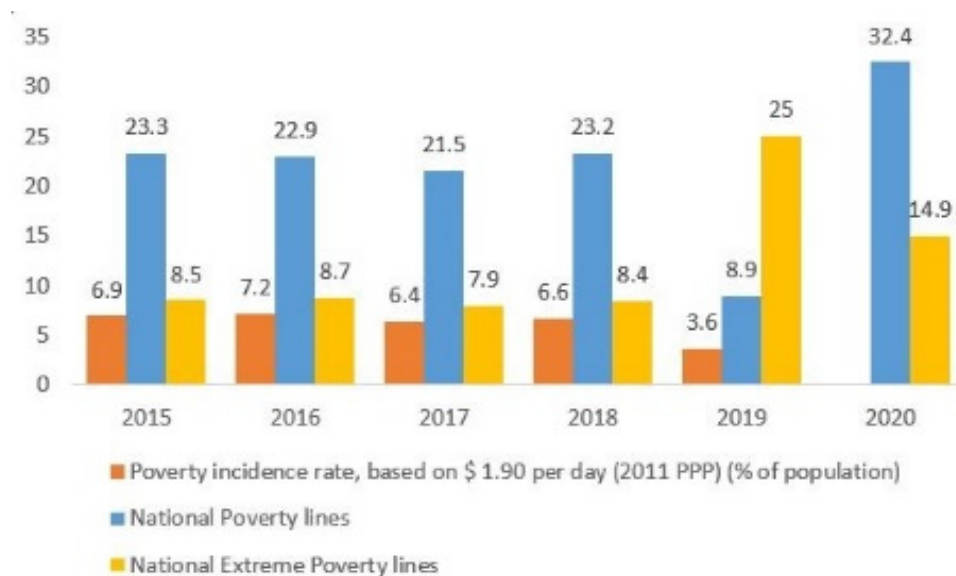
**Table 1.** ECE Determination.

ERR	$R_0$	Mobility Reduction	ECE
3.95 *	2.4 **	67% ****	−1.31
3.95 *	2.93 ***	67% ****	−1.01

Sources: \* Caicedo-Ochoa et al. [7]; \*\* Sustainable Development Report [6]; \*\*\* Fernandez-Naranjo et al. [9]; \*\*\*\* Google Mobility Report [10].

### 3.1. SDG 1

Generally, poverty is considered a social phenomenon caused by a lack of resources. Internationally, a person is poor by income when he lives with less than 1.90 USD per day, known as the poverty line. At the National level, the poverty line of 2020 is at 84.1 USD per month. The extreme poverty line is at 47.4 USD per month [11]. The data so far (see Figure 1) indicates that poverty increased by 3.5 percentage points and extreme poverty by 1 percentage point from 2017 to 2019.



**Figure 1.** Percentage of population living under national and international line of poverty [12].

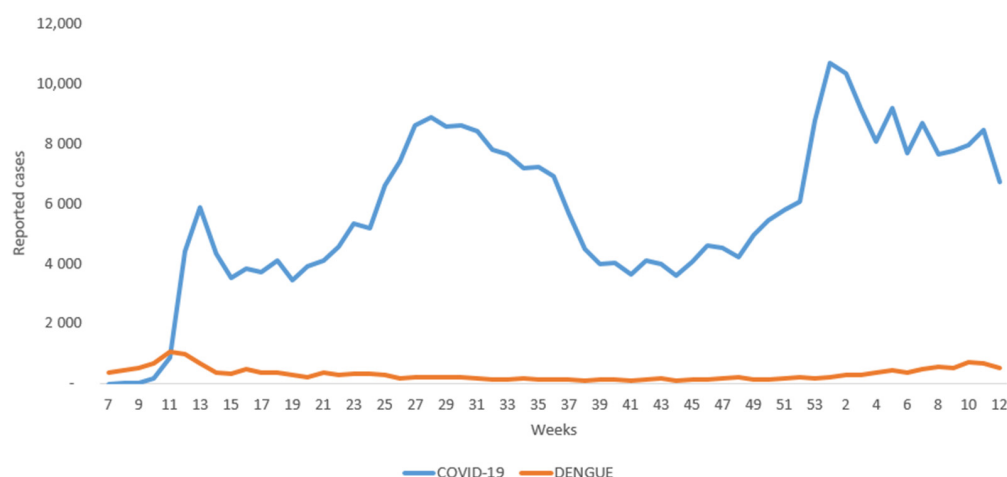
In 2020, the poverty rate at a national level was at 32.4% and the rate of extreme poverty was at 14.9%. Both have maintained an increasing tendency since December 2018 (see Figure 1). According to Ecuador's Central Bank (BCE in Spanish), by sex, the incidence of poverty was at 31.6% for men and 33.1% for women; these numbers have also increased since 2018 [11].

Therefore, by Executive Decree 1022, the Ecuadorian Government established the Family Protection Bonus for Emergency due to COVID-19, which involves the transfer of USD 120.00, paid in two equal parts between April and May. This bonus could be accessed only by those affiliated with the Rural Social Security and those affiliated with the Unpaid Work at Home Regime, and by those with an income less than 400.00 USD per month, on the basis that no member of the family group receives any Monetary Transfers granted by the Ministry of Economic and Social Inclusion (MIES, in Spanish) [13].

### 3.2. SDG 3

The COE-N presented the 72nd report about the national epidemiological situation due to COVID-19 [14]. This report shows the evolution since the beginning of the pandemic in Ecuador and the weeks that saw a maximum increase in contagion (Figure 2).

Dengue is a disease transmitted by vector *Aedes aegypti*. In the year 2015, there were 42,459 reported cases, the highest in the last five years, due to the co-epidemic of Chikungunya disease, another vector transmitted disease [16]. On the other hand, while there were 14,159 reported cases in 2016 and 11,387 in 2017, cases decreased in 2018 and 2019, with only 3,094 and 8,416 cases, respectively.



**Figure 2.** COVID-19 and Dengue reported cases from week 7 to 53 of 2020 and weeks 1 to week 13 of year 2021 in Ecuador. Source: Ministry of Health [15].

During 2020, there were 16,570 cases reported [17,18]; most Dengue Cases were published a couple of weeks before the peak of COVID-19 in Guayas, a coastal province. Figure 2 compares the reported cases of Dengue during the start of the pandemic and weeks 1 to 13 of 2021, when the highest number of reported cases occurred within the weeks ten until week twelve, which is the month of March. Said weeks are the end of the hot and rainy season in which the likelihood of the spread of juvenile *Ae. aegypti* increases [16].

Due to the similarities between COVID-19 and Dengue during their early stages, they are difficult to distinguish; they share similar clinical and laboratory features early on [19–24]. Dengue disease can be misdiagnosed due to these similarities. Similarly, Singapore and Thailand have reported cases where COVID-19 was misdiagnosed with a false positive result from Dengue serology testing [24,25].

SARS-CoV-2 testing in Ecuador proved to be complicated on a large scale. Testing took place mainly in the three largest cities of the country, while many rural communities comprised 1.1% of the population tested [26]. According to COE-N, the number of samples processed nationwide only corresponded to the cases detected through RT-PCR tests, which define the confirmed and discarded category due to COVID-19. This indicator corresponds to the total number of tests carried out by the laboratories authorized to process them. In Ecuador, from 29 February 2020 to 6 April 2021, 1,166,467 samples for COVID-19 were taken from RT-PCR tests, obtaining 337,702 confirmed cases according to the date of onset of symptoms [14]. Unfortunately, the number of confirmed deaths of COVID-19 amounts to 12,106. However, this lack of testing could be due to the underestimation of cases and increasing uncertainty [14].

### 3.3. SDG 4

The rate of school dropout in Ecuador in the last decade followed a regular decrease, reaching values of 3.8% (2010); 3.1%(2014), and 5.67% (2020) for the Highlands-Educational Regime [27] and the same tendency is seen in the entire country (Table 2). In a survey [28], it was found that 42% of dropouts were due to economic factors and 3% to a lack of internet connection. The Information and Communication Technology (ICT) indicators [29] showed that 74.7% of households do not have a desktop computer and 68.7% do not have a laptop, as shown in Table 2. Access to technology is still an obstacle for specific students; there are growing trends regarding school dropouts that affect the guarantee of inclusive, equitable, and quality education [30].

**Table 2.** Global data of Education and ICTs in Ecuador from 2015 to 2020.

Year	Students Enrolled *	Schools *	Teachers *	Schools as Internet Source (%) **	Households with Internet Access (%) **
2015	4,620,397	19,000	218,109	10.01	32.80
2016	4,574,350	17,000	214,478	10.79	36.03
2017	4,508,457	17,000	216,876	9.29	37.20
2018	4,465,240	17,000	219,406	7.21	37.17
2019	4,399,567	16,000	219,540	5.15	45.54
2020	4,307,554	16,000	206,448	0.47	53.21

Sources: \* Ministerio de Educación [31], \*\* Peña M., A. and Herrera [29].

In addition, many schools were forced to close permanently due to the economic crisis (see Table 2) [32]. Nevertheless, the Ecuadorian government developed the COVID-19 Educational Plan, called Let Us Learn Together at Home, which contains pedagogical guidelines to follow while the health emergency lasts [33]. However, UNICEF considers virtual education a significant challenge [30]. Despite the decreasing number of teachers in the education system (see Table 2), teachers were provided with online courses for the development and improvement of digital skills in the context of virtual distance education by the Ministry of Education of Ecuador, who developed a self-learning course for teachers, called My Classroom Online (Mi Aula En Línea, in Spanish) [34].

### 3.4. SDG 8

According to the BCE, the GDP is the sum of the gross value added of all resident producers in the economy. Additionally, the GDP per capita is the gross domestic product divided by the population at the middle of the year. In 2016, Ecuador's GDP was affected by an earthquake and the drop in oil price [35], as shown in Table 3. However, the economy then recovered in 2017 due the increase in household final consumption expenditure and the general government final consumption expenditure and exports [36].

**Table 3.** GDP and GDP in growth rate in Ecuador.

Year	GDP(%)	GDP per Capita (%)
2015	0.10	−1.51
2016	−1.23	−2.90
2017	2.37	0.57
2018	1.29	−0.48
2019	0.05	−1.61

Source: Central Bank of Ecuador [12].

Furthermore, by the end of 2019, GDP decreased due to the lower dynamics of gross fixed capital formation and final consumption of the general government and the imports of goods and services [37]. At the end of 2020, the BCE declared a GDP of −7.8% due to the decrease in gross fixed capital formation, decrease in household final consumption expenditure, reduction in final consumption expenditure of the general government and contraction of exports of goods and services [38].

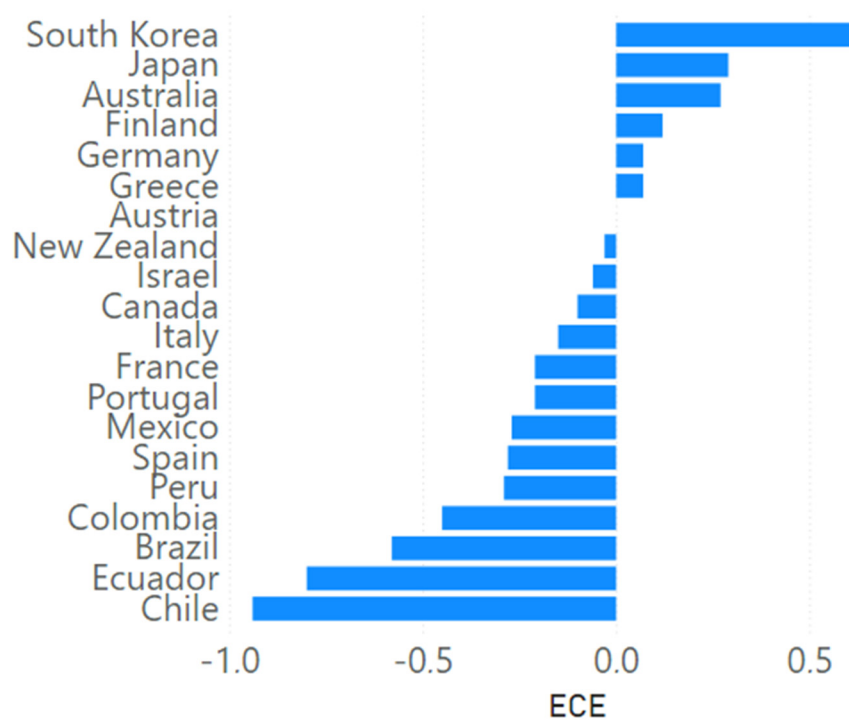
In March 2020, at least 70% of the productive sector ceased their activities. However, the Ministry of Labor reported that 425,328 people were found to be carrying out tele-work, and 138,927 in the private sector during the exception time in Ecuador. According to values from the INEC, of the total number of people with employment in December 2020, 51.1% of these worked in the informal sector. Likewise, during the pandemic, 180,852 contracts were terminated, of which 20% of the terminations occurred unexpectedly, leading to the unemployment of more than 30,000 people in the country [39].

As for equal pay, the INEC's latest report of the labor indicators of employment, unemployment and underemployment [40] stated that the average labor income of a man with a job was USD 309.9, while for a woman with a job it was USD 262.6.

Therefore, the first response measures to face the pandemic focused on alleviating financial and tax obligations, avoiding a deterioration in employment, and increasing access to credit. The development of regulations to allow new contracting modalities, the establishment of guidelines for teleworking due to the suspension of face-to-face work in both the public and private sectors, and the creation of the support program credit “Reactivate Ecuador” [41] were among the efforts to promote the resumption of productive activities. The Reactivate Ecuador program channels resources to the public and private financial system and the popular and solidarity economy sector [42].

#### 4. Discussion

The ECE value, when positive, indicates effective control of the pandemic; when negative, the management is inefficient in control and mobility exceeds the reduction in ERR. In both cases, the value obtained for Ecuador was  $< 0$ , and, hence, was ineffective in the time frame analyzed. Furthermore, other countries faced the pandemic differently. The rapid widespread testing, diagnosis, tracing and monitoring by South Korea places it first in the ECE country chart (Figure 3). ECE values for OECD countries were taken from the 2020 Sustainable Development Report [6]. As for Brazil, Mexico, Peru, Colombia and Chile, some estimations were made following the same methodology employed for Ecuador and based on several academic publications from each country [7,10,43,44].



**Figure 3.** ECE per country.

##### 4.1. Impacts on SDG 1

As a consequence of the lockdown and the interruption of productive activities due to the health emergency, along with a contraction of the economy, decreased the income of the population. The economic and social effect of unemployment are very pronounced in vulnerable sectors, particularly for people in extreme poverty who survive in the informal economy [45]. Poverty spreads due to unsatisfied basic needs and the worsening of the public's standard of living, especially in the most vulnerable rural sectors [45]. In 2020, the minimum income was 84.1 USD, 21% of a 400 USD wage to meet basic needs. Additionally, with a poverty rate of 32.4%, 3 out of 10 Ecuadorians live with less than 3 USD a day to meet their basic needs. As the relationship of employment and poverty are inversely proportionate [11], poverty and extreme poverty increased because the COVID-19 crisis



caused unemployment to rise. The COVID-19 pandemic directly affected organizations of all kinds and society in general, where families are made vulnerable by many necessary and mandatory restrictions that limit access to goods and services [45]. Although the law set on March 2020 promised money bonuses to poor people [39], the indicators of poverty did not decrease.

#### 4.2. Impacts on SDG 3

Ecuador's geographical position makes it vulnerable to tropical endemic diseases, such as the vector-transmitted Chikungunya, Dengue and Malaria. Ecuador has been fighting a Dengue epidemic since 2018 [20]. Dengue has a seasonal behavior that aligns with the winter season in Ecuador [16,46], where the presence of dengue reservoirs is higher, therefore encouraging the spread of mosquitos. Dengue and COVID-19 present similar symptoms at the beginning of the disease, such as fever, chills, red skin and nausea [19–24]. A misdiagnosis of COVID-19 occurred in Thailand where a patient with an exanthema with fever initially diagnosed as dengue was eventually diagnosed for COVID-19 infection through a RT-PCR test [25]. Additionally, a co-infection of Dengue and COVID was confirmed in Reunion Island, suggesting that a co-infection might present more severe symptoms [47]. In Ecuador, where the incidence of Dengue and COVID-19 are both high, misdiagnosis can often occur. Therefore, it is recommended for Ecuador and countries with tropical climates and high cases of dengue to develop effective tests for both viruses and correctly diagnose each disease [20,24,25,47]. Ecuador does not have a good testing system. There were problems registering the actual number of infected people due the reliability of rapid tests [48]. Therefore, in comparison to the rest of the world's ability to control the pandemic (Figure 3), Ecuador shows poor management.

#### 4.3. Impact on SDG 4

A global assessment of school closures due to COVID-19 carried out by UNESCO [49] showed that as of 20 April 2021, 202,366,403 students were affected worldwide, with 5,131,897 of these in Ecuador. The COVID-19 pandemic forced education to become virtual and according to the INEC's survey [29], more than 50% of households do not have access to a desktop computer or laptop, items that are crucial for virtual education [50]. Another important resource is internet access, which only 53.21% households have. Therefore, for students without a desktop computer or laptop, and without internet connection, their probability for learning is very low [50]. The change to virtual education caused the rate of enrollment of students in the period 2019–2020 to drop by approximately 3%. In addition to student enrollment, schools were closed permanently, and teachers were fired or quit their work (see Table 2).

#### 4.4. Impacts on SDG 8

The International Labor Organization (ILO) established that the COVID-19 crisis will cause an increase in world unemployment between 5.3 million people and 24.7 million people [51]. The closure or the administrative adjustments of public and private organizations caused by the COVID-19 pandemic has left many Ecuadorians without a job. The quarantine did not allow people to work and interrupted their professional activities without advance planning, which directly affected the per capita family income [45]. The GDP measures the economic growth of a country; it is composed of public spending, private consumption, investment and net exports. GDP has an inversely proportional relationship with poverty; since 2018, GDP has decreased as poverty increases. The GDP per capita will rise unless the national income increases and populations remain constant [52]. Furthermore, the increase in unemployment, the slow recovery of the economy, the rise in external and internal debts, caused both GDPs to drop and affected the achievements of economic growth [53]. Despite measures made by the government to face the economic crisis, the capital money of the country is mostly devoted to the control of this current health emergency [54].

## 5. Conclusions

Data suggest that the country's response to the pandemic was ineffective, partly due to the country's circumstances before the pandemic, such as its weak health system and economy. The pandemic seems to have set back Ecuador's progress towards SDG 1 because the indicators of poverty and extreme poverty have increased. Regarding SDG 3, the increase in Dengue cases increases the likelihood of co-infection of both viruses and the delay of treatment for COVID-19 and decreases the efforts to fight the neglected Dengue disease. Limited SARS-CoV-2 tests for all regions of Ecuador has generated deficiencies due to problems regarding diagnosis and follow-up of possible COVID-19 infections, with rural areas being the most affected. Therefore, this assessment of the efficiency of epidemic control in Ecuador shows that managing and controlling mobility was not effective in the analyzed time frame. Education indicators have decreased due to the lack of ITC resources to attend to the new modality of virtual education, unemployment has increased due to the imposed economic measures on public and private organizations, and the increase in unemployment and poverty has affected GDP per capita and GDP. These indicators show that Ecuador's economic growth is decreasing due to the pandemic.

**Author Contributions:** Conceptualization, C.V.C. and D.d.L.G.; methodology, D.d.L.G.; software, D.d.L.G.; validation, E.M.A., C.V.C. and D.d.L.G.; formal analysis, E.M.A.; investigation, E.M.A.; writing—original draft preparation, E.M.A.; writing—review and editing, C.V.C.; visualization, D.d.L.G. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Publicly available datasets were analyzed in this study. This data can be found here: [www.salud.gob.ec](http://www.salud.gob.ec), [www.bce.fin.ec](http://www.bce.fin.ec), [www.educacion.gob.ec](http://www.educacion.gob.ec).

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. World Health Organization. *Addressing Human Rights as Key to the COVID-19: Response*, 21 April 2020; World Health Organization: Geneva, Switzerland, 2020.
2. SENPLADES. Examen Nacional Voluntario Ecuador. 2020. Available online: <https://www.planificacion.gob.ec/ecuador-presento-su-examen-nacional-voluntario-sobre-el-cumplimiento-de-la-agenda-2030/> (accessed on 1 March 2021).
3. Dong, E.; Du, H.; Gardner, L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect. Dis.* **2020**, *20*, 533–534. [CrossRef]
4. Pan American Health Organization. Ecuador Receives Its First COVID-19 Vaccines through the COVAX Facility. 2021. Available online: <https://www.paho.org/en/news/17-3-2021-ecuador-receives-its-first-covid-19-vaccines-through-covax-facility> (accessed on 20 March 2021).
5. Ritchie, H.; Ortiz, E.; Beltekian, D.; Mathieu, E.; Hasell, J.; Macdonald, B.; Giattino, C.; Appel, C.; Rodés, L.; Roser, M. Coronavirus Pandemic (COVID-19). Available online: <https://ourworldindata.org/coronavirus> (accessed on 1 March 2021).
6. The Sustainable Development Goals and COVID-19. Sustainable Development Report. 2020. Available online: <https://unstats.un.org/sdgs/report/2020/> (accessed on 1 March 2021).
7. Caicedo-Ochoa, Y.; Rebellón-Sánchez, D.E.; Peñaloza-Rallón, M.; Cortés-Motta, H.F.; Méndez-Fandiño, Y.R. Effective Reproductive Number estimation for initial stage of COVID-19 pandemic in Latin American Countries. *Int. J. Infect. Dis.* **2020**, *95*, 316–318. [CrossRef] [PubMed]
8. Organization for Economic Co-operation and Development. *Development Co-operation Report 2020*; OECD: Paris, France, 2020; pp. 1–328. [CrossRef]
9. Fernández-Naranjo, R.P.; Vásquez-González, E.; Simbaña-Rivera, K.; Gómez-Barreno, L.; Izquierdo-Condoy, J.S.; Cevallos-Robalino, D.; Ortiz-Prado, E. Statistical data driven approach of COVID-19 in Ecuador: R0 and Rt estimation via new method. *Infect. Dis. Model.* **2021**, *6*, 232–243. [CrossRef] [PubMed]
10. COVID 19-Google Global Mobility Report. Available online: <https://datastudio.google.com/u/0/reporting/a529e043-e2b9-4e6f-86c6-ec99a5d7b9a4/page/yY2MB?s=ho2bve3abdM> (accessed on 1 March 2021).
11. Dirección Nacional de Síntesis Macroeconómica; Subgerencia de Programación y Regulación. Reporte de pobreza, ingreso y desigualdad. 2020. Available online: <https://contenido.bce.fin.ec/documentos/Estadisticas/SectorReal/Previsiones/IndCoyuntura/Empleo/PobrezaDic2020.pdf> (accessed on 1 March 2021).



12. Banco Central del Ecuador. Indicadores Socioeconómicos Internacionales. 2019. Available online: [https://contenido.bce.fin.ec/documentos/Administracion/bi\\_menuIntegracionRegional.html](https://contenido.bce.fin.ec/documentos/Administracion/bi_menuIntegracionRegional.html) (accessed on 1 March 2021).
13. Moreno Garcés, L. Decreto Ejecutivo No. 1022. 2020. Available online: [https://www.propiedadintelectual.gob.ec/covid\\_19/files/Decreto\\_Ejecutivo\\_No\\_1022\\_20200227194449.pdf](https://www.propiedadintelectual.gob.ec/covid_19/files/Decreto_Ejecutivo_No_1022_20200227194449.pdf) (accessed on 1 March 2021).
14. Comité de Operaciones de Emergencia Nacional, C. Informe de Situación COVID-19 Ecuador 2020. 2021. Available online: <https://www.gestionderiesgos.gob.ec/informes-de-situacion-covid-19-desde-el-13-de-marzo-del-2020/> (accessed on 1 March 2021).
15. Ministerio de Salud Pública. Gacetas epidemiológicas. Available online: <https://www.salud.gob.ec/gacetas-epidemiologicas-gaceta-general-2020/> (accessed on 1 March 2021).
16. Vitale, M.; Lupone, C.D.; Kenneson-Adams, A.; Ochoa, R.J.; Ordoñez, T.; Beltran-Ayala, E.; Endy, T.P.; Rosenbaum, P.F.; Stewart-Ibarra, A.M. A comparison of passive surveillance and active cluster-based surveillance for dengue fever in southern coastal Ecuador. *BMC Public Health* **2020**, *20*, 1065. [CrossRef] [PubMed]
17. Ministerio de Salud Pública. Gacetas Vectoriales. 2020. Available online: <https://www.salud.gob.ec/gacetas-vectoriales/> (accessed on 1 March 2021).
18. Ministerio de Salud. Enfermedades transmitidas por vectores Ecuador SE 03–2021. 2021. Available online: <https://www.salud.gob.ec/wp-content/uploads/2021/01/Vectores-SE-03.pdf> (accessed on 1 March 2021).
19. Centers for Disease Control. Dengue and COVID-19. 2020. Available online: <https://www.cdc.gov/dengue/is-it-dengue-or-covid.html> (accessed on 1 March 2021).
20. Navarro, J.C.; Arrivillaga-Henríquez, J.; Salazar-Loor, J.; Rodríguez-Morales, A.J. COVID-19 and dengue, co-epidemics in Ecuador and other countries in Latin America: Pushing strained health care systems over the edge. *Travel Med. Infect. Dis.* **2020**, *37*, 101656. [CrossRef] [PubMed]
21. España, I.G.; Gómez, M.C. Análisis de la relación COVID-19 y dengue dentro de la época de pandemia marzo a mayo en el Ecuador. *Univ. Y Soc.* **2020**, *12*, 261–268.
22. Centers for Disease Control. Coronavirus Disease 2019 (COVID-19)-Symptoms. 2021. Available online: <https://www.cdc.gov/dotw/covid-19/index.html#:~:text=Key%20Facts,fever%2C%20chills%2C%20and%20cough> (accessed on 1 March 2021).
23. Frantchez, V.; Fornelli, R.; Sartori, G.P.; Arteta, Z.; Cabrera, S.; Sosa, L.; Medina, J. Dengue en adultos: Diagnóstico, tratamiento y abordaje de situaciones especiales. *Rev. Med. Del Urug.* **2016**, *32*, 43–51.
24. Yan, G.; Lee, C.K.; Lam, L.T.; Yan, B.; Chua, Y.X.; Lim, A.Y.; Phang, K.F.; Kew, G.S.; Teng, H.; Ngai, C.H.; et al. Covert COVID-19 and false-positive dengue serology in Singapore. *Lancet Infect. Dis.* **2020**, *20*, 536. [CrossRef]
25. Joob, B.; Wiwanitkit, V. COVID-19 can present with a rash and be mistaken for dengue. *J. Am. Acad. Dermatol.* **2020**, *82*, e177. [CrossRef]
26. Ortiz-Prado, E.; Henriquez-Trujillo, A.R.; Rivera-Olivero, I.A.; Freire-Paspuel, B.; Vallejo- Janeta, A.P.; Lozada, T.; Garcia-Bereguian, M.A. Massive SARS-CoV-2 RT-PCR Testing on Rural Communities in Manabi Province (Ecuador) Reveals Severe COVID-19 Outbreaks. *Am. J. Trop. Med. Hyg.* **2021**, *104*, 1493–1494. [CrossRef]
27. Barre Sarango, J.P.; Castro Chugá, C.L. Deserción educativa generada a raíz de la cuarentena obligatoria durante la pandemia del COVID-19, en estudiantes de básica elemental y media en la ciudad de Quito. Master Thesis, Universidad Central del Ecuador, Quito, Ecuador, 2021.
28. Pachay-López, M.J.; Rodríguez-Gámez, M. La deserción escolar: Una perspectiva compleja en tiempos de pandemia. *Polo Del Conoc.* **2021**, *6*, 130–155.
29. Peña, M.A.; Herrera, L. Indicadores de tecnología de la información y comunicación. 2021. Available online: [https://www.ecuadorencifras.gob.ec/documentos/web-inec/Estadisticas\\_Sociales/TIC/2020/202012\\_Boletin\\_Multiproposito\\_Tics.pdf](https://www.ecuadorencifras.gob.ec/documentos/web-inec/Estadisticas_Sociales/TIC/2020/202012_Boletin_Multiproposito_Tics.pdf) (accessed on 1 March 2021).
30. Fondo de las Naciones Unidas para la Infancia (UNICEF). COVID-19: Más del 95 por ciento de niños, niñas y adolescentes está fuera de las escuelas en América Latina y el Caribe. 2020. Available online: <https://www.unicef.org/lac/comunicados-prensa/covid-19-mas-del-95-por-ciento-de-ninos-y-ni%C3%B1as-esta-fuera-de-las-escuelas> (accessed on 1 March 2021).
31. Ministerio de Educación. Estadísticas educativas-Datos Abiertos–Ministerio de Educación. Available online: <https://educacion.gob.ec/datos-abiertos/> (accessed on 1 March 2021).
32. Sanahuja, J.A. COVID-19 en América Latina: La economía política de las respuestas gubernamentales. *Pensam. Iberoam.* **2020**, *3*, 22–33.
33. Ministerio de Educación. Plan Educativo: Aprendamos juntos desde casa. 2020. Available online: <https://recursos2.educacion.gob.ec/wp-content/uploads/2020/05/Plan-Educativo-Aprendamos-Juntos-en-casa.pdf> (accessed on 1 March 2021).
34. El Ministerio de Educación abre el curso de autoaprendizaje “Mi Aula en Línea”–Ministerio de Educación. Available online: <https://educacion.gob.ec/el-ministerio-de-educacion-abre-el-curso-de-autoaprendizaje-mi-aula-en-linea/> (accessed on 1 March 2021).
35. Banco Central del Ecuador. Resultados de las Cuentas Nacionales Trimestrales del cuarto trimestre de 2016 y anual 2016. Available online: <https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/965-resultados-de-las-cuentas-nacionales-trimestrales-del-cuarto-trimestre-de-2016-y-anual-2016> (accessed on 1 March 2021).

36. Banco Central del Ecuador. Ecuador creció 3.0% en 2017 y confirma el dinamismo de su economía. Available online: [https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1080-ecuador-crecio-30-en-2017-y-confirma-el-dinamismo-de-su-economia#:~:text=La%20econom%C3%ADa%20ecuatoriana%20\(PIB\)%20en,Gobierno%20General%20y%20las%20Exportaciones](https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1080-ecuador-crecio-30-en-2017-y-confirma-el-dinamismo-de-su-economia#:~:text=La%20econom%C3%ADa%20ecuatoriana%20(PIB)%20en,Gobierno%20General%20y%20las%20Exportaciones) (accessed on 1 March 2021).
37. Banco Central del Ecuador. La economía ecuatoriana decreció -0.1% en el tercer trimestre de 2019. Available online: <https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1339-la-econom%C3%ADa-ecuatoriana-decreci%C3%B3-01-en-el-tercer-trimestre-de-2019> (accessed on 1 March 2021).
38. Banco Central del Ecuador. La pandemia incidió en el crecimiento 2020: La economía ecuatoriana decreció 7.8%. Available online: <https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1421-la-pandemia-incidio-en-el-crecimiento-2020-la-economia-ecuatorial-decrecio-7-8#:~:text=Esto%20fue%20determinante%20para%20que,de%20las%20cuentas%20nacionales%20trimestrales> (accessed on 1 March 2021).
39. Lenin, M.G. Decreto Ejecutivo No 1074-2020-ESTADO DE EXCEPCION. 2020. Available online: <https://www.uta.edu.ec/v3.2/uta/reglamentosexternos/Decreto%20Ejecutivo%20No%201074-2020-ESTADO%20DE%20EXCEPCION.pdf> (accessed on 1 March 2021).
40. Instituto Nacional de Encuestas y Censos. Encuesta Nacional de Empleo, Desempleo y Subempleo (ENEMDU)- Indicadores Laborales. 2020. Available online: [https://www.ecuadorencifras.gob.ec/documentos/web-inec/EMPLEO/2020/Diciembre-2020/202012\\_Mercado\\_Laboral.pdf](https://www.ecuadorencifras.gob.ec/documentos/web-inec/EMPLEO/2020/Diciembre-2020/202012_Mercado_Laboral.pdf) (accessed on 1 March 2021).
41. Heredia Zurita, A.; Marco, D. *Análisis de las políticas de apoyo a las pymes para enfrentar la pandemia de COVID-19 en América Latina*; Comisión Económica para América Latina y el Caribe (CEPAL): Santiago, Chile, 2021.
42. Comisión Económica para América Latina y el Caribe. Sectores y empresas frente al COVID-19: Emergencia y reactivación. 2020. Available online: <https://www.cepal.org/en/publications/45736-sectors-and-businesses-facing-covid-19-emergency-and-reactivation> (accessed on 1 March 2021).
43. Torres-Roman, J.S.; Kobiak, I.C.; Valcarcel, B.; Diaz-Velez, C.; Vecchia, C.L. The reproductive number R0 of COVID-19 in Peru: An opportunity for effective changes. *Travel Med. Infect. Dis.* **2020**, *37*, 101689. [CrossRef] [PubMed]
44. Hilton, J.; Keeling, M.J. Estimation of country-level basic reproductive ratios for novel Coronavirus (SARS-CoV-2/COVID-19) using synthetic contact matrices. *PLoS Comput. Biol.* **2020**, *16*, e1008031. [CrossRef]
45. Chaguay, S.L.; Galeas, R.R.; Chaguay, L.A.L. Desempleo en tiempos de COVID-19: Efectos socioeconómicos en el entorno familiar. *J. Sci. Res. Rev. Cienc. E Investig.* **2020**, *5*, 187–197.
46. Stewart Ibarra, A.M.; Ryan, S.J.; Beltrán, E.; Mejía, R.; Silva, M.; Muñoz, Á. Dengue vector dynamics (*Aedes aegypti*) influenced by climate and social factors in Ecuador: Implications for targeted control. *PLoS ONE* **2013**, *8*, e78263. [CrossRef]
47. Verduyn, M.; Allou, N.; Gazaille, V.; Andre, M.; Desroche, T.; Jaffar, M.C.; Traversier, N.; Levin, C.; Lagrange-Xelot, M.; Moiton, M.P.; et al. Co-infection of dengue and COVID-19: A case report. *PLoS Negl. Trop. Dis.* **2020**, *14*, e0008476. [CrossRef]
48. Portillo, R.T.V.; Uscata, B.A.; Gonzales-Zubiate, F.A.; Medina, K.J.; Sevillano, O.R.; Ramos-Sanchez, E.M. Pruebas rápidas para COVID-19, la mejor alternativa para Ecuador. *Bionatura Lat. Am. J. Biotechnol. Life Sci.* **2020**. [CrossRef]
49. United Nations Educational, Scientific and Cultural Organization (UNESCO). From Disruption to Recovery. 2021. Available online: <https://en.unesco.org/covid19/educationresponse> (accessed on 1 March 2021).
50. Vivanco-Saraguro, A. Teleeducación en tiempos de COVID-19: Brechas de desigualdad. *Cienci América* **2020**, *9*, 166–175. [CrossRef]
51. International Organization of Labor. Observatorio de la OIT: El COVID-19 y el mundo del trabajo. *Cuarta Edición* **2020**, *4*, 26.
52. León, L.; Vargas, K.; Zúñiga, F. Ecuador: Incidencia de la pobreza en el producto interno bruto y desempleo 2000–2018. *Rev. Espiritu Emprend.* **2020**, *19*, 1–13.
53. Arévalo, M.I.; López, M.R.A. Posibles medidas de política económica en el contexto actual y post COVID-19: Caso Ecuador. *Sur Acad. Rev. Académica-Investig. De La Fac. Jurídica Soc. Y Adm.* **2020**, *7*, 59–73. [CrossRef]
54. Correa-Quezada, R.; Vélez, D.G.; García, J.Á.; Castillo, M.d.C.T. La COVID-19 y su impacto en la pobreza de Ecuador: Método de escenarios. *Contaduría Y Adm.* **2020**, *65*, 5. [CrossRef]