

Partial Economic Effect of Covid-19 in Camagüey, Cuba

Efecto económico parcial de la COVID-19 y sus resultados en Camagüey,
Cuba

Dr. C. Iris María González Torres^{1*} <http://orcid.org/0000-0003-1343-4142>

MSc. Ernesto Collado Cardoso¹ <http://orcid.org/0000-000208117-4832>

Dr. C. Inés Josefina Torres Mora² <http://orcid.org/0000-0002-3060-4900>

MSc. Zoila Madiu Quiroga Gómez¹ <http://orcid.org/0000-0002-1910-9626>

Dr. Carlos Morán Giraldo³ <http://orcid.org/0000-0002-9260-739X>

MSc. Alexander Gómez Rosabal⁴ <http://orcid.org/0000-0003-2955-4173>

¹Faculty of Economic Sciences, Ignacio Agramonte Loynaz University of Camagüey,
Cuba

²National Association of Economists and Accountants of Cuba, Camaguey
Headquarters

³Ministry of Public Health, Camaguey Office, Cuba

⁴Territorial Statistical and Information Office, Camagüey, Cuba

*Corresponding author: iris.gonzalez2010@gmail.com

ABSTRACT

Objective: To evaluate the partial epidemiological results of COVID-19, its immediate economic effects, and the mid-term perspectives in the province of Camagüey, Cuba.

Methods: Statistical descriptive and inferential techniques. The logistic model was used for prognosis.

Main results: The confirmed asymptote case number is 50, showing lower incidence and mortality than the rest of the country. The recovery percent was similar to the national level, particularly in health areas adjacent to the municipality of Camagüey.

Conclusions: Covid-19 exacerbated the already existing economic problems, with special repercussions on economic growth, due to the decline of important productions in the agricultural sector and the food-producing industry. Additionally, the export plan, the import substitution plan, and overall commercial activities were cut down. As a result, there will be an impact on short and mid-term inputs to the budget, thus increasing public expenditure.

Key words: COVID-19 epidemiological effects; COVID-19 economic effects; prediction model of confirmed cases; prediction models.

RESUMEN

Objetivo: Evaluar los resultados parciales epidemiológicos de la COVID-19, su efecto económico inmediato y las perspectivas a mediano plazo para la provincia de Camagüey, Cuba.

Métodos: Técnicas estadísticas descriptivas e inferenciales; para el pronóstico se eligió el modelo logístico.

Principales resultados: Los casos confirmados asintóticos a 50; una tasa de incidencia y mortalidad por debajo de la del país y un por ciento de recuperación similar al nacional, con mayor manifestación en el municipio Camagüey y concentrado en dos zonas de áreas de salud colindante.

Conclusiones: La COVID-19 agudizó los problemas económicos ya presentes, fundamentalmente en el crecimiento económico por la disminución de producciones importantes para el sector agropecuario y la industria alimentaria; también disminuyó el plan de exportaciones y de sustitución de importaciones y la actividad comercial. Esto debe repercutir en los ingresos al presupuesto en el corto y mediano plazos y en el incremento del gasto público.

Palabras clave: efecto epidemiológico COVID-19; efecto económico COVID-19; modelo de pronóstico para casos confirmados; modelos de pronóstico.

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INTRODUCTION

The Cuban model of economic and social development declares that "... education and formation of values, health, science, technology and innovation, culture, social communication, defense and national security, rational use and protection of resources and the environment ..." are critical for the nation's sustainability and prosperity (Communist Party of Cuba [PCC], 2017a, p. 13). One of its main principles is that "... humans are the main target and most important subject..." (p. 14)

The implementation of the model, along with the Guidelines of the Economic and Social Policy of the Party and the Revolution in the 2016-2021 period, are extraordinarily relevant under the current conditions of COVID-19 pandemic. Concerning health, Guideline 126 refers to the quality of service and efficient utilization of resources. Guideline No128 says that "... sustainability of interdisciplinary, intersectoral, and community actions directed to the improvement of hygienic-epidemiological conditions that determine communicable diseases with the highest impacts on health..." (PCC, 2017b, p. 23).

Accordingly, under pandemic conditions, as in COVID-19 case is, specific organizations are armed to speed up decisions and channel measures to detect the sick and protect the healthy. The leader organization is Public Administration. Although there are several definitions, there is consensus in the manner the government and citizens establish a relation to increase current welfare, and create the capacities for further improvements (Arenilla, 2001; Cárdenas and Tamayo, 2014; Galindo, 2000; González, 2005).

The model of development and the guidelines are within a legal frame in the Constitution of the Republic of Cuba. Article 171 formulates the fundamental mission of the provincial government, whose main role is "... to encourage local economic and social development, harmonization of the local interests (province and municipalities)..."

(National Assembly of the People's Power, 2019, p. 12). It becomes the main actor in local development management, as this process gathers local actors to plan, organize, run, and control actions that lead to such wellbeing and progress (Elías, 2014; González, 2017).

The Economic Commission for Latin America and the Caribbean (CEPAL, 2020) has predicted that the COVID-19 pandemic will cause short and mid-term economic and social impacts. Thus, the aim of this paper is to evaluate the partial epidemiological results, their immediate economic effects, and the mid-term perspectives in the province of Camaguey, and Cuba.

DEVELOPMENT

Theoretical and methodological rationale

To identify the forecast model of accumulated confirmed cases, other previously designed models were consulted (Donostial University Hospital, Kucharski *et al.*, 2020; Liang, 2020). Then a logistic model was used in the province to estimate accumulated cases until a specific date.

$$CA = \frac{1}{\frac{1}{K} + b_0 b_1^{-t}}$$

Where $CA = K$ is the asymptote of saturation, since $\lim_{t \rightarrow +\infty} (K-CA) = 0$ when the model $t \rightarrow +\infty, t \in \mathbb{N}$. Such model does not have a relative extreme value; it is always growing. Then, almost at the same time, it was known that province Sancti Spiritus used the same model with an excellent adjustment (Sebrango, 2020).

To determine the economic structure of the province, and the economic effect of the epidemic in Camagüey, temporary series, regression analysis, correlation analysis, comparisons by analogy, and calculations of rates and indexes were used.

Main results

Some characteristics of Camagüey, which is located in the mid-eastern region of Cuba, should be mentioned. It is the largest province in Cuba as to the extension, whose area is mostly covered by plains (14% of the national territory), but with the lowest population density (49.9 inhab/km²), only after the special municipality of Isla de la Juventud (National Office of Statistics and Information [ONEI], 2019).

The province has mineral deposits (chrome, gold, and nickel), and non-mineral deposits (zeolite and sand), quality beaches in the north coast and the southern keys. The historic center of the capital city is a World Cultural Heritage site, declared by UNESCO. The local economy depends on agriculture, and related industry, with 23.4 and 22.7% of gross value added, respectively (Provincial Office of Statistics and Information, 2019). The same source indicates that tourism does not represent an important proportion of the gross value added, with approximately 4%. This sector is expected to have a remarkable increase in the next few years, according to heavy investment in the northern keys, which does not mean neglecting agriculture. On the contrary, the goal is to make it an important source of foods for the population, raw materials for industry, and supplies for tourism, under intensive production conditions.

Only after 22 days of identification of the causal agent of COVID-19 (01/07/2020) by Chinese scientists, Cuba began preparing for what WHO later declared a pandemic. This preparation consisted in training health care and national government personnel in biosafety (02/03/2020), the creation of a Group of Sciences (02/12/2020), the establishment of the Health Observatory, and an Innovation Committee. On February 28, the first five research projects to fight COVID-19 were approved (Sánchez and Moreno, 2020).

In the presence of COVID-19, the country has made multiple efforts to diffuse every measure, and in relation to the results achieved in health care of the people included in the daily statistics published by the Ministry of Public Health regarding the confirmed, studied, recovered, and deceased people. This information is offered to the country as a whole, and includes specifics for provinces and municipalities. Additionally, the expected forecast has been dealt with through several models used by engaged professionals in research centers, including universities.

These actions are part of ongoing wider international efforts. The University of Oxford has published an instrument to publish government responses in several countries, based on indicators, such as closing schools, jobs, cancellation of public events, a halt of public transportation services and public awareness campaigns, restriction of internal movement, health research, and vaccine research (Blavatnik School of Government, 2020). All of them are implemented in Cuba, and additionally, special care has been provided to vulnerable groups in their homes. Televised school lessons have been broadcast for different educational levels; workers have received salary guarantees, especially vulnerable groups of employees who are in home quarantine as part of physical isolation; a moratorium of service and taxes of the state, cooperative, and private entities was established; and isolation facilities for COVID19 infected patient contacts, and people suspected to have the disease were readied. Command centers were set up throughout the province to organize the above.

International researchers and bodies acknowledge that COVID-19 might affect world economy in three different ways: direct damage to production, trouble in the supply chain and the markets, and financial impact on companies and financial markets (Deloitte, 2020a). This study will address direct damage to production, and public expenditure as consequences of the measures adopted to protect the healthy and sick population.

Besides, even before the pandemic ends, strategies for a post-COVID-19 scenario should be designed, based on the criteria that the problems and uncertainties created should be considered as opportunities to grow and change, relying on the conception of resilience (Deloitte, 2020b).

Results of fighting COVID-19 in Camagüey

However, up until 06/15/2020, the above mentioned measures contributed to better numbers than in the Americas and the rest of the world, with 2 248 confirmed cases (20.0 x 100 000 inhabitant), of which 1 948 (86.7%) have recovered, and 84 (3.7%) have deceased.

The province has confirmed 48 cases so far, without native cases for 29 days; most of them have been recovered and only one patient died. Recently, a new case was

confirmed in a person who lives in the province, but arrived from Mexico. The patient is currently receiving treatment.

To determine the risk of confirmed cases in Camagüey, the model suggested was used. The model in Fig. 1 explains that 93.9% of the total variation of the dependent variable “accumulated number of infected people”, highly significant considering that $F = 0.000$, with the two variables significantly differing from zero. The residues are normally distributed, though temporary correlation is observed it is not spatial, according to the overall Moran I. It favors the occurrence of minimum estimation risk, considering also that practice has demonstrated the pertinence of the model.

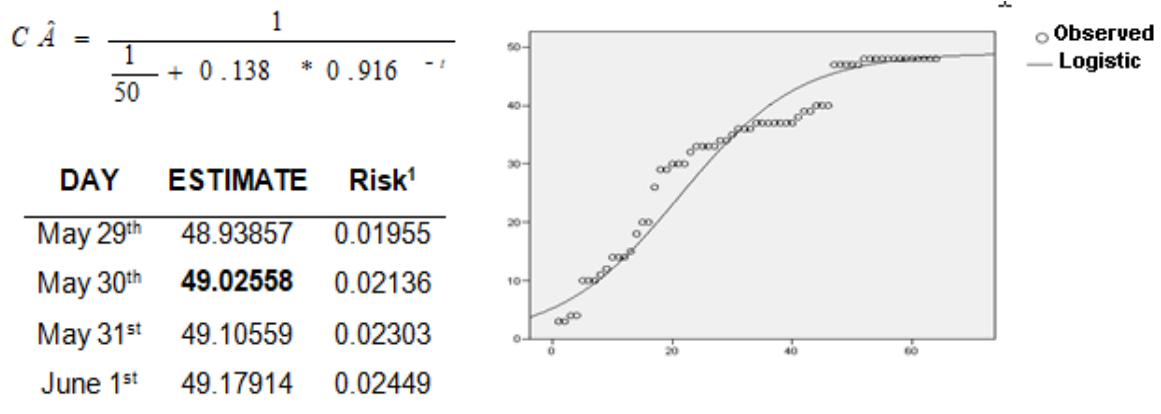


Fig. 1 Logistic model to forecast confirmed cases in the province of Camagüey

Source: Calculations based on information retrieved from <http://www.camaguey.gob.cu/es/>

Fig. 2 and 3 show that the province has a number of cases varying between 1 and 3, though three relative peaks were observed due to violations of physical isolation. Mostly, when both peaks occurred, they behaved similarly, with no significant differences between the daily variation in the province and the country, which was demonstrated through proportion hypothesis tests.

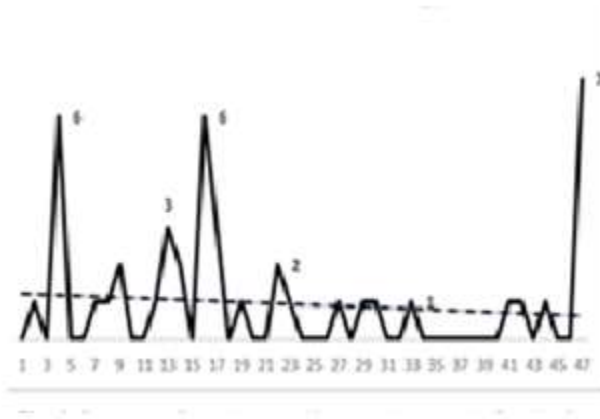


Fig. 2. Daily confirmed cases in the province of Camagüey during the first 47 days

Source: Calculations based on information retrieved from <http://www.camaguey.gob.cu/es/>

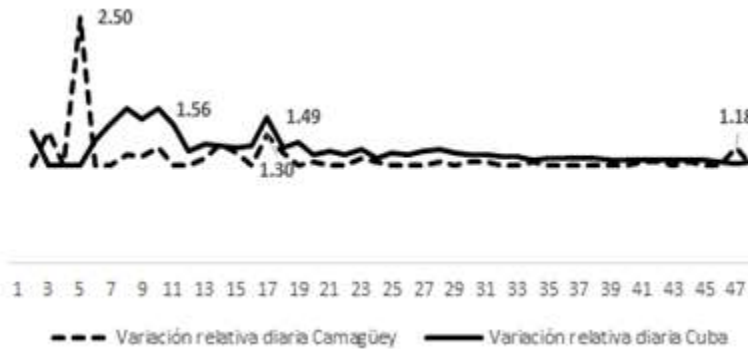


Fig 3 Relative variation of daily confirmed cases in Camagüey and Cuba, in the first 47 days

Source: Calculations based on information retrieved from <http://www.camaguey.gob.cu/es/>

The local behavior shows that:

- The municipality of Camagüey, mainly comprising the capital city, contributed with the largest number of cases (77.3%), followed by Florida (12.8%), and Nuevitas (8.5%); other cases were reported in Esmeralda and Vertientes, with minimum amounts. Only 5 municipalities of the 13 in the province reported confirmed cases of COVID-19. Assuming that the incidence rate is $\times 100\ 000$ inhabitants, the order of incidence is Nuevitas, Camagüey and Florida. These are the largest municipalities and cities in the province, which ratifies that the greater the concentration of the population, the larger the number of confirmed cases.

- The geographical distribution of the health care areas shows two concentrations of several geographically adjacent areas, the first made of health care areas Centro, Previsora, and Oeste, with 2-8 confirmed cases, and the highest number observed in Centro. The second concentration of cases was produced in Agramonte, Este, and Mella. Based on spatial analysis, a hot spot was observed in the Norte health care area, whose main cause was the concentration of people residing abroad or Cuban residents that traveled outside the country, with their respective contacts in their residential areas.
- The two health care areas adjacent to Norte, Pirre, and Finlay have not reported any cases, as a result of isolation measures adopted.

The incidence of the epidemic in the province is not high thanks to the measures adopted, and the general observance of preventive rules by the population. Among them are the isolation of people suspect of having the disease due to the presence of a symptom who go to health institutions or because they have been in contact with confirmed cases or been included in the randomized sample done daily to the population; and the administration of medication manufactured by Cuban biotechnology at different stages of the disease, including the asymptomatic stage. The cases in epidemiological control, regardless of the lack of symptoms, total 28 per 100 people in the hospitals (confirmed or suspect).

Obviously, the previous has a negative impact on the production of goods and services, which includes public expenditures to cover the costs of all these activities, which are free of charge.

The evaluation of the effect of the pandemic on the economy should also include the difficulties from the previous year, which had been foreseen by CEPAL in 2019 (CEPAL, 2020), which in the Cuban case, they are significantly related to the economic crisis of Venezuela (main trading partner), the termination of contracts of medical services (Brazil), a decline in tourism, and the accumulation of new sanctions imposed by the US, which have had a negative impact on several key areas. In 2019, these sanctions included the suspension of remittances, fuel imports, and the activity of foreign companies operating on the island (Torres, 2020). It affected the supply of raw materials for manufacture, transportation, and investment, with short, mid, and long-term effects.

Particularly, in the province, according to an interview made to Carmen Hernandez Requejo, current President of the Provincial Administrative Council, (Hernández, 2019), the economy was struck by insufficient sales that did not surpass the 122 million pesos, as a result of shortages in the supply of an important number of items. Additionally, four companies reported losses with no productive back up: two in the Ministry of Agriculture, Sugar industry, and the Industry of Construction Materials belonging to the provincial government. The physical production of key items in agriculture and food producing industry reported shortages as well. To mitigate the economic impact, a strategy was implemented to reduce expenditure, and resources were directed to areas where they could generate more income, which produced results, but not in the expected amounts.

In addition to the above, agricultural efficiency decreased below the national mean, a behavior that has been taking place for several years now (Social, Economic, and Environmental Observatory, 2016). There are several entities with a strong payment/gross value added ratio, limiting not only payment to the remaining factors of production, but also broadened reproduction of the economy.

According to the Provincial Office of Statistics and Information, in Camagüey, in the first four months of 2020:

- Not all the entities of the province programmed growth numbers, even with the real possibility to do it. This must be because of salary payments without sufficient productive back up, which is confirmed by the mean salary/productivity ratio, below but very near 1.
- Agricultural products such as milk for the industry, as a result of fewer milking cows and lower yields; crop production, due to the reduction of cropland, sowing was not sufficient. Outstanding increases in total meat and eggs were produced.
- If the implicit GDP deflator (ONEI, 2019) is used to estimate its magnitudes in 2019 and 2020, and the result is applied to the GVA, the economy is not growing 21.7%, as estimated in current prices, but 7.0%, caused by the increase of quantities. This magnitude corresponds more to the real situation until May 2020.
- The expenditure/income ratio is bad; each peso invested produces 95 cents.

- Most of the most important entities have a higher ratio than the magnitude set by the ministry of Finance and Prices (2016) in salary/gross value added (0.35). This situation not only affects economic growth, but also impacts on taxes, and therefore resources that can be allocated to public expenditure to favor the economy and people welfare.
- The export plan was met 46.1% only, with the negative incidence of key entities. In the mid-term, this can affect the production of other goods and services, since the financial resources produced by exports are used to purchase raw materials and equipment for production.
- The previous situation, in addition to entities that stopped or cut down manufacturing, represent 15.5% of the planned volume of goods and services to be produced. The main responsible for this is Commerce and Gastronomy, representing 89.2% of unproduced profit, and the repercussion on net sales, which affect budget income unfavorably, mostly as income granted, the main source of local funding, for current and capital expenses.
- Non-planned public expenditures were made, most of them to insure the salaries of isolated vulnerable groups (68.9%), followed by the patients in isolation facilities (19.2%). However, these two measures contributed most to the excellent results of the province. The remaining 11.9% is broken down in hospitalized patients, diagnostic kits, and preparation and transportation to isolation facilities.
- Education was remarkably affected in day care centers, schools, and universities, with 8 153, 106 307, and 6 710 students, respectively. School education, however, was provided via television, and universities worked by assigning homework. This situation demands additional actions for the post COVID-19 period.

CONCLUSIONS

Public administration in the province has led actions that not only involved Public Health professionals, but also several local actors, which is outstanding, especially under the conditions imposed by the US economic and financial blockade.

Accumulated problems have had an impact on the provincial economy, mainly linked to the lack of efficiency and failure to comply with the plans. The epidemic of COVID-19, though not so intense, has worsened this situation, and will undoubtedly impact the immediate future of the province. The economic issues of several entities should be addressed in order to turn difficulties into success.

The solution (with pressing urgency) of these problems involves the application, according to the Cuban president, of the same scientifically implemented model to fight COVID-19, in the production of food nationally. He indicated the need to identify research centers, scientific leaders, scholars, experts, innovators, and farmers who can implement scientific results faster than some state institutions (Díaz-Canel, 2020)

If the generation of goods and services is not in accordance with the existing potentialities, and the resources used, not only economic growth, but also people wellbeing will be affected directly, with the reduction of goods and services, indirectly caused by the reduction of taxes and public expenditure to support the existing social policy of the country.

Therefore, these indicators should be considered systematically: salary/GVA ratio, productive consumption/total production of goods and services, and the physical indicators of every activity in particular. They must be monitored systematically by local organizations, regardless of their administrative subordination, which is a powerful tool that contributes to local and entrepreneurial development.

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Conflicts of interest and conflict of ethics statement

The authors declare that this manuscript is original, and it has not been submitted to another journal. The authors are responsible for the contents of this article, adding that it contains no plagiarism, conflicts of interest or conflicts of ethics.

Author contribution statement

Iris M. González Torres: Theoretical rationale, development of the procedure and analysis tools.

Ernesto Collado Cardoso: Forecasting model, analysis of results, redaction of conclusions.

Inés Josefina Torres Mora: Design of the manuscript, redaction of results and summary, content review.

Zoila Madiu Quiroga: Redaction and review of the content.

Carlos Morán Giraldo: Redaction and review of the content.

Alexander Gómez Rosabal: Redaction and review of the content

NOTES

As the decimals near the closest whole number, the risk of having an estimated result in a whole number with lower approximation is calculated by dividing the decimal part by the whole number. When in upper approximation, the complement is divided by the whole number