

Health tourism in Colombia. A factors systematic review and econometric estimation of the impact of the health emergency (Covid-19) on the number of visitors for health reasons in Colombia

Turismo de salud en Colombia. Una revisión sistemática de factores y estimación econométrica del impacto de la emergencia sanitaria (Covid-19) en el número de visitantes por motivos de salud en Colombia

Turismo de saúde na Colômbia: uma revisão sistemática de fatores e estimativa econométrica do impacto da emergência sanitária (Covid-19) no número de visitantes por motivos de saúde na Colômbia

José Marcelo Torres Ortega¹

Carlos Javier Carmona Campo²

Raúl Armando Martínez Espinosa³

Autores

¹ Docente de la Facultad de Ciencias Empresariales, Universidad de La Costa, Colombia, E-mail: jtorres99@cuc.edu.co Orcid: <https://orcid.org/0000-0001-8107-8763>

² Docente de la Facultad de Ciencias Empresariales, Universidad de La Costa, Colombia, E-mail: ccarmona@cuc.edu.co Orcid: <https://orcid.org/0000-0003-1395-4359>

³ Docente de la Facultad de Ciencias Empresariales, Universidad de La Costa, Colombia, E-mail: rmartinez55@cuc.edu.co Orcid: <https://orcid.org/0000-0002-7643-8311>

Corresponding author: Raúl Armando Martínez Espinosa. Universidad de La Costa, Colombia, E-mail: rmartinez55@cuc.edu.co

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Abstract

This article contributes to medical tourism literature in two ways: with a systematic review of articles published about factors that affect the development of health tourism and a measurement of the Covid-19 impact on the reduction of foreign visitors for health and medical care in Colombia for 2020 and 2021, with an ARIMA time series model. Colombia's medical tourism faces more limitations than promotion, with COVID-19 causing structural damage that cut 2020 international health arrivals to 41% of estimates. While recovery began in 2021, with arrivals reaching 75% of projections, the industry shows a slow but evident rebound.

Keywords: Medical tourism, Econometric estimation, Time series, Covid-19, Health.

JEL Classification: Health (I1), Sports; gambling; leisure; tourism (L83)

Resumen

Este artículo contribuye a la literatura sobre turismo médico de dos maneras: mediante una revisión sistemática de artículos publicados sobre los factores que afectan el desarrollo del turismo de salud y mediante la medición del impacto de la COVID-19 en la reducción de visitantes extranjeros para atención médica en Colombia durante 2020 y 2021, utilizando un modelo de series temporales ARIMA. El turismo médico en Colombia enfrenta más limitaciones que oportunidades de desarrollo, ya que la COVID-19 provocó daños estructurales que redujeron las llegadas internacionales de pacientes con problemas de salud en 2020 al 41% de las estimaciones. Si bien la recuperación comenzó en 2021, alcanzando llegadas del 75% de las proyecciones, el sector muestra un repunte lento pero evidente.

Palabras clave: Turismo médico, Estimación econométrica, Series temporales, Covid-19, Salud.

Clasificación JEL: Salud (I1), Deportes; juegos de azar; ocio; turismo (L83).

Resumo

Este artigo contribui para a literatura sobre turismo médico de duas maneiras: com uma revisão sistemática de artigos publicados sobre fatores que afetam o desenvolvimento do turismo de saúde e; com uma mensuração do impacto da Covid-19 na redução de visitantes estrangeiros para tratamento de saúde e assistência médica na Colômbia em 2020 e 2021, utilizando um modelo de séries temporais ARIMA. O turismo médico na Colômbia enfrenta mais limitações do que a promoção, com a Covid-19 causando danos estruturais que reduziram as chegadas internacionais de turistas de saúde em 2020 para 41% das estimativas. Embora a recuperação tenha começado em 2021, com as chegadas atingindo 75% das projeções, o setor demonstra uma retomada lenta, porém evidente.

Palavras-chave: Turismo médico, estimação econométrica, séries temporais, COVID-19, saúde

Classificação JEL: Saúde (I1), Esportes; jogos de azar; lazer; turismo (L83).

1. Introducción

"Medical tourism" is commonly used to describe international (or even domestic) travel for medical care purposes (De La Puente, 2018). According to the World Tourism Organization (UNWTO), this segment encompasses physical, mental, and spiritual health, achieved through medical and wellness activities to improve people's ability to meet their needs and "function" better in their environment (Campbell, Restrepo, & Navas, 2020). It comprises four

basic categories: curative, preventive, aesthetic, and wellness medicine (Ibañez Picón, 2014).

The categories are important when guiding the specific origin to be treated. Understanding that curative medicine corresponds to that is applied to a person to establish a diagnosis at any stage of health, and its purpose is to carry out treatment or indications for their rehabilitation, to avoid death, and to preserve health.

There is little research on medical tourism in Colombia, its influencing factors, characteristics, supply, and demand. Preventive medicine is a big part of medical tourism and is about preventing diseases based on previous actions and advice established by responsible and applied at the healthcare, specialized, hospital, and primary care levels.

Preventive medicine description as taking place at the primary, secondary, tertiary, and quaternary prevention: the primary is about the government and health personnel, including health promotion, specific protection, and chemoprophylaxis (supply of preventive drugs); the secondary is about population screenings, and its purpose is the detection and treatment of previous and early diseases; the tertiary is when preventing the complications and sequelae of established illnesses and the treatment consists of avoiding stroke in predetermined sickness; the quaternary corresponds to all those health activities that mitigate avoiding excessive or unnecessary consequences in the health system.

Considering the above, since the health emergency caused by COVID-19, the countries' governments have been trying to prevent the spread of the virus with sanitary restrictions and protocols. To mitigate the indicators of infected people, governments took the preventive measure of suspending the entry of foreigners in the different modalities of access, placing restrictions on the land, maritime, fluvial, and air borders, restricting the free movement of people.

In this context, economic losses were caused to Colombia, negatively impacting the country's income, as reflected in its Gross Domestic Product (GDP). Paradoxically, the sanitary restrictions affected the medical tourism sector because foreigners are recipients of our medical services and products for the prevention, curative medicine, and aesthetics. At the same time, the economic dynamism generated by medical tourism visitors was affected in other sectors such as visiting tourist attractions, hotels, tourism, gastronomy, business, entertainment in general, liquor consumption, casinos, and recreation, among others.

As a contribution to the medical tourism literature and measurement of the impact of the health emergency on the reduction in the number of visitors for health care, the present investigation carried out: first, a systematic review of the research articles on medical tourism is presented to the period between 2016 – 2020, to identify the recognized factors of medical tourism; second, an econometric model of time series is estimated to forecast the number of foreign visitors who, for health and medical care reasons, were no longer received in Colombia for the year 2020 and 2021 due to the health emergency, this to calculate the effect it had restrictions on medical tourism in the country.

2. Methodology

The present investigation has two parts. First, we present a systematic review of research articles on medical tourism for 2016 – 2020. Second, we calculate the restrictions Covid-19's impact on medical tourism; we estimate the number of foreign visitors for health and medical care reasons that Colombia didn't receive in 2020 and 2021. Therefore, we present the methodology for each of these sections.

2.1. Sysremtic review

This systematic review has highlighted the scarcity of structured care policies and models for the foreign population in the different sectors of Colombia. This section shows the methodology of the article search strategy and the selection of these.

2.1.1. Search strategy:

The purpose of this section is to review articles published from 2016 to 2021 in English and Spanish about the factors affecting medical tourism development in Colombia. We consulted several databases such as Web of Science, Scopus, Science Direct, PubMed, SciELO, Redalyc, and BioMed Central. We include the following search keywords: "Medical tourism", "Health tourism", "Export of medical services", "Reproductive tourism", "Dental tourism", "Cosmetic surgery", "Infertility tourism", and "Colombia". We use OR and AND boolean

connectors to combine the keywords, and we type them in the search box of the described databases.

We search synonyms keywords with the MeSH thesauri (for the search in English) and DeCS (for the examination in Spanish). Then, we compare the results and relevant findings from pertinent literature, and we summarize the results.

Selection of articles: We use the following inclusion criteria for this study.

- (a) Articles published between January 2016 and January 2021.
- (b) We use the keywords for the title and abstracts of the articles.
- (c) Investigation completed.
- (d) Researches that study the Colombian case.
- (e) Articles published in English or Spanish;
- (f) Quantitative and qualitative research methods. Finally,
- (g) Articles about impact factors on medical tourism.

We excluded the duplicate studies. Studies that met the inclusion criteria were coded and compared.

2.2. Forecast of the number of foreign visitors who, for health and medical care reasons, were no longer received in Colombia for the years 2020 and 2021

This section presents an integrated autoregressive moving average econometric model (ARIMA) of time series. We made this model to forecast the number of visitors for

health and medical care reasons in Colombia for 2020 and 2021.

For that, we use historical data on the number of foreign visitors for health and medical care reasons. We estimate the ARIMA (3,1,1) model because the data suggest that the number of foreign visitors for health and medical care reasons depends on three lags of the same variable (p), one differentiation (d), and one error lag (q). We compare this forecast with the number of visitors for the mentioned years to estimate the number of visitors for medical tourism that Colombia stopped receiving due to the health emergency caused by Covid-19.

We took the data from the Ministry of Commerce, Industry, and Tourism of Colombia (2021-11) retrieved on October 6, 2022, from the website <https://www.mincit.gov.co/>.

To find the number of monthly visitors, we multiply the monthly data (percentages) of trips for health and medical attention with the monthly data of foreign visitors (air, land, sea). We obtain information from January 2012 to December 2019 for 96 observations.

3. Results of a systematic review of research articles on medical tourism for 2016 - 2020

In the Table 1 summarizes the most important selected articles' characteristics and the main positive and negative factors. Table 1 contains eight research articles (72.7%) and three reviews (27.3%).

Table 1. Details of the articles included in the review

Author(s)	Year	item type	Facilitating factors	Hindering factors
Bastidas-Goyes LG, Mendez-Castillo E, Bonilla-Estevez CM.	2021	Investigation article	-----	Lack of consistent regulation of medical tourism.
Alonso JC, Diaz DM, Estrada D, Mueces BV.	2018	Investigation article	The medical programs met the bilingualism goal established by the government in 2014.	Only 41.9% of the medical programs met this goal. About 70% of future medical graduates do not have an intermediate or advanced level of English.
Garces JM, Delgado LP.	2020	Investigation article	For the sector of physical aesthetics and dentistry,	-----

Author(s)	Year	item type	Facilitating factors	Hindering factors
			innovation processes in the marketing and sale of the services offered mark a differential for competitive development, being one of the most effective practices in terms of innovation for this sector.	
Vásquez-Bernal, OA, Pinzón'n-Hoyos, B., Mosquera-Laverde, WE	2019	Review article	It establishes strategic importance to take advantage of the economy surrounding the tourist destinations in the different regions of Colombia.	There are not enough accredited hospitals in the country to expand the medical tourism market.
Campbell CA, Restrepo C, Navas G, Vergara I, Peluffo L.	2019	Review article	ISAPS Global Statistics 2016 ranks Colombia ninth in the total surgical procedure volume. Colombian plastic surgeons also rank first globally in medical tourism patients, with the average plastic surgeon performing 44 surgical procedures per year on foreign patients. In addition to the surgeons' skills, Colombia has an established tourism industry, substantial intellectual capital, and modern hospitals. The government and the private sector run the industry and aim to provide tourists visiting Colombia with physical revitalization, mental rejuvenation, cultural enrichment, and spiritual upliftment.	-----
Campbell CA, Restrepo C, Navas G.	2021	Review article	Overall, patient satisfaction was very high, with 98.2% of patients responding that they would recommend us to their friends and family. Patient satisfaction rates in all other aspects were also very high (range: 97.1-100%) for information provided, surgeon, staff, facility, and payment.	-----
de la Puente Pacheco MA, de Oro Aguado CM, Lugo Arias E, Fontecha Pacheco B.	2020	Investigation article	The national strategy to increase the arrival of foreign patients based on international accreditations impacts the target audience positively.	-----
from the Pacheco Bridge MA.	2017	Review article	-----	The scarcity of up-to-date information exposes a difficulty in continuously monitoring trends in the health tourism sector. There is a variability of information and data that is

Author(s)	Year	item type	Facilitating factors	Hindering factors
				not very similar, which does not allow an approximate analysis of the arrival of tourists only for medical purposes, beyond the surveys of general tourists who arrive in the country. The lack of information about the role of international insurers and their agreements with national specialized clinics and centers makes it difficult to analyze the viability of the sector and its sustainability.
From the Pacheco Bridge MA.	2018	Investigation article	Free zones, clusters, and the combination of medical procedures with tourist activities increase the possibilities of international positioning of Colombian medical tourism.	-----
Arias-Aragonés FJ, Caraballo-Payares AM, Jiménez-Osorio JE.	2020	Investigation article	-----	Lack of hospital infrastructure, shortage of specialists fluent in foreign languages, lack of laws and regulations for the activity, and growing local health needs in a context of deficient hospital infrastructure and health professionals.
Orozco DT, Álvarez DO, Díaz-Solano BH.	2017	Investigation article	-----	Individualistic business culture does not allow long-term goals. Poor level of bilingualism. Lack of integration of the different sectors to facilitate the process of forming a cluster. Poor management of information is sometimes non-existent; in other cases, the institutions do not disclose or share information of interest.

Source: Own elaboration based on information from the articles analyzed.

A total of five (5) of the reviewed articles concluded the existence of promoting factors, four (4) of hindering factors, and two (2) of both. Two (2) articles consider that in the last ten (10) years, there has been more attention to medical tourism in Colombia.

In this section, we identify factors that positively and negatively influence the development of medical tourism in Colombia. We have found fundamental factors such as human talent, infrastructure, innovation, and user satisfaction

with the quality of service, play an indispensable and differentiating role in the development of medical tourism. Among the main obstacles we find are the lack of accreditation in institutions, clinics, and hospitals at an international level, the deficiency in the diversity of languages by the health team, and the constant change of current regulations for the health sector and global law.

Two of the reviewed studies (Garcés JM et al. and of the Bridge, 2020), (De La Puente, 2017) refer to the tourist package as an offer of global services and attractions according to the destination origin where their regional customs and Good Will represent importance and commercial value in the interest of professionals oriented to medical tourism from their thematic axes, which means prestige.

And an advantageous position against the competition in recognition of better profitability for consumers who contribute to the economic movement of the sector, as pointed out by Heidekruger et al. (2017).

Another critical aspect of medical tourism consists of advertising and marketing as a commercial strategy to develop a response to demand and supply according to economic capacity, the specific need, or value aggregate (Fuerst & Torkkeli, 2018).

Health tourism requires concrete actions to reach international standards; for example, campaigns and social networks, marketing, credibility, connectivity, visibility, economic return, and inter-institutional link.

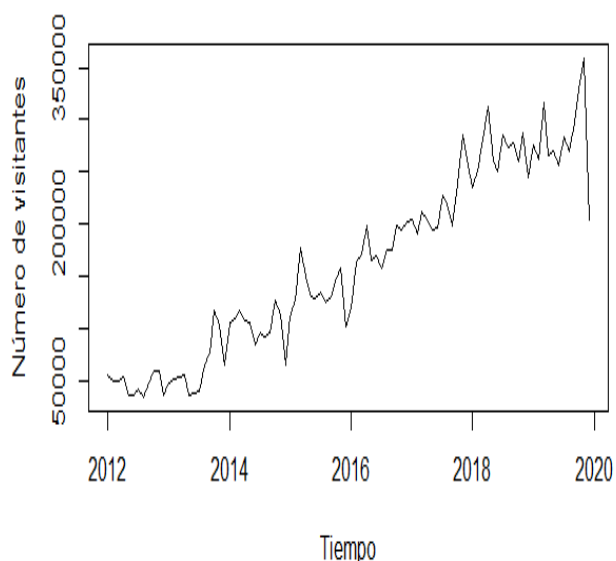
Thus allowing sustained growth, becoming important destinations where specialties and subspecialties participate that would enable the flow of international travelers to receive international medical services such as consultations, surgical interventions, hospitalization, medicines, knowledge of health policies, scientific advances, and even participation in medical research rethinking strategies for specific care, campaigns for recession and involvement of specialists worldwide, the design of a policy against medical tourism as a source of competitiveness, construction of leveraged medical

associations and oriented to public health policy that ultimately represents health and well-being (Campbell et al., 2021).

4. Results of the estimation to determine the COVID-19 impact on the number of foreign visitors for health and medical care reasons in Colombia for the years 2020 and 2021

The following graph shows the monthly behavior of foreign visitors to Colombia for health and medical care reasons from 2012 to 2020. The minimum data was 34,131 visitors, while the maximum corresponds to 359,116, with an average of 161,176 and a median of 157,404.

Graph 1: Evolution of the number of visitors to Colombia for health reasons

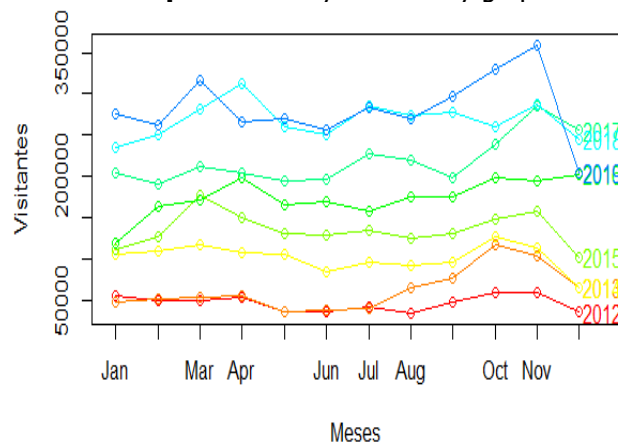


Source: Authors' calculations with information from Mincit.

The graph shows that the number of visitors to Colombia for health reasons increases over time. We can see from the chart that the series is not stationary; that is, the mean and the variance are not constant over time.

With the information revealed in the previous graph, it is necessary to visualize the data in comparison with the individual seasons, using each of the months as the season, and thus be able to identify the seasonal patterns of the series; For this purpose, we show the following graph.

Graph 2: Monthly seasonality graph

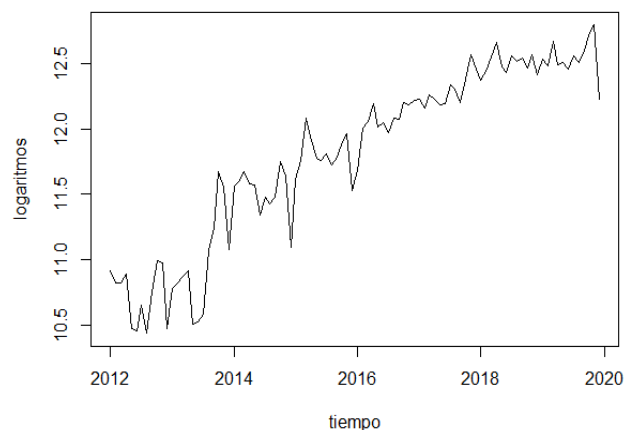


Source: Authors' calculations with information from Mincit.

When analyzing the previous visualization, we can identify some seasonal patterns, although some are not marked. We observe high peaks between March and April, a slight one in July, and another high between October and November. Also, we perceive that in all of December, we found the influx of foreign visitors for medical reasons to Colombia decreased. Likewise, we can see in the graph that December 2019 showed an even more substantial drop due to the start of the health emergency caused by Covid-19.

As identified in the first graph, we must correct the series trend to forecast. For this, we can estimate the series in logarithms or with differences. First, we evaluated it as logarithmic and applied the Dickey-Fuller test to identify the stationary series.

Graph 3: Graph in logarithmic form



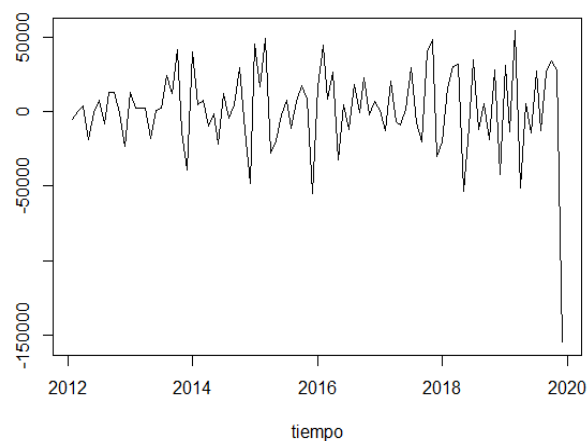
Source: Authors' calculations with information from Mincit.

Looking at the series in logarithms in Graph 3, we can identify that a trend continues to exist, so the series may continue to be non-stationary. For this, we applied the Dickey-Fuller test. The data obtained are the following:

Dickey-Fuller = -1.9028,
Lag order = 4,
p-value = 0.6166

The p-value of the test is greater than 0.05; this indicates that the hypothesis that it is not stationary is not rejected, that is, there is a unit root. So then, even though the series is in logarithms, it is still not stationary; therefore, we estimate the first difference of the original series.

Graph 4: Series with the first difference



Source: Authors' calculations with information from Mincit.

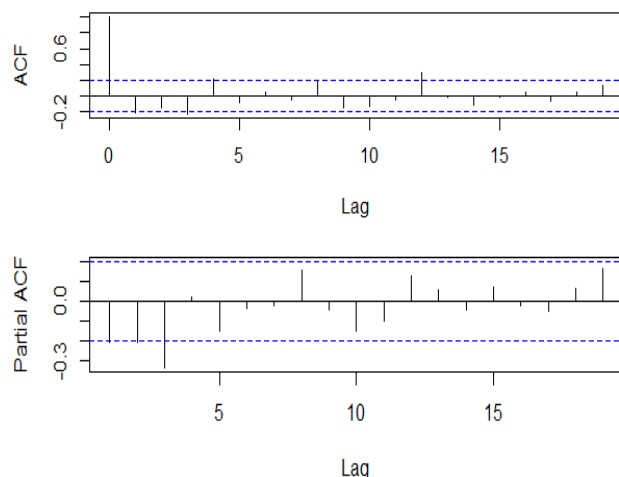
In the series with the first difference, we observe that it is stationary, with a mean of zero and a constant variance. These are characteristics necessary for the forecast model we estimate in this research. When performing the Dickey-Fuller test, we obtain the following result:

Dickey-Fuller = -6.9224,
Lag order = 4,
p-value = 0.01

As can be seen, the Dickey-Fuller test shows a p-value less than 0.005, confirming that it is a stationary series. Once we verified the above, we made an autocorrelation graph to identify the number of moving averages we must consider. Likewise, the following chart shows partial

autocorrelation. With this graph, we can determine the number of autoregressive factors for the model.

Graph 5: Partial autocorrelation graphs to identify forecast autoregressive



Source: Authors' calculations with information from Mincit.

Following the previous correlogram, the data suggest an ARIMA (3,1,1) model, estimated and diagnosed to identify its fit. The ARIMA (p,d,q) model, in this case, ARIMA (3,1,1), by three lags of the variable (p), one differentiation (d), and one error lag (q). We formulate this model mathematically as follows:

$$\Delta y_t = \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \beta_3 \Delta y_{t-3} + \beta_4 e_t + \theta_1 e_{t-1}$$

Since it is the first difference, we can rewrite the equation as shown below:

$$y_t - y_{t-1} = \Delta y_{t-1} + \Delta y_{t-2} + \Delta y_{t-3} + e_t + \theta_1 e_{t-1}$$

So, we get:

$$y_t = \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \beta_3 \Delta y_{t-3} + e_t + \beta_4 e_{t-1} + y_{t-1}$$

Where:

- y_t = the number of foreign visitors for health and medical care reasons for period t.
- y_{t-1} = number of foreign visitors for health and medical care reasons for the period t -1

- Δy_t = difference of the series of the number of foreign visitors between time t and its delay; that is, $y_t - y_{t-1}$
- Δy_{t-1} = difference of the series of the number of foreign visitors between time t - 1 and its delay.
- Δy_{t-2} = difference of the series of the number of foreign visitors between time t - 2 and its delay.
- Δy_{t-3} = difference of the series of the number of foreign visitors between time t - 3 and its delay.
- e_t = Error component at time t.
- e_{t-1} = Error component at time t -1
- $\beta_{1,2,3,4}$ = Coefficients or estimators

The following table shows the estimated model.

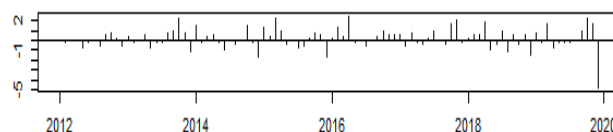
Table 2: Estimated model

ARIMA model (3,1,1)			
Coefficients:			
Ar1	Ar2	Ar3	Ma1
-0.6226	-0.4722	-0.5082	0.2373
HE:			
0.3462	0.1600	0.1214	0.4087
R^2	0.9176068		
sigma^2 estimated as 6.07e+08: log likelihood = -1095.92, aic = 2201.85			

Source: Authors' calculations with information from Mincit.

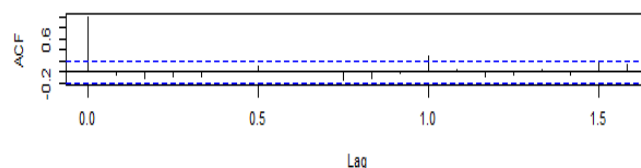
The following graphs show the diagnosis of the model.

Graph 6: Graph for standardized residuals



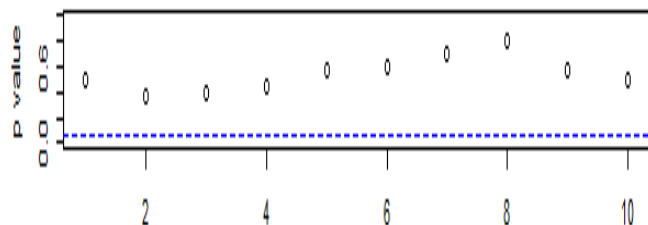
Source: Authors' calculations with information from Mincit.

Graph 7: ACF graph of residuals



Source: Authors' calculations with information from Mincit.

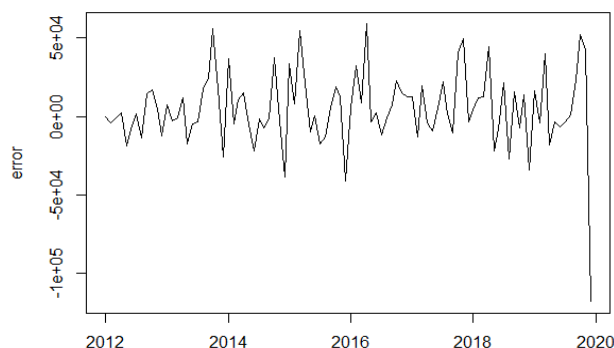
Graph 8: P-values graph for the Ljung-Box statistical test



Source: Authors' calculations with information from Mincit.

The previous graphs show that the standard errors have a white noise behavior, which makes the model robust in the forecast. We verify it for the p values of the Ljung – Box test shown in the graph. The following chart reflects the behavior of the errors, and we applied the Box-Ljung test again to verify if there is white noise in the errors.

Graph 9: P-values graph for the Ljung-Box statistical test



Source: Authors' calculations with information from Mincit.

Table 3: Box-Ljung test for errors.

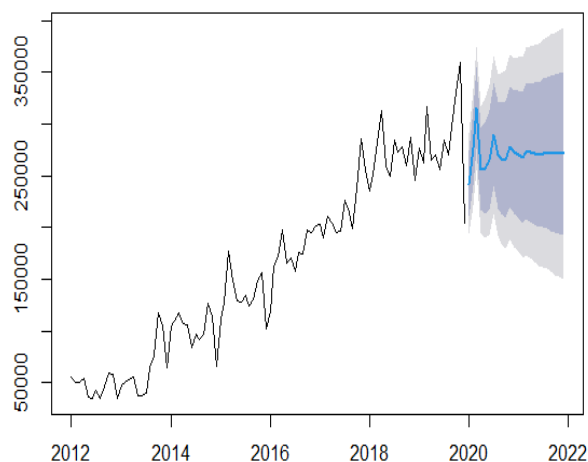
Box-Ljung test for errors
X-squared = 0.47021, df = 1, p-value = 0.4929

Source: Authors' calculations

The p-value is greater than 0.05; the error has white noise, with a mean equal to zero, constant variance, and is not serially correlated; therefore, the estimated model fits the data used well.

Once we corroborated the estimated model, we forecasted 2020 and 2021. The following graph shows the evolution of the data and the estimated forecast.

Graph 10: The estimated forecast with the ARIMA model (3,1,1)



Source: Authors' calculations with information from Mincit.

The previous graph shows the estimated monthly projection for 2020 and 2021 of tourist visitors for health and medical care reasons that Colombia would probably have had, according to the behavior of the data and without the Covid-19 health emergency. The blue line is the estimated average forecast.

According to the projections obtained for the model, by 2020, Colombia would have had around 3,253,234 foreign visitors for health reasons. Comparing this information with real visitors, we found that only 41% of the estimated (1,319,289) arrived in Colombia for health reasons. So, the negative impact of Covid 19 on visitors to Colombia for health reasons in 2020 was around 59%, with an approximate effect of 1,933,945 fewer foreign visitors. Undoubtedly this affected the development of the supply of medical services in Colombia and the economic dynamism of providers of medical services to foreigners.

For 2021, the forecast was 3,270,500 foreign visitors, on average, for health reasons. Comparing with real value, we found that only 75% of that (2,436,607) arrived in Colombia for 2021, with an estimated difference of 833,894. The previous shows that the health emergency's effect had an essential negative impact for 2021, although economy reactivation.

5. Conclusions

Medical tourism has become a driver of development in Colombia, not only for the health sector but also for tourism and the economy in general, where the government plays a fundamental and strategic role in managing and connecting with the authorities. Regulations, thus allowing the combination of health, tourism, and economy. The country has capacities and potential for this sector, especially in cities such as Cartagena de Indias, Barranquilla, Medellín, Cali, Bucaramanga, and Bogotá. In addition to the installed health capacity, outstanding professionals with advanced techniques and methods in the health sector, and a typical (regulated) health sector, these cities have added value due to: extensive geographical tourist attractions, historical wealth, aspects cultural, weather, gastronomy.

In the first section of the present investigation, we identify the factors that promote or hinder medical tourism in Colombia through a systematic review of studies published in several databases. With this analysis, we conclude that there are more limiting elements than promoters for the medical tourism industry in Colombia. The strategies of tourism managers and authorities have a significant impact on the greater attraction of tourists. In addition, the first section allows us to appreciate the medical responsibility for the implements they use in medical procedures; these implements can cause harm to patients and damages that arise from the handling of defective prostheses for which malpractice.

Once we identify the factors that affect the development of medical tourism with the systematic review, we estimate the impact of the

health emergency on the number of foreign visitors for health and medical care purposes. According to the historical evolution of the number of foreign visitors and the robust econometric model estimated, by 2020, around 3,253,234 visitors for health reasons would have arrived in Colombia if the pandemic had not occurred. By 2021, close to 3,270,500 visitors would have come to the country if did not appear the sanitary emergency. However, for the health emergency, only 41% of the estimated visitors arrived in Colombia in 2020; for 2021, only 75% of the estimated projection came to the country; although the sector had recovered due to the lifting of restrictions, the negative impact was considerable.

From the beginning of the health emergency, researchers estimated that economic and social activity involvement would be affected. Without a doubt, this health emergency not only brought consequences in these socioeconomic aspects, such as the lack of employment and an increase in inequality. The health emergency also affected the development of the supply of medical services in Colombia and the economic dynamism of providers of medical services to foreigners.

For that reason, it was necessary to measure the adverse effects that this problem brought to be able to visualize, take measures and join efforts so that the productive and social sectors could return to normality, gradually this impact. This phenomenon affected 2020 (the year of more significant restrictions) and 2021. In 2021, people were expecting a better evolution due to having removed most of the limits for this sector; therefore, we identified that the health emergency caused a negative structural impact on the growth of the medical tourism sector.

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