Evolution of COVID-19 in Londrina (State of Paraná – Brazil) between March and August of 2020

Evolução da COVID-19 em Londrina (Paraná – Brasil) entre Março e Agosto de 2020

Aline Midori Susuki[1]; André Silva Olak[2]; Ana Luiza Favarão Leão[3];
Milena Kanashiro [4]; Mariana Ragassi Urbano[5]

Abstract

The pandemic situation of COVID-19 has provided strong impacts that can be observed everywhere, especially in underdeveloped countries. The purpose of this paper is to describe the evolution of COVID-19 pandemic in the city of Londrina (second biggest city of State of Paraná – Brazil) between March 9 and August 10 of 2020. For that, spatio-temporal descriptive and statistical analysis were performed to identify its evolution in the city. The first cases of COVID-19 in Londrina were registered in March (considering the symptoms onset day) and were located in central and southern regions of the city, both with high vertical residential density and higher average incomes. Soon, COVID-19 exponentially increased in a short period of time with a reproduction number, $R_0 = 1.45$. However, some measures adopted by the city Hall and Paraná State Government slowed down the evolution of cases in Londrina, like the suspension of non-essential activities and classes in the very beginning of the pandemic, and also the expansion of intensive therapy units (ITU) in existing hospitals, which avoided a collapse in the healthy system of the city. Such findings can be helpful to avoid a second wave of COVID-19 cases, and ways to deal with future pandemics.

Keywords: Pandemic. Spatio-temporal description. SARS-CoV-2. Statistical analysis.

Resumo

A situação pandêmica da COVID-19 tem proporcionado fortes impactos que podem ser observados em diversos lugares, especialmente em países subdesenvolvidos. O objetivo deste artigo é descrever a evolução da pandemia na cidade de Londrina (segunda maior do Estado do Paraná - Brasil) entre os dias 9 de março e 10 de agosto de 2020. Para tanto, foram realizadas análises descritivo espaço-temporal e estatísticas para identificar a sua evolução na cidade. Os primeiros casos foram registrados no mês de março (considerando o dia do início dos sintomas) e localizavam-se nas regiões centro e sul da cidade, ambas com alta densidade residencial vertical e renda média elevada. Logo, a COVID-19 aumentou exponencialmente em um curto período de tempo com um número de reprodução, $R_0 = 1,45$. Porém, medidas adotadas pela Prefeitura e Governo do Estado do Paraná retardaram a evolução dos casos em Londrina, como a suspensão de atividades e aulas não essenciais logo no início da pandemia, e também a ampliação das unidades de terapia intensiva (UIT) em hospitais existentes, o que evitou o colapso do sistema de saúde da cidade. Essas descobertas podem ser úteis para evitar uma segunda onda de casos de COVID-19 e maneiras de lidar com futuras pandemias.

Palavras-chave: Pandemia. Descrição espaço-temporal. SARS-CoV-2. Análise estatística.

[1] Master student, Postgraduate Program of Architecture and Urbanism, Paraná, Brazil; E-mail: alinemidori.arq@gmail.com
[2] Me., Department of Statistics, UEL, Londrina, Paraná, Brazil, Brazil; E-mail: andre_olak@hotmail.com
[3] PhD Student, Postgraduate Program of Architecture and Urbanism, Londrina, Paraná, Brazil; E-mail: analuiza.favarao@uel.br
[4] Prof[a]. Dr[a]., Department of Architecture and Urbanism, PPU/UEL-UEM, Londrina, Paraná, Brazil; E-mail: milena@uel.br
[5] Prof[a]. Dr[a]., Department of Statistics, PPU/UEL-UEM, Londrina, Paraná, Brazil; E-mail: mrurbano@uel.br

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Introduction

The pandemic situation of COVID-19, caused by the SARS-CoV-2 virus, has caused strong impacts that go beyond the health aspect. The effects of this pandemic pervade cities around the world, which face a scenario illustrated by uncertainties in the social, economic, cultural and political spheres. Within a few weeks, the epidemic outbreak of COVID-19, unleashed in the Chinese city of Wuhan in December 2019, spread rapidly to other locations outside China. Unlike other pandemic episodes in history (DHAVAL, 2020), COVID-19 has a very accelerated potential for dissemination due to the mode of disease transmission (WHO, 2020).

Since the 17th century, infectious diseases have become the center of concern and have permeated much of cities evolution after intense epidemiological crises (DEJTIAR, 2020; MUGGAH; ERMACORA, 2020), as the cholera outbreak, the bubonic plague, tuberculosis and the Spanish flu. These and other epidemics contributed to the development of infrastructures aimed to guarantee health and hygiene for urban residents, leading to health innovation that promoted an increase in people's life expectancy (MEGAHED; GHONEIM, 2020). These historical events of coping with past pandemics have promoted an understanding of how they mapped the growth and progress of cities (DHAVAL, 2020; JOHNSON, 2007).

Although diseases are catastrophic in societies as they have unequal impacts and geographical extensions (MCLAFFERTY, 2020), they can be considered ways to deal with new challenges and transformations that assist in assertiveness of future problems. Without the availability of antiviral drugs (SHEREEN *et al.*, 2020), the possible and unknown genetic mutations of the COVID-19 virus, some preventive measures have been taken to minimize the spread of the disease, such as social isolation, quarantine, more hygiene care, the use of masks and restriction of people movement.

Brazil, ranked between the low and upper middle income countries with deep social disparities, is located in South America, with an estimated population of more than 200 million inhabitants. The Brazilian Unified Health System ("Sistema Único de Saúde" SUS) provides universal and free access to a comprehensive set of healthcare services for the population (BOTEGA; ANDRADE; GUEDES, 2020). According to Correa-Galendi *et al.* (2020) about 70% of the population is exclusively insured with SUS and private insurance offers supplementary coverage.

The first COVID-19 case in Brazil was confirmed by the Brazilian Ministry of Health in February 25, 2020. This event also represented the first case of COVID-19 in the South American region with a population of over 640 million people (RODRIGUEZ-MORALES *et al.*, 2020).

In 2020 the fall season started in Brazil in March, 20 until June, 19 followed by the winter up to September 22. On this period, the incidence of respiratory diseases tends to increase (cold, flu, asthma attacks, sinusitis, pneumonia, bronchitis). Considering that the symptoms of flu and COVID-19 are similar, the Ministry of Health anticipated the usual free vaccination for influenza, for major risk groups, in order to help health professionals, rule out influenza in patient screening and improve diagnosis of COVID-19 (OLIVEIRA, 2020).

When it comes to testing in Brazil, the COVID-19 tests were initially available only for people with "Severe Acute Respiratory Syndrome" and health professionals. However, with the advance of the pandemic to the interior of the country, there was greater concern with the cases of asymptomatic individuals or those with mild symptoms. Therefore, since June 2020, the testing capacity has been expanded in locations with higher incidence of the virus. In August 2020, Brazil presented more than three million cases of COVID-19 and more than 100,000 deaths.

The State of Paraná, located in the south of Brazil, is divided in four health macro-regions: macro-regional east, macro-regional west, north macro-regional and northwest macro-regional. The city of Londrina is in the north of the State of Paraná (Figure 1). The health macro-regions in the State of Paraná are subdivided into twenty-two "Health Regionals". The 17ª Health Regional comprises 21 cities with an estimated population of 972,283 inhabitants, being the second largest, succeeding the 2nd Health Regional, from which the state capital Curitiba is part of. Londrina is the major city of the 17ª Health Regional and has an estimate population of 575,377 inhabitants according to IBGE (2020).

In March, 11, 2020, COVID-19 was classified as "pandemic" by the OMS, and after the confirmation of the first COVID-19 case in Londrina in march 18, 2020, the city Hall and the Paraná State Government established some coping measures to contain the spread of the virus at an early stage.

From March, 22, 2020 to April, 19, 2020 activities considered essentials kept working, such as: health care facilities, medical and hospital assistance services; daily supplies of distribution and sale of medicines and foodstuffs and gas stations; infrastructure supplies as

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Figure 1 – Location of State of Paraná and Londrina city in Brazil and Health Regions Divisions Scheme in the State of Paraná.
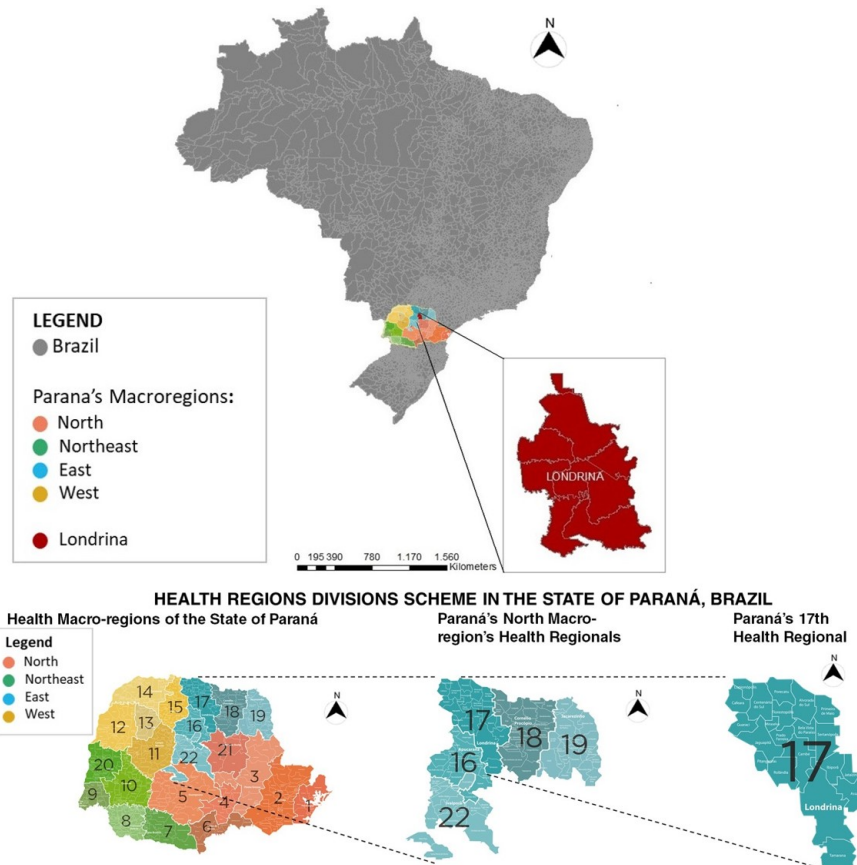
electricity, gas, water, sewage and garbage collection and treatment; public and private security; telecommunications and press services; veterinary clinics and animal supply stores (food and medicines); funeral services; and data processing related to essential services. Those considered non-essentials were suspended by the city Hall (The complete list of essential and non-essential activities is in the Appendix).

In April, 3, 2020, with 76 cases registered in the city, were also closed public spaces as parks, squares, lakes, walking tracks, cycle paths, open-air gyms and the agglomeration of people (in any number), in these places was prohibited. It is worth noting that, in April, 9, 2020 the use of masks outside of home became mandatory. These were some of the various measures adopted by the City Hall of Londrina, and the preventative measures of the last decrees were still in course up to August, 10, 2020.

Not only the municipal authority but also the Paraná State Government decreed a lot of measures to contain the spread of COVID-19. Two of them included Londrina: the first starting in March 20 was the suspension of all level classes and universities (still in course up to August, 10, 2020); the second, established in July 1, 2020,

suspended once more non-essentials activities (The complete list of essential and non-essential activities is in the Appendix). In Londrina, due to some local authority decisions the State Government decree started in July 6, 2020 and finished in July, 14, 2020.

The transportation from Londrina to other cities was also impacted. In March, 20, 2020 the Paraná State Government, restricted the entrance and circulation of buses from other States in Paraná for 14 days. In Londrina, the airport did not operate commercial flights between April, 14, 2020 and May, 4, 2020.

The World Health Organization (WHO) guidelines before the COVID-19 pandemic, had recommended between 10 and 30 ITU for each 100,000 people. Therefore, due to the high occupancy rate of intensive therapy units (ITU) caused by this disease, many cities adopted the construction of field hospitals to provide more hospital beds.

Before the pandemic Londrina presented 198 ITU (considering the ITU just for adult patients) which correspond to 34.75312 ITU for each 100,000 inhabitants, higher than the recommend for the WHO, and also higher than State of Paraná, with 17.99027 ITU for each 100,000 inhabitants, and even higher compared to other States very

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affected by the COVID-19 pandemic, as State of Amazonas – Brazil (ORELLANA *et al*., 2020) with 7.021189 ITU for each 100,000 inhabitants and State of Ceará-Brazil (LEMOS *et al*., 2020) with 9.450204 ITU for each 100,000 inhabitants.

In Londrina instead of building a field hospital, the ITU of the Brazilian Unified Health System for COVID-19 patients were expanded in existing hospitals. The city had 36 ITU exclusively for COVID-19 patients of the Brazilian Unified Health System until June, 4, 2020. The ITU expansion happened in two hospitals. In a private hospital, 50 ITU were hired by the city Hall of Londrina starting in June, 5, 2020, and until August, 10, 2020 these ITU were still hired and in use. In Londrina, the new building of the Maternity that belongs to the Hospital of the State University of Londrina was ready but not activated yet, and with the COVID-19 pandemic and financial resources of the City Hall and Paraná State Government were activated ITU (10 ITU in June, 16, 2020 and more 20 ITU in July, 21) for treatment of those with COVID-19. The whole capacity was expanded from 36 ITU in June, 4, 2020 to 116 until July, 21, 2020. It is understood that the availability of hospital beds are parameters for ensuring municipal health care to support decision-making actions in this pandemic situation.

The aim of this research is to describe the spread of COVID-19 in Londrina between March 9, 2020 (symptoms onset day of the first three cases in the city) and August, 10, 2020, and some governmental decisions to deal with this pandemic in the city. The city of Londrina was chosen due to the characteristics of regional centrality that it presents and because it is considered a reference in health care (NUNES; ALAPANIAN, 2005).

Materials and Methods

Data

The data used in this research were the confirmed COVID-19 cases in Londrina and additional information of the cases as symptoms onset date, address, gender, age, hospitalization in ITU and death. The symptoms onset date was used because is considered less biased compared to the date of the performed exam, or the confirmation date, taking into account that the COVID-19 exams are performed in different laboratories, with different processing dates, and the daily number of COVID-19 cases are usually published based in the confirmation date. For the asymptomatic cases, the symptoms onset dates were estimated according to the dates of the performed exams. The period considered was between March 9, 2020 and August, 10, 2020, with the cases updated until August, 25, 2020. All the data was provided by the City Health Secretary of Londrina and the project was approved by the ethical committee under n° 36044520.5.0000.5231.

Spatio-temporal descriptive analysis

The Spatio-temporal descriptive analysis was performed with the aim to identify the spread of COVID-19 in Londrina.

The addresses of those that tested positive for COVID-19 were collected, and the cases were georeferenced in a Geographic Information System environment (2020) according to the symptoms onset date of COVID-19.

Statistical analysis

The statistical analyses were performed to identify some characteristics of COVID-19 cases in Londrina, as gender, age, hospital internment in ITU and death. Using the SIR model, were performed projections and calculated the reproduction number (R_0), that reflects the ability of an infection under no control (YOU *et al*., 2020), in which R_0 values over 1, indicates that the infection trends to increase, and R_0 values lower than 1, indicates that the infection trends to slow down. All the analyses were conducted in software R (R CORE TEAM, 2020).

Results

The first three patients with COVID-19 from Londrina presented symptoms on March, 9, 2020, and had returned from international travels, two people from the USA and one from Italy. In the first 14 days (between March, 9 and March, 22) Londrina had 34 cases of COVID-19, and is possible to verify that cases increased exponentially in this period (Figure 2).

Until August, 10, 2020, the city had 4509 cases, 2465 (54.67%) female with mean age of 40.97 years, 2044 (45.33%) male with mean age of 41.74 years and 22,646 RT-PCR tests for the detection of COVID-19 had been performed. The first death by COVID-19 was in April, 3, 2020, and until August, 10, 2020, 140 deaths had been registered. The SIR model was used to calculate the reproduction number (R_0), which was 1.45 between March, 9, 2020 and March, 22, 2020. The number of cases until August, 10, 2020, could have been reached in April, considering $R_0 = 1.45$ (Figure 3).

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Figure 2 – Accumulated cases (absolute numbers (a) and in log-scale (b)) of COVID-19 between March, 9, 2020 and March, 22, 2020.
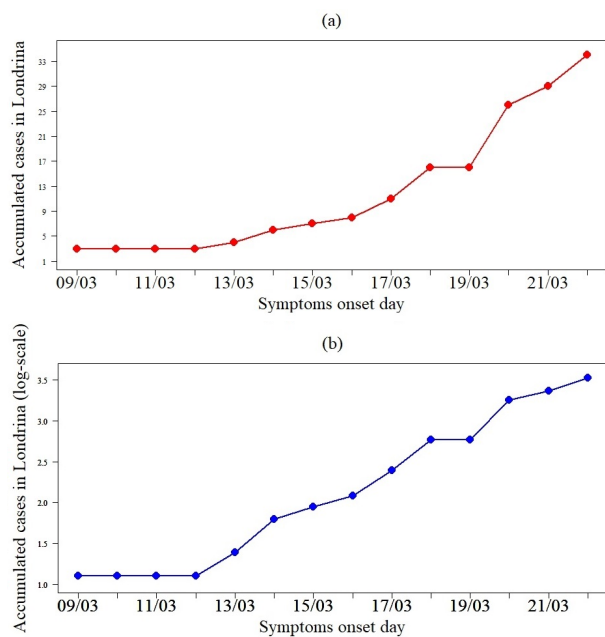
Source: The authors.

The higher number of COVID-19 daily cases was in July, 11, 2020 with 113 cases followed by August, 10, 2020 with 104 cases. The R0 values were calculated for each 15 days since March, 09, 2020, with the R_0 values starting in March, 23, 2020. Until August, 10, 2020, the R_0 values presented variation but always with values over 1 (Figure 4).

The R_0 reached the highest value between March, 11, 2020 and March, 25, 2020 with $R_0 = 1.539$ and the lowest between April, 18, 2020 and May, 2, 2020 with $R_0 = 1.016$. The fall in the R0, in the end of March can be considered a result of the actions performed by the city hall of Londrina, Paraná State Government, and also the media coverage about the COVID-19 showing the impacts of this disease all over the world.

The spatio-temporal distribution of COVID-19 cases according to the symptoms onset date in Londrina are presented in Figure 5. In the beginning (map 1), most of the cases were in the central region and in the Gleba Palhano neighborhood, located in the southern region of the city. Both neighborhoods have in common characteristics of high and vertical residential density, in addition to concentrating higher average incomes.

It can be observed that from March, 23, 2020 until May 6, 2020, there was a decrease in the R_0 rate, that was closer to 1. In this period, just a few cases were registered as shown in maps 2, 3 and 4, Figure 5. Despite the initial trend of cases concentration in the central region and in the Gleba Palhano neighborhood, new cases started to appear evenly in different regions of the city.

On April, 20, 2020, considering the pressure from commercial establishments and entities for the return of activities due to the proximity to the national holiday of Mother's Day on May 10, 2020, a new decree allowed the return of several activities that had been previously prohibited or restricted. An increase in R_0 can be observed few weeks later.

A new spatial evolution behavior of COVID-19 cases can be observed. On map 06, Figure 5, almost all neighborhoods in the city of Londrina had confirmed cases. The highest concentration of cases remained in the center and the southern region, but also began to spread to the entire portion of the extreme north region. All these areas are the most populous in the city. In this period the R0 presented a high value, with $R_0 = 1.29$.
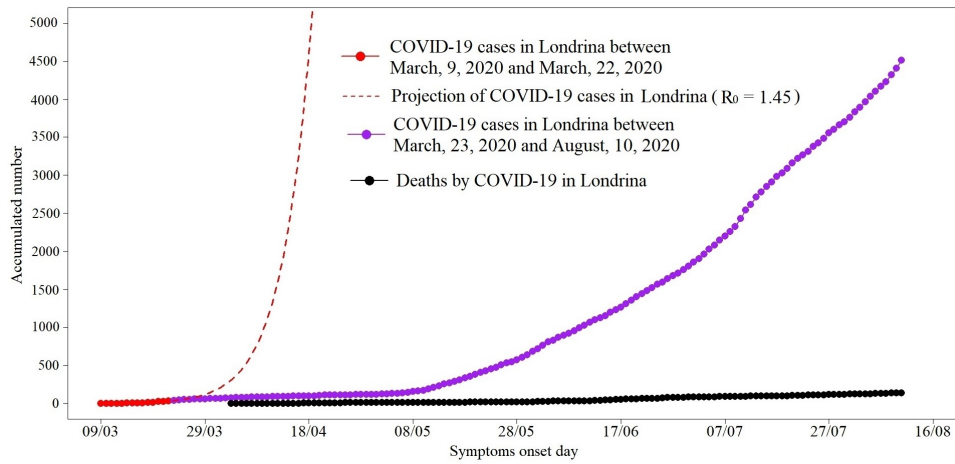
The spread of the disease throughout the city affected social strata from the highest to the most vulnerable. On maps 7 and 8, Figure 5, can be noticed that the north and southeast regions were affected, areas of the city with most vulnerable population when it comes to socioeconomic characteristics.

The greater number of recorded cases by neighborhoods was of 83 people within the analyzed period (March, 9, 2020 until August, 10, 2020), as shown in map 10. The south, north and central regions were the most affected in a two-week period, as can be noticed in maps 06 to 10, Figure 5.

The ITU total occupation in Londrina (units of the Brazilian Unified Health System and private units), and total occupation of ITU by Londrina inhabitants with COVID-19 between April, 27, 2020 and August, 10, 2020, are presented on Figure 6.
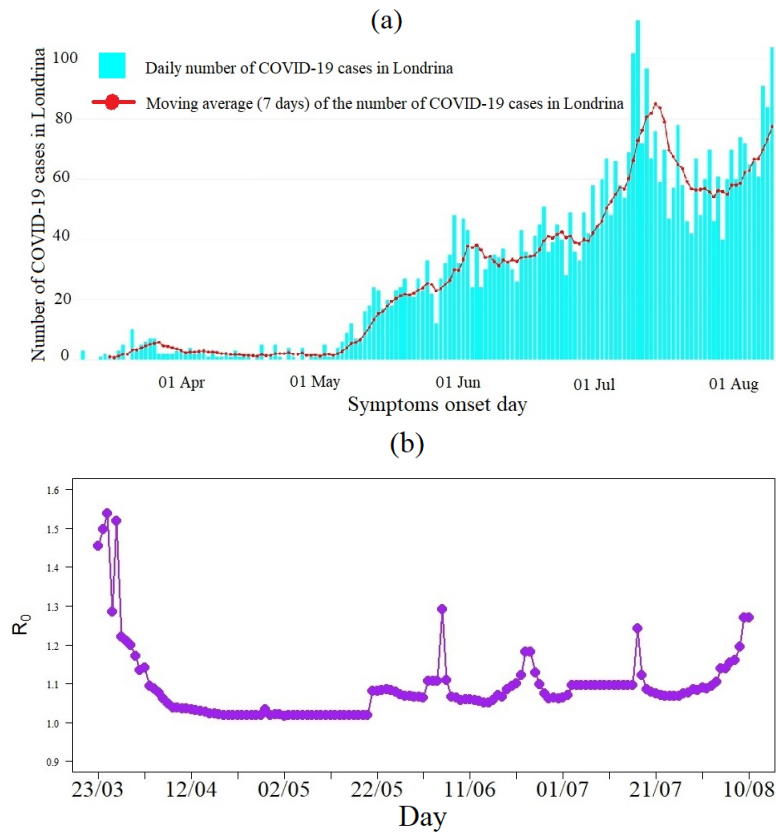
In this period, the ITU were expanded in existing hospitals, from 198 ITU in April, 2020 to 292 ITU in July, 2020. The higher occupancy in this period, considering the percentage was in May, 14, 2020 with 150 ITU occupied from 208 available, corresponding to 72.11%. The lowest occupancy was in July, 8, 2020 with 138 ITU occupied from 262 available, corresponding to 52.67%. The ITU of the Brazilian Unified Health System in Londrina just for COVID-19 patients, with the respective occupancy, between July, 1, 2020 and August, 10, 2020 are presented in Figure 7. The occupancy includes COVID-19 cases from Londrina, from the 17ª Health Regional and from other cities (all attended by the Brazilian Unified Health System).

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Figure 3 – Accumulated cases and deaths by COVID-19 with fitted curve obtained in the SIR model.
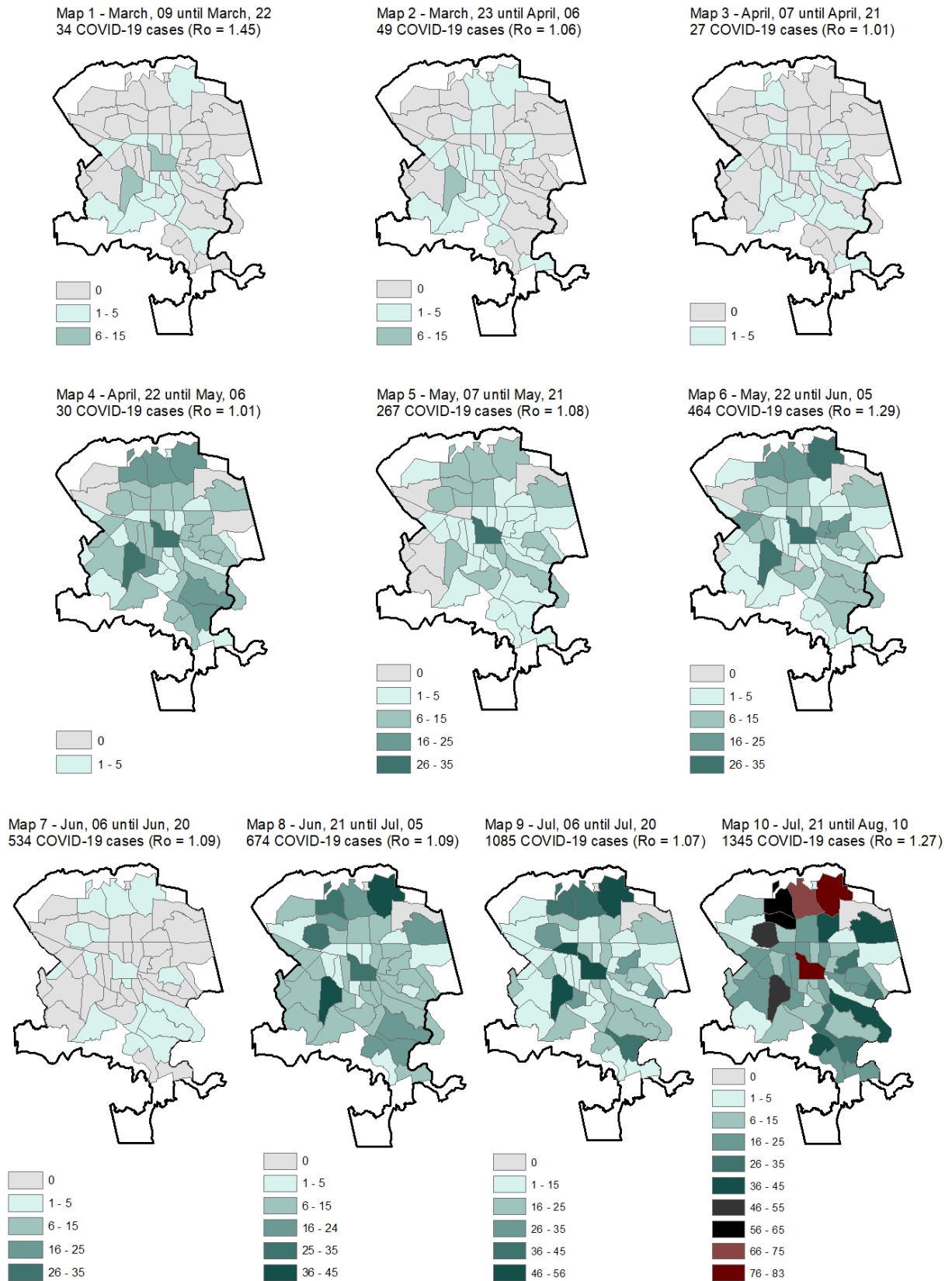
Figure 4 – Daily cases of COVID-19 between March, 9, 2020 and August, 10, 2020 (a) and R_0 calculated using the SIR model, for each 15 days (b).
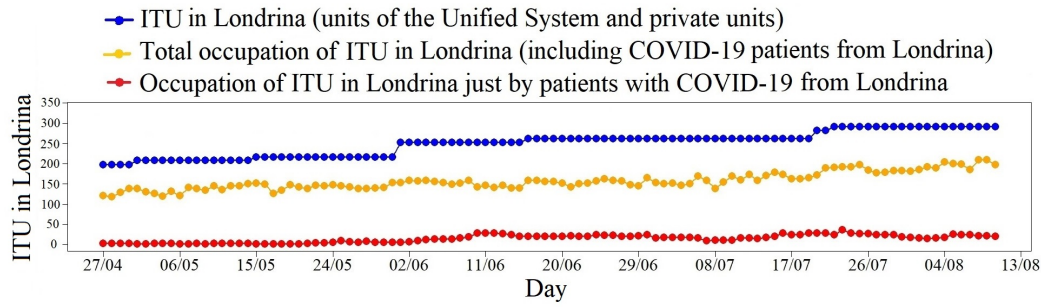
(a)

(b)

Figure 5 – Georeferenced cases of COVID-19 in Londrina according to the symptoms onset day (March, 09, 2020 until August, 10, 2020).

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Figure 6 – Intensive therapy units in Londrina (units of the Brazilian Unified Health System and private units), total occupation, and occupation of ITU by Londrina inhabitants with COVID-19 between April, 27, 2020 and August, 10, 2020.

Source: The authors.

Figure 7 – Intensive therapy units in Londrina (units of the Brazilian Unified Health System) just for COVID-19 patients, including cases from Londrina, from the 17ª Health Regional and also from other cities between July, 1, 2020 and August, 10, 2020.
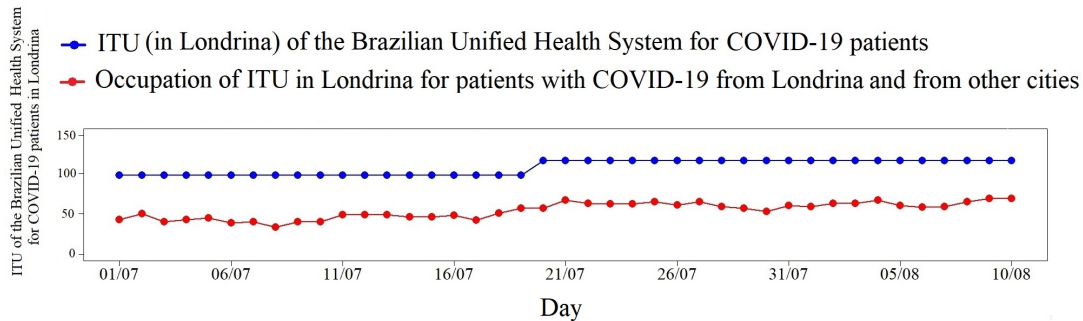
Source: The authors.

The higher occupancy in this period, considering the percentage was in August, 9, and August, 10, 2020 with 69 ITU occupied from 116 available, corresponding to 59,48%. The lowest occupancy was in July, 8, 2020 with 33 ITU occupied from 98 available, corresponding to 33.67%. The expansion of ITU in Londrina was very important, which avoided a collapse in the healthy system.

Conclusion

COVID-19 in Londrina "officially" started in march 9, 2020 (considering the symptoms onset date) with three cases, from people that had returned from USA and Italy, reached 4509 cases and 140 deaths until August, 10, 2020 and is still in course in the city.

In this research were presented the results considering the confirmed cases of COVID-19 in Londrina, but just like in other cities there is also a lot of underreporting due to the lack of massive testing for patients, either asymptomatic or symptomatic (BRITO; RIBEIRO; SILVA-FILHO, 2020).

After the confirmation of the first case of COVID-19 in Londrina, the evolution of the disease in time and its distribution in space was georeferenced. A total of 21 epidemiological weeks of occurrence of COVID-19 were analyzed. The situation presented by the maps refers to the evolution of the pandemic to all neighborhoods in the city, having a greater impact in the most densified regions highlighted in the central region, Gleba Palhano neighborhood and north region. It should be noted that the first preventive measures established by the local government were related to slow down the spread of the virus.

The spatio-temporal descriptive analysis and statistical analysis performed showed that the Covid-19 highly impacted Londrina in many ways, as happened to other cities affected by the COVID-19 pandemic. The suspension of nonessential activities also happened in other cities in this period, with the aim to avoid personal contact but as a collateral effect leading to an increase in unemployment and negative impacts in the economy (NICOLA *et al.*, 2020).

All the measures implemented by the Government authorities causing restrictions of some activities had the same objective, reduce people agglomeration to contain the spread of COVID-19.

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Considering that Londrina is part of the 17º Health Region, and the health system in the analyzed period was able to supply hospital beds without collapsing, as happened in other cities in Brazil also affected by the COVID-19 (ANDRADE, 2020; LEMOS *et al*., 2020), the measures adopted for Londrina by the governmental authorities can be considered appropriated.

Since the beginning of the pandemic in Londrina, the city Hall formed various groups for coping with COVID-19 in the city, including weekly meetings to discuss the evolution of cases and the possible measures to be adopted in order to slow down the spread of COVID-19. The communication with the population happened very often using social medias as Facebook (https://www.facebook.com/saudelondrinaoficial/), Instagram (@saudelondrinaoficial), the COVID-19 panel (http://saude.londrina.pr.gov.br/painelcovid19) and also the official web page of the Londrina city Hall (https://www.londrina.pr.gov.br/).

If the decisions of the city Hall and Paraná State Government had not been implemented early, the number of COVID-19 cases and deaths in Londrina would probably be higher, considering the R0 = 1.45 in the first 14 days, and the exponential growth of the cases of COVID-19 just like in other cities (CANALS *et al*., 2020; COURTEMANCHE *et al*., 2020; LI *et al*., 2020).

As long as the population is not immunized against the virus, it is not possible to predict the end of this pandemic, and without contention measures there are chances of a second wave of COVID-19. (PANOVSKA-GRIFFITHS *et al*., 2020; XU; LI, 2020).

Acknowledgments

Appendices

List of activities considered non-essential and suspended by the city Hall from March, 22, 2020 until April, 19, 2020:

I - shopping malls and galleries;

II - retail and wholesale stores;

III - theaters, cinemas, concert halls and other event venues;

IV - restaurants, bars, pubs and snack bars;

V - nightclubs, lounges, tobacconists, nightclubs and similar;

VI - clubs, recreational and associations;

VII - fitness centers;

VIII - common areas, playgrounds, ballrooms, swimming pools and gyms in condominiums;

IX - cults and religious activities;

X - any other private customer service) were suspended by the city Hall, and the activities considered essentials kept working.

List of activities considered essential (kept working) by the city Hall from March, 22, 2020 until April, 19, 2020:

I - health, medical and hospital assistance services;

II - distribution and sale of medicines and foodstuffs, such as pharmacies, butchers, bakeries, fishmongers, grocery stores, markets and supermarkets;

III - generation, transmission and distribution of electricity and gas IV - gas stations and convenience stores;

V - water treatment and supply;

VI - sewage and garbage collection and treatment;

VII - telecommunications and press services;

VIII - data processing related to essential services;

IX - public and private security;

X - funeral services;

XI - veterinary clinics and animal supply stores (food and medicines);

XII - machine shops and winch services.

List of activities considered non-essential and suspended by Paraná State Government from July, 6, 2020 until July, 14 (in Londrina):

I - street commerce;

II - gyms and clubs;

III - shopping malls and commercial galleries;

IV - gas station convenience stores;

V - bars and nightclubs;

VI - barber shops, beauty clinics and beauty salons;

VII - Restaurants and snack bars only serve in drive-thru, delivery or take-away systems.

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List of activities considered essential (kept working) by Paraná State Government from July, 6, 2020 until July, 14 (in Londrina):

I - water collection, treatment and distribution;

II - medical and hospital assistance;

III - veterinary assistance;

IV - production, distribution and sale of medicines for human and veterinary use and dental-medical-hospital products, including delivery and similar delivery methods;

V - production, distribution and sale of food for human and animal use, including delivery, convenience stores and the like, even if located on highways;

VI - agriculture and livestock to maintain the supply of inputs and food necessary for the maintenance of animal life;

VII - funeral homes;

VIII - collective transportation, including taxi services and individual private paid passenger transportation;

IX - chartering for transportation of employees of companies and industries whose activity is authorized to operate;

X - transportation of professionals from services essential to health and garbage collection;

XI - sewage and garbage collection and treatment;

XII - telecommunications;

XIII - custody, use and control of radioactive substances, nuclear equipment and materials;

XIV - data processing related to essential services;

XV - press;

XVI - private security;

XVII - transportation and delivery of cargo in general;

XVIII - postal service and national air mail;

XIX - air traffic control and air navigation;

XX - payment, credit and withdrawal and investment services provided by institutions supervised by the Central Bank of Brazil, including lottery units;

XXI - medical-expert activities related to social security, included in art. 194 of the Federal Constitution;

XXII - medical-expert activities related to the characterization of the physical, mental, intellectual or sensory impairment of the person with disabilities, through the integration of multidisciplinary and interdisciplinary teams, for the purpose of recognizing the rights provided for by law;

XXIII - other medical-expert services in the career of Medical Expert, indispensable to meet the urgent needs of the community;

XXIV - industrial and civil construction sectors in general;

XXV - generation, transmission and distribution of electric energy, including the supply of supplies for the operation and maintenance of generating plants and energy transmission and distribution systems, in addition to the production, transportation and distribution of natural gas;

XXVI - public lighting;

XXVII - oil production and production, distribution and sale of fuels, liquefied petroleum gas and other petroleum products;

XXVIII - sanitary and phytosanitary surveillance and certifications;

XXIX - prevention, control and eradication of plant pests and animal disease;

XXX - inspection of food, products and derivatives of animal and vegetable origin;

XXXI - agricultural surveillance;

XXXII - production and distribution of cash to the population and maintenance of the technological infrastructure of the National Financial System and the Brazilian Payment System;

XXXIII - maintenance, assistance and marketing services for land motor vehicle or bicycle parts;

XXXIV - credit services and credit renegotiation of the financial agents that are part of the Paraná Development System, Decree No. 2,570, of October 8, 2015, amended by Decree No. 2,855, of September 24, 2019;

XXXV - labor inspection;

XXXVI - research, scientific, laboratory or similar activities related to the pandemic;

XXXVII - activities of judicial and extrajudicial representation, legal advice and consultancy performed by public lawyers, related to the regular and timely provision of public services;

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XXXVIII - religious activities of any nature, obeying the determinations of the State Department of Health and the Ministry of Health;

XXXIX - production, distribution and sale of personal hygiene products and environments;

XL - hospital and industrial laundry services;

XLI - activities of lawyers and accountants that cannot be provided through remote work;

XLII - training and qualifications required of electricians working on energy distribution contracts.

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