

RESTRICTIVE MEASURES ASSOCIATED WITH THE NEW CORONAVIRUS IN RECIFE, PE, BRAZIL

(ANÁLISE DAS MEDIDAS RESTRITIVAS ASSOCIADAS AO NOVO CORONAVÍRUS
NA CIDADE DO RECIFE)

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RESUMO

Este estudo teve como objetivo analisar as medidas restritivas adotadas em Recife (estado de Pernambuco - Brasil) e associar os casos de COVID-19 durante a pandemia. Foi realizado um estudo de coorte retrospectivo em Recife com dados relacionados às medidas restritivas para pandemias de SARS-CoV-2 de março a agosto de 2020. Os dados foram coletados de portarias publicadas pelo governo do estado e prefeitura e categorizados em quatro grupos. Casos confirmados de SARS-CoV-2 também foram coletados por meio de boletins epidemiológicos. Em seguida, analisou-se a frequência e evolução dos casos associados à implantação e duração das medidas restritivas em Recife. Apesar do aumento absoluto no número de casos, o percentual de novos casos reduziu com a implementação de medidas restritivas. Medidas restritivas podem efetivamente reduzir a taxa de disseminação do novo coronavírus e o número de casos. Portanto, medidas colaborativas devem ser adotadas pelo governo, instituições e população para o enfrentamento adequado da COVID-19.

Palavras-chave: Infecções por Coronavírus; Epidemiologia; Pandemias; Análise de dados.

ABSTRACT

This study aimed to analyze restrictive measures adopted in Recife (Pernambuco state - Brazil) and associate with COVID-19 cases during early pandemics. A retrospective cohort study was conducted in Recife with data related to restrictive measures for SARS-CoV-2 pandemics from

March to August 2020. Data were collected from decrees published by the state government and city hall and categorized into four groups. Confirmed cases of SARS-CoV-2 were also collected through epidemiological bulletins. Then, frequency and evolution of cases associated with the implementation and duration of restrictive measures in Recife were analyzed. Despite the absolute increase in number of cases, percentage of new cases reduced with restrictive measures implementation. Restrictive measures can effectively reduce the rate of spread of the new coronavirus and number of cases. Therefore, collaborative measures must be adopted by the government, institutions, and population to confront COVID-19 adequately.

Key words: Coronavirus Infections; Epidemiology; Pandemics; Data Analysis.

INTRODUCTION

Pneumonia cases of unknown cause in China were reported to the World Health Organization (WHO) in December 2019. Soon after, Chinese scientists isolated a new coronavirus specimen, performed genetic sequencing and named it severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) (GORBALENYA et al., 2020; BRASIL, 2020a). The WHO declared the new virus infection a public health emergency of international concern (WHO, 2020; OPAS, 2020). Confirmed cases of COVID-19 already exceeded 169 million worldwide, causing death of more than 4 million individuals, of which more than 500,000 were in Brazil (WHO, 2021). South America has the highest number of daily cases (256 new cases per million inhabitants) (BERMUDEZ, 2021). SARS-CoV-2 has placed global health and economy at risk (JUNIOR and SANTA RITA, 2020), causing more damage than SARS-CoV (JAMES, 2004).

Symptomatology varies and may be more severe in individuals aged over 60 years (CHEN et al., 2020), pregnant women (ESTRELA et al., 2020), and with comorbidities (ISER et al., 2020). Therefore, individuals with chronic diseases (e.g., diabetes, hypertension, or autoimmune diseases) are considered risk groups and more vulnerable to COVID-19 (ISER et al., 2020).

In this context, strategic contingency plans to control virus transmission were needed due to lack of recommended or effective treatment for SARS-CoV-2. In Brazil, the Ministry of Health implemented a national contingency plan (BRASIL, 2020b) and listed several measures to reduce disease spread (e.g., pharmaceutical assistance, health surveillance, and communication and management of risk) (BRASIL, 2020a). The most common form of virus transmission between humans is indirect contact through

respiratory droplets, aerosolized particles (LU *et al.*, 2020), and contaminated objects (NETTO & DO NASCIMENTO, 2020). In this sense, strategies to control the infection and avoid health services overload were implemented by health agencies (e.g., use of surgical masks, frequent hand and surface sanitization, and social isolation) (CARVALHO and TEIXEIRA, 2020). Therefore, this study aimed to describe restrictive measures adopted in Recife (Pernambuco state - Brazil) and associate with COVID-19 cases at early pandemics (between March and August 2020).

METHODS

Study Place

This retrospective cohort study was conducted in Recife, the capital of Pernambuco state, with 218.843 km² and an estimated population of 1,653,461 inhabitants (IBGE, 2020). It is considered the second largest medical center in Brazil and currently has 2,116 health facilities, from which 296 belong to the Brazilian Unified National Health System (SUS, acronym in Portuguese) (RECIFE, 2020). According to municipal management, Recife is inserted in the first regional health management and divided into eight health districts and six political administrative regions.

Target Population and Data Collection

Data related to restrictive measures for SARS-CoV-2 pandemic was collected from decrees of Pernambuco State government and Recife City Hall websites from March to August 2020. Subsequently, all measures were categorized into four groups: Group 1 (G1, traffic restriction): social isolation, restriction of individuals, vehicles, and circulation of motorcycle taxi; Group 2 (G2, suspension of collective activities): suspension of collective games, presential classes, cinema, and theaters; Group 3 (G3, closure of commercial establishments and recreational areas): closure of malls, gyms, beauty salons, barbershops, restaurants, bars, playgrounds, parks, Beira Rio, and Boa Viagem beach; Group 4 (G4, individual protective measures): use of hand sanitizers and masks in establishments. Measures were implemented at different periods and sometimes superposed from March to August 2020. Timeframes of each restrictive measure are shown in Figure 1.

Data regarding tested and confirmed SARS-CoV-2 cases, according to diagnostic tests available by health authorities from Pernambuco Government and scarce at early pandemics, were collected from weekly epidemiological bulletins published in the official website of the State Health Department of Pernambuco state (SES-PE). Data regarding epidemiological weeks (EW) ten to 31, according to cases notified by the Ministry of Health, were included.

Data Analysis

Data were tabulated in an Excel[®] spreadsheet to analyze frequency and evolution of cases, according to availability of diagnostic tests performed by SES-PE. Percentage of new cases per EW was calculated as the number of new cases per EW multiplied by 100 and divided by total number of accumulated cases in that EW. Subsequently, CorelDraw[®] software compiled data and created a figure using evolution of cases and implementation and duration of restrictive measures in Recife. The figure contemplated all groups (isolated or superposed) analyzed in this study: Group 1 (pink), Group 2 (blue), Group 3 (green), Group 4 (purple).

Ethical Aspects

This study was developed using public domain data available on official websites of the Municipal Health Secretariat of Recife and the State Health Secretariat of Pernambuco.

RESULTS AND DISCUSSION

Despite the increased number of cases, percentage of new cases reduced since restrictive measures were implemented in Recife (Figure 1).

GROUP 1 - Traffic Restriction

Restrictive measures for vehicles and individuals were implemented from May 16th to 31st 2020 (EW20 to EW22) as lockdown, and cases increased from 4.566 to 6.455,

however, traffic restriction may have contributed to decreasing virus spread since percentage of new cases reduced from 20.59% to 10.92% between EW20 to EW21 and EW21 to EW22, respectively.

A decree recommended social distancing from May 15th, 2020 to date, comprising all EW analyzed herein (EW10 to EW31). Therefore, social distancing was associated with oscillation of new cases because several individuals did not follow this recommendation due to working conditions and public transportation needs, which were not always adequately managed to meet needs of government-imposed measures (i.e., state and municipal decrees).

Restrictive measures to control this disease and decrease the number of new cases were needed due to limited knowledge regarding COVID-19 in early pandemics and rapid virus spread. Moreover, such restrictions must be promptly implemented to be effective (GARCIA and DUARTE, 2020). Restriction of vehicles and circulation of individuals effectively reduced new cases from EW20 to EW22 and helped to prevent contact between asymptomatic and healthy individuals.

To ensure that social distancing of infected individuals impacted virus spread, individuals who had contact with those infected should be promptly detected and remain in social distancing (AQUINO et al., 2020).

Moreover, asymptomatic cases must be controlled since this group also transmits the disease (WILDER-SMITH and FREEDMAN, 2020). Data showed that cases oscillated since social distancing implementation due to limited diagnostic tests in Pernambuco state during early pandemics. Social distancing alone is not more effective to reduce virus spread (WILDER-SMITH and FREEDMAN, 2020) than measures to reduce agglomeration (e.g., restricted circulation of vehicles, suspension of collective activities, and closure of establishments). Therefore, more diagnoses should be performed, and infected individuals identified to social distancing be effective (AQUINO et al., 2020).

Motorcycle taxi circulation was prohibited between March 23rd, 2020 (EW10) and August 17th, 2020 (EW31). New cases increased 41.30% early on this period, while only 2.27% of new cases were observed in EW31, despite 8,632 confirmed cases. Thus, restriction of motorcycle taxi traffic also reduced virus spread since staying close to the driver and sharing helmets may also transmit the virus (AQUINO et al., 2020).

GROUP 2 - Suspension of collective activities

Collective games were suspended from June 13th, 2020 (EW10) (when rate of new cases was 77.78%) to EW31. The Brazilian Soccer Commission suspended all national events, and each state started to regulate championships. Minas Gerais was the first state to suspend activities on March 15th, 2020. Other events worldwide were also suspended or rescheduled, such as the 2020 Olympics (VEJA, 2020).

Suspension of activities in schools and universities, public and private events, cinemas, and theaters started in the EW12 and are still happening. In this period, Recife increased from 27 to 8,632 confirmed cases even with restrictive measures. However, the disease spread curve reduced after suspending activities, indicating that numbers would be much bigger without restrictive measures.

Suspension of classes followed a global trend to control pandemics. Italy was the first to suspend classes but some countries (e.g., China) restarted classes on September 1st, 2020 (after 23 days without registering new cases) (EL PAÍS, 2020), demonstrating a satisfactory reopening similar to Uruguay, Germany, and Portugal (SALOMÃO, 2020). Nevertheless, classes were suspended in these countries after the second wave of new COVID-19 cases. Several cautions and biosafety measures are needed to resume activities and avoid new disease foci, such as in England (new cases detected after few days of schools opening), France, South Korea, the United States of America (TAJRA *et al.*, 2020), and other countries in Europe.

GROUP 3 – Closure of commercial establishments and recreational areas

Restrictive measures were also implemented to contribute to social distancing in public places (e.g., commercial or recreational places). According to data from the Brazilian Association of Shopping Centers, 554 malls (96%) interrupted activities in Brazil to restrict circulation of individuals and reduce virus transmission. The Pernambuco State Government published a decree prohibiting the opening of these establishments from March 17th, 2020, right after the official announcement of the pandemics.

Malls had their activities completely suspended between March 21st, 2020 (EW13) and June 6th, 2020 (EW26). Confirmed cases rose from 46 to 7,707, and percentage of new cases oscillated from 41.30% to 3.36% in EW26. Gyms, recreational centers, and working out areas were closed on March 18th, 2020 (EW12) and reopened on July 20th, 2020 (EW30), when 8,436 cases were registered with incidence rate of 2.58%. Beauty salons and barbershops were closed from March 21st 2020 (EW12) to June 15th, 2020 (EW25), when rate of new cases was 3.22%. Establishments related to gastronomy (e.g., restaurants and bars) could not open their physical space for public use between March 21st 2020 (EW12) and July 20th, 2020 (EW30), when rate of new cases was 2.58%. Recreational areas (e.g., parks, rivers, sidewalks, beaches, and the Boa Viagem waterfront) in Recife remained restricted between April 4th, 2020 (EW14) and June 20th, 2020 (EW25), when cases increased from 119 to 7,448.

The Ministry of Health, state, and municipal governments decreed safe measures on mid to late March 2020 (LUCENA et al., 2020). However, according to data from municipal decrees, such measures were not uniformly followed. For instance, open fairs were banned in some municipalities of Pernambuco (e.g., Caruaru) and allowed in other locations (e.g., Palmares) (SILVA et al., 2020). The lack of uniform safe measures in Pernambuco state enabled the spread of the virus to countryside, where higher incidence rates were registered in mid to late 2020.

Regarding restriction of individuals and intercity transport, the government of Pernambuco state initially recommended that only public servants from risk groups should not travel for work activities. For this group, intercity and interstate public and private passenger transportation of any modality (except air transportation) were prohibited (SILVA et al., 2020). After a period of evolution of cases, restriction of intercity transport was recommended to the entire population, limiting displacement of people and increasing permanence at home (SILVA et al., 2020).

The decree published by the Federal Government (Decree 10344/2020) included gyms and beauty salons in the list of essential services and activities, which was contested by several states. However, final decision regarding COVID-19 safe measures was under responsibility of state governments (PETHERICK *et al.*, 2020). Therefore, on March 18th, 2020, the governor of Pernambuco state decided to close malls, beauty salons, restaurants, and similar places to control the emergence of new cases.

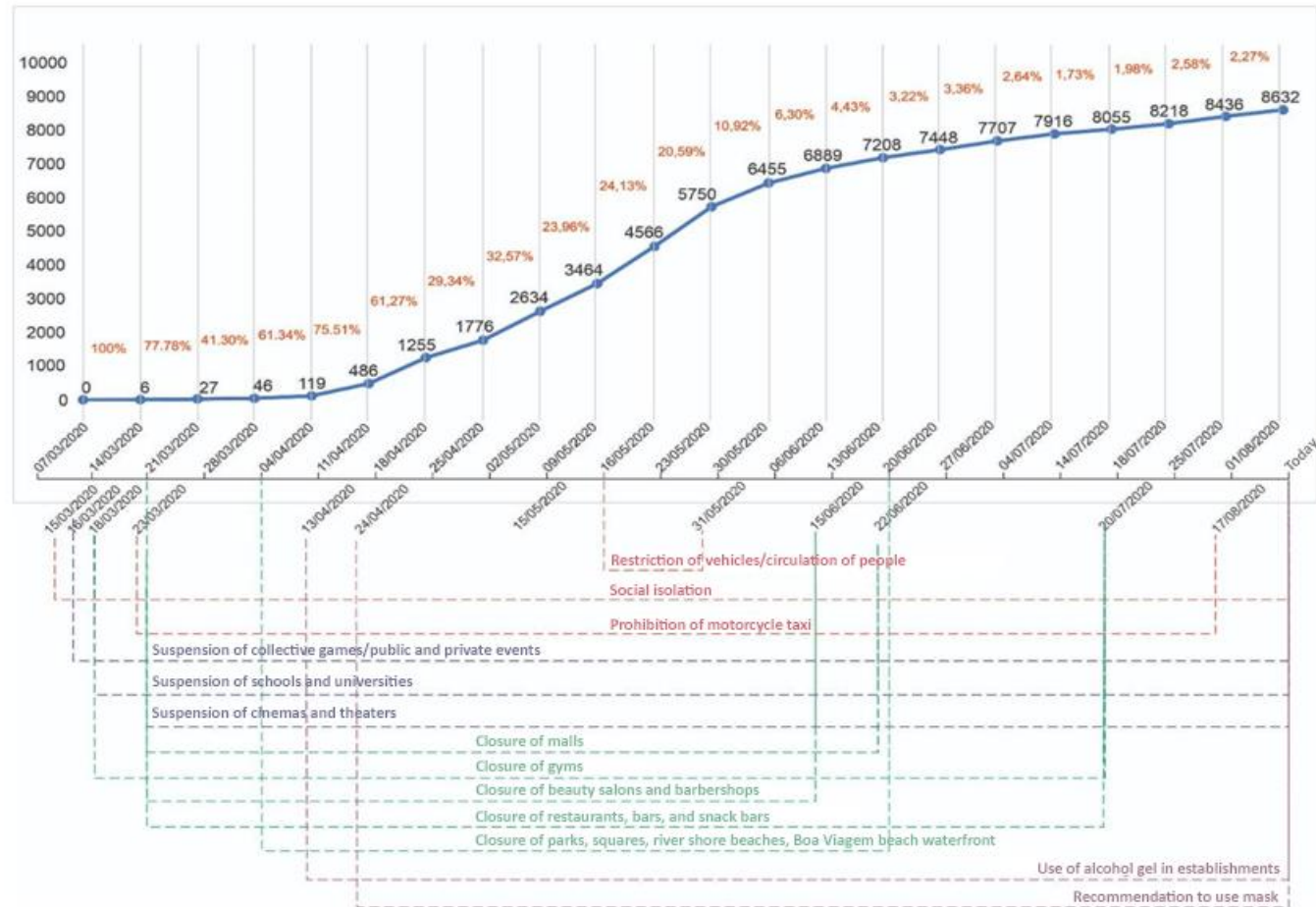
GROUP 4 - Individual protective measures

According to Kampf *et al.* (2020), the new coronavirus can remain infectious on inanimate surfaces at room temperature for up to nine days, depending on material type. Therefore, infection is possibly associated with frequency of hands touching surfaces. For that reason, disinfection of surfaces and constant hand sanitization are important to reduce virus spread.

Hand and sanitizers became mandatory supplies in establishments on April 13th, 2020 (EW16), while handmade masks made of cotton fabric, TNT, or other materials became mandatory from April 24th, 2020 (EW17) to date in Recife. Although handmade masks are recommended, no studies proved their effectiveness. However, despite uncertain protection, their use contributes to awareness of individual responsibility against infectious diseases (GARCIA 2020). According to studies conducted with SARS-CoV, MERS-CoV, and other zoonoses, the WHO recommended using alcohol-based formulations for hand decontamination (SIDDHARTA *et al.*, 2017). Even after the implementation of those measures and government recommendations, individuals still go out without masks in public places, including government officials, as reported by the media.

Measures adopted by state and municipal governments reflect the world health organizations and Ministry of Health recommendations. During April 26th and May 2nd, 2020 (EW18), right after recommending individual protective measures, Recife reached 2,634 new cases (incidence rate of 32.57%). Restrictive measures of individual protection (Group 4) and social distancing should continue for an extended period because they are the most effective strategy to control the emergence of new cases with consequent hospitalizations (Sequinel *et al.*, 2020; Oliveira *et al.*, 2020).

Figure 1: Number of SARS-CoV-2 cases (blue line) and percentage of new cases (indicators in orange) reported by epidemiological week (EW10 to EW31), associated with restrictive measures and divided into groups (Group 1 - orange; Group 2 - blue; Group 3 - green; Group 4 - purple). Recife from March to August 2020.



Epidemiological weeks: 10th (03/01/2020 to 03/07/2020); 11th (03/08/2020 to 03/14/2020); 12th (03/15/2020 to 03/21/2020); 13th (03/22/2020 to 03/28/2020); 14th (03/29/2020 to 04/04/2020); 15th (04/05/2020 to 04/11/2020); 16th (04/12/2020 to 04/18/2020); 17th (04/19/2020 to 04/25/2020); 18th (04/26/2020 to 05/02/2020); 19th (05/03/2020 to 05/09/2020); 20th (05/10/2020 to 05/16/2020); 21st (05/17/2020 to 05/23/2020); 22nd (05/24/2020 to 05/30/2020); 23rd (05/31/2020 to 06/06/2020); 24th (06/07/2020 to 06/13/2020); 25th (06/14/2020 to 06/20/2020); 26th (06/21/2020 to 06/27/2020); 27th (06/28/2020 to 07/04/2020); 28th (07/05/2020 to 07/11/2020); 29th (07/12/2020 to 07/18/2020); 30th (07/19/2020 to 07/25/2020); 31st (07/26/2020 to 08/01/2020).

CONCLUSION

Control of COVID-19 by restrictive measures (e.g., circulation of vehicles and individuals, suspension of activities in commercial establishments, schools, recreational areas, and implementation of mandatory individual protective measures) effectively reduced the rate of new coronavirus cases. However, despite measures imposed by the state and municipal decrees, it is challenging to ensure efficiency of these measures by the entire population, which reflects the persistent circulation of the virus and increased number of cases. Therefore, collaborative measures should be adopted by the government, institutions, and population to address COVID-19 adequately. Further studies correlating prevalence, incidence, and implementation of restrictive measures should also help elucidate disease prevention and control.

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