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ARTICLE
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The territorial planning against COVID-19: considerations on the situation of the hospital beds in the municipalities in Pernambuco, Brazil

A utilização do planejamento territorial no combate da COVID-19: considerações sobre a situação dos leitos nos municípios de Pernambuco, Brasil

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ABSTRACT

Introduction: The new coronavirus (SARS-CoV-2) has arrived in Brazil and measures to combat the spread are being implemented. It is important to observe the hospital structure in order to empower decision making, where territorial planning is included, giving the proper support. **Objective:** To analyze how territorial planning can help combat COVID-19 in Pernambuco, based on vital information about the population's health and good practices in the epidemiological literature. **Method:** The methodology involved geoprocessing together with data collection from hospital beds and the local population in the municipalities. **Results:** Of the 158 municipalities, 33 have more than 100 beds. When only the complementary beds are filtered, i.e., beds of higher complexity, the absence of these beds is observed in approximately 80% of the municipalities. In addition, from the territorial planning, it is possible to verify in the municipalities reference cities for possible health incentives and creation of health complexes beyond the capital. **Conclusions:** Aspects such as allocation of resources to health, incentives in new hospital structures and implementation of policies for social isolation can be raised as possible options to confront the new coronavirus; however, it is known that many municipalities do not have cash to strengthen their health system in a short period of time, a measure that should be executed by the state government and/or federal in joint actions. In addition to social isolation, the use of emergency hospital structures can be a temporary alternative to halt the advance of COVID-19 in the interior and/or to unburden the health system in the capital and its neighborhoods.

KEYWORDS: SARS-CoV-2; Brazil; Pandemic

RESUMO

Introdução: O novo coronavírus (SARS-CoV-2) chegou ao Brasil e as medidas para enfrentamento da disseminação estão sendo executadas. É importante a observação da estrutura hospitalar para potencializar tomadas de decisão e, nessa ação, o planejamento territorial deve ser incluído, dando o devido suporte. **Objetivo:** Analisar como o planejamento territorial pode auxiliar ao combate da COVID-19 em Pernambuco, tendo como base as informações vitais a saúde da população e as boas práticas existentes na literatura epidemiológica. **Método:** A metodologia envolveu o geoprocessamento junto à coleta de dados de leitos hospitalares e à população local nos municípios. **Resultados:** Dos 158 municípios, 33 possuem acima de 100 leitos. Quando se filtra apenas os leitos complementares, ou seja, leitos de complexidade mais elevada, observa-se a ausência desses leitos em aproximadamente 80,0% dos municípios. Além disso, a partir do planejamento territorial é possível verificar nos municípios, cidades referências para possíveis incentivos de saúde e criação de complexos sanitários além-capital. **Conclusões:** Aspectos como destinação de recursos à saúde, incentivos em novas estruturas

hospitalares e implementação de políticas para o isolamento social podem ser levantados como opções possíveis ao enfrentamento do novo coronavírus, contudo, sabe-se que muitas prefeituras não têm caixa para fortalecer seu sistema de saúde em um curto período de tempo, medida esta que deve ser executada pelo governo estadual e/ou federal em ações conjuntas. Além do isolamento social, a utilização de estruturas hospitalares emergenciais pode ser uma alternativa temporária para frear o avanço da COVID-19 no interior e/ou desafogar o sistema de saúde na capital e seu entorno.

PALAVRAS-CHAVE: SARS-CoV-2; Brasil; Pandemia

INTRODUCTION

Epidemic outbreaks are observed over time in different territories, configuring a pandemic when the pathology can spread quickly across the globe, threatening the health of large populations and forcing public and private institutions to mobilize to mitigate losses, whether emotional, human, or economic[1,2,3,4,5,6,7,8]. The Spanish Flu (1918), the influenza virus H1N1 (2009), and the most recent coronavirus (SARS-CoV-2), the etiological agent of the Coronavirus Disease 2019 (COVID-19) are examples of pandemics that have caused deaths in different countries. Emphasis is placed on COVID-19 for which, until now, the cure or production of a vaccine has not been developed.

Of varying transmission, the new coronavirus can be spread easily among humans, through droplets of saliva, sneeze, cough, phlegm, touches, and contaminated objects/surfaces and, given the population flow being transported by different modes daily, the virus got to infect thousands of people in a short period of time[9,10]. COVID-19 in its most acute form attacks the respiratory tract, being able to cause pneumonia and other complications, which require the aid of Intensive Care Units (ICU); in the absence of drugs aimed at treating the virus or vaccines for prevention, the older population with comorbidities is the most vulnerable and susceptible to deaths from the virus[11,12].

Therefore, the World Health Organization (WHO) has recommended practices to be implemented by the countries to contain the pandemic. Such practices include, among other aspects: social isolation of the population to stop the virus spread and reduce the number of infected; the reassessment and rescheduling low-risk surgeries to maintain the ICU beds directed to the most severe cases of COVID-19; the implementation of new ICU hospital beds; the creation of field hospitals; massive testing of individuals and encouraging the creation of scientific cooperation networks for the development of effective treatments against the virus[13].

Even though it started in China in December 2019 (as the official notification), in Brazil the first cases were dated in March 2020; the apparent delay made it possible for the Brazilian State to apply preventive measures, observing the evolution of the virus in other countries. Notably, governors and mayors adopted different policies, aligning themselves or not with the technical recommendations of WHO and researchers in the area[14]. For the departure of the good practices advised by WHO, the main justifications were: the economic sphere, the reduction of jobs, and the respective recession caused by the pandemic[15].

The Southeast region of Brazil has been the epicenter of COVID-19 in the country, however, there are confirmed cases in all Brazilian regions. The poorest states, emphasizing those in the North-Northeast when compared to those in the Southeast-South, maintain inferior health systems and can collapse more quickly, being essential the application of preventive policies, as well as the respect of these by the population[14]. It should be noted that, as in other pandemics, cyclicality, also known as “epidemic waves”, will reach more vulnerable regions later, causing more deaths than in the first attacks, as happened with the Spanish Flu[16].

Given these challenges and limitations, the government of Pernambuco, since the first ones dated in Brazil, has been implementing with transparency and recommending to mayors policies aligned with the Ministry of Health, WHO, and specialists, avoiding the abrupt increase in the number of infected and consequent congestion of hospitals[17,18]. Recife, the state capital, has been applying, in addition to the aspects recommended by WHO, monitoring through networks and cell phones, to delegate the performance of public power concerning the social isolation policy and the closure of non-essential services[19,20].

Besides the capital, there are other cities on the coast, in the forest area, and the hinterland, being affected by the new coronavirus. The availability of official data, the good practices present in the literature on pandemics over the world and on COVID-19 itself, and the possibility of integrated planning, through the geographic information system and geoprocessing techniques, can provide subsidies for coping, governmental decision-making, and reduce the number of deaths caused by the virus in the territory of Pernambuco.

Coping with COVID-19 in some countries

Due to the high degree of transmission, the new coronavirus has spread quickly among Chinese territories from Wuhan, leading to global transmission. The increase, control, and maintenance of the epidemiological curve are directly related to the governmental attitudes of each country, as well as cultural aspects and population discipline.

The Hubei case - Wuhan (China): the lockdown

On December 31, the first cases of COVID-19 were reported in Wuhan, a city with approximately 11 million people in China. Its spread greatly worried the Chinese government, since the spring festival (also known as Lunar New Year) was very close and would have a flow of over 2 billion people in the period[21,22,23,24]. Faced with this situation, emergency levels were elevated in Wuhan and, concerning health policies, the lockdown[25] was implemented, which consisted of: closing public transportation, schools, universities, and non-essential businesses; prohibiting traveling within or outside the city radius; expulsing non-citizens - floating population. These measures also reached the Hubei province, reaching a populational contingent of approximately 50 million inhabitants[23,24,26].

In addition, there was mass testing of the entire population of that territory and all suspected or confirmed cases were isolated in their homes from social life. Hospitals directed to the clinical treatment of COVID-19's symptoms were created in record time to maintain the levels of beds for the infected perennial and to prevent health collapse, and this attempt to isolate viral contention is one of the greatest in the history of environmental sanitation when compared to population coverage at other times[26].

Even if it does not prevent the spread of COVID-19 to other Chinese cities and other countries, according to Tian et al.[26], the measure adopted by the Chinese government managed to give time delay for other Chinese cities and provinces to prepare by implementing policies similar to those of Hubei-Wuhan and assisting in the general contention of the epidemic in China. The authors stressed that the prohibition of population mobility and the isolation of suspected and confirmed cases are strongly linked to the control of transmission, preventing hundreds of thousands of cases from occurring.

After containing the virus in the territory concerning the increase of cases, China announced the deactivation of temporary hospitals created to control the disease. However, there is still a lot of security and control by the government and the population, so that the outbreak does not return[27,28].

South Korea and its method to flatten the transmission curve

The experience obtained in 2002/2003 with Severe Acute Respiratory Syndrome (SARS) made South Korea face COVID-19 very seriously. In multidisciplinary actions, it was initially possible to develop rapid tests, which were generally applied to the population, detecting even asymptomatic cases, which were isolated in quarantine. The tests were performed on drive-thru and facilitated the knowledge of the results and the control, consequently[29].

In addition to the mass testing, the country developed an application for tracking confirmed cases, distributed basic income to cover the expenses of the families that are in social isolation, prevented travel from other countries, and applied other recommendations presented by WHO and observed in the Chinese action against the virus[30,31]. These activities added to the number of beds available, the South Korean culture of using prevention masks, and the absence of contact when greeting others contributed to flattening the infection curve in the country[31,32].

It is worth noting that during the social isolation period there was a case of agglomeration in a church that resulted in the spread of the virus[32], which further raised the warning of the importance of social isolation, even in religious activities.

Italy and the importance of social isolation policies

The Italian demography has as a characteristic the elderly in quantity and, naturally, they develop some chronic comorbidity throughout life that reduces their immune system[11]. Furthermore, the initial loosening of important social isolation policies can also be raised as one of the factors of the high death rates in Italy due to COVID-19, which had its cases started in the territory in mid-February[33,34].

Modifying the test policy amid the epidemic evolution - from widespread to only severe cases -, the campaign "Milan doesn't stop"[35], which preached the normalization of activities amid the pandemic, made it difficult for policies of social isolation in the region that later became the epicenter of COVID-19 in Italy, the Lombardy region. The increase in deaths in this region and the collapse of the health system made the mayor of that city publicly admit that he made a mistake in not adopting restrictive policies in favor of the continuity of local economic results[35,36].

After days with the number of infected people increasing and with death records due to the congestion of the health system, which reached its maximum capacity, quarantine was implemented in the country[37]. Day[38] reported that not only the quarantine influences the reduction of those infected but also the return of mass testing, including asymptomatic ones so that the necessary policy can be applied.

It should again be noted the pattern of infected and dead by COVID-19 in Italy studied by Onder, Rezza, and Brusaferro[34]: with 23% of the population over 65, the pattern of mortality includes men aged 60 or over and with pre-existing comorbidities. However, the number of elderly people explains the high lethality of the new virus when compared to other countries.

Territorial planning

According to Santos and Nascimento[39], territorial planning is an action that aims at continuity and serves the purpose of directing the rationalization of individual decision-making regarding the evolution of an object or thing in the lived space. The use of resources and their potentization and appropriate destination can also be considered ways in territorial planning.

Territorial planning is commonly used in urban regions; however, its use can go beyond several services. Territorial planning[40], environment[41], adequate company allocation[42], population studies[43,44], and public health[45,46] are some examples of how

territorial planning can support, with relevance, alternative situations. In the case of the COVID-19 pandemic, specialized knowledge in its various layers can help in better planning to face this pandemic.

Given the above, the objective of this research was to analyze how the territorial planning can help in the fight against COVID-19 in Pernambuco, based on the observation of information vital to the population's health and the good practices existing in the epidemiological literature.

METHOD

Study area

The state of Pernambuco is one of the most influential territories in Northeast Brazil. With 185 municipalities, the region has the 10th national gross domestic product (GDP), highest GDP per capita in the Northeast, and is one of the most populous in the country. With a varied climate, the presence of coastal areas is noted, transitioning with the semi-arid environment and the semi-arid region itself[47].

Economic dynamics are diverse given the different edaphoclimatic conditions in the state, with technological hubs, plaster complexes, sugarcane monoculture, tourism, and export agribusiness as examples of success in the territory in question[47].

Methodological procedures

The information was obtained by consulting DATASUS[48], based on data for March, regarding the number of available beds in Pernambuco. Regarding information on beds in the cities, data were collected on the total sum of beds and complementary beds (private and public).

Unlike general beds, complementary beds correspond to beds of higher complexity, whether they are semi-intensive care, intensive care unit (ICU - coronary, where cardiac patients are taken; burned - for individuals with high degree burns; neonatal for newborns, directed to the current cases of COVID-19 or classified by their survey and complexity of the location - 1, 2 or 3), isolation units, and other locations that can be reorganized for use in the fight against the new coronavirus. It is known that COVID-19 affects adults more frequently[48], which is why there was a generalized choice of this type of bed due to the ability to reorganize the technological apparatus that these more complex beds have.

In addition to information from health facilities, population data estimated for 2019 by the Brazilian Institute of Geography and Statistics (IBGE) were collected, aiming to analyze via COVID-19 lethality and hospitalization rates the average number of people who will need hospitals. The methodology, reference periods, and other procedures for population estimation can be checked on the IBGE page Populations [49].

On the map of the ICU percentage according to the population of each city, the WHO information was used, which recommends that for every 10,000 inhabitants there is an ICU bed[50,51]. Thus, the formulas were applied following the logic (Equations 1 and 2):

$$\text{No. of beds per inhab. (WHO)} = \frac{\text{Projected population (2019)}}{\text{10,000 (inhabitants)}} \quad (1)$$

$$\text{\% of city's bed preparation} = \frac{\text{Existing no. of complementary beds}}{\text{No. of beds per inhab. (WHO) in the city}} \quad (2)$$

Where: the result of equation 2 below 1 indicates a lack of preparation of the municipal network regarding the number of beds of complexity higher than the WHO recommendations for beds for 10,000 inhabitants.

Observing the current literature on the subject and the news in media outlets that participate in good transparency practices, maps were made, with considerations aimed at helping the public sphere and its consequent prevention policy. It should be noted that the results are absolute and do not consider the health system in collapse nor the current capacity for hospitalization for other diseases in the beds.

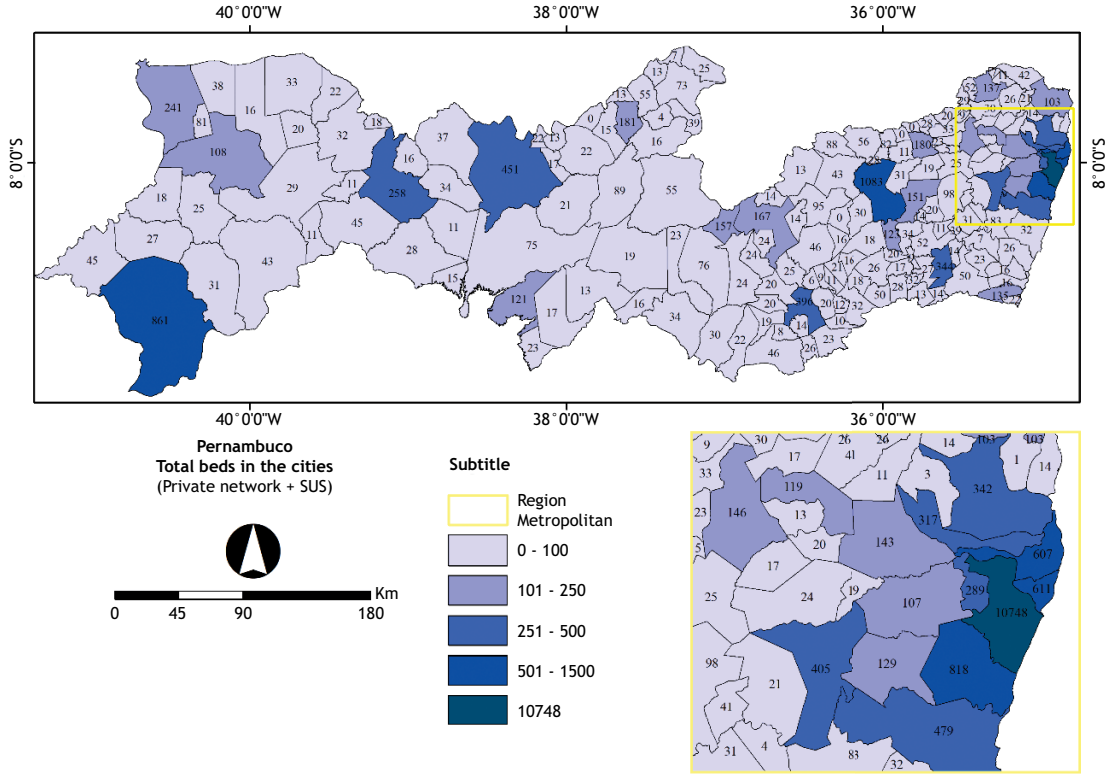
RESULTS AND DISCUSSION

Territorial planning and the advance of COVID-19: considerations on the health system of Pernambuco's cities

WHO recommends that there is at least one ICU bed for every 10 thousand inhabitants and, when this scenario is considered for Northeast Brazil, only the states of Pernambuco and Sergipe can reach this number with only the Unified Health System (SUS)[51]. This reality is different for private care, where the number is reached satisfactorily for every state. The combination of the two networks (public and private) positively favors the relation of one bed for every 10 thousand inhabitants for all states in the Northeast[51].

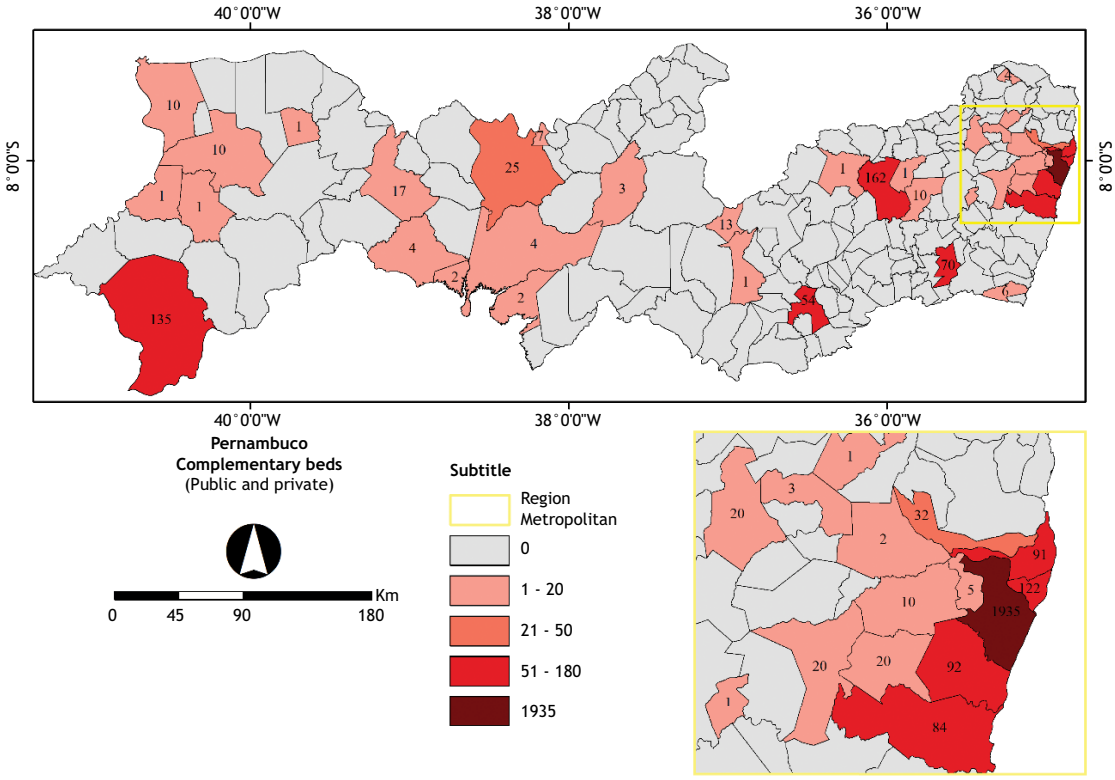
It was observed in other countries affected by COVID-19 the demand for two ICUs per 10,000 people[50], however, it is known that in Brazil the spatialization of ICUs in the territories is not homogeneous, being commonly concentrated in large capitals[50,51]. This condition, coupled with the possibility of other epidemiological waves in regions with no ICU beds, raises the warning of the need to implement a public policy that manages, on one hand, to provide health for the population in demand and, on the other hand, not to bring back the outbreaks in already controlled regions.

Thus, the situation of Pernambuco given the advance of COVID-19 must be carefully analyzed, since the beds follow the Brazilian situation of concentration in the capital. From Figures 1, 2, and 3 it is possible to observe the spatialization of beds in Pernambuco's cities and, from the territorial analyzes, apply considerations to provide the best health policies. It is known that, in emergency periods, public partnerships policies and bed loans in private networks are encouraged so that there is no collapse



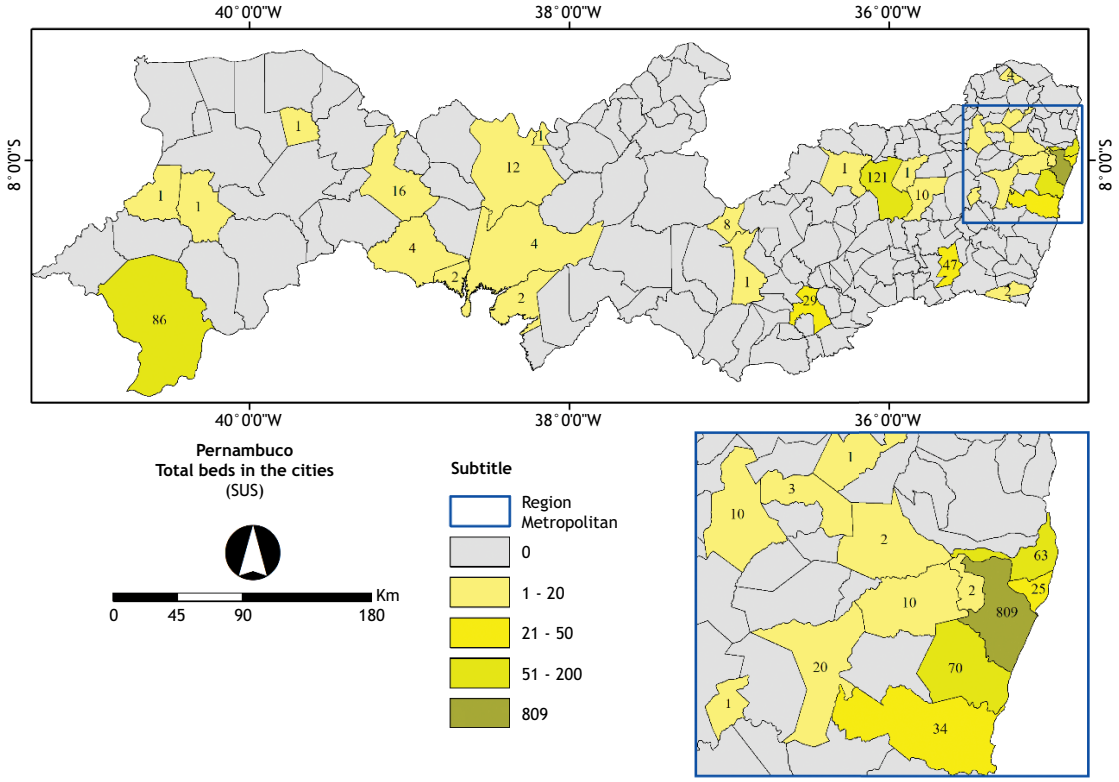
Source: Elaborated by the authors, based on data from the Health Cara Secretariat; Ministry of Health (CNESNet), and DATUM: SIRGAS 2000, 2020.

Figure 1. Spatialization of the total number of beds in the cities of Pernambuco.



Source: Elaborated by the authors, based on data from the Health Cara Secretariat; Ministry of Health (CNESNet), and DATUM: SIRGAS 2000, 2020.
* Semi-intensive care, intensive care units, isolation units, and other locations that can be reorganized for use in the fight against the new coronavirus.

Figure 2. Spatialization of the total number of complementary* beds (public and private) in the cities of Pernambuco.



Source: Elaborated by the authors, based on data from the Health Cara Secretariat; Ministry of Health (CNESNet), and DATUM: SIRGAS 2000, 2020.
* Semi-intensive care, intensive care units, isolation units, and other locations that can be reorganized for use in the fight against the new coronavirus.

Figure 3. Spatialization of the total number of complementary* beds (belonging to the Unified Health System) in the cities of Pernambuco.

of the public health. Other alternatives, such as the adaptation of hospital beds to create an ICU, can also emerge, provided that the equipment is purchased[51,52,53].

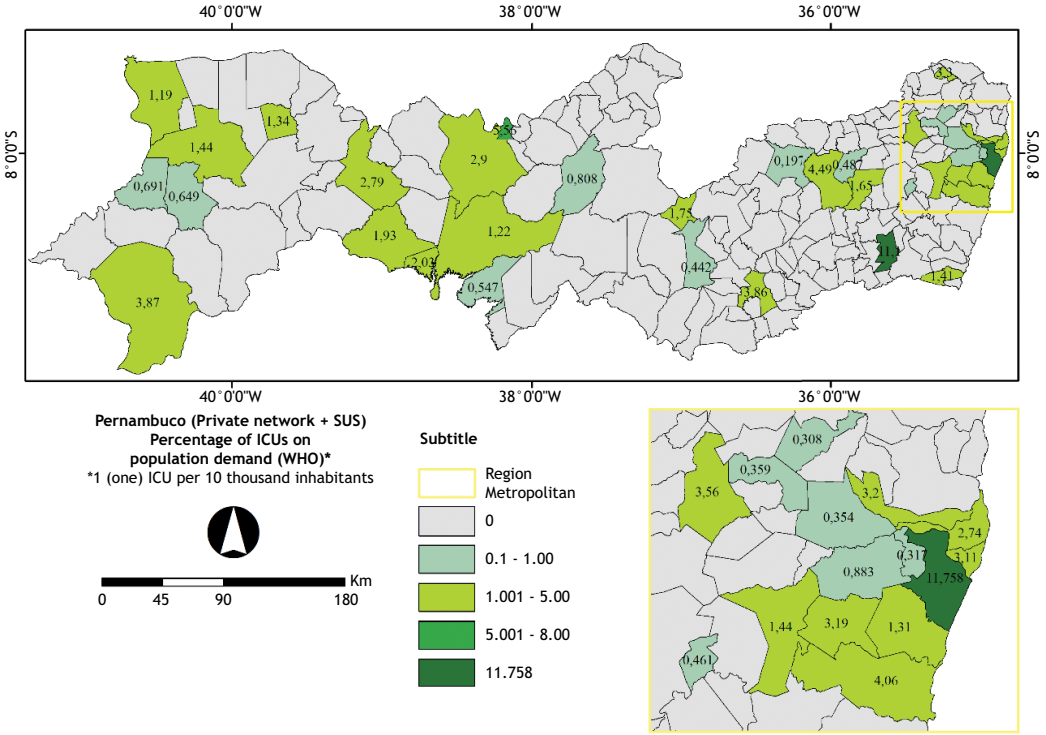
According to Figure 1, in the mesoregions that make up the Pernambuco hinterland (Mesoregion of Pernambuco Hinterland and Mesoregion of Pernambuco São Francisco), of the 56 cities, only eight have a number of beds (private network + SUS) above 100 (Araripina n = 241; Ouricuri n = 108; Petrolina n = 861; Salgueiro n = 258; Petrolândia n = 121; Serra Talhada n = 451; Afogados da Ingazeira n = 181; Arcoverde n = 157), with an emphasis on Petrolina, Salgueiro, and Serra Talhada. The Agreste and Zona da Mata region is supported by the cities of Caruaru n = 1.083; Garanhuns n = 396, and Palmares n = 344, with the highest number of beds. In addition to these three cities, it is worth mentioning: Bezerros n = 151 and Agrestina n = 123, which, due to the proximity of Caruaru, may favor the creation of a health complex outside the Recife Metropolitan Area (RMR - Recife, Cabo de Santo Agostinho, Olinda, Paulista, and Jaboatão dos Guararapes). The capital maintains the largest number of beds in the state (Recife n = 10,748) and, along with it, cities with a high number of beds that make RMR and its neighbors a favorable environment for health in Pernambuco when compared to other regions of the state.

Looking at Figures 2 and 3, there is a heterogeneous range of complementary beds in the state, especially when the sum of the private network and SUS is observed, with approximately 79.0% of the cities without beds. When focusing only on SUS, there is a decrease in the number of beds (82.0% of cities without beds). Even with their reduced quantity, the importance of these beds in the cities is emphasized, as well as the reinforcement and attention to the public network, since without these the health scenario in Pernambuco would be even more worrying.

In general, Petrolina, Serra Talhada, Garanhuns, Caruaru, Palmares, and the RMR complex have the largest number of complementary beds in the state and this number is reflected in the WHO recommended bed capacity *versus* the population (Figures 4 and 5).

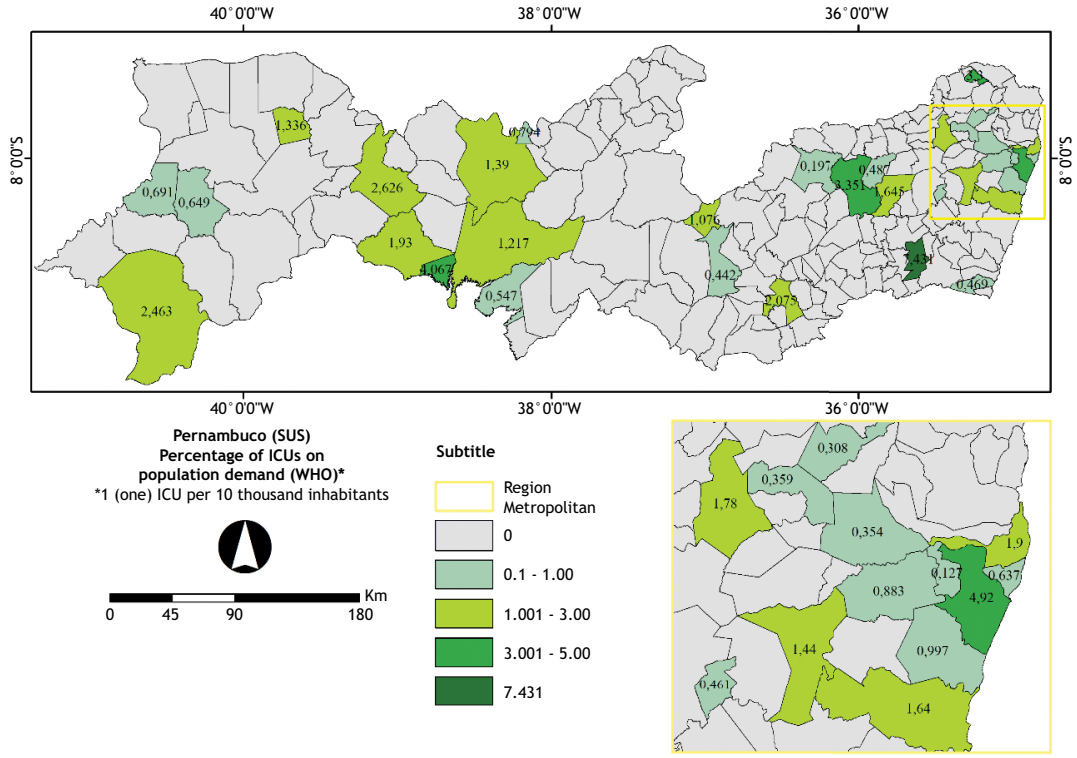
The results of the sum of the public and private networks (Figure 4) of the percentage of complementary beds over the population not only bring satisfactory capacity to some cities but also the possibility of having highly complex beds in several territories in Pernambuco. Along with the exposed data, it is noted that Petrolina, Serra Talhada, Garanhuns, Caruaru, Palmares, and the RMR complex have the best bed rates.

Working only with SUS complementary beds (Figure 5), there is a reduction in the number of available beds *versus* the population, with the greatest losses present in the Araripina Microregion, because if the private care is not considered, the cities of



Source: Elaborated by the authors, based on data from the Health Cara Secretariat; Ministry of Health (CNESNet), IBGE Population Estimates (2019), and DATUM: SIRGAS 2000, 2020.

Figure 4. Percentage of intensive care units (private network + Unified Health System) on population demand, according to the World Health Organization in cities of Pernambuco. Values below 1 indicate the unpreparedness of the municipal network.



Source: Elaborated by the authors, based on data from the Health Cara Secretariat; Ministry of Health (CNESNet), IBGE Population Estimates (2019), and DATUM: SIRGAS 2000, 2020.

Figure 5. Percentage of intensive care units (only Unified Health System) on population demand, according to the World Health Organization in cities of Pernambuco. Values below 1 indicate the unpreparedness of the municipal network.

Araripina and Ouricuri do not maintain intensive care beds under their domain. RMR loses strength when comparing to the public structure against the recommendations of beds per population, highlighting only Recife, Paulista, and Cabo de Santo Agostinho. The cities outside the RMR that stand out are: Palmares, with the best index in the state, followed by Itacuruba, Caruaru, Ferreiros, Salgueiro, Petrolina, and Garanhuns.

The data exposure shows the vulnerability that several cities maintain if they are new epicenters of COVID-19 in Pernambuco and the need for investment in health, not only to support the cases of the pandemic in question but to support families in the region. In the long term, the creation of health complexes such as the existing ones in RMR can be an option to be discussed - observing the repetition of other municipalities. The Floresta-Salgueiro-Serra Talhada, Garanhuns-Pesqueira, Araripina-Ouricuri, Petrolina, and Palmares complexes can be thought, thus, the investment in structure and human capital in health would be decentralized and, as a consequence, would relieve the health system, especially the capital's, which receives patients from all over the state.

However, what should be done since the new coronavirus is being disseminated among the population and new confirmed cases are present in the cities in the countryside? The Pernambuco government has been working seriously and transparently[17], applying measures, allocating resources, and reactivating hospital structures, as well as guiding city mayors to implement preventive measures in the cities they manage. The closure of beaches and non-essential services, testing of health workers, suspension of elective surgeries, the recommendation to families not to travel during this pandemic period, and the creation of applications for monitoring and informing the population have been carried out[19,54,55,56,57], but it is known that several city halls have no budget to strengthen their health system in a short period of time[58]. This measure must be carried out by the state and/or federal government in joint actions.

The use of private and emergency hospital structures - also known as field hospitals[59] – has already been implemented in other countries and are being built in Brazil to relieve the health systems that are near the maximum capacity[60]. Rio de Janeiro, Goiás, Fortaleza, Roraima, and São Paulo have already started working and it is hoped, with this, to be able to advance in the fight against coronavirus, medicate intermediate cases, and reallocate more complex cases[61,62,63]. It is worth noting that São Paulo expands these emergency hospitals, implementing in countryside cities, the use of containers and tents as structural bases[64], as extensions in the Emergency Care Units (UPA).

In Pernambuco, so far Recife is the place that has been receiving the most emergency beds in this pandemic since it has the largest number of COVID-19 confirmed cases. In addition, the government has a project to create 1,000 beds, 400 of which are for ICU, exclusively directed to coping with the new coronavirus. In addition to the capital, cities such as Caruaru, Serra Talhada, Araripina, and Petrolina will benefit[65,66]. Going against the statements of the state government regarding the increase in beds and the Figures presented in the research, it is worth considering other cities to implement more investments in health and, in the short term, in field hospitals. The cities already mentioned that can be complexed from the data in the Figures are: Floresta-Salgueiro-Serra Talhada, Garanhuns-Pesqueira, Araripina-Ouricuri, Petrolina, and Palmares, given the good health structure present concerning the surrounding population and strategic location in the territory. These statements would not eliminate the mass incentive that the coastal zone and the RMR should have since there is a high population contingent and the collapse in health systems has to be avoided, already operating with 95.5% of beds occupied[67].

Similar to any epidemic infection without a consolidated treatment, with the loosening of restrictive policies, it can re-emerge in a territory that was later controlled, as well as searching regions that have not yet been infected, creating new epicenters: the so-called epidemic waves. The Spanish Flu, which killed over 40 million people in the world, is an example since three epidemic waves were dated and the last two were the most lethal, due to aspects such as transmission to less assisted regions[16,68,69].

The province of Hubei, stage of the first COVID-19 epicenter in the world, is now starting to loosen the blocks applied to contain the infection since the cases have been reduced to zero and the concern has returned to imported cases. Due to the preventive measures successfully applied in the province, the control of the epidemic was possible, however, a high population contingent is not yet immune to the virus and inspires care to return to normal, since there is still no cure for the new coronavirus[70].

The draconian measures implemented by China made it possible for them to resume their economy, even with apprehension[71], but it should be noted that these measures are not being adopted exactly in other countries and this allows new epidemic waves, especially in poorer and underdeveloped countries. According to Zorzetto[72], the second COVID-19 epidemic wave in Brazil will consist of spreading the infectious network throughout the coast (from Rio Grande do Sul to Bahia) and increasing the radius of the focal points of the new coronavirus in the state.

Based on these models and integrated planning it is possible to prepare and apply or maintain preventive measures in advance to curb the spread of the disease to denser and far from health complexes areas. Besides that, the epidemic waves raised the discussion concerning the decentralization of reference hospitals throughout the Brazilian territory, which is especially addressed in this work, in Pernambuco.

The new character makes this disease a challenge for any country, as many, even the developed, suffered adversities in the economic and social fields (closing companies and the consequent increase in unemployment and family losses, for example). At the moment, the union of points as reinforcement in the health structure as a whole (protection of the existing professionals' health, expansion of existing structures, and creation of

new structures) and its secondary network, implementation of recommendations for social isolation, and respect on the part of the population, as well as the full absorption of these measures on a daily basis, are the recipes for success observed in countries that have been controlling and reducing the occurrence of COVID-19 infections in society, and should be perpetuated in the Brazilian territory to preserve lives.

CONCLUSIONS

Observations of the first dissemination of the new coronavirus in Chinese cities and the severity of the infection in Europe provided time for practices to be implemented in an attempt to control cases in Brazil. Due to the different territorial dimensions and dynamics, each state has been implementing different measures to avoid or, in certain cases, fight the exponential increase presented by the new coronavirus.

Through territorial planning, it is possible to observe the situation of each city regarding hospital beds in specificities so that, in this way, solutions that concern the whole population are applied. When only complementary beds are filtered, these corresponding to higher complexity beds, the absence of these is observed in approximately 80.0% of Pernambuco cities.

In addition, through territorial planning, it is possible to verify reference cities for possible health incentives and for the creation of health complexes in addition to the capital and/or the Recife Metropolitan Are.

The Pernambuco government has been working seriously and transparently. Aspects such as applying measures, allocating resources, and reactivating hospital structures, as well as guiding city mayors to implement preventive measures in the cities they manage are observed and raised as an example. However, it is known that several city halls have no budget to strengthen their health system in a short period. This measure, therefore, must be carried out by the state and/or federal government in joint actions.

In addition to social isolation, the population's respect for the measures implemented, and investment in health facilities, for cities with low health facilities it is recommended to use emergency hospital structures - also known as field hospitals - as a temporary alternative to fight COVID-19 in the countryside and/or relieve the health system in the capital and its surroundings.

No country is fully prepared to face a pandemic but monitoring good practices is essential to avoid significant losses, whether they are structural, family, or economic.

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Author's Contributions

Freire-Silva J –Conception, planning (study design), acquisition, analysis, data interpretation, and writing of the work. Ferreira HS, Candeias ALB - Data interpretation and writing of the work. Pinho MAB, Oliveira BRB – Conception, planning (study design), and writing of the work. All authors approved the final version of the work.

Conflict of Interests

The authors inform that there is no potential conflict of interest with peers and institutions, politicians, or financial in this study.