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COVID-19 SPATIAL CIRCULATION THROUGH THE SLAUGHTERHOUSES IN THE SOUTH AND SOUTHEAST PARÁ: SPATIAL IMPACTS OF AN "ESSENTIAL ACTIVITY" IN THE MIDST OF A PANDEMIC

CIRCULAÇÃO ESPACIAL DA COVID-19 ATRAVÉS DOS FRIGORÍFICOS NO SUL E NO SUDESTE DO PARÁ: IMPACTOS ESPACIAIS DE UMA "ATIVIDADE ESSENCIAL" EM MEIO À PANDEMIA

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Abstract

Considered an essential activity, the production coming from slaughterhouses did not stop its activities in the midst of the new coronavirus pandemics (SARS COV-19) in Brazil. South and Southeast regions of Pará are examples of how such activity is associated to the worldwide production circuit. Nevertheless, the spatial circulation of the supplies coming from the slaughterhouses becomes one of the covid-19 transmission vectors, due to the intense mobility of workers in the sector. By taking into consideration the spatial circulation as the main approach in the dissemination of the pandemic through slaughterhouses, this work aimed at understanding the impact of the spatial circulation of goods and people linked to the slaughterhouses in the dissemination and prominence of Covid-19 cases in the South and Southeast Pará. The methodology presented is based on graphical and cartographic representations in addition to the statistical procedures with data of cases and deaths confirmed by Covid-19, social isolation rate, volume in dollar of meat exports, formal work bonds in cattle slaughter and cattle herd, as well as the decrees from the State of Pará and from the municipal governments. Even though the results are not determinant, they point to production conditions in slaughterhouses and to the spatial circulation imposed by the activity in the propagation of Covid-19 in the South and Southeast regions of Pará. Social distancing is harmed in municipalities that are strong in the activity, so that, in the composition of the formal work, causing an increase in the indexes of confirmed cases and deaths from complications of the disease.

Keywords: Covid-19. Pandemics. Slaughterhouses. South and Southeast Pará. Spatial Circulation.

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Resumo

Considerada uma atividade essencial, a produção oriunda de frigoríficos não parou suas atividades em meio à pandemia do novo coronavírus (SARS COV-19) no Brasil. As regiões Sul e Sudeste do Pará são exemplos de como tal atividade está associada aos circuitos da produção mundial. Não obstante, a circulação espacial dos insumos provenientes dos frigoríficos torna-se um dos vetores de transmissão da covid-19 devido à intensa mobilidade de trabalhadores do setor. Ao considerar a circulação espacial a principal abordagem na disseminação da pandemia através dos frigoríficos, este trabalho possui o objetivo de compreender o impacto da circulação espacial das mercadorias e das pessoas vinculadas aos frigoríficos na disseminação e prominência de casos de Covid-19 no Sul e Sudeste do Pará. A metodologia apresentada baseia-se em representações gráficas e cartográficas além de procedimentos estatísticos com dados de casos e mortes confirmados por Covid-19, taxa de isolamento social, volume em dólar de exportação de carnes, vínculos de trabalho formal em abate de bovinos e rebanho bovino, assim como decretos do Estado do Pará e de prefeituras municipais. Mesmo que não sejam determinantes, os resultados apontam para condicionantes da produção em frigoríficos e da circulação espacial impostos pela atividade na propagação da covid-19 na região Sul e Sudeste do Pará. O distanciamento social é prejudicado em municípios que possuem peso da atividade na composição do trabalho formal ocasionando elevação nos indicadores de casos confirmados e mortes por complicações da doença.

Palavras-chave: Circulação espacial. Covid-19. Frigoríficos. Pandemia. Sul e Sudeste do Pará.

Introduction

First of all, it is true to say that a pandemic cannot be classified as something unprecedented in our lives, not least because other diseases have already been classified by health-related institutions as pandemics, as was the case of the Spanish flu, which occurred from 1918 (Ferreira, 2020).

In the other hand, it is also true to say that the Covid-19 pandemic (SARS COV-19) is quite different from other outbreaks of disease already seen in the planet due to its global particularity; it is at this point that it should be noted why the global warning is directed in a totalitarian way in several sectors of society. In these terms, 'totalitarian' does not become a mere expression, but a real manifestation of how the pandemics has reached all segments; even if some more intensely than others.

Among all segments, what they have in common is a materiality based on the circulation of goods and people, through which, obviously, the virus passability and the disease propagation is intense. In the beginning, the virus circulation took place on a local scale, in Wuhan, Hubei province, in China. The scale begins to change around the world by using the aerial networks, which are the first link (process-subject) in a discontinuous way, in which the territorial proximity is not needed. In the sequence, the aerial network, associated to the terrestrial transportation and to the people circulation, configuring in a generic way, a pattern of spatial distribution that, eventually, gives geo-biological consistency to the pandemic concept.

In this article, the pandemic is structurally versed by the spatial circulation, in which the slaughterhouse segment – elected by the authorities as an essential activity (PARÁ, 2020³) – becomes an analytic-empirical cutout in the South and Southeast regions of Pará. Through the unequal scales development (SMITH, 1988), the objective of this work is to understand the impact of the spatial circulation of goods and people linked to slaughterhouses on the dissemination and prominence of cases in the South and Southeast Para. It is base on the hypothesis that the production from slaughterhouses behaves in an unequal and uneven way when supplying foreign markets, while they expose the working population from that sector. In the wake of this process, the population of the municipalities of South and Southeast Para, where the slaughterhouses are located, unequally counteracts this pandemic by exposing themselves to the disease, keeping a difference in the political scales that build up the production and circulation of goods.

³ See in <https://www.legisweb.com.br/legislacao/?id=396239> - access in 13/08/2020.

In order to methodologically proceed the set of ideas presented above, graphic and cartographic representations are used in addition to the statistical procedures with data on cases and deaths confirmed by Covid-19. Social isolation rate, volume in dollar of meat exports, formal working bonds in cattle slaughter and cattle herd, as well as the decrees from the State of Pará and from the municipal governments were used.

Finally, for a better understanding, this work is divided into three sections besides introduction and conclusion. In the first one, it is revealed how the relationship between pandemic - spatial circulation is very close in a way to attribute to a biosanitary concept the empirical-geographical character, making it possible to understand its indissociability. In a second moment, the methodological assumptions used are presented, with evidence of the analytical cutouts and limits of the research. Then, the analysis itself is done in the light of the theoretical-methodological reflections previously exposed.

Spatial circulation and scale understanding: bases for a general comprehension of the pandemic

The technical-scientific and informational period described in Milton Santos's works (SANTOS, 1993, 1995, 2000; SANTOS and SILVEIRA, 2001), in order to understand globalization as a totaling dimension of the economic-social relations that we all go through, can and must be seen as a condition without which the Covid-19 pandemic becomes unthinkable and impossible to achieve. However, it must be agreed that the material condition that substantiates the globalized space is the circulation. The latter becomes an authentic point of inflection that works as an amalgam to all relationships, be they economic (in which goods connect places), or of people themselves, in their daily exchanges, through power relations.

In Geography, specifically, the circulation theme has been historically linked to the transportation segment, thus limiting itself to complementary back and forth of fixed and goods order flows. For Silveira (2011), the limited relationship between circulation and transportation was due to the development of the dominant mode of production and, in particular, to the theme 'transportation logistics'. The overcoming of this theme, still according to Silveira (2011), should be relativized in order to avoid a conceptual contingency of what will be the circulation. For this author:

By proposing the name, *id est*, "Geography of circulation, transportation and logistics" as an important branch to be studied by Geography and other related sciences – especially in times of "globalization of capital" – we are saying that we should not turn "our geographic eyes" and "our geographic emotions" only on part of the supply chain, but on all of it. This includes transportation, tactics and the "situations" of storage from upstream to downstream of the economic system (productive, commercial and services), i.e., from transportation and storage of raw materials to the delivery to the final consumer (...) (SILVEIRA, 2011, p. 21-22, **authors' emphasis**. Our translation).

If the logic of circulation obeys a geographic expansion of fixed and flows, which are intrinsically linked to transportation, as well as to communications, then, the relation growth of the geographic space (its expansion) – circulation can be understood in the field of both ideas and practice; for one thing is closely linked to the other.

Moraes (2017) is one of the authors who values the understanding of the role of production space circuits as a central issue in the production-distribution-exchange-consumption relationship, which, according to this work, is central to knowing how the circulation of goods functions, such as the one that slaughterhouses produce. Starting from a Marxian thesis in which distribution is a factor of production and that, dialectically, one arrives at the idea that the exchange processes – *per se* – are configured in the production processes, Moraes (2017) assumes that:

(...) discussing the space circuits of production is discussing the space of production-distribution-exchange-consumption as a constant circular movement. Getting its determining elements is to realize the essence of its movements (MORAES, 2017, p. 27. Our translation).

Thus, it is supposed that Moraes (2017) is strongly concern with spatiality, a category without which circuits, and more broadly, circulation does not happen. In these terms, there are at least, three paths to help us in this reading. The first one has to do with the articulation between the different places that integrate production on a global scale, making up what Santos (1994) claims as the "global accumulation". The second path deals with the materiality that spatiality possesses and that allows us to understand better how the spatial circuits of production guarantee the vivacity of

the commodity in a worldwide way. The third one reveals that within spatiality there is an unequal and geographical combination structured in the production of scales, which are ‘manipulated’ by the agents from the upper circuit of economy.

It is Soja (1983) who presents an instigating debate on how spatiality is a material condition for the emergence and development of issues such as circulation and, especially, for the materialization of unequal geographical development (UGD). For him, “the UGD can therefore be defined as a succession component of the systematically structured spatiality (...)” (SOJA, 1983, p. 56). This idea, according to the author, leads to an understanding of how locational differentiations are associated with production mode variables, such as labor productivity. This element becomes important to know how the production of slaughterhouses, for example, works within productive scheme, respecting the various regions of the planet. Soja (1983) is called again in order to make known the dynamics of the integrating parts of the productive system. For him,

All these variables are clearly interrelated and from their compound interrelationship arises a tendency to spatial covariation. This tendency is what can be seen in the concepts of **development/subdevelopment and center/periphery**. These terms are “first order” DGD descriptions and differ in two “classes” of areas categorized according to a regular pattern or association of the basic variables defined previously (SOJA, 1983, p. 57, **author’s emphasis**. Our translation).

By relating the concepts development/subdevelopment and center/periphery, Soja (1983) provides us the path to make the reasoning of circulation comprehensive through the contradictory but combined and essential relationship of the upper and lower circuits of economy. For Silveira (2017) it dictates the territory modernization, thus ensuring them much of a connection with the external market than an internal cohesion in their territory of production.

Brandão (2007) treats this as the Sales’ production, especially with preeminence of some of them over the others in a certain historical period. Until the mid-1970s, due to the devastation caused by the World War II and the US leadership in rebuilding Europe, as well as the confrontation of the socialist expansion, the national scale, represented by the Nation-State, was preponderant.

In the wake of the oil crises, with global repercussions and the change in the gold standard (CARNEIRO, 2002), with greater impact on dependent economies, such as Latin America, there has been a renegotiation on the production process, which has reconfigured the preponderant scales. There was, in that period, a protagonism of global scales, represented by multilateral organizations and financial capital. As for the local scale, it can be said that it began to configure itself as a recipient of benefits from the intensification of competition to obtain the productive ‘benefits’ and global circulation.

Recently, with the health crisis imposed by the new coronavirus, Nation-States were again called upon to intervene energetically in the circulation of people and goods from the strengthening of border barriers and economic protectionism. Actions of different nations have been accumulated in this direction⁴. It is expected, especially in a continental country like Brazil, that the national planning will be preponderant in the confrontation of a pandemic, whether by its strategic character or by administrative, economic and political condition positioned by the central government. However, social practice has demonstrated the inertia of the Brazilian State, transposing to states and municipalities the actions of first order clashes, as well as abstaining from a border control of people and goods that is imposed from the global demands.

In the meantime, as previously stated, circulation is a preponderant factor for the dissemination of covid-19. The stimulus to it, however, occurs in an unequal way. In the case of the slaughterhouse production, external demand – originating from the higher scales – promotes productions that stimulates the circulation of workers from the main input – as the cattle – while processing with large contingents of workers and, finally, for their disposal.

However, it is highlighted that the circulation of goods and people from the slaughterhouses’ production is a condition and not a determinant for the dissemination of the new coronavirus. Until

⁴ Some News about the national protectionism in the confrontation of Covid-19 pandemic:

<https://g1.globo.com/bemestar/vacina/noticia/2020/07/22/eua-paga-quase-2-bilhoes-de-dolares-para-garantir-doses-de-potencial-vacina-afirmam-empresas.ghtml> - Accessed in 10/08/2020.

<https://neofeed.com.br/blog/home/covid-19-remodelara-o-comercio-mundial-mas-nao-sera-o-fim-da-globalizacao-nem-da-china/> - Accessed in 10/08/2020.

<https://www.euqueroinvestir.com/trump-proibe-venda-de-equipamentos-medicos-contra-o-coronavirus-para-canada-e-america-latina/> - Accessed in 10/08/2020.

now, there are no scientific bases that allow accuracy on the main factors for the dissemination. Nevertheless, there are evidences that lead to considering the circulation influenced by slaughterhouses as a protagonist variable in places and regions with high participation of these entities in the composition of the labor force, as Heck et al (2020) point out. As follows, the methodological path used in this research is presented.

Methodological Path

The methodological path for this analysis was based on techniques and data that, interrelate, integrate and intend the theoretical assumptions and the hypothesis formulated. Six procedures were followed based on quantitative, bibliographic and documental data, which were presented based on cartographic and statistical techniques. The following table represents the synthesis of the information considered with subsequent descriptive-analytical detailing.

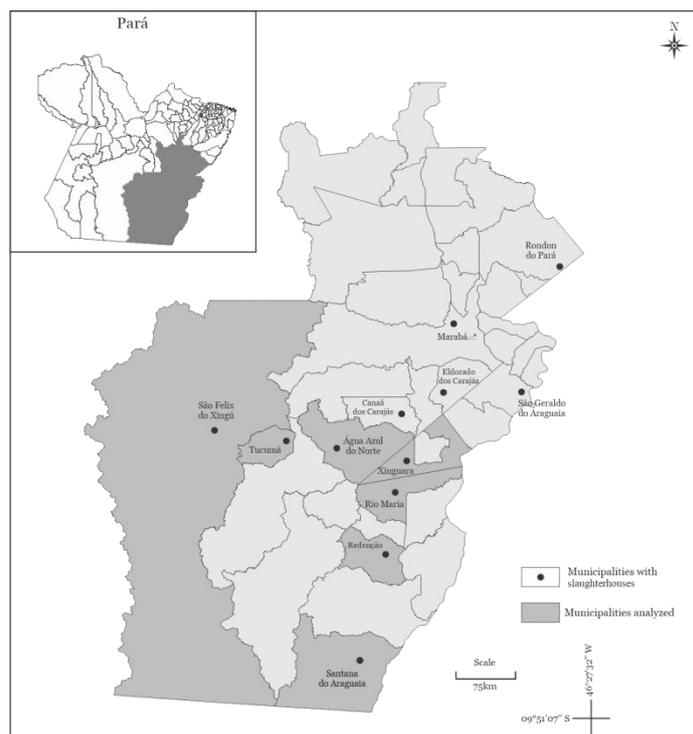
Table 1: Synthesis of methodological procedures.

Step	Information	Bases/Source	Code	Description
I	Spatial and temporal cutout	IBGE - Intermediate Regions detailed by municipality	1503; 1504	Intermediate regions of Marabá and Redenção
II	Presence of slaughterhouses	Rais – CNAE 2.0 subclass	1011201	Cattle Slaughter
III	Foreign Trade	COMEX – SH2 (chapter)	02	Edible meat and offal
IV	Cattle herd	IBGE - Intermediate Regions detailed by municipality	1503; 1504	Cattle herd
V	Covid-19	SSP/PA – Confirmed cases Segup/PA – Social isolation rate	1503; 1504	Intermediate regions of Marabá and Redenção
VI	Cartography and statistical processing			

Source: built by the authors.

At first, spatial and temporal limits of the research were defined. As a spatial frame, the South and Southeast regions of Pará are considered in this study as the set of thirty-eight municipalities that make up the intermediate regions of Marabá and Redenção⁵, in the meridional portion of the state, according to the cartographic representation as follows. As it is presented and discussed in the next section, in this region, the participation in production and export of animal protein and derivatives has grown in recent years. At the same time, reproduction and spatial circulation have been increasingly governed by this productive niche.

⁵ According to the regionalization of IBGE. For further information, see IBGE (2017)

Map 1: South and Southeast regions of Pará and the presence of slaughterhouses (in 2018).

Source: IBGE, 2017 and RAIS, 2018. Produced by the authors (2020).

The selection of the time cut was not possible to occur in a uniform way for all the information analyzed due to the nature of the phenomena and the restriction in accessing the data. As for the nature of the coronavirus phenomenon, the first confirmed case in the region was on 23rd of March of 2020, in Marabá, according to the Secretariat of Public Health of Pará (SSP/PA)⁶. This information was considered until 15th of August of 2020 with the purpose of finalizing this study, totaling the range between the epidemiological weeks⁷, 13 to 33. This final date was also applied to verify the information of social isolation, initiated on 9th of April, seen the availability given by the Secretariat of Public Security and Social Defense of Pará (Segup/PA)⁸.

The information on formal labor relations and establishments of ‘beef slaughtering’, have as the latest information provided by the Annual List of Social Information (Rais) for the year 2018, assumed in this study for argumentative purposes, aware of the recent dynamization of the sector towards the expansion of work and companies linked to the segment. As for meat and meat products, from the first year recorded with exports by municipalities in the region, it was considered the year 1999 until the current year, 2020. The intention is to verify if there was, in the year of the pandemic, a change in external demand that may require the intensification of spatial circulation. The volumes exported between the months of January and July of each year were selected for comparative purposes. The initial date of exports was the basis for the selection of data on the cattle herd in the region until the last data available, 2018.

The second methodological stage was the verification of the municipalities of South and Southeast Pará with the presence of slaughterhouses and their representativeness to all formal workers. This information was systematized based on the Rais, according to the National Classification of Economic Activities (CNAE 2.0)⁹, and the subclass code 1011201 selected, corresponding to “Cattle Slaughter”.

⁶ Further information available at <https://www.covid-19.pa.gov.br/#/> access in 18/08/2020. Information systematization available at <https://ietu.unifesspa.edu.br/painel-covid-19.html> access in 18/08/2020.

⁷ According to the Aggravates Information System and Notification Further information in <http://portalsinan.saude.gov.br/calendario-epidemiologico>. Access in 12/08/2020.

⁸ Further information available at <http://www.segup.pa.gov.br/%C3%ADndice-de-isolamento-social-covid-19-0> access in 18/08/2020. Information systematization available at <https://ietu.unifesspa.edu.br/painel-covid-19.html> access in 18/08/2020.

⁹ Further details in <https://concla.ibge.gov.br/> access in 11/08/2020.

Twelve of the thirty-eight municipalities, as shown in the table below, had formal links in bovine slaughter in 2018¹⁰. For this analysis, seven municipalities were selected in which the formal work in bovine slaughter was superior to 5% of the total. This cut occurred due to situations correlated to the intention of verifying the influence of circulation promoted by the slaughterhouse segment in the propagation of Covid-19 in the region: i) For municipalities with few links compared to the total, it is suspected that the sector's inference in the spread of the disease was minimal, with little possibility of verification. And ii) for medium-sized municipalities, such as Marabá, with a total of 46,807 formal workers and an estimated population of almost 280,000 in 2019¹¹, it is still premature, with the current availability of studies and data on the determinants of the Covid-19 dissemination. Highlighting the slaughterhouse segment from the total urban and peri-urban network that makes up Marabá, as well as affirm that only this segment has been preponderant.

Table 01: Formal work bonds in bovine slaughter, total and weight in 2018 in South /Southeast Pará.

Municipality	Bovine slaughter	Total	Weight links in slaughter
Água Azul do Norte	527	1,714	30.75%
Canaã dos Carajás	34	11,926	0.29%
Eldorado do Carajás	5	1,876	0.27%
Marabá	991	46,807	2.12%
Redenção	842	12,422	6.78%
Rio Maria	438	2,722	16.09%
Rondon do Pará	77	3,805	2.02%
Santana do Araguaia	771	4,660	16.55%
São Félix do Xingu	404	5,621	7.19%
São Geraldo do Araguaia	7	2,949	0.24%
Tucumã	1,030	4,400	23.41%
Xinguara	1,584	8,300	19.08%

Source: RAIS, 2018. Adapted by the authors.

It is understood, therefore, that suppressing the five municipalities not highlighted in the table tends to arrive at a more accurate reflection. In turn, three categories of municipalities were created: with 5% or more links in beef slaughter, consisting of seven municipalities; with up to 5% of links in beef slaughter, with five municipalities; and with no links in beef slaughter, the remaining twenty-six.

In the third stage, export information was collected from the Ministry of Economy¹² to understand if there was a change in the external demand pattern for animal protein from South and Southeast Pará due to the Covid-19 pandemic, a fact that would intensify circulation flows and, concomitantly, tend to accelerate the spread of the virus. As a sectorial cut, from the Harmonized System¹³, it was selected the Chapter SH2 code 02 described as "Edible Meat and Offal".

Besides the verification of the alteration of the exported volume, it was sought to analyze the occurrence of alterations in the historical pattern of commercial partners. It was detailed, therefore, volume and importing countries of the products derived from the meat chain of South and Southeast Pará.

The fourth stage was the verification of the variation and the spatiality of the bovine herd in the region. Since this is the main input for the production of slaughterhouses and, by extension, it indicates the possible vertices of circulation of goods and workers for the supply of the main activity of the chain. Comparative tracings of the regions with Pará and Brazil were made to visualize the levels of growth of the activity.

¹⁰ The bovine slaughter is highlighted due to the inexistence of formal work and establishments registered in the slaughter of other species in the region in 2018.

¹¹ See <https://www.ibge.gov.br/estatisticas/sociais/populacao/9103-estimativas-de-populacao.html>. Access in 11/08/2020.

¹² See at <http://comexstat.mdic.gov.br/pt/município> access in 11/08/2020.

¹³ More details at <http://www.aprendendoexportar.gov.br/index.php/sistema-harmonizado> access in 11/08/2020.

The fifth methodological stage was to collect and systematize the occurrence of Covid-19 in the municipalities of the South and Southeast regions of Pará, especially in the twelve presented in table 1, the ones in which there are slaughterhouses. The database was the Secretariat of Public Health of Pará (SSP/PA) from the systematization of the “Covid Ietu/Unifesspa Panel”¹⁴. Information on the social isolation rate was also collected for purposes of comparison among the three groups of municipalities considered to verify the existence of little isolation in the places with slaughterhouses, given the character of essential activity inferred by state and municipal administrative authorities.

With both information, comparisons within the region became possible to draw, in a preliminary way, indications about the inference of circulation from the intensification of external demand for meat derivatives in the dissemination of Covid-19 in South and Southeast Pará.

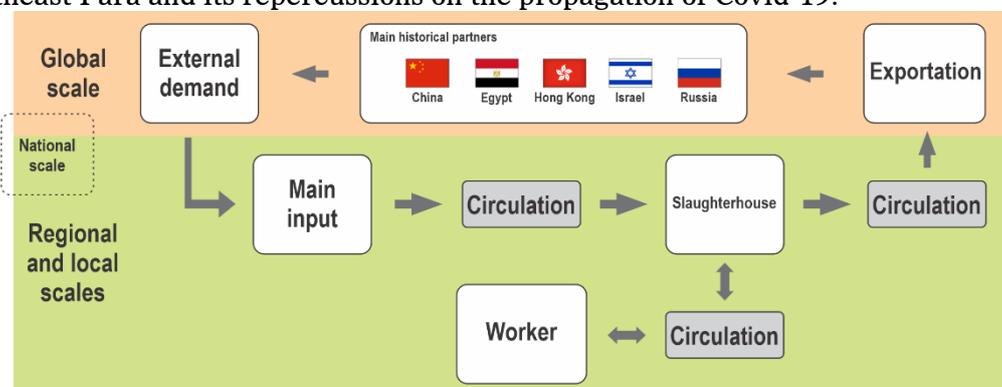
Finally, as a last stage, graphic and cartographic systematizations were made for synthesizing and exposing the collected data. Correlation indexes, linear regression, and multicollinearity in regression were explored to elucidate the understanding about the weight of production and circulation caused by the slaughterhouse chain in the propagation of Covid-19 in the region's municipalities.

The spatial circulation stimulated by slaughterhouses and the propagation of Covid-19

The proposal of analysis in this article, based on the assumptions previously exposed, started from the ‘knots’ of the animal protein production chain in South and Southeast Pará with emphasis on two elements. i) The process of circulation of goods/input/product – mainly, but not only, given the workers involved – stimulated by global demand in its main links until the export of the product. ii) The centrality of slaughterhouses, given the circulation quota of workers.

Based on this information, an estimated route is drawn, which can help in understanding the propagation of Covid-19 in the highlighted region, thus, the analysis will follow the analytical path, synthetically exposed in the figure below.

Figure 01: Summary of the analytical proposal of the animal protein chain circulation in South/Southeast Pará and its repercussions on the propagation of Covid-19.



Source: Created by the authors.

Assuming that the stimuli coming from the global scale have been predominant in the production of the Amazon region since the 1960s (BECKER, 1990), when there was, on the part of the national government, a strategic articulation of integration of the Amazon at that present time, with distinct peculiarities, this process continues and intensifies. In South and Southeast Pará, specially, the global demand for primary products is the tonic of the majority regional production. Something that also goes back decades, through the exportation of forest products, and nowadays is characterized, especially, by the exploration of mineral products, cattle raising and commercial agriculture.

Of all these chains of exploration, circulation and production, livestock stands out for the contingent of workers involved at the regional/local scale, as Oliveira et al (2019) and Santos (2017), especially in the process of processing refrigerated plants, but not only in them, in view of the

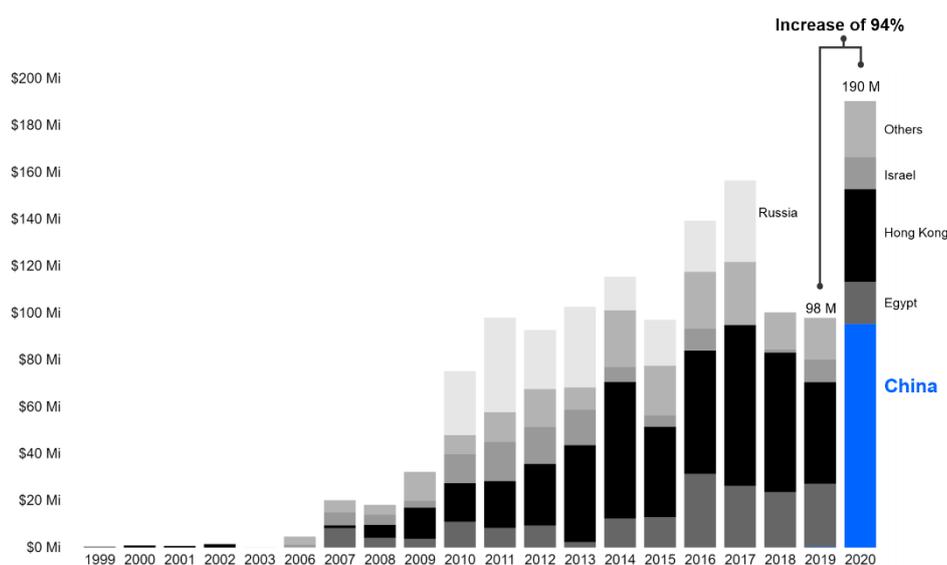
¹⁴ See at <https://ietu.unifesspa.edu.br/painel-covid-19.html> access in 18/08/2020.

circulation to supply the main input, cattle and the downstream flow. In this sense, and based on recent studies carried out by Heck et al (2020), the weight of this specific activity in the dissemination of Covid-19 is presumed, even more so in a region with precarious sanitary conditions.

As previously stated, the State Government explicitly classified this activity as an essential activity (PARÁ, 2020). Among the sixty-four activities thus defined, besides the explicit citation to the production of livestock goods, there are at least fifteen others that directly or indirectly support this production and accentuate the circulation of people and goods in times of pandemic. Nevertheless, this situation is cancelled by most of the municipal governments of southern and southeastern Pará, in decrees with this purpose and based on the state decision – Redenção (2020), Rio Maria (2020), Santana do Araguaia (2020), São Felix do Xingu (2020), Tucumã (2020) and Xinguara (2020).

Thus, not only was the activity eminently exported maintained, but during the Covid-19 pandemic, meat exports from those municipalities have increased by almost 100% compared to 2019, as shown in the following graph. This data becomes more prominent when one considers that since the beginning of the exportation of these products by the region, 2020, until the month of July, it is in the historical series the year with the largest exportation. It demonstrates, not only the intensification of the external demand - as a result (presumably) of the restrictions of the central governments of these countries (graph 1) - but also the intensification of the circulation of people and goods in the screen region, impacting on the lesser social isolation and case dissemination curves, as demonstrated in this section.

Graph 01: Exports of “Edible Meat and Offal” from South and Southeast Pará between January and July, historical series. Five main commercial partners. (values in US\$).



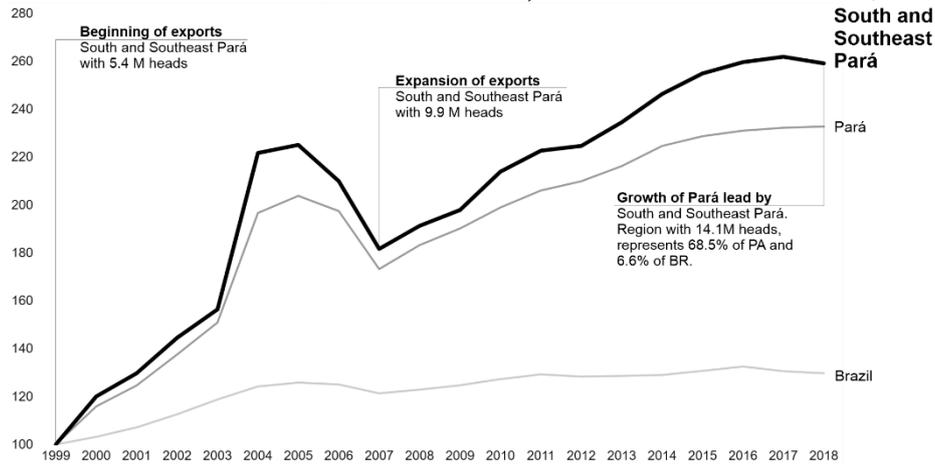
Source: Ministry of Economy, COMEX, 2020. Created by the authors.

In addition to the increase in the amount of exported meat and derivatives, there were significant changes in commercial partners. Among the thirty-four importing countries of the products in 2020, four of them: China, Egypt, Hong Kong and Israel were responsible for 87.4% of the total. However, it is noteworthy the insertion of China as a trading partner in the year of 2020 and, as soon as it entered the list of importers of the region's products, is responsible, until the month of July, for more than 50% of the value exported.

The main input of the chain, the cattle, is, in part, from the Southern and Southeastern region of Para. In order to understand the increase in production and circulation in recent years stimulated by exports¹⁵, the initial year of exports, 1999, is assumed as the year to realize the phenomenon. The following graph shows that there were 5.4 million head in the region; the growth curve of Pará was practically the same as that of the region, that is, leveraged by the latter. In proportional terms, the region increased its herd in indexes superior to the state and the country until the last year available.

¹⁵ As can be seen from 2007, when the exportation increased, boosting the demand for raw material.

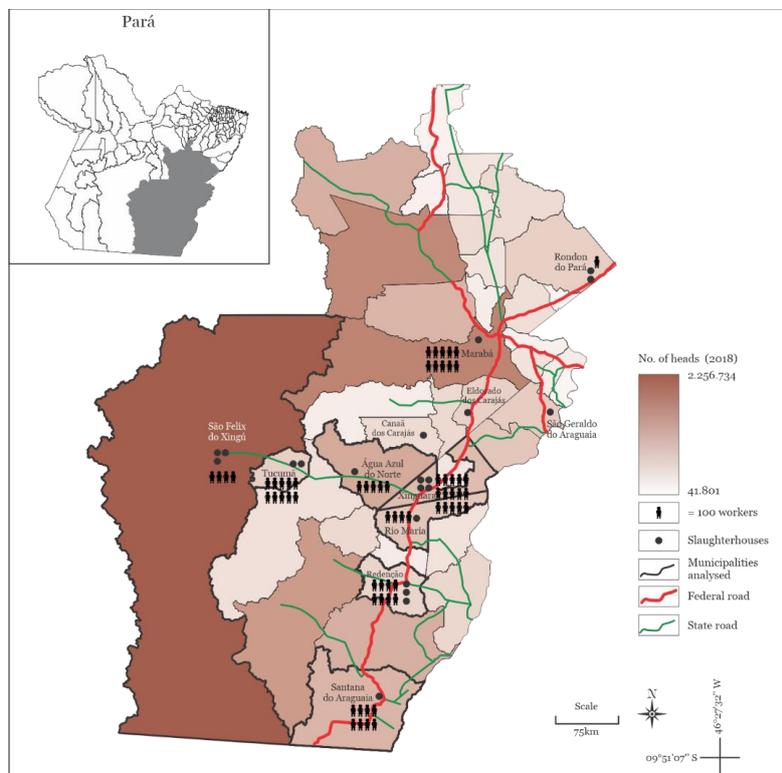
Graph 02: Bovine herd from the South/Southeast Pará, Pará and Brasil indexed (1999 = 100).



Source: IBGE, 2020. Created by the authors.

By aggregating and mapping information on the number of head of cattle with the presence of slaughterhouses and the number of workers directly employed in them, it is possible to estimate the intensity of the processes of circulation of goods and people linked to the chain in the region under analysis, from the raw material.¹⁶ In map 02, this information is represented with the main circulation axes of the region where the concentration of slaughterhouses and workers in the regional hinterland is perceptible. With a focal point at the crossing of West-East axis starting in São Félix do Xingu and ending in Xinguara; and a South-North axis starting in Santana do Araguaia and ending in Marabá.

Map 02: Circulation Axis and chain productive ‘knots’ of slaughterhouses form South ‘and Southeast Pará.¹⁷



Source: IBGE, 2020 and RAIS, 2018. Produced by the authors.

¹⁶ The slaughterhouses of the region are not only supplied with cattle from the region itself. However, attention is drawn to the impact of circulation in the region and its intersections with the propagation of Covid-19 in South and Southeast Pará.

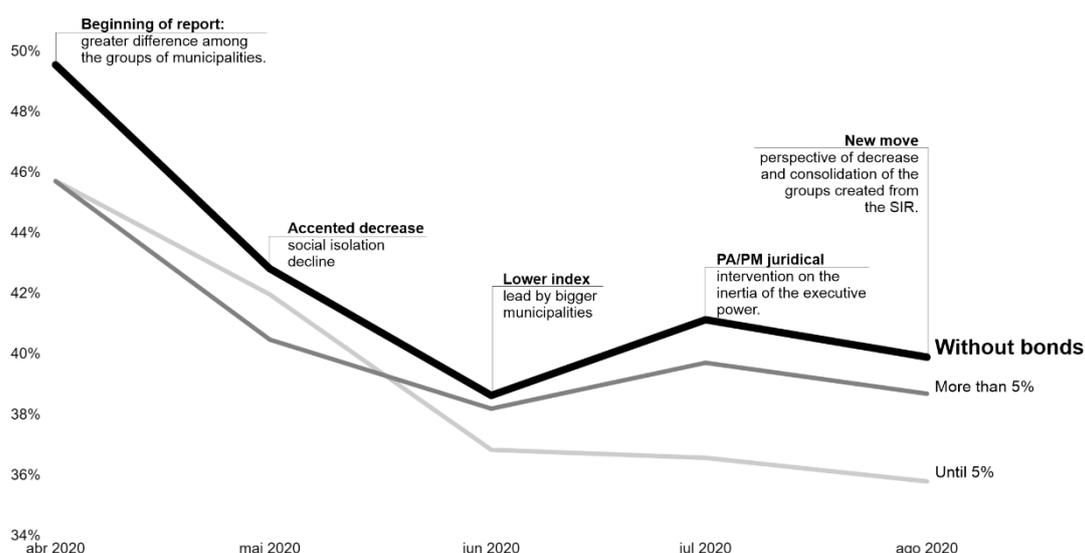
¹⁷ The municipalities with slaughterhouses, but without the indication of workers in the cartographic representations indicate that there should be, in 2018, less than 100 workers linked to “bovine slaughter” activities.

Focusing on the intersection between the propagation of Covid-19 with the production and circulation because of the slaughter of cattle in slaughterhouses, it is sustained that the maintenance of activity during the pandemic was one of the factors for the dissemination of the virus. As highlighted, a linear metric that brings as unique cause this activity would be simplistic. The Ministry of Health (2020) indicates that there are numerous factors that influence the contamination, such as ecological, physiological, socio-cultural, and economical factors, among others. However, some pertinent considerations can be made.

Sanitary authorities affirm strongly since the intensification of the dissemination of Covid-19 that the social isolation is a more effective way to contain the propagation while there is no vaccine efficiently proved against the virus - CDC (2020); ECDC (2020). It is indicated that in area with high infection levels, the Social Isolation Rate (SIR) is, at least, of 70%. In South and Southeast Pará, the indexes were never at those standards, even in the beginning of the precaution, when the population adhesion and state control were greater.

The following graph uses the categorization of municipalities explicated in Table 1 and clearly demonstrates that the municipalities of the region – without working bonds in slaughterhouses – always showed SIR superior to the others, especially in the beginning of the reports. Meanwhile there was the flexibilization of the social distancing, the curve of municipalities with working bonds behaved less accentuated, once the slaughterhouse activity was always maintained, and, consequently, the circulation of products and workers.

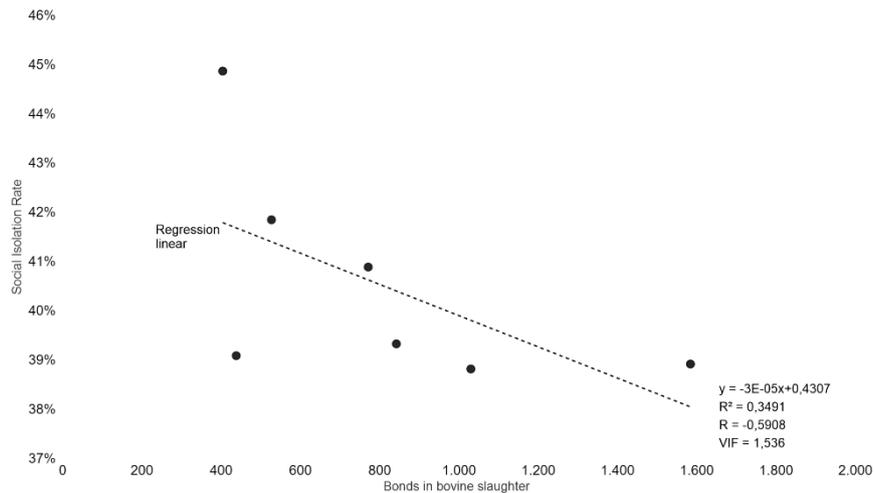
Graph 03: Social Isolation Rate by groups of municipalities: i) without bonds to the bovine slaughter; ii) more than 5%; iii) until 5%.



Source: Segup/PA, 2020. Produced by the authors.

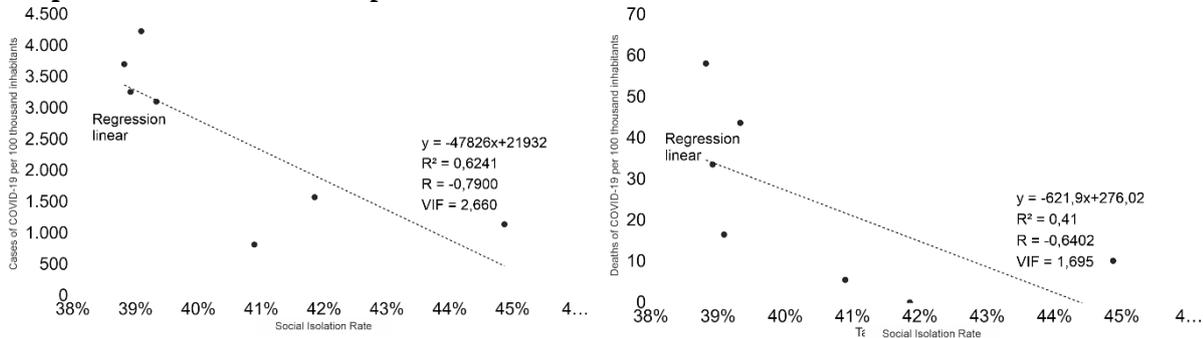
By highlighting the seven municipalities with more than 5% of workers in slaughterhouses, that is, with more explaining power for the hypothesis created for the comprehension of the region observed. Statistical information of correlation, linear regression and multicollinearity help in the comprehension of the impact of this activity in the propagation of Covid-19, by the SIR and the number of cases and deaths confirmed.

The negative correlation of 0.5908 indicates, with statistical representativeness, that fact that the greater the number of workers linked to the sector of cattle slaughter, the lower is the SIR, and the linear adjustment of 34% in the number of slaughter serves to explain social isolation. Nevertheless, the FIV lower than 10 in all the analyses performed demonstrates that the variables used are explanatory in a process of multicollinearity.

Graph 04: Social Isolation Rate and bonds in bovine slaughter

Source: Segup/PA, 2020 and Rais, 2020. Produced by the authors.

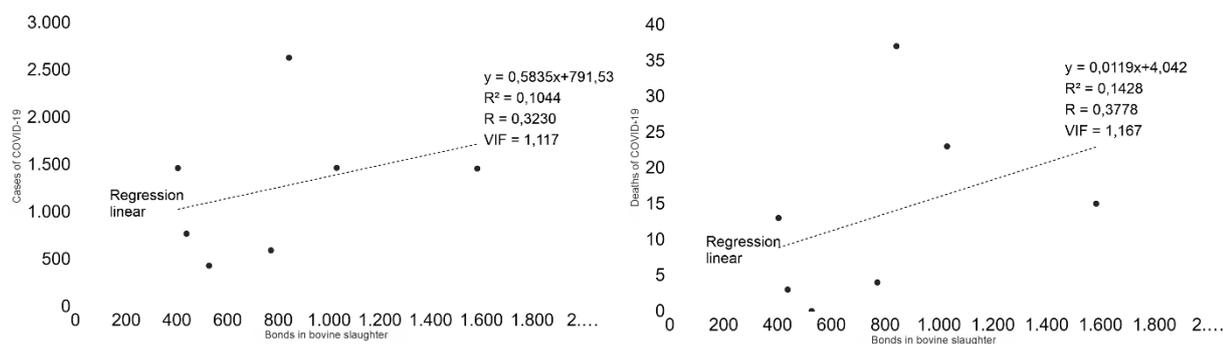
Thus, since the number of workers in slaughterhouses is an expressive variable to determine the SIR, it was necessary to notice whether in the seven municipalities with more than 5% of employment in the sector, the SIR is in fact related to the number of cases and deaths by COVID-19, as stated by CDC (2020) and ECDC (2020). The regressions exposed in the following graphs demonstrate a high negative correlation, with -0.79, in relation to the cases and with a linear adjustment of 62%, and 0,6402, in relation to the deaths in linear adjustment of 41%. That is, the graph indexes demonstrate that the bigger the SIR, the smaller the index of deaths and cases per 100 thousand inhabitants is¹⁸.

Graph 05: Cases and deaths per 100 thousand inhabitants and Social Isolation Rate.

Source: Segup/PA, 2020 and Rais, 2020. Produced by the authors.

Therefore, we tried to directly relate the number of cases and deaths per 100 thousand inhabitants to the number of workers in cattle slaughter activities. The statistical indicators are not so expressive, with determination coefficient of 0.1044 and 0.1428 (linear adjust) for cases and deaths, respectively. As previously explained, given the numerous influences that determine the contamination of COVID-19, explaining only one variable is an efficient simplification as long as the explanatory limits are considered and added to other variables, such as SIR, pointed out above.

¹⁸ For purposes of comparison between different populations, case and death indicators per 100,000 inhabitants were used.

Graph 06: Cases and deaths and bonds in bovine slaughter

Source: Segup/PA, 2020 and Rais, 2020. Produced by the authors.

In view of the information brought and analyzed, it can be suggested that, even in a non-determining way, there are constraints on the form of production in slaughterhouses¹⁹ and the spatial circulation imposed by the activity in the propagation of Covid-19 in the South and Southeast regions of Pará. Social distancing is harmed in municipalities with impressive importance in the slaughterhouse activity in the composition of formal work, causing the elevation in the indicators of confirmed cases and deaths from complications of the disease.

Final Considerations

The spatial circulation of goods and workers linked to the slaughterhouse activity not only did not heal, but was expanded in the South and Southeast regions of Pará, according to export indicators. The activity thus acted as a condition for a lower rate of social isolation. The isolation, on the other hand, cannot be attributed only to the slaughterhouse activity, in the same way that the contamination by Covid-19 is the result of several factors. However, statistical evidence was found in the information collected that leads to an understanding of the proximity between the increase in cases and deaths from the disease as a result of the maintenance of the activity during a pandemic period.

The circulation is, in these terms, a preponderant factor for the dissemination of Covid-19. The stimulus, however, occurs in an unequal way. In this case, the external demand, coming from higher scales, promotes a production that stimulates the circulation of workers from the main input, in large contingents during the processing and, finally, for its flow.

There is a propulsion favor for the dissemination of Covid-19 in the region of external order, which configures the local/regional pattern with the consent of the national scale represented by the Brazilian nation-state, which, contrary to what has occurred in other countries, consents to the practice of putting its nationals at risk to meet an exogenous demand.

The example of slaughterhouses in regions such as the ones studied point to a geographical reasoning in which spatial circulation is mirrored by unequal geographical development that does not manifest itself in an absolute way only with goods, but involves human (individuals) and social (collective) issues that are aggravated by the Covid-19 pandemic. Finally, this picture reinforces that an activity considered essential cannot gain this attribute without first understanding the social, economic and cultural relations, which are necessary in the comprehension of a pandemic such as Covid-19, what reinforces the understanding of the impact of the spatial circulation of this disease.

This fact becomes even more latent when, in the case of the slaughterhouse production in South and Southeast Pará, a significant part of the production classified as essential, due to the composition of the food chain, is not destined to the domestic Market. There was, in this case, a Brazilian political movement in the opposite direction of that executed in most nations during pandemic. While a defense of the public health conditions of the national population was sought, in Brazil the worker was put at risk to meet exogenous demands.

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¹⁹ Reported in: https://www.youtube.com/watch?v=PtG_Ab1M7s4&feature=emb_logo access in 21/08/2020; and at <https://www.bbc.com/portuguese/brasil-53477319> access in 21/08/2020.

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