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FOR DEMOGRAPHY AND
GLOBAL HUMAN CAPITAL

The changing age-structure of Coronavirus SARS-CoV-2 deaths and cases: a case study of Paraná, Brazil

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Background

- Demographic aspects of Paraná state in Brazil:
 - Older population age-structure – ↓ fertility rate and ↑ life expectancy
 - Paraná is one of the most developed states of the country.
 - The Human Development Index (HDI): **0.749**.
- Current situation of the pandemic in state:
 - First case of Covid-19: March 12, 2020.
 - As of July 27, 2020: 68,000 cases and 1,703 deaths → death coefficient of **0.05** (Brazil: 42 per 100,000 inhabitants) and a fatality rate of **2.5** percent (Brazil: 3.6 percent).
 - Limited testing (Mills 2020; Paixão et al. 2020).

Background

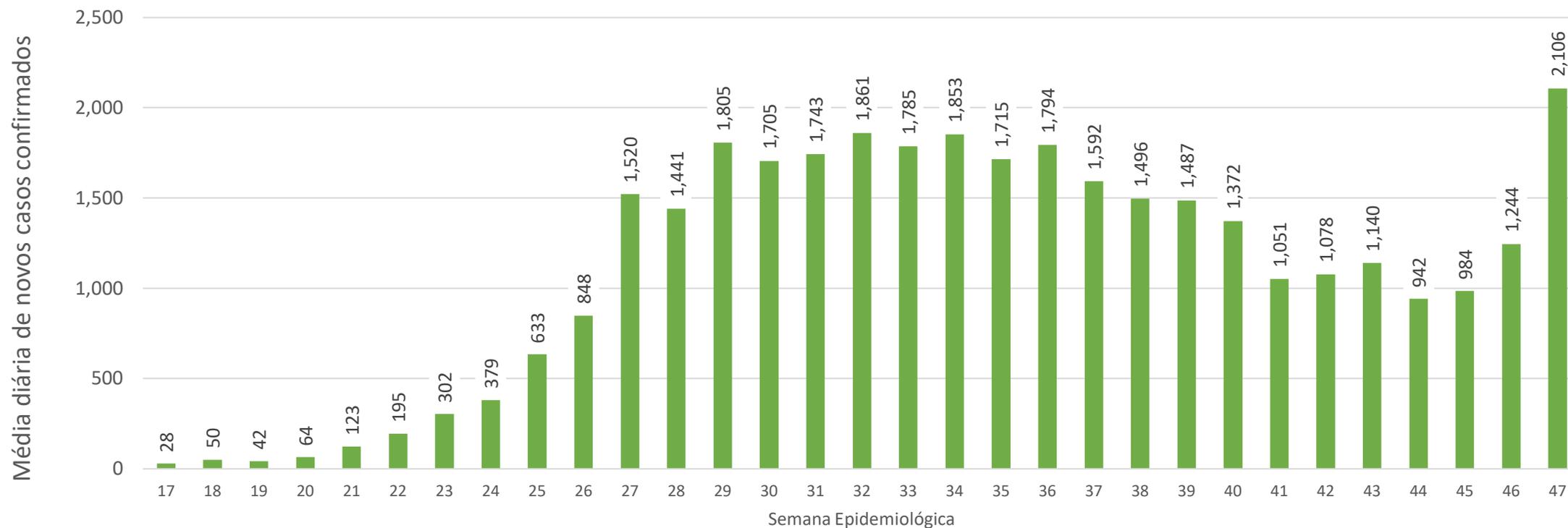


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Average daily COVID19 cases in the State of Paraná, according to epidemiological week.

Last updated: 21 nov 2020.



Elaboração: equipe do Nesde

Fonte: SESA/PR

Projeto de Pesquisa SESA/UFPR 22075/022270/2020-07

Background



- Principal measures regarding the prevention of COVID-19 adopted by the Government of the State of Paraná:



Research question

- Given these demographic features of Paraná state in Brazil, and the availability of administrative microdata by gender, age and sex for the confirmed COVID-19 cases and deaths, **our goal is to explore the demographic evolution of the Coronavirus SARS-CoV-2 deaths and cases in the state.**

Hypothesis

- Loose restrictions of social isolation, \uparrow levels of inequality compared with more developed populations (Oliveira et al., 2020) \rightarrow Younger adults likely contribute to community transmission of COVID-19 \rightarrow younger age-structure of the deaths and cases.

Relevance



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- Given the role of asymptomatic and presymptomatic transmission → strict adherence to community mitigation strategies and personal preventive behaviors by younger adults is needed to help reduce their risk for infection and subsequent transmission of SARS-CoV-2 to persons at higher risk for severe illness.

Methods



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Data

- We use administrative records from the Paraná Health Secretariat.

Design

- We monitor COVID-19 cases and confirmed COVID-19 deaths by single age, sex and municipality of residence.
- The municipalities are classified in low, medium, high as per the percentage of elderly in the population, and low, medium, high as per the number of confirmed COVID-19 cases (cumulative) in the period of reference.

Results

- COVID-19 cases and deaths in the state of Paraná endorse the rejuvenation of the age-structure when the pandemic unfolds in the State.
 - Cases are more concentrated among individuals in the economically active age groups (prime ages), unlike the beginning of the pandemic.
 - The initial age-sex distribution of COVID-19 deaths was more concentrated among the 50-60s and above → As the pandemic unfolds, there is a clear rejuvenation of the age structure of deaths.

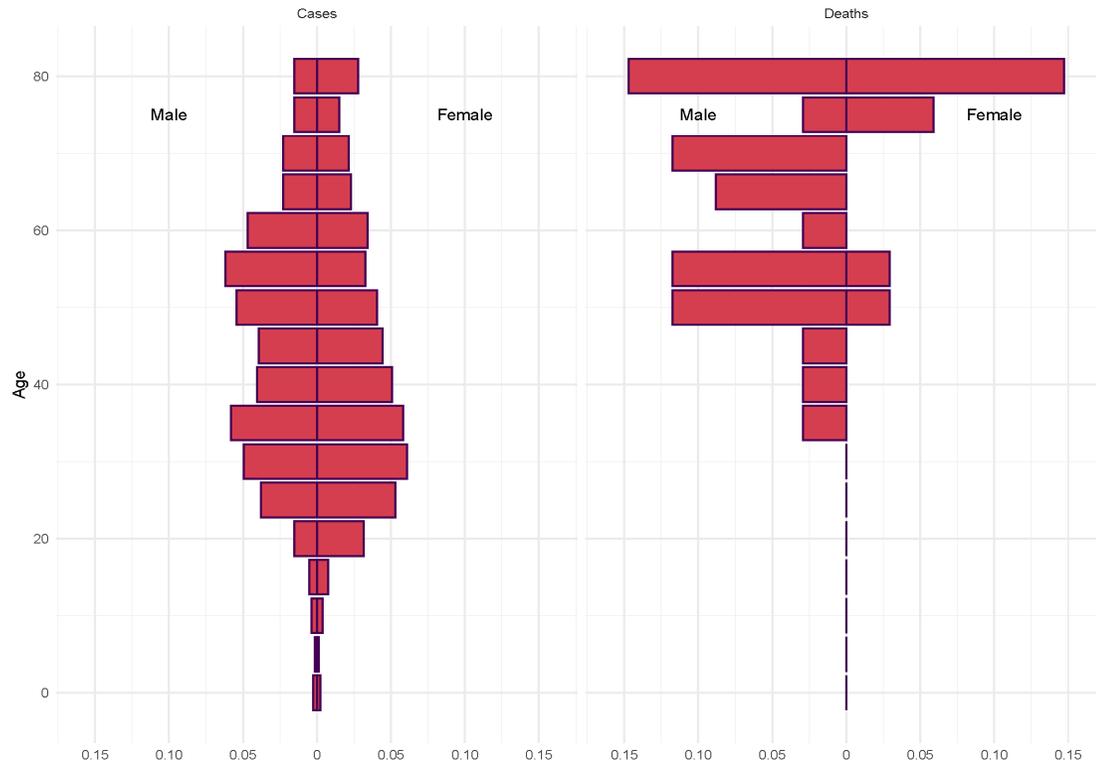
Results



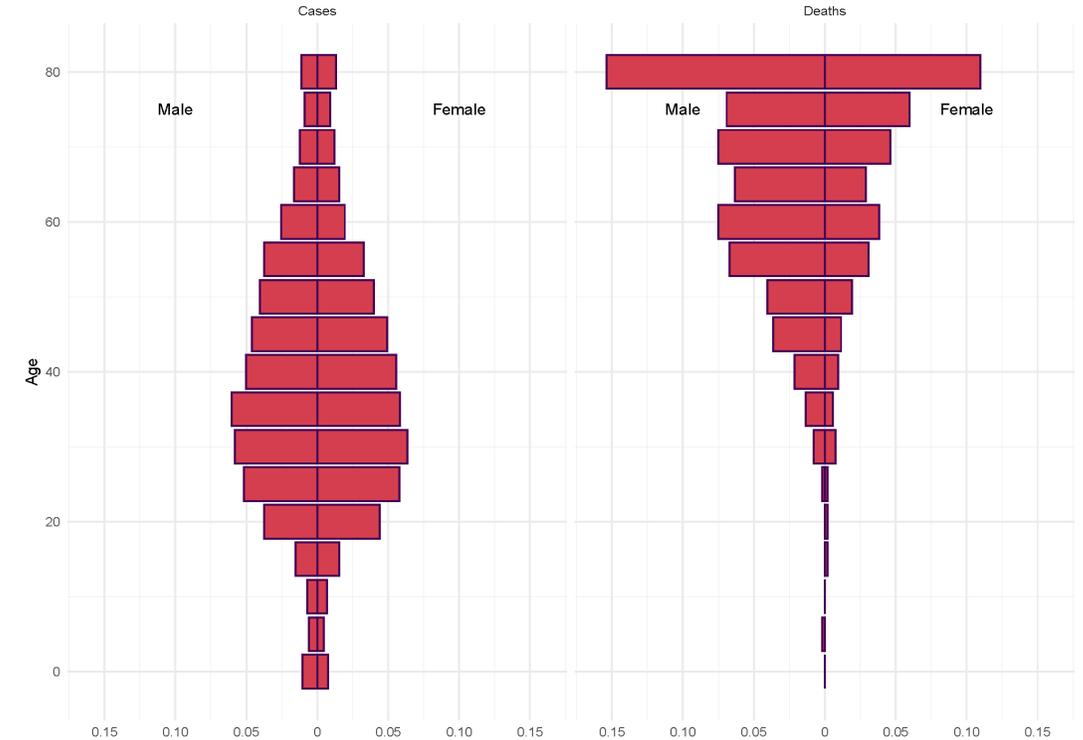
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Relative age-distribution by sex of COVID-19 cases and deaths according to the temporal evolution of the disease

ISO weeks 11-15, 2020



ISO weeks 11-25, 2020



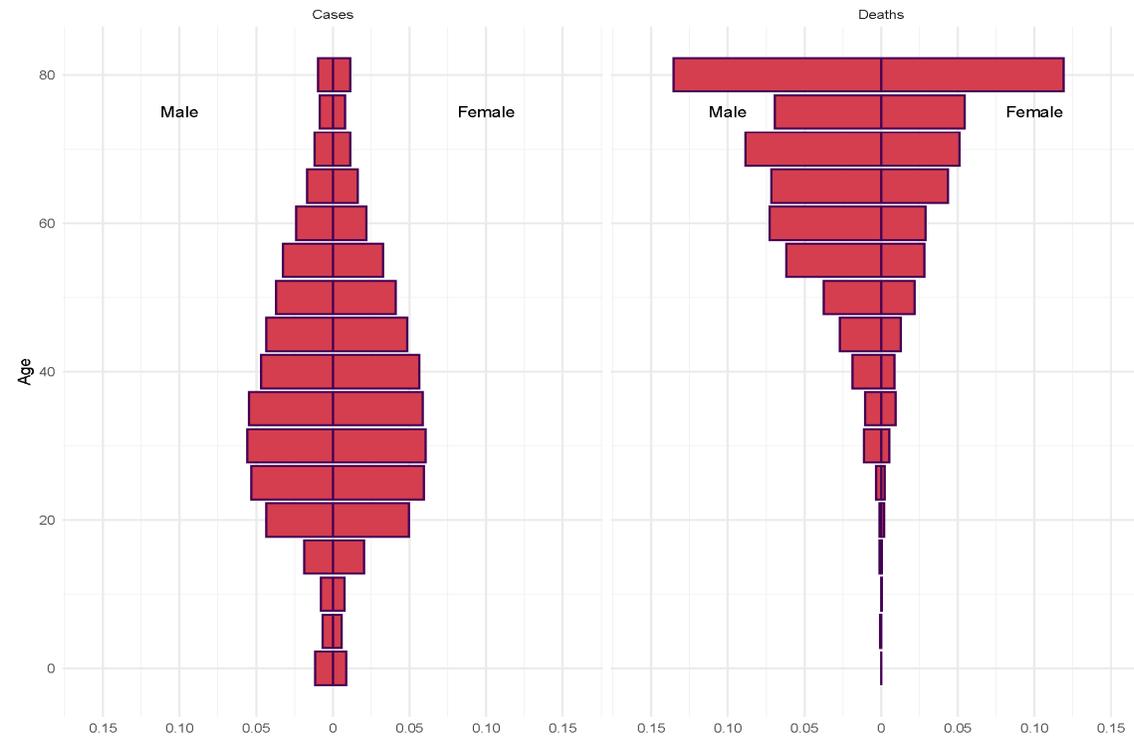
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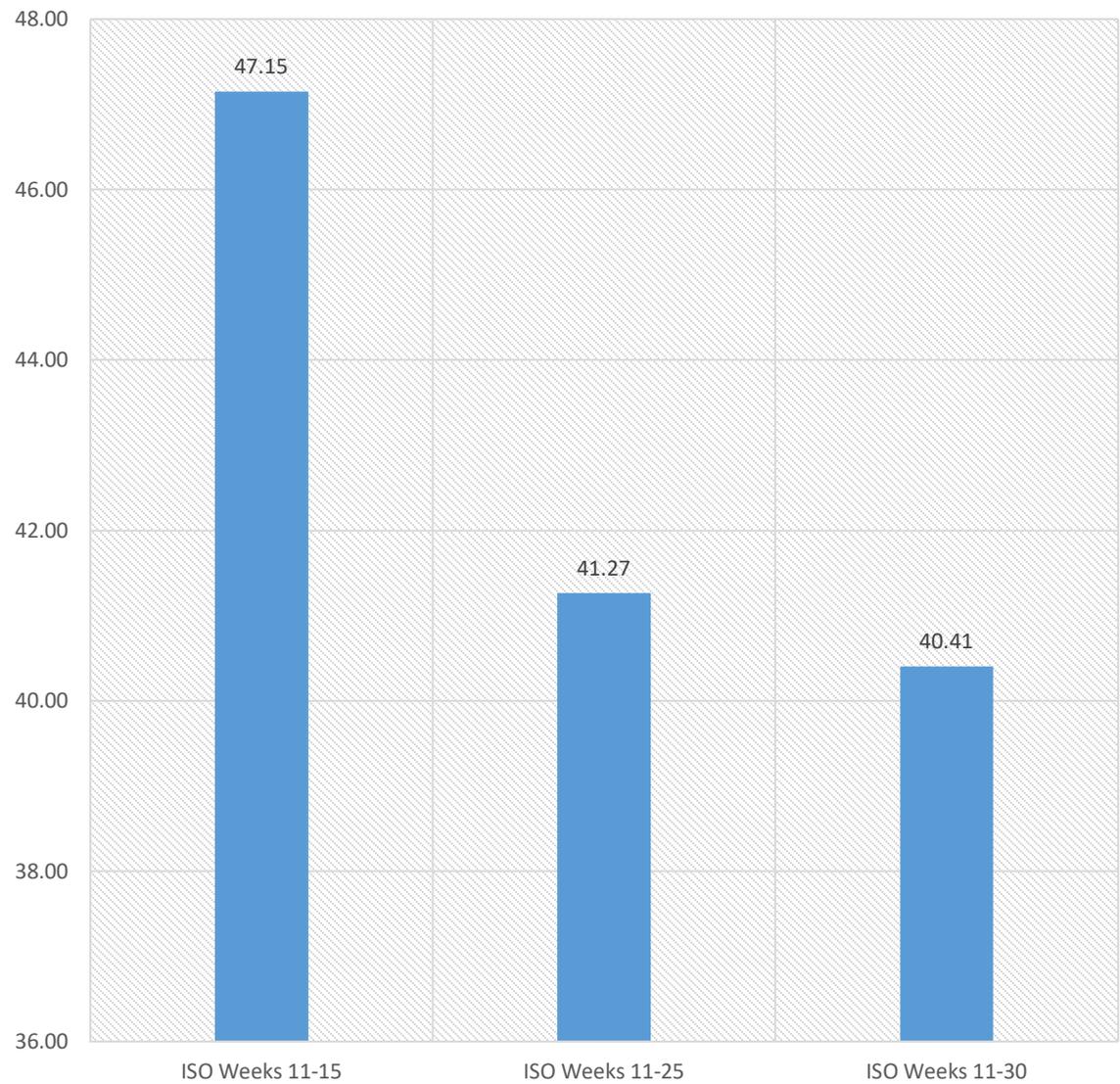
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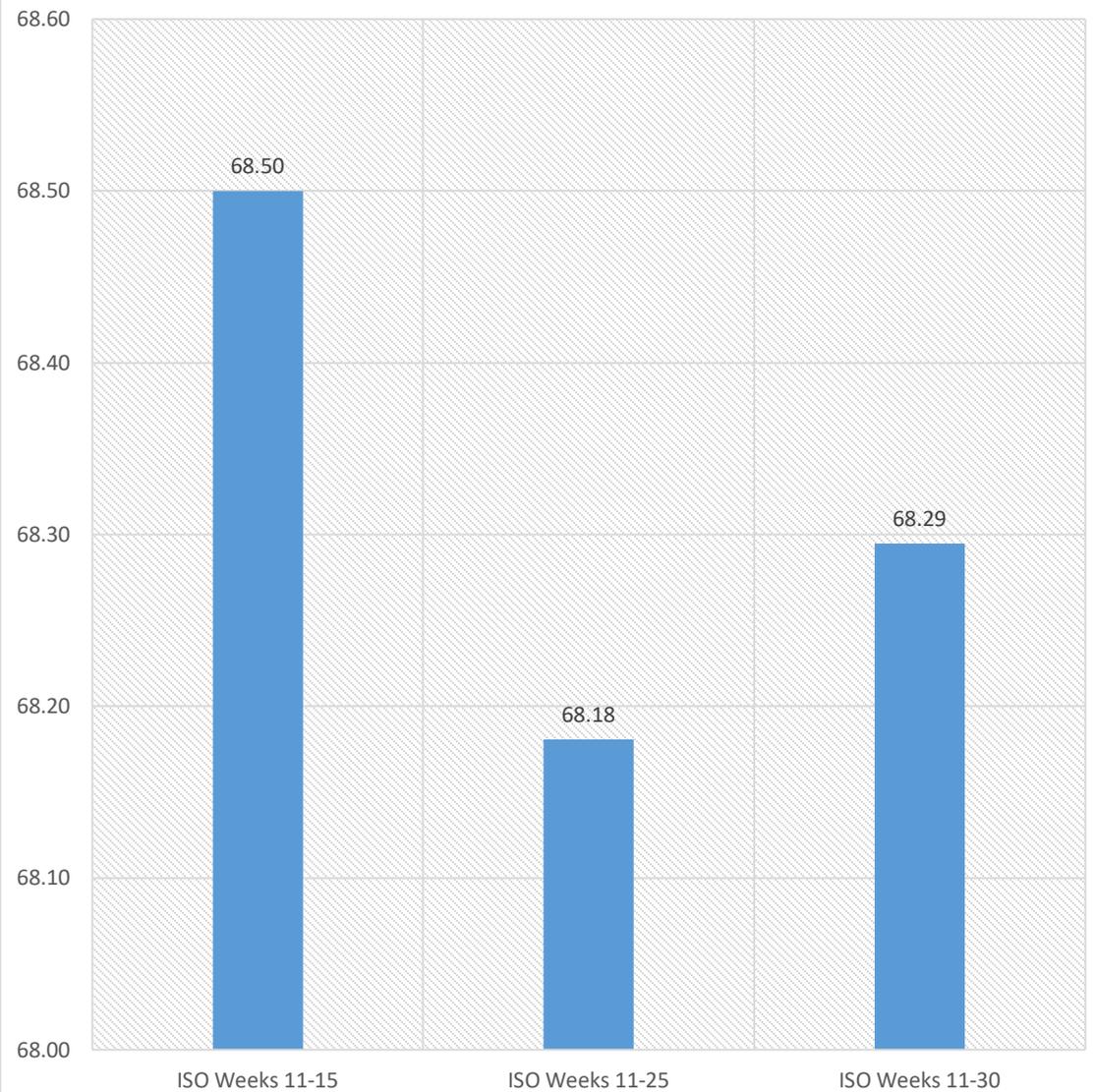
ISO weeks 11-30, 2020



Average age - Cases Confirmed



Average age - COVID-19 Deaths



Results

- Regarding the heterogeneity in space on the demographic aging process at the local level and the relationship with the **age-distribution of cases**:
 - The number of low-low municipalities decreases (blue) → Out of 109 municipalities with this condition, only 45 persist until week 30.
 - The Rejuvenation process can be seen from the medium-low municipalities in week 11-15 (green).

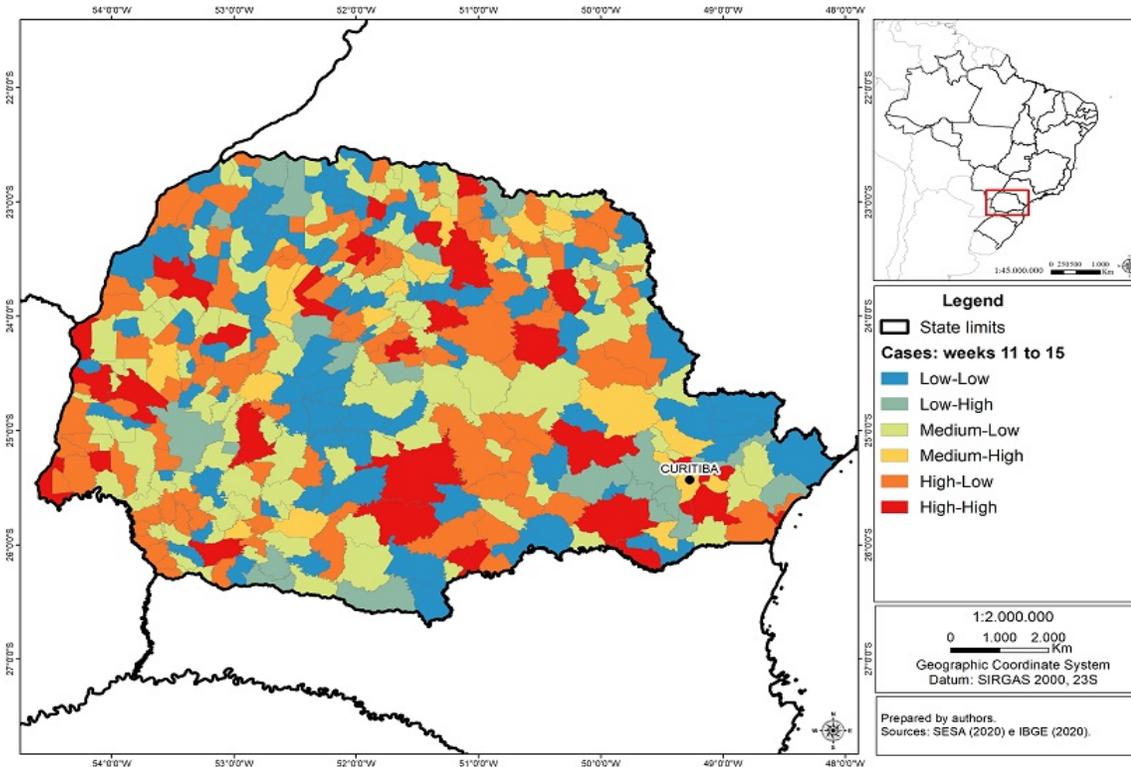
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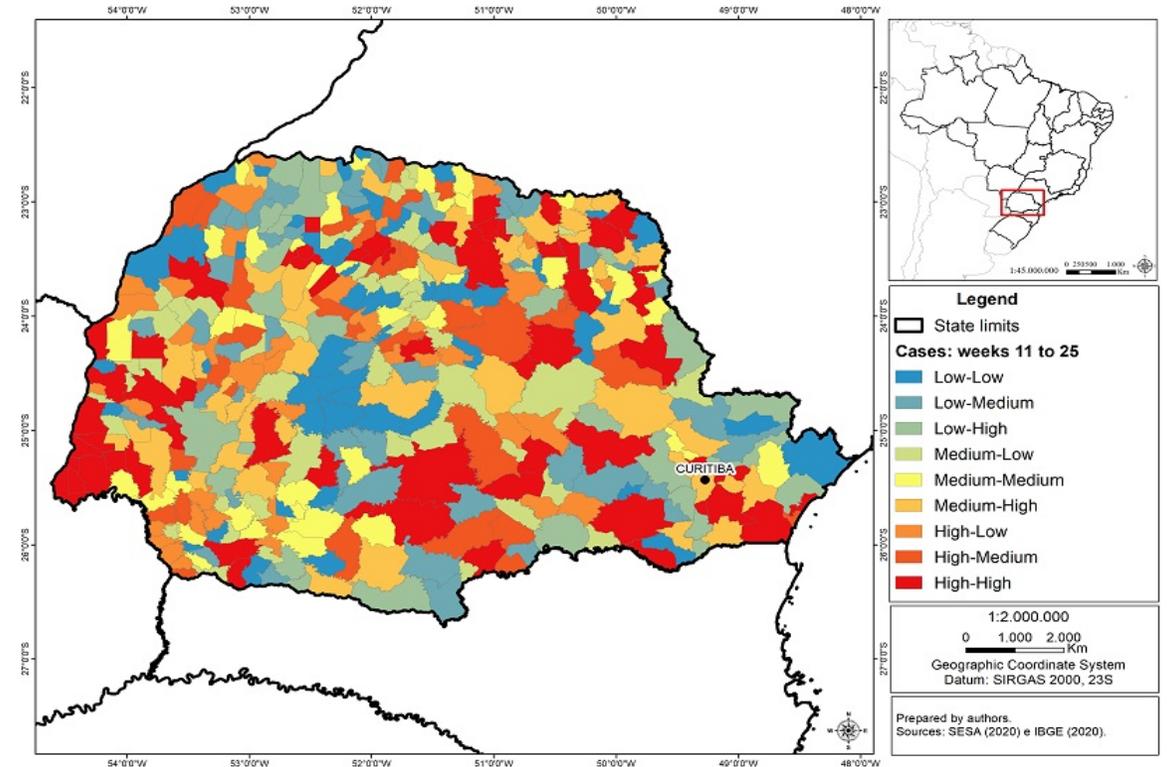
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Regional distribution of the confirmed COVID-19 cases, according to the percentage of elderly in the municipality and temporal evolution of the pandemic

ISO weeks 11-15, 2020



ISO weeks 11-25, 2020



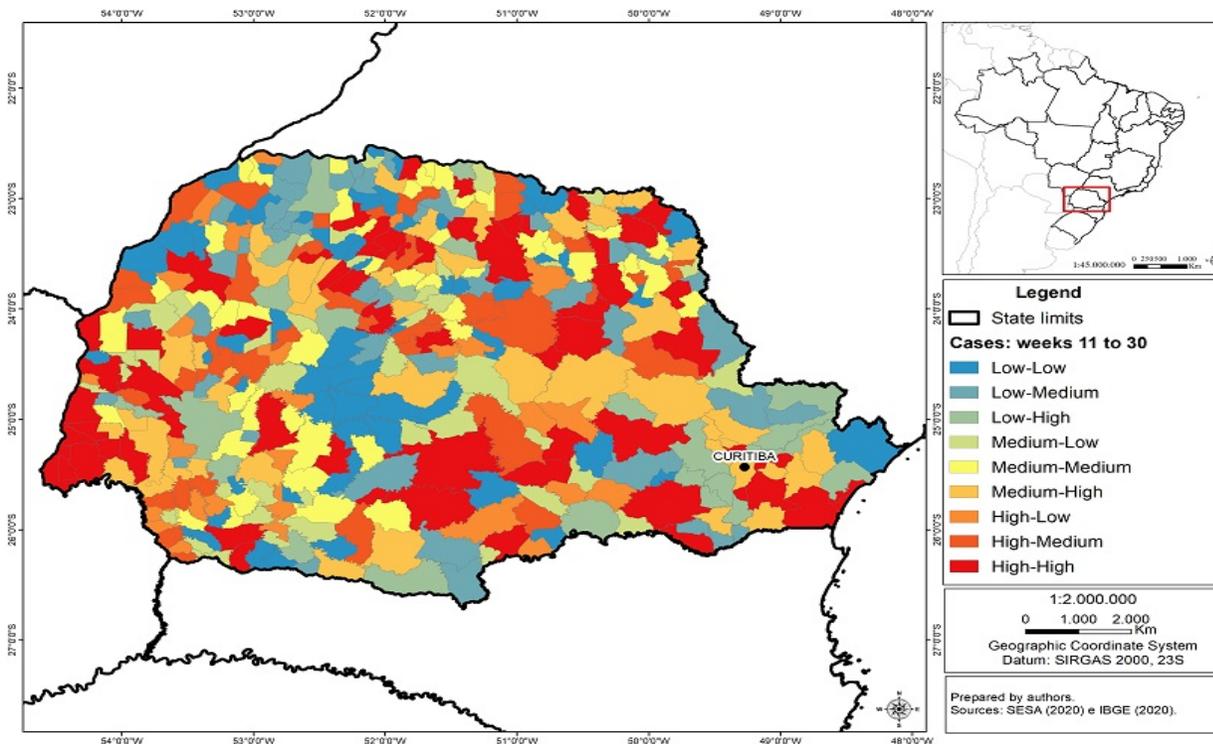
Results



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Regional distribution of the confirmed COVID-19 cases, according to the percentage of elderly in the municipality and temporal evolution of the pandemic

ISO weeks 11-30, 2020



Results

- Regarding the heterogeneity in space on the demographic aging process at the local level and the relationship with the **age-distribution of deaths**:
 - The number of municipalities that turn out to have a higher number of deaths (red) increases systematically over the weeks (from 5, to 47, and then to 59 localities).
 - The number of municipalities with the lower percentage of elderly and lower number of registered deaths (low-low, blue) decreases.

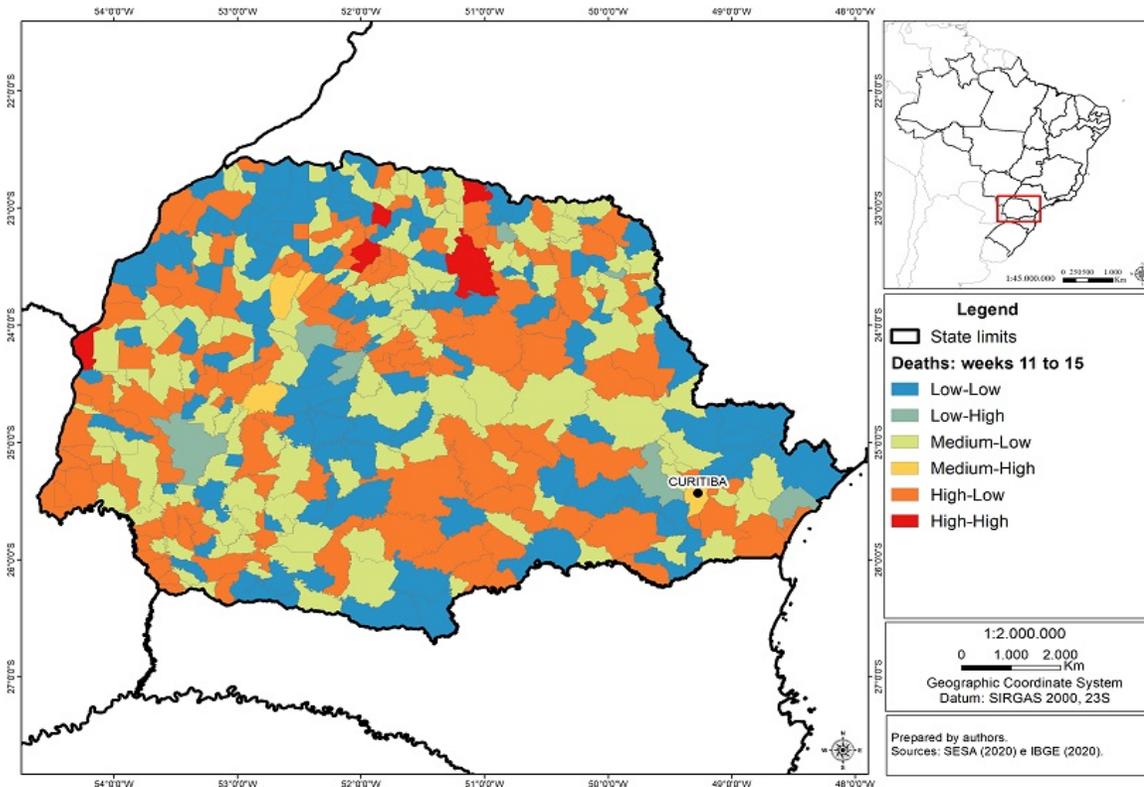
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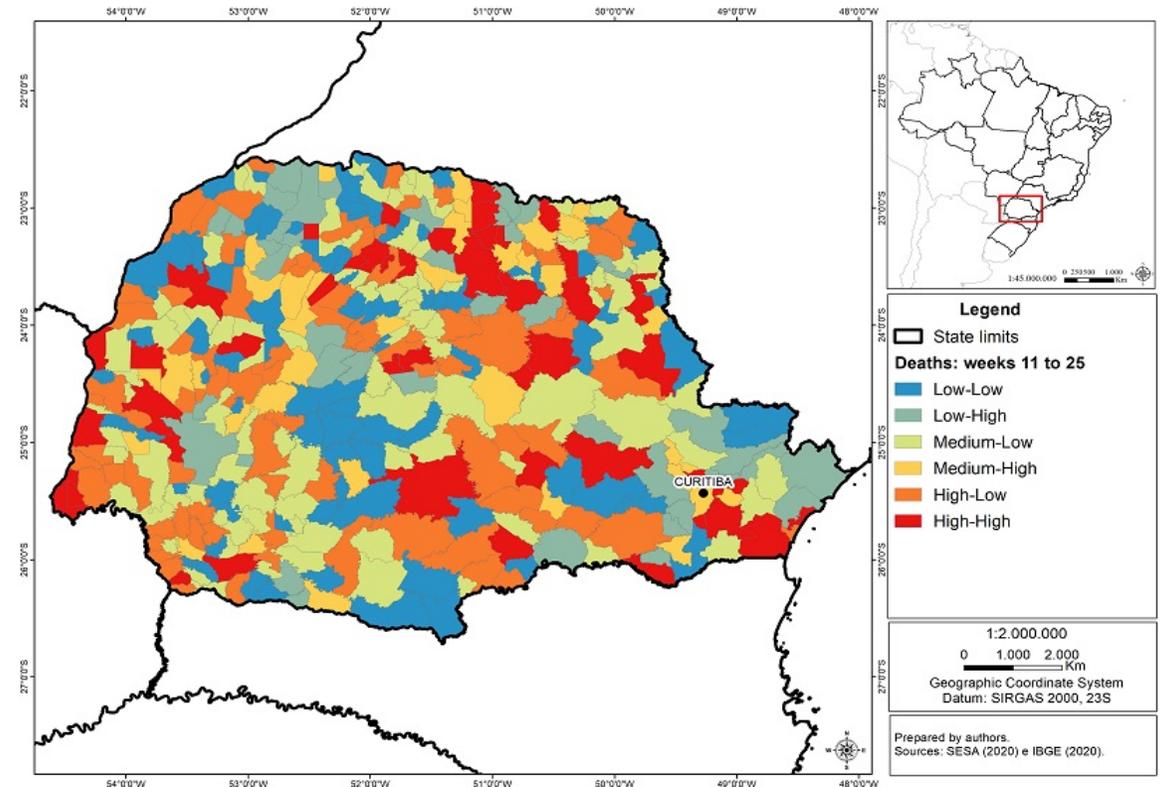
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Regional distribution of the number of COVID-19 deaths, according to the percentage of elderly in the municipality and temporal evolution of the pandemic

ISO weeks 11-15, 2020



ISO weeks 11-25, 2020



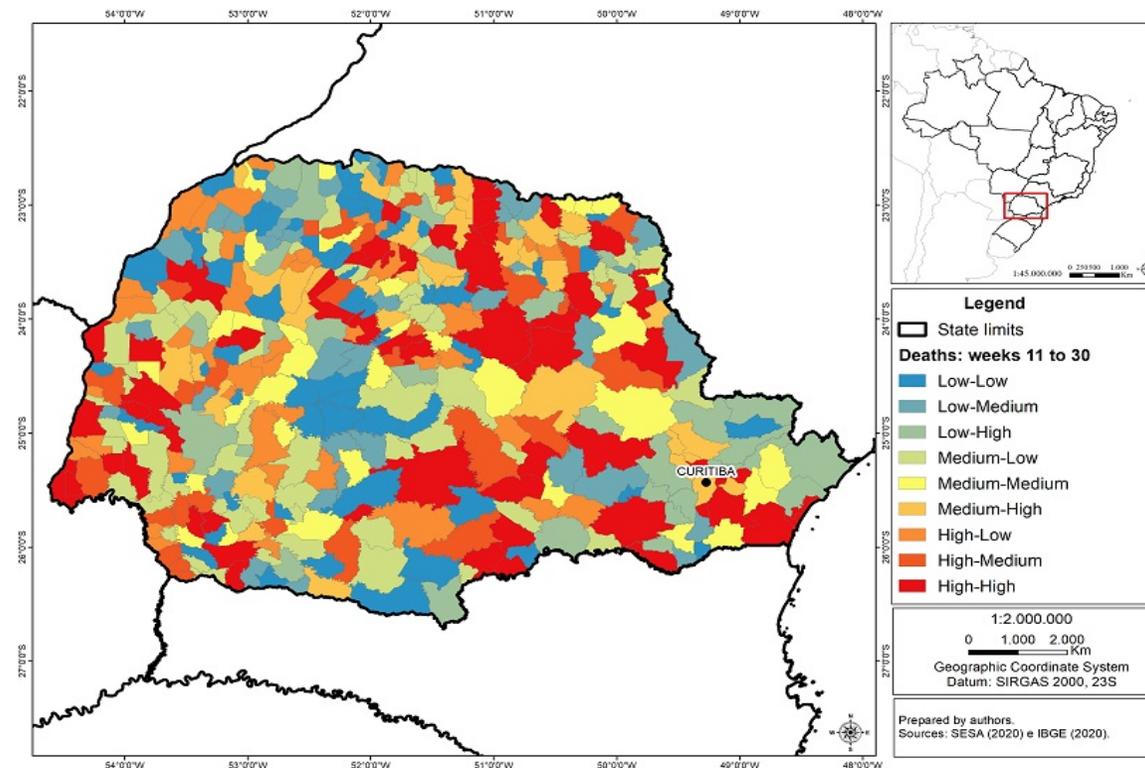
Results



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Regional distribution of the number of COVID-19 deaths, according to the percentage of elderly in the municipality and temporal evolution of the pandemic

ISO weeks 11-30, 2020



Conclusions



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- Our results demonstrate that, with the evolution of the pandemic and small take up to the measures of social isolation by the population, the age distribution of deaths and cases has rejuvenated over time.
- As a future research agenda, besides the age-structure, we will incorporate the structure of morbidity in the state, as claimed by several researchers as being an important feature for comparisons (Nepomuceno et al. 2020).

References



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Thank you for attention!

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