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Comunicação Breve

Differences in the prevalence of risk factors for severe COVID-19 across São Paulo city regions

Diferenças de prevalência de fatores de risco para COVID-19 grave nas regiões da cidade de São Paulo

Short title: Differential risk factor prevalence for severe COVID-19 in São Paulo

Título resumido: Prevalência de fatores de risco para COVID-19 grave em São Paulo

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Author contribution:

Study design: BT, LR. Data analysis: BT, LR, MCS, CN, MG. ISA conceptualization and analysis: MG, CN. Manuscript write up and review: BT, LR, MCS, CN, MG.

Introduction

São Paulo city stands as the epicenter of the outbreak sparked by SARS-Cov-2 in Latin America. On July 2nd there were 134,984 confirmed COVID-19 cases and 7,370 deaths, roughly 10% of confirmed cases and deaths in Brazil¹. São Paulo city is composed of 5 regions (North, East, South, Midwest and Southeast), each with unique socioeconomic and epidemiological characteristics.

São Paulo health systems are currently being challenged in the attempt to control transmission of SARS-CoV-2 while providing adequate care in particular to a subset of infected patients with severe disease. In Brazil it has been observed that among deaths due to COVID-19, 69% were 60 years or older, and 63% had at least one of the identified clinical risk factors for severe disease, amongst which the most prevalent were cardiovascular disease and diabetes². As part of response planning it becomes of utmost importance to identify segments of the population who may be at risk for severe COVID-19 and describe their sociodemographic characteristics and how they are geographically distributed.

The scientific community has been calling attention to the disproportionate impact of the pandemic among the population subgroups of lower socioeconomic status³. In this study we estimated the prevalence of risk factors for severe COVID-19 living in São Paulo city by sociodemographic characteristics based on routinely collected public health data.

Methods

We retrieved data from the most recent household-based survey conducted in São Paulo, ISA Capital 2015, which collected information from a representative sample of non-institutionalized residents. ISA-Capital 2015 collected respondents' self-reported

health conditions, weight and height, smoking habit, among other information. The survey was based on probabilistic sample. Two-stage sampling was done within census tracts (primary sampling unit) and households (second stage). A total of 4,043 respondents were interviewed. Data were collected through a structured questionnaire with mostly closed questions. The design, characteristics, and questionnaires of ISA-Capital 2015 have been described in detail in: https://www.prefeitura.sp.gov.br/cidade/secretarias/saude/epidemiologia_e_informacao/isacapitalsp/.

In our analysis we included risk factors for severe disease described in the literature and other reliable public health resources⁴ which were available in ISA-Capital survey. From the total of people interviewed we included data from 3,223 adults (≥ 18 years) for whom information on chronic diseases and lifestyle risk factors was available. Criteria for risk for severe disease included people aged ≥ 65 years or with a diagnosis of cardiovascular disease, diabetes, chronic respiratory disease, hypertension, (current) cancer, history of stroke, obesity (BMI ≥ 30 kg/m²), current smoking, or moderate to severe asthma (defined as asthma that moderately/severely limits daily activities as per respondents). We estimated the prevalence of one or more risk factors for severe COVID-19 by sex, age, education, income, race/ethnicity and São Paulo city region.

All statistical analyses considered ISA complex multistage sampling design and were carried out using Stata 15.0 software (StataCorp, TX, USA).

Results

Participants included in our study were 47% were men, 66% had at least secondary education, 51% were white, and 54% lived on less than a minimal wage per capita.

Prevalence of single risk factors for severe COVID-19 among older adults ≥ 65 years were as high as 58% (hypertension), while for younger adults (<65 years) obesity was the most prevalent risk factor (21%). In general, risk factors were more prevalent among older adults with two exceptions: obesity and smoking were more prevalent in younger adults (data not shown).

The prevalence of one or more risk factors for severe COVID-19 was 56.4% (4.7 million) in the city of São Paulo (Table 1). The proportion was higher in adults <65 years old (51%) vs. in the older adults (80%). Among less educated adults, that is, those who had no formal education reported, 86% had at least 1 risk factor for severe COVID-19, as compared to 49% among those with university education initiated. Distribution of risk factors was similar according to income or race (Figure 1).

Southeast (59.8%), North (58.7%) and South (56%) had higher prevalence of one or more risk factors, while in the Midwest it was relatively lower (53.8%) (Table 1), despite the high proportion of adults ≥ 65 years (data not shown).

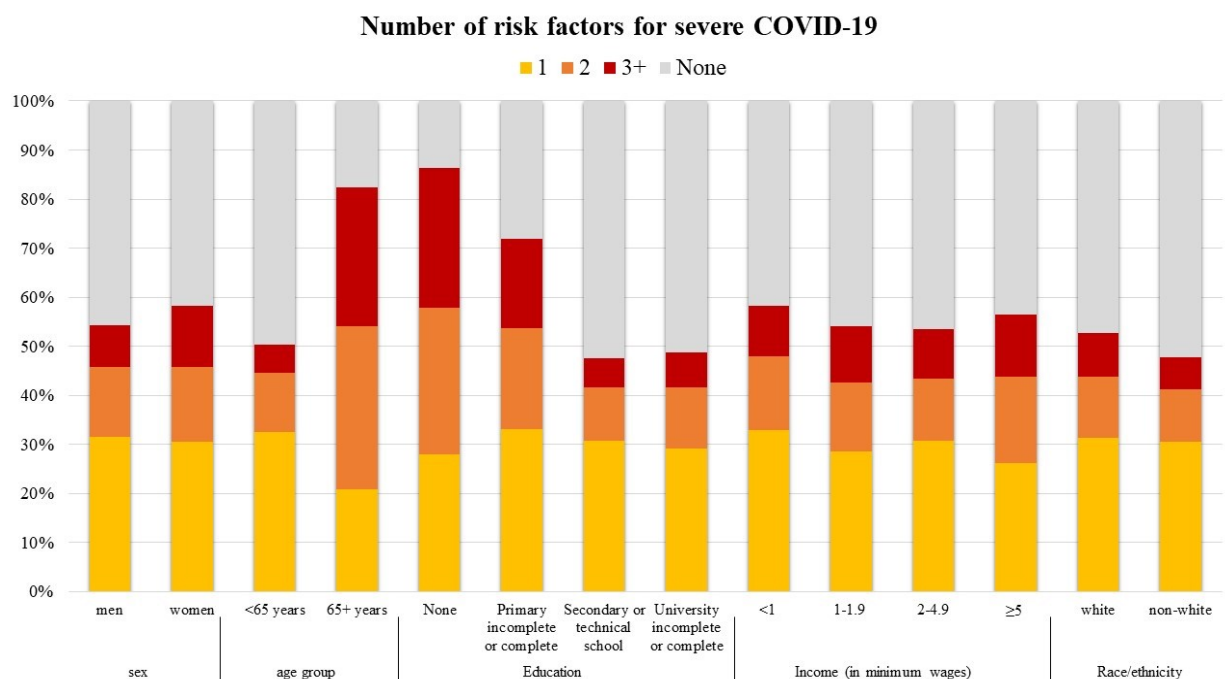


Figure1. Distribution of risk factors for severe COVID-19 by sociodemographic characteristics.

Table 1. Prevalence and 95% confidence intervals (CI) of one or more risk factors for severe COVID-19 by region of São Paulo city, ISA-Capital 2015.

Characteristics	Regions of São Paulo city					
	North (n=624)	Mid-west (n=499)	Southeast (n=690)	South (n=746)	East (n=664)	Total (n=3223)
Risk factors for Severe COVID-19						
	8.0 (6.2, 10.3)	9.1 (5.8, 13.9)	11.9 (8.9, 15.7)	5.6 (4.1, 7.6)	8.0 (6.5, 9.9)	8.6 (7.5, 9.9)
Cardiovascular disease						
	7.1 (5.2, 9.8)	6.6 (4.6, 9.4)	7.3 (5.9, 9.0)	8.2 (6.4, 10.6)	7.8 (6.0, 10.0)	7.5 (6.6, 8.4)
Diabetes						
	2.9 (1.6, 5.3)	2.5 (1.4, 4.3)	2.4 (1.4, 4.3)	2.5 (1.5, 4.1)	3.9 (2.7, 5.4)	2.8 (2.2, 3.5)
Chronic respiratory disease						
	23.1 (19.1, 27.7)	22.8 (17.5, 29.1)	24.8 (21.7, 28.3)	19.7 (16.3, 23.7)	21.9 (18.4, 25.8)	22.5 (20.7, 24.4)
Hypertension						
	1.8 (0.8, 3.9)	0.4 (0.1, 1.4)	1.1 (0.5, 2.3)	0.2 (0.1, 0.6)	0.3 (0.1, 1.1)	0.8 (0.5, 1.2)
Cancer (currently)						
	1.0 (0.6, 1.9)	1.9 (0.9, 3.9)	1.4 (0.7, 2.8)	1.1 (0.6, 2.0)	1.3 (0.6, 2.7)	1.3 (1.0, 1.8)
Stroke						
	23.0 (19.6, 26.8)	17.5 (13.9, 21.9)	23.1 (19.3, 27.5)	19.7 (17.0, 22.8)	18.8 (15.9, 22.3)	20.7 (19.2, 22.4)
Obesity (BMI ≥ 30 kg/m ²)						
	18.3 (15.7, 21.2)	16.7 (13.2, 20.8)	17.8 (14.2, 22.2)	20.4 (17.3, 23.9)	14.8 (12.2, 17.8)	17.8 (16.3, 19.4)
Smoking						
	2.4 (1.5, 3.8)	1.4 (0.8, 2.7)	2.4 (1.5, 3.8)	3.2 (2.1, 4.9)	2.2 (1.3, 3.7)	2.4 (1.9, 3.0)
Moderate to severe asthma						
Number of risk factors for severe COVID-19^a						
	41.3 (37.2, 45.6)	46.2 (39.7, 52.9)	40.2 (35.6, 45.1)	44.0 (40.0, 48.2)	48.2 (45.0, 51.4)	43.6 (41.6, 45.7)
None						
	33.0 (29.2, 37.1)	28.2 (23.3, 33.6)	31.0 (27.2, 35.1)	33.1 (29.8, 36.5)	29.1 (26.0, 32.3)	31.1 (29.3, 32.9)
1						
	15.8 (12.9, 19.1)	13.3 (10.3, 17.2)	15.1 (12.0, 18.8)	15.0 (12.5, 17.9)	13.4 (11.0, 16.2)	14.6 (13.3, 16.1)
2						
	9.9 (7.4, 13.0)	12.3 (8.8, 16.9)	13.7 (11.0, 16.8)	7.9 (6.1, 10.1)	9.4 (7.3, 11.9)	10.6 (9.4, 12.0)
3+						
Adult population living in São Paulo city^b						
	1.787.806	1.253.318	2.180.543	2.120.010	1.894.605	8.411.089
Number of adults with risk factors for severe COVID-19^c						
	1.049.442	674.285	1.303.965	1.187.206	981.405	4.743.854

^aCriteria: age ≥ 65 years or diagnosis of cardiovascular disease, diabetes, chronic respiratory disease, hypertension, cancer (currently), stroke, obesity (body mass index - BMI ≥ 30 kg/m²), current smoking, moderate to severe asthma (limit moderate/severe daily activities).

^bAdult population (≥ 18 years) living in São Paulo city in 2020.

^cAdult population (≥ 18 years) presenting with one or more risk factors for severe COVID-19 (age ≥ 65 years, cardiovascular disease, diabetes, chronic respiratory disease, hypertension, cancer (currently), stroke, obesity (BMI ≥ 30 kg/m²), smoking, moderate to severe asthma, in São Paulo city, 2020.

Discussion

We found that more than half of the population, and hence a large number of adults, presented with at least one risk factor for severe COVID-19 in the city of São Paulo, including under the age of 65 years. A similar estimate for worldwide risk for severe disease pointed out to a fifth of the population, but is likely to be underestimated, since the calculation did not include obesity, a highly prevalent risk factor globally⁵.

We also described how the prevalence of risk factors is unequally distributed across São Paulo city: in the North and Southeast these risk factors were more prevalent, which may partially explain the higher deaths rates, alongside with inequalities in resources for care, particularly in the North. Subgroups of the population with lower education rates, a robust indicator of lower socioeconomic status, had higher prevalence of risk factors for severe disease. Data analysis of the first weeks of the pandemic in the city of São Paulo pointed out to a concentration of COVID-19 cases in the Midwest and Southeast regions, while COVID-19 deaths concentrate in the North, Southeast and East regions⁶. probably also reflecting disparities in accessing the necessary health services.

As part of an effective COVID-19 response it is important to describe the distribution of risk factors for severe disease in the population in order to identify vulnerabilities and tailor prevention and care strategies.

The present study has limitations. Risk factors were self-reported and therefore prone to misclassification bias. In addition, ISA-Capital dates from 2015, and other risk factors

(known and unknown) were not captured. Nevertheless, our findings contribute to a better understanding of the greater impact of COVID-19 in lower-resource settings and population subgroups. Response strategies will need to be tailored to address such vulnerabilities.

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