

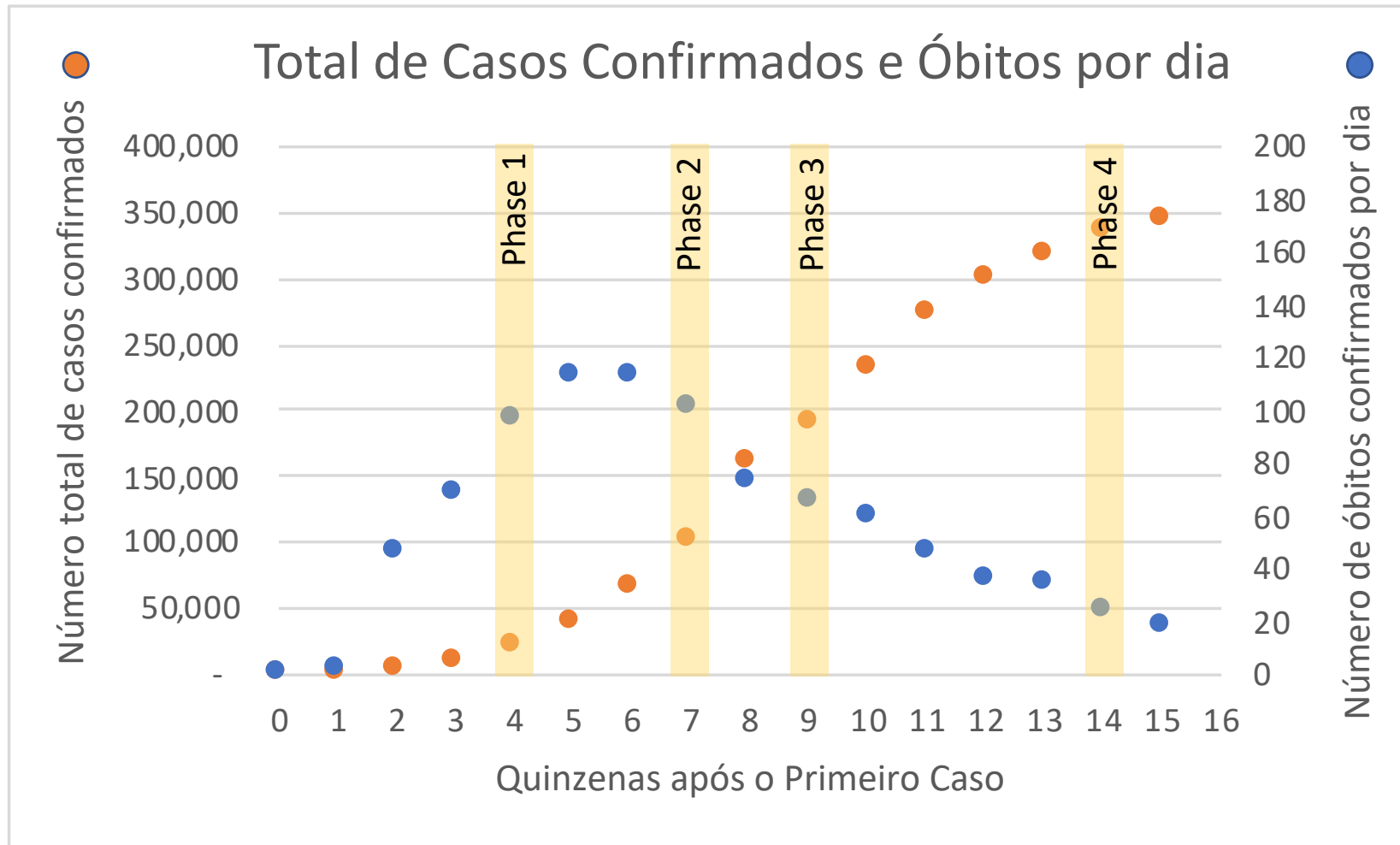
Phase 4: 26.2% of the adult population in the city of São Paulo have antibodies against SARS-CoV-2. This figure reaches 35.8% among those who have up to a complete primary education.

A household survey to monitor the seroprevalence of SARS-CoV-2 infection in adults: a cross-sectional study with probabilistic sampling, conducted in the city of São Paulo between October 1st and 10th, 2020 (28 weeks after the first registered case in the city)

Financiers:

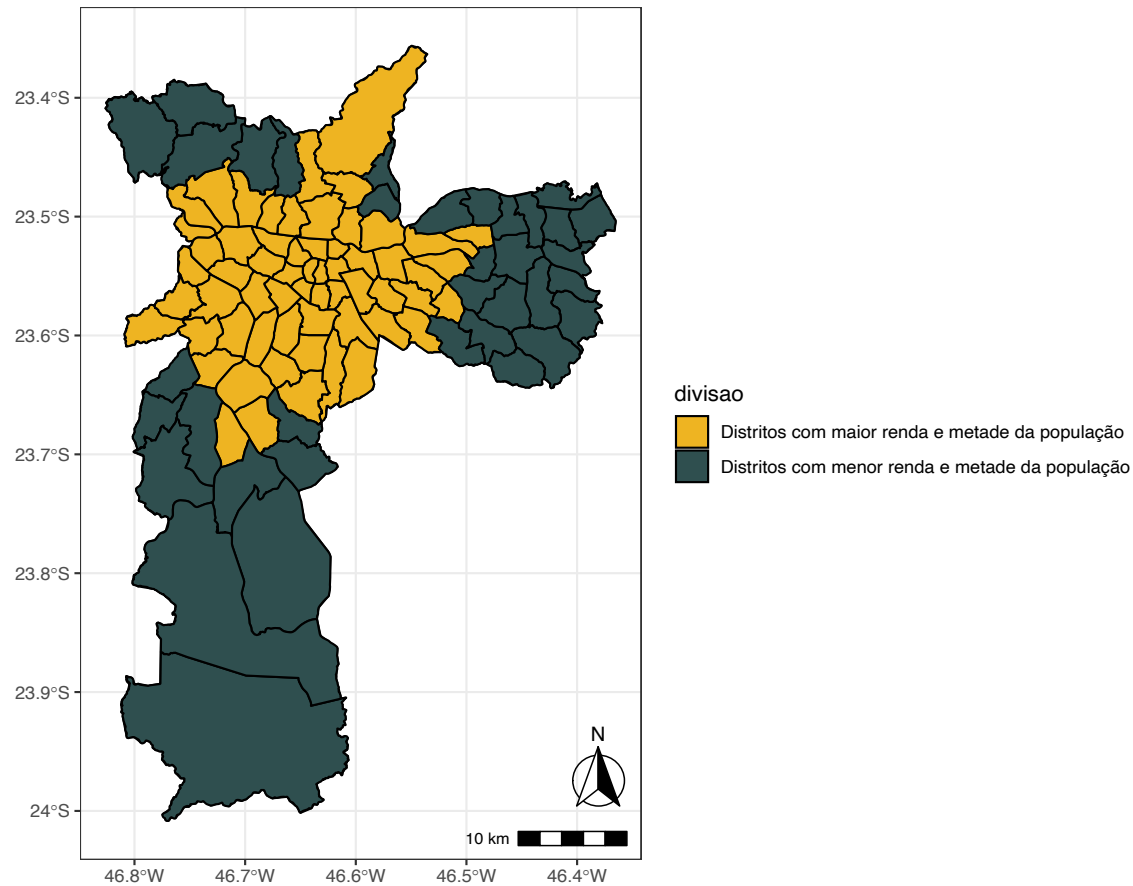


This is Phase 4 of the study. The collection ended on October 10, when the municipality attained 343,000 confirmed cases of infection (red dots) and a total number of confirmed deaths of 13,100. There were approximately 13 deaths per day (blue dots).



To measure seroprevalence in the city of São Paulo, 1,129 blood samples were analyzed from participants in 152 census sectors. 8 residences in each census sector were selected from a drawing

District Map



Methodology Summary: There are 8,407,202 inhabitants aged 18 or over in the city of São Paulo. Two strata were created in the city: districts with a higher average income and districts with a lower average income, each of which corresponds to about half of the adult population living within the municipality.

The sample was obtained by probabilistic sampling in two stages of drawings: census sector and home. In the first stage, 152 census sectors were drawn. In the second stage, 8 households in each sector were selected in another drawing. All residents of the selected households over the age of 18 were invited to participate.

After answering a questionnaire, a blood sample from the participants was collected by venipuncture. The amount of anti-SARS-CoV-2 antibodies (IgG and IgM) was measured, first with a chemiluminescence test and then an electrochemiluminescence test using (total Ig).

Details of the project can be found on the website:
<https://www.monitoramentocovid19.org/>

Seroprevalence in the municipality of São Paulo is estimated at 26.2%, the richest districts are lower (21.6%) and the poorest districts are higher (30.4%). The differences between the two strata are statistically significant

Estratos	N= 1129 %	Prevalência %	IC 95%	Valor de p
Total	100	26,2	22,5-29,9	
Distritos mais ricos	48	21,6	17,0-26,3	0,0185
Distritos mais pobres	52	30,4	24,7-36,0	
*teste quiquadro com ajuste de Rao-Scott				

An increase of 8.3 percent was observed between Phase 3 (17.9%) and Phase 4 (26.2%). That is a statistically significant increase.

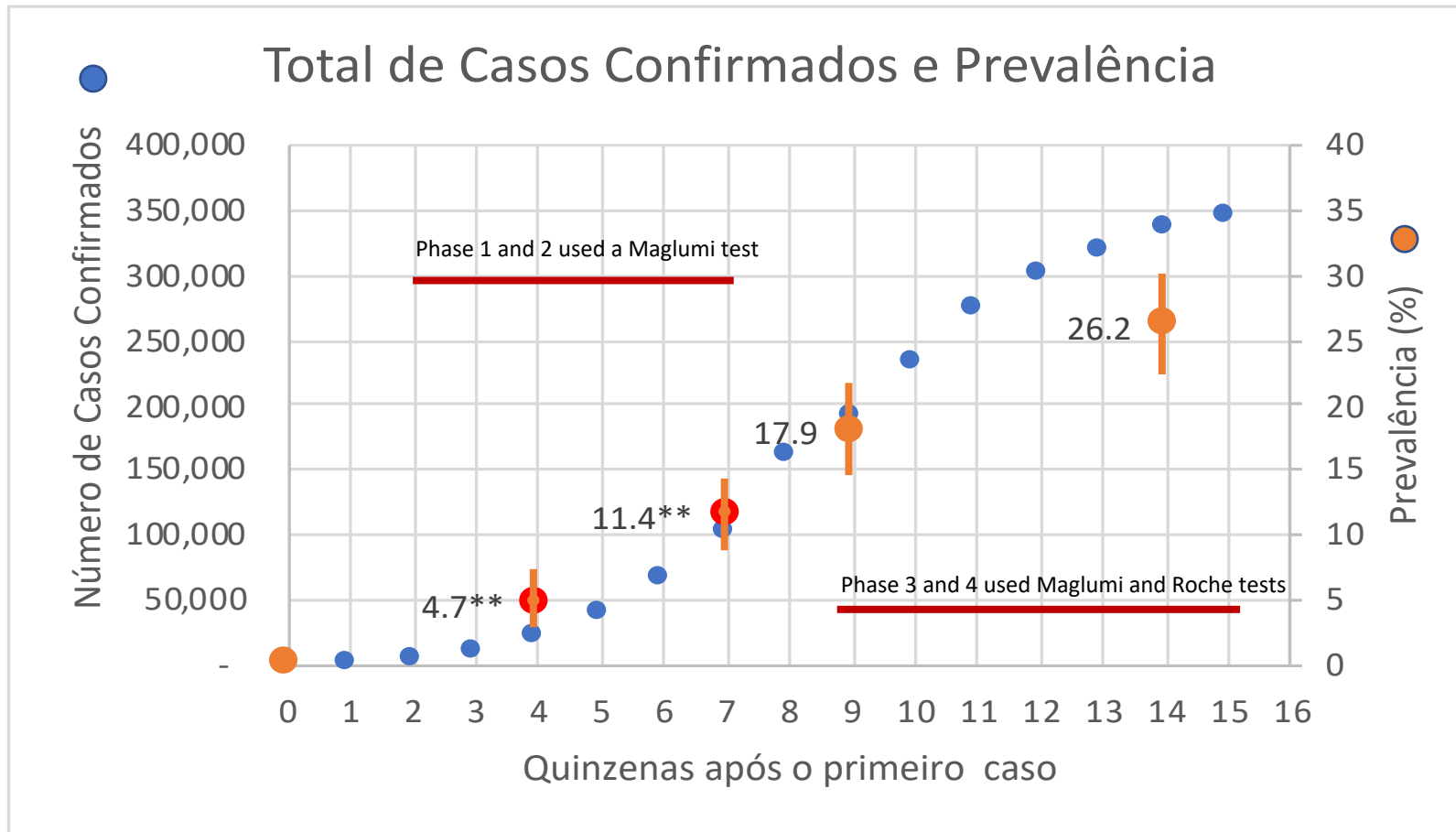
Schooling and race/skin color are related to seroprevalence.

People with up to fundamental education have a seroprevalence 2.2 times higher than individuals who graduated from college (35.8% versus 16.0%).

A similar phenomenon occurs in relation to race/skin color. Seroprevalence is higher among blacks and browns when compared to whites (31.6% versus 20.9%).

Variável	n=1129 %	Prevalênci %	IC 95%		valor p
Total	100	26,2	22,5	29,9	
Sexo					
Masculino	46,6	26,7	21,4	32,0	0,6977
Feminino	53,4	25,7	21,7	29,6	
Idade					
18 a 34	32,7	24,7	19,3	30,9	0,5110
35 a 44	22,4	30,2	23,8	37,4	
45 a 59	24,6	25,9	20,0	32,8	
60+	20,2	24,5	18,9	31,1	
Escolaridade					
Até Fundamental	35,6	35,8	29,8	41,9	< 0,0001
Ensino Médio	41,3	23,5	19,0	28,0	
Superior	23,1	16,0	19,9	21,2	
Raça/cor					
Preto e Pardo	47,7	31,6	26,6	36,6	0,0008
Branco	48,8	20,9	16,4	26,4	
Amarelo e Indígena	3,5	20,1	8,1	32,1	
Moradores					
1 a 3	38,7	22,0	17,9	26,1	0,0281
4 ou +	61,3	28,8	23,7	33,9	

The seroprevalence (red) measured in our study increases with the number of confirmed cases of infection (blue) but with a lower growth rate. The Vertical bars indicate the 95% confidence interval.



** Phase 1 (pilot) and Phase 2 data were conducted using only one test (Maglumi).

Since the rate of serum reversion (seropositive people who become seronegative) is very low when using these tests, the lower growth of seroprevalence in relation to the growth in the number of confirmed cases needs to be further investigated.

Conclusions

In the 73 days between Phase 3 (July 20 and 29) and Phase 4 (October 1 and 10), significant changes in the seroprevalence of SARS-CoV-2 infection could be verified in the city of São Paulo.

Seroprevalence increased from 17.9% to 26.2%, an increase of 8.3 percent. There are still statistically significant differences in seroprevalence between types of race/skin color, as well as educational levels. Seroprevalence is 35.8% among adults who have at least completed elementary school.

- Seroprevalence of the municipality: 26.2%
 - In the stratum with the highest average income: 21.6%
 - In the lower average income stratum: 30.4%

Considering the seroprevalence of 26.2% and the total population of those 18 years old or older in the municipality of São Paulo (8.4 million people), the number of adults already infected is around 2.2 million. Approximately 700 thousand adults were infected with SARS-CoV-2 in the period between Phase 3 and Phase 4.

The estimated serum reversion rate using both tests is very low. Therefore, the seroprevalence estimated in this study represents the adult inhabitants of the Municipality of São Paulo already infected with SARS-CoV-2 since the beginning of the pandemic who produce antibodies detectable by at least one of the two tests used.

SARS-CoV-2 Mapping Group

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