


Letter to the Editor

The quiet before the storm: Negligence and inappropriateness in face mask use in the community preceded devastating second wave of coronavirus disease 2019 (COVID-19) in Brazil

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To the Editor—As of June 2021, Brazil has approached 500,000 deaths from coronavirus disease 2019 (COVID-19, <https://covid.saude.gov.br/>). Hundreds of patients die every day while awaiting intensive care unit beds. Hospitals face shortages of hypnotic drugs and muscle relaxants for patients requiring mechanical ventilation.¹ The Brazilian president's denialism,² lack of vaccines,³ and lack of coherent social distancing policies³ have undermined COVID-19 control. We hypothesize that, both as an additional factor and as consequence of the previously cited failures, population negligence in using face masks was one of the triggers of the devastating second wave that threatens Brazil since January 2021.

We conducted a cross-sectional study to analyze predictors of no use of masks or incorrect mask use (masks not covering nose or mouth) in the commercial center of Botucatu, a city with 150,000 inhabitants located in inner São Paulo State, Brazil. This city is the central hub of a regional health division and is home to a Public Medical School and a teaching hospital. It has been severely threatened by COVID-19 since April 2020. After a peak of cases in July 2020, a gradual decrease in that number occurred until November, when case numbers started to increase again.⁵

Our study was conducted from September 21 through 27. During that period, the so-called "São Paulo Plan" (<https://www.saopaulo.sp.gov.br/planosp/>), which provided for the calibration of mobility restrictions according to COVID-19 epidemiological indicators, was in a phase of partial relaxation. However, a governmental decree mandated the use of face masks in public places and required retail stores to restrict entry to 25% of their usual costumers. Therefore, crowding on the sidewalks was common.

We estimated sample size of 767 in OpenEpi software (Emory University, Atlanta, GA), for a total population of 150,000, unknown prevalence of not using masks, 5% precision in results, and effect design of 2. That sample was expanded to achieve balanced distribution of observations per weekday and period.

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The research team circulated through retail streets in cars with closed windows, following a constant and predetermined route, in the morning, afternoon and evening of each day of the week. These observations were conducted for the first 50 people seen in each repetition of the route. In total, 150 daily nonduplicate observations were recorded (N = 1,050). Study participants were characterized by sex, apparent age (through concordance of 2 investigators), period, and weekday. Multivariable logistic regression models with polynomial outcomes assessed independent factors associated with both inappropriate and no use of face masks using SPSS version 27 software (IBM, Armonk, NY).

Overall, 38.4% of those observed in this study did not wear masks, and 12.0% presented inappropriate use. In univariate analysis, use of face masks was significantly ($P < .05$) associated with male sex (44.7% vs 29.4% among women), apparent age of <30 years (44.5% vs 35.0% in older persons), Sundays, and morning periods. Except for male sex, all of the other variables were similarly associated with inappropriate use. Multivariable analysis presented similar results (Table 1).

Our findings agree with previous reports addressing self-protective behavior of general population. Male sex and younger age have been identified as predictors of not wearing face masks in public places.^{6–9} That attitude has been attributed to inflated self-perception of invulnerability and COVID-19 denialism.⁷ It is also influenced by perceptions of overall compliance. Barile *et al*⁸ found that intention to wear face masks increased when study participants perceived that "some" or "most" others were wearing them. Also, a study conducted in the United States found that those in rural areas were less likely to wear face masks.⁹ This finding is relevant for our study because our study was conducted in inner São Paulo State, which is relatively far from urban centers. The rural lifestyle may have affected our findings, though previous authors have reported similar results in metropolitan areas.^{6,7,9}

Both our findings and those of previous studies identified a pattern of noncompliance with wearing a face mask in community settings, especially among males and those aged <30 years. We observed a greater likelihood of mask negligence in the mornings and on Sundays. Those findings identify targets for educational or normative interventions, which, interpreted together with results

Table 1. Multivariable Multinomial Logistic Regression Analysis of Factors Associated With Inappropriate Use or No Use of Face Masks Among People in the Commercial Center of Botucatu, Brazil, Between the First and Second COVID-19 Pandemic Waves

Characteristic	Error in Face Mask Use ^a			Not Using Face Mask		
	OR	95% CI	P	OR	95% CI	P
Weekday						
Sunday (reference)	...	...	...	...	...	...
Monday	0.09	0.03–0.28	<.001	0.24	0.14–0.42	<.001
Tuesday	2.33	1.12–4.86	.02	1.04	0.61–1.76	.89
Wednesday	0.67	0.31–1.45	.31	0.35	0.20–0.59	<.001
Thursday	1.05	0.50–2.19	.31	0.44	0.26–0.75	.002
Friday	0.54	0.24–1.19	.54	0.31	0.25–0.69	.001
Saturday	0.19	0.07–0.45	.001	0.15	0.09–0.29	<.001
Period						
Morning	5.26	2.90–9.57	<.001	2.10	1.46–3.04	<.001
Afternoon	2.14	1.19–3.82	.01	1.36	0.97–1.02	.08
Evening (reference)	...	...	...	...	...	...
Demographics						
Male sex	0.99	0.54–1.15	.95	2.09	1.56–2.81	<.001
Age categories, y^b						
	2.47	0.52–11.68	.25	9.99	3.36–29.73	<.001
10–19	1.77	0.44–7.02	.41	6.86	2.57–18.31	<.001
20–29	1.44	0.48–4.38	.52	4.20	1.89–9.92	.001
30–49	0.55	0.18–1.67	.55	2.15	0.91–5.06	.08
50–69	0.40	0.19–1.61	.23	1.02	0.41–2.54	.96
≥70 (reference)	...	...	...	...	...	...

Note. OR, odds ratio; CI, confidence interval. Statistically significant ($P < .05$) results are presented in boldface.

^aUse of face masks not entirely covering nose or mouth.

^bApparent age was estimated by concordance of 2 members of the research team upon direct observation.

from Barile *et al*,⁸ may have a beneficial “herd effect.” Such interventions should focus not only on the use of a mask but also on the appropriate facial coverage.

Our study was limited by the short period, the “distance observation” design, and a small sample size. Even so, it had sufficient statistical power to strengthen our hypotheses. How do these factors affect infection control and healthcare epidemiology? COVID-19 is a clear example of a disease that can be introduced into healthcare settings by patients, visitors, and healthcare workers (HCWs), causing devastating outbreaks. Overall compliance with self-protective measures in the community decreases the risk of nosocomial transmission of SARS-CoV-2. Noncompliance with face mask policies and other personal protective devices by HCWs has a harmful influence on the overall population.¹⁰ Thus, campaign to improve adherence to good practice guidelines within healthcare settings might improve adherence to self-protective behavior in community settings. Finally, in the hiatus between 2 successive epidemic waves, hospital admissions declined. This factor may have induced a false sense of security and relaxation in the use of masks. This trend demonstrates that risk communication, through surveillance indicators and hospital occupancy, must be done with caution. Furthermore, low adherence to social restriction and the use

of masks during this “quiet” period likely contributed to the arrival of subsequent pandemic waves.

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References

- Alves L. Brazilian ICUs short of drugs and beds amid COVID-19 surge. *Lancet* 397:1431–1432.
- COVID-19 in Brazil: “So what?” *Lancet* 2020;395:1461.
- Ensuring equitable access to COVID-19 vaccines. *Bull World Health Organ* 2020;98:826–827.
- Boschiero MN, Palamim CVC, Ortega MM, Mauch RM, Marson FAL. One year of coronavirus disease 2019 (COVID-19) in Brazil: a political and social overview. *Ann Glob Health* 2021;87:44.
- de Almeida GB, Pronunciate M, Grotto RMT, *et al*. Two hundred days of COVID-19 in São Paulo State, Brazil. *Epidemiol Infect* 2020;148:e295.
- Ganczak M, Pasek O, Duda-Duma Ł, Świstara D, Korzeń M. Use of masks in public places in Poland during SARS-Cov-2 epidemic: a covert observational study. *BMC Public Health* 2021;21:393.

7. Mahalik JR, Bianca MD, Harris MP. Men's attitudes toward mask wearing during COVID-19: understanding the complexities of mask-ularity. *J Health Psychol* 2021. doi: [10.1177/1359105321990793](https://doi.org/10.1177/1359105321990793).
8. Barile JP, Guerin RJ, Fisher KA, *et al*. Theory-based behavioral predictors of self-reported use of face coverings in public settings during the COVID-19 pandemic in the United States. *Ann Behav Med* 2021;55:82–88.
9. Haischer MH, Beilfuss R, Hart MR, *et al*. Who is wearing a mask? Gender-, age-, and location-related differences during the COVID-19 pandemic. *PLoS One* 2020;15:e0240785.
10. Picard J, Cornec G, Baron R, Saliou P. Wearing of face masks by healthcare workers during COVID-19 lockdown: what did the public observe through the French media? *J Hosp Infect* 2020;106:617–620.