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The socioeconomic patterns of COVID outside advanced economies: the case of Bogotá.

Marcela Eslava, Oscar Becerra, Juan Camilo Cárdenas, Margarita Isaacs, Daniel Mejía*

Abstract

Using Bogota's system of socioeconomic division, the "strata", we show that falling ill with a serious case of COVID has been over eight times more likely for an individual in the lowest stratum, where the poorer population concentrates, compared to one in the highest. Other pieces of evidence are consistent with this being driven by more exposure to contagion, at least partly driven by people in the lower strata being: 1) Less likely to be in occupations fit for telework; 2) Not only more vulnerable ex ante but also disproportionately hit by the economic effects of the crisis, and therefore pushed to go to work; 3) Subject to more crowding at home; 4) Less likely to recognize a high risk of contagion. The mechanisms that we quantify will imply a widening of the socioeconomic gaps resulting from the pandemic, in one of the world's most unequal societies.

Keywords: COVID, Inequality, Socioeconomic Impact, Psychological Biases, Latin America, Colombia

JEL Codes: O17, O20, D91

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Los patrones socioeconómicos del COVID por fuera de las economías desarrolladas: el caso de Bogotá

Marcela Eslava, Oscar Becerra, Juan Camilo Cárdenas, Margarita Isaacs, Daniel Mejía*

Resumen

Usando los *estratos* (el sistema de división socioeconómica) de Bogotá, este documento muestra que sufrir un caso serio de COVID ha sido ocho veces más probable en las personas de estratos más bajos, en donde la población más vulnerable se concentra, comparado con las personas de estratos más altos. Este resultado, junto con evidencia adicional, es consistente con una mayor exposición al contagio, que se explica en parte por que las personas en estratos más bajos son: 1) menos propensas a realizar ocupaciones que puedan hacerse remotamente; 2) más vulnerables *ex ante* a ser afectados negativamente por los efectos económicos de la crisis, lo que los obliga a salir a trabajar; 3) más propensos a vivir en hacinamiento en sus casas; y 4) menos propensos a reconocer altos riesgo de contagio. Estos mecanismos implicarían una profundización de la desigualdad socioeconómica como resultado de la pandemia, en una de las sociedades más desiguales del mundo.

Palabras clave: COVID, Desigualdad, Sesgos sicológicos, América Latina, Colombia

Códigos JEL: O17, O20, D91

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1. Introduction

Researchers have followed with interest the differential incidence of COVID and its impact among different socioeconomic groups in advanced economies. In the US, non-remote workers, who were economically disadvantaged pre-pandemic, have suffered disproportionate employment and health losses from the crisis (Angelucci et al, 2020). Students of less educated homes in the Netherlands experienced learning losses during the eight-week lockdown period that were up to 55% larger compared to those of less disadvantaged peers (Engzell et al, 2020). And while high income groups in the UK have seen their savings increase during the crisis, people in the poorest quintile have seen declines of £170 per month on average in their bank account balances (Davenport et al, 2020). Tracking cell phone data for 98 million people in the 10 largest cities in the US during the first wave of the pandemic, Chang et al. (2020) show that stores in low-income neighborhoods have 59% more people per square meter than stores in high-income neighborhoods, and their clients stay 17% more time inside these stores. Disadvantaged groups have also reduced mobility less sharply than others. Incorporating these patterns in a SEIR model, they predict that 10% of the facilities in these cities would account for 85% of all contagions, concentrated in low-income neighborhoods. Lockdown measures, and the reduction of mobility that comes with them, have disproportionately affected people residing in low-income neighborhoods, who face twice the risk of infection given their exposure to crowded environments.

Data to look into the differential effect of the pandemics across income groups is becoming increasingly available also for developing economies, typically also more unequal. We analyze here the case of Bogotá, Colombia's capital city, using public information on the incidence of both serious cases of COVID and a variety of economic shocks for different socioeconomic groups. Colombian cities are representative of main urban centers in middle income countries in the world, especially Latin American economies, in terms of the structure of economic activity and the labor force. As in much of Latin America, informality is prevalent at close to 50% of employment, and social protection far from comprehensive in terms of coverage. The fraction of people who has jobs fit for telework stands at under 20% as in other countries in Latin America and much lower than in advanced economies (Alfaro

et al 2020, IMF 2020). Poverty has steadily fallen in the 2000s, to levels close to 30%, roughly the Latin American average. The urbanization rate in Colombia is 81%, close to the 77% average for Latin American and the Caribbean. Our analysis should thus shed light on the socioeconomic impacts of the crisis at a much wider level, and in particular for Latin America.

The data that we use covers the first four months of the pandemic. The progress of COVID contagion was slower in Colombia that in advanced economies, reaching its first peak only in August 2020. Bogotá (and Colombia more generally) implemented strict stay-at-home orders for the extent of the period covered by our data. Non-essential economic activity was only virtual for the early part of the period and then progressively allowed in some subsectors under specific restrictions. This is the context of our analysis, also representative of a group of Latin American countries, such as Argentina, Chile and Peru

2. Methods

We analyze differences across socioeconomic groups in terms of health, economic, and behavioral outcomes of interest during the pandemics for Bogota, using official data from a variety of sources. To classify socioeconomic groups, we take advantage Colombia's socioeconomic "strata" system. The system classifies dwellings according to their physical characteristics. Originally aimed as a targeting tool for subsidies to water and energy consumption, it more generally serves the purpose of classifying households along the socioeconomic dimension and define cross-subsidies for the collection of public services. Households are classified, depending on their home characteristics, into six categories, with stratum six being the richest group.

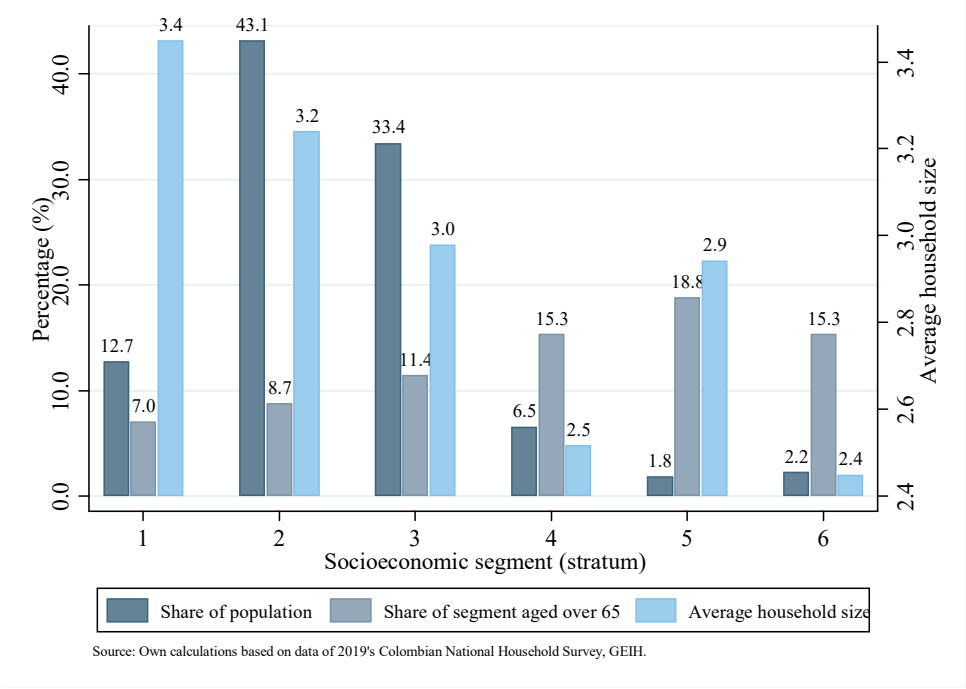
Socioeconomic strata are generally recorded for respondents in official surveys of individuals and administrative records that enquire about income, employment, COVID occurrence, fines for violating COVID-related restrictions, and other outcomes of interest. The different sources of data used, all official, are representative of Bogotá's population.

We use: 1) administrative records on COVID deaths and hospitalization from Bogotá's official Health Observatory, SALUDATA. 2) Data on household composition and employment outcomes from the National Household Survey (GEIH), which is representative

at the city level. 3) National Police data on violations to sanitary restrictions imposed in the context of the pandemic. 4) The National Population Census of 2018 to measure the coverage of health services and prevalence of health events; 5) Citizenship Culture Survey conducted by Bogota Mayor's office.

Economic strata categories are positively correlated with income. The correlation coefficient between income quintiles and strata for Bogota in the official national household survey deciles is around 0.35. This, and the fact that exclusion errors in the lower strata are almost non-existent (Eslava, 2019), are the basis that supports our use of the strata system for this analysis. This is not without limitations, however. The population is not evenly split: the fraction of households in the upper strata is minimal, and most households in Bogotá are classified in strata two or three (Figure 1). Moreover, inclusion errors are large in the lower strata (Eslava, 2019). This implies a bias towards finding less heterogeneity across strata than there is, for instance, across income quintiles. Such limitation must be factored into the interpretation of our findings, which are probably a lower bound to the true differences across socioeconomic groups.

Figure 1. Population, average household size, and population aged over 65 per stratum: Bogota

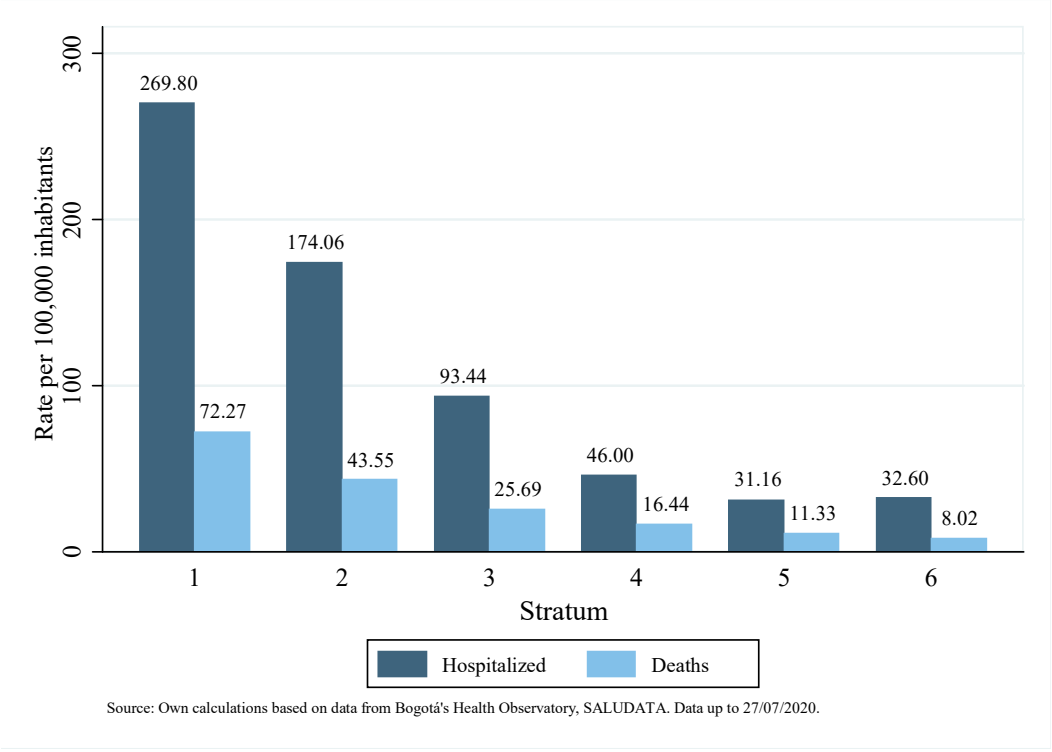


Source: Own calculations based on data of 2019's Colombian National Household Survey, GEIH.

3. COVID incidence

In Bogotá, the virus has attacked with more severity the most vulnerable socioeconomic sectors of the population. An individual in stratum one is over eight times more likely to be hospitalized or die from the virus (Figure 2)[1].

Figure 2. People affected by COVID per 100,000 inhabitants: Bogotá.



Source: Own calculations based on data from Bogotá's Health Observatory, SALUDATA. Data up to 27/07/2020.

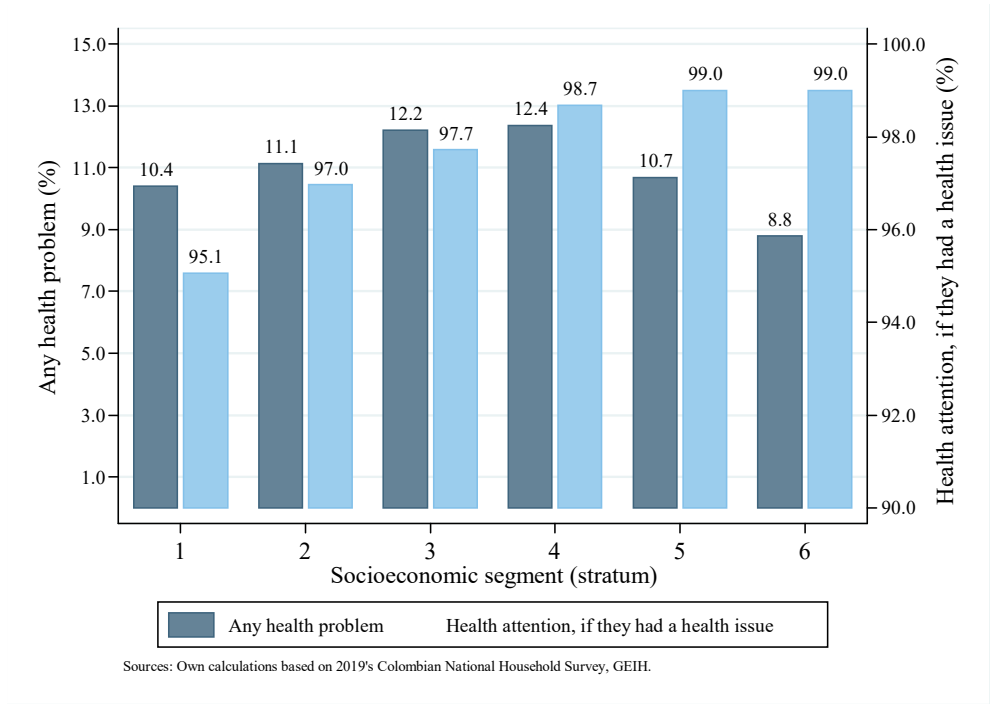
This is despite the fact that the older population, which is at higher risk of serious COVID outcomes, represents a higher fraction of households' members in the highest socioeconomic segments. The presence of people over 65 in households in strata 4 to 6 is twice as large as their presence in stratum 1 (Figure 2). Therefore, the high incidence of COVID in the lowest socioeconomic sectors cannot be explained by the age composition of these groups.

Moreover, it does not seem to be the case that the pattern of deaths results from differences in the general access to medical services. Figure 3 shows the percentage of

[1] Given the possibility that the GEIH may be biased against full coverage of the higher strata, where the population may be less likely to respond to surveys, we calculate the population for each stratum by multiplying the number of energy subscribers from administrative records times the average household size from the GEIH.

individuals by socioeconomic strata who report having had a health issue in the last 30 days, and the percentage of individuals by stratum that report having received medical care for some health problem during the same period of time, based on 2018 Census data. Individuals in the lowest socioeconomic segments do not display higher prevalence of health issues or receive less medic care than the highest segments. Moreover, the relative rate at which they are hospitalized for COVID19, compared to people in the higher strata, is similar to their relative fatality probability due to COVID19.

Figure 3. Fraction of people in Bogotá in 2018 who report having had, in the last 30 days:



Hence, what the data suggest is that individuals that are most vulnerable in the socioeconomic dimension have a higher probability of COVID infection relative to individuals among the same age group in other strata. Why?

4. Economic hardship and culture-information-cognition as explanations for more infections

Socioeconomic vulnerability itself may lead to higher probability of infection. To start, lower strata households are exposed to more crowded environments, offering higher risk of in-

home contagion.[2] The average stratum 1 household has 3.4 members, compared 2.4 members on average in stratum 6 (Figure 1). The average number of persons sleeping in a room in a household in stratum 1 is about 2 persons per room, compared to 1.3 persons per room in strata 4 to 6. In addition, lower strata workers are more likely to use crowded public transportation systems, increasing their exposure to contagion. About 60% of workers in strata 1 and 2 use public transportation as their main transportation system, compared to 20 percent in strata 4 to 6.

Sheltering at home for protection from contagion requires a guaranteed livelihood, either because one can work from home, is covered by employment protection regulations or social insurance when unemployed or can rely on savings while unemployed. This is ex ante less likely for people in the lower socioeconomic strata, as shown in Figure 4 for 2019 (pre-pandemic). Among these groups, occupations not fit for telework are more prevalent, as is unemployment, and informality, which also implies lack of social insurance and of access to employment protection. Following Dingel and Neiman (2020) to classify occupations as fit for telework or not, we find that people in Bogotá's stratum 1 is more than twice as likely to be in an occupation not fit for telework as are people in strata 4-6.[3] Not paying mandatory pension contributions is 4.5 times more likely, and unemployment three times more likely, in stratum 1 compared to stratum 6. Lack of pension contributions is one measure of informality that indicates one crucial form of absence of social protection.

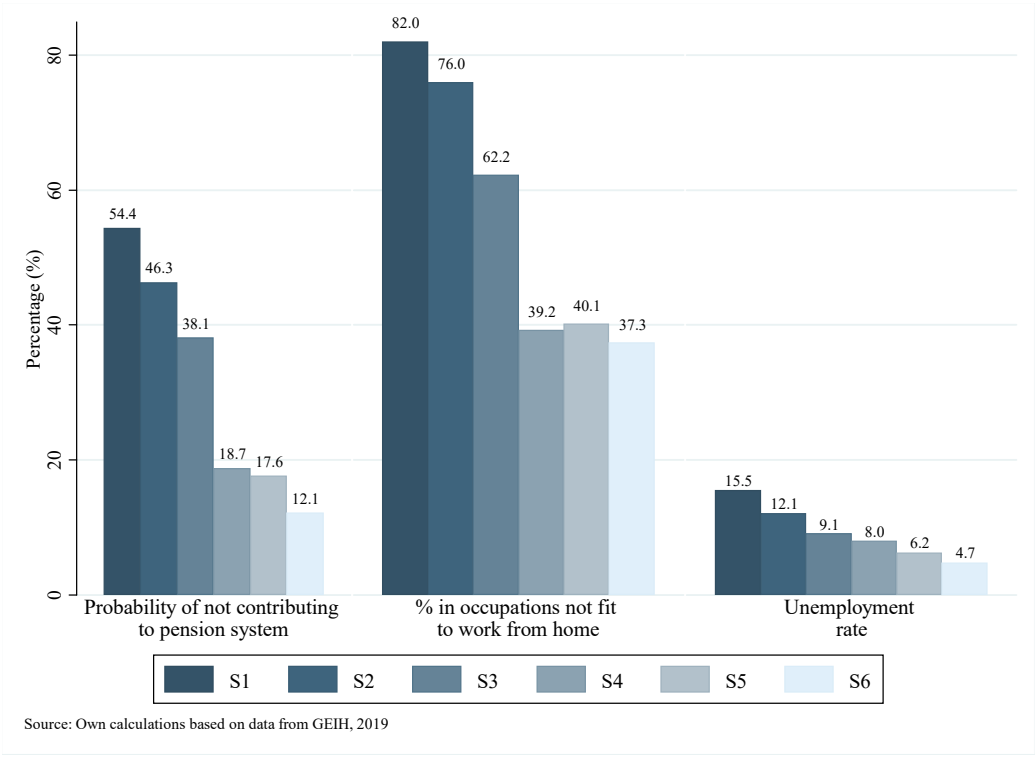
Not only were employment and income risks more prevalent in lower strata before the pandemic, but these groups have also been, ex-post, most affected by the crisis. This is the case, for instance, of employment outcomes. Though changes in data collection for the National Household Survey over the first months of the crisis make it impossible to directly classify employment outcomes losses by socioeconomic strata, Figure 5 characterizes the

[2] For the 10 largest cities in the US, Chang et al. (2020) show that convenience stores in low-income neighborhoods concentrate 59% more people per square meter, and people in these neighborhoods stay, on average, 17% more time inside these stores when doing their shopping. As a result, the likelihood of COVID contagion is twice that observed in high-income neighborhoods.

[3] Dingel and Neiman (2020) classify 478 occupational categories along this dimension for the US using the American Community Survey (ACS). The Colombian GEIH only has 83 occupational categories. As in Alfaro et al (2020), we calculate the probability that the occupation of a Colombian is fit for telework as the fraction of US workers with US occupations fit for telework within the more aggregate Colombian occupational class of the worker.

unemployed by education levels, highly correlated with strata.[4] While in normal times (i.e. 2019) the probability of having recently lost the job is not higher for unemployed people with lowest vs. highest education, in 2020 those with primary and secondary education are 20 pp more likely to have lost their job recently than those with higher education.

Figure 4. Labor market outcomes. Bogotá 2019



Source: Own calculations based on data from GEIH, 2019

Also consistent with this hypothesis, sanctions for not complying with sanitary regulations are more prevalent in areas of the city where the lowest socioeconomic segments are predominant. The probability of being fined for violations to these regulations has been over three times as high in street blocks classified in strata 1-3 compared to those in strata 4-6, as shown in Figure 6 (total). This holds also individually for specific violations to stay-at-home orders (either blanket or by gender).

[4] The Colombian statistical office did not collect information on the respondent's stratum in the National Household Survey in the second quarter of 2020.

Figure 5. Fraction of unemployed people in May who lost their employment less than 12 weeks ago, Bogotá

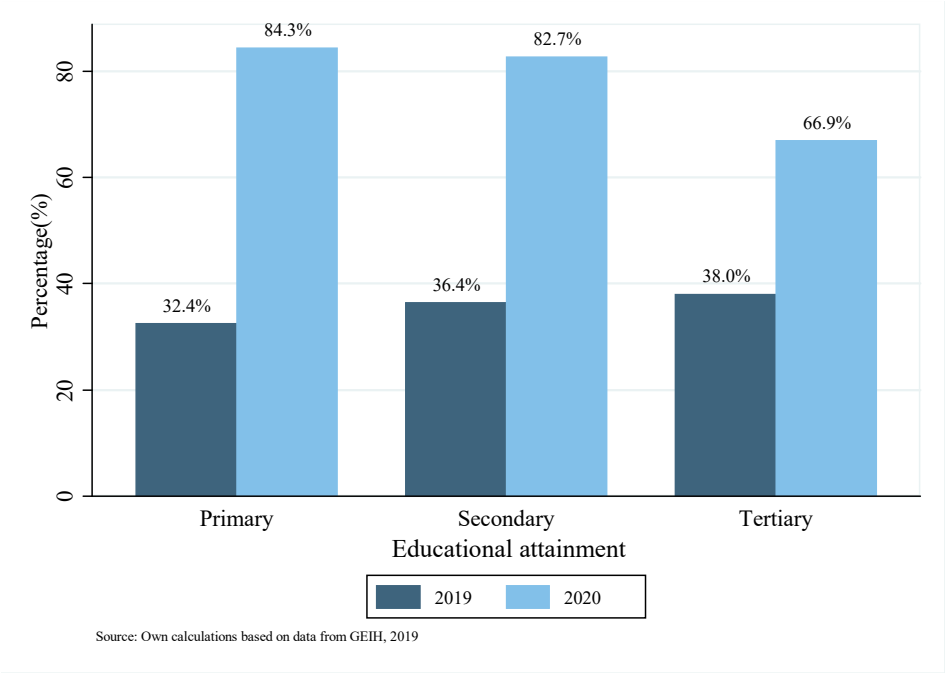
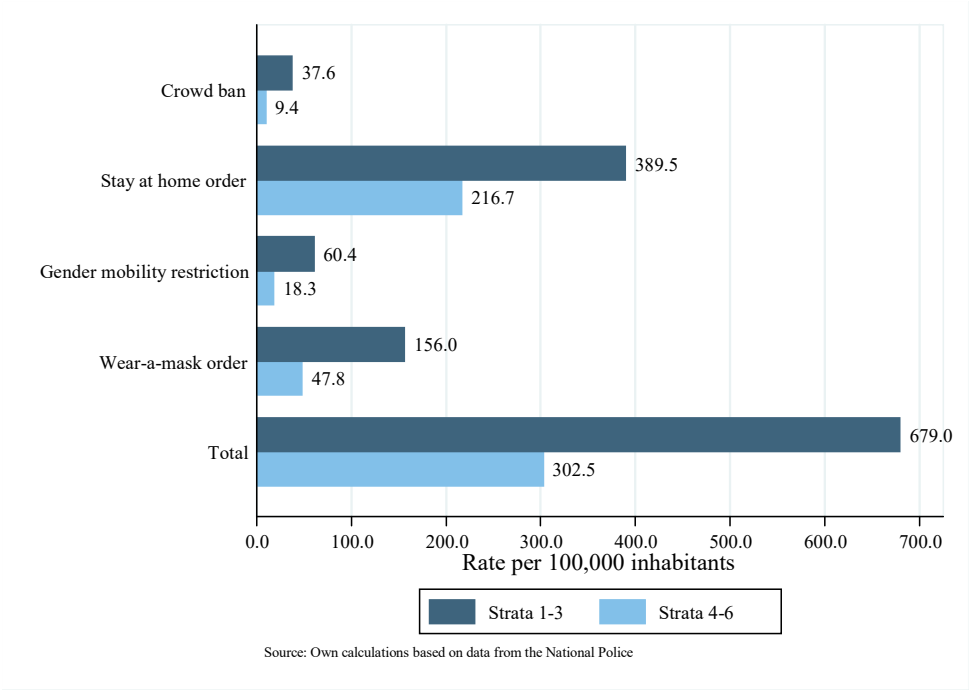


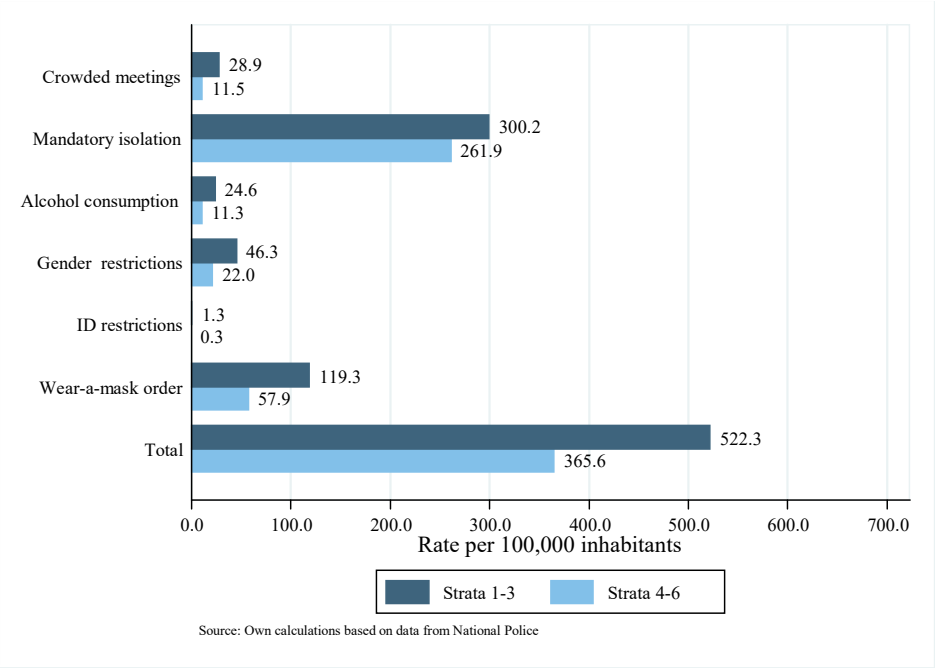
Figure 6. Fines for violating sanitary measures during the pandemic. Bogota



A similar pattern is observed in recidivism for violation of confinement and quarantine measures. Figure 7 shows recidivism (recurrence) in comparisons by

socioeconomic stratum. Like the pattern shown in Figure 6, recidivism in violation of quarantine measures is higher in the lowest socioeconomic strata. People in low strata seem to have less ability to meet the confinement measures decreed by national and district governments in Bogota.

Figure 7. Recidivism rate in violations of confinement and quarantine restrictions



Interestingly, something similar applies to the order of wearing masks, despite its relative low-cost. It is, thus, difficult to explain all these behaviors as originating solely in economic hardship and a consequent inability to comply in lower strata. Rather, they may also reflect cognitive, informational, and cultural biases specific to these socioeconomic groups. Figure 8, where each dot represents a city sub-district unit, indeed shows that individuals in lower strata subdistricts report a lower perceived probability of becoming infected. This could be explained by psychological mechanisms, being "cognitive dissonance" a main suspect. By reporting and perceiving a lower probability of contagion one can go out to work and reduce the cognitive costs of self-inconsistency. Other candidate is less access to more reliable sources of information regarding the mechanisms of contagion.

Further, as shown in Figure 9, lower strata neighborhoods also have the perception that people around them are less likely to comply with the lockdown measures. The latter

pattern is consistent with the reported data on fines imposed to low vs high strata groups. On the other hand, people in lower strata areas report greater trust in the government's measures to deal with the pandemic.

Subjective perceptions and psychological biases can create a cognitive poverty trap in which the more vulnerable groups construct an idea of lower contagion. There may also be less social sanctioning among these groups in the face of lack of compliance with lockdown measures in the end, this implies higher personal and social licenses to expose to the virus outside of homes. Economic hardship would be just one more layer of larger economic costs lockdown orders for the poor, creating this vicious cycle that generates the epidemiological results reported at the start of our text.

Figure 8. Self-reported perceived probability of catching the virus

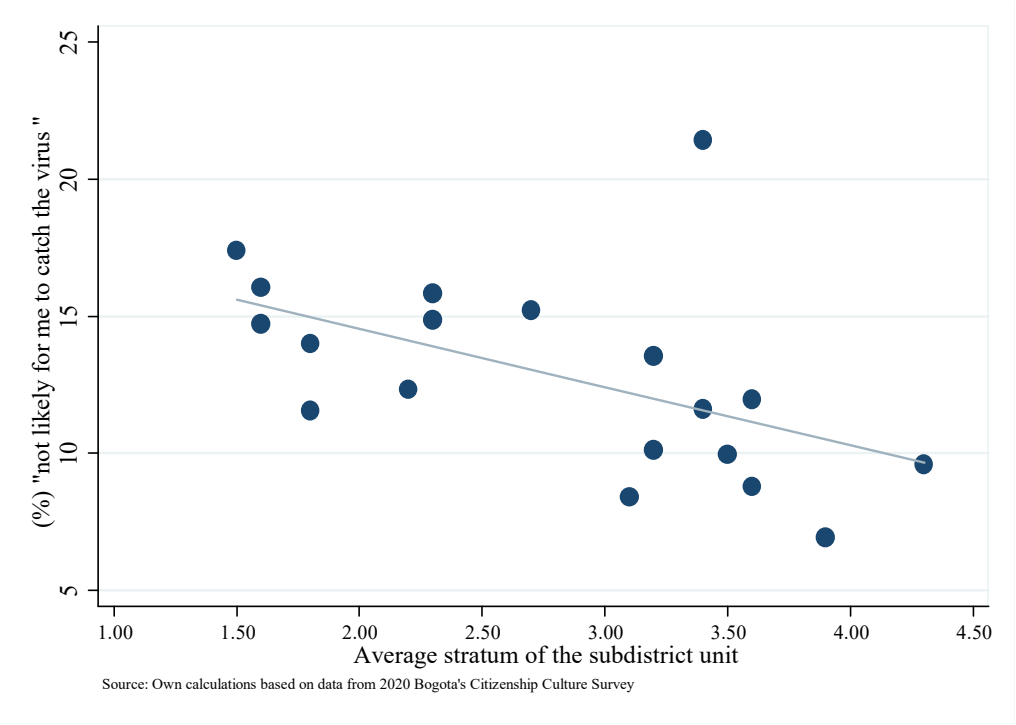
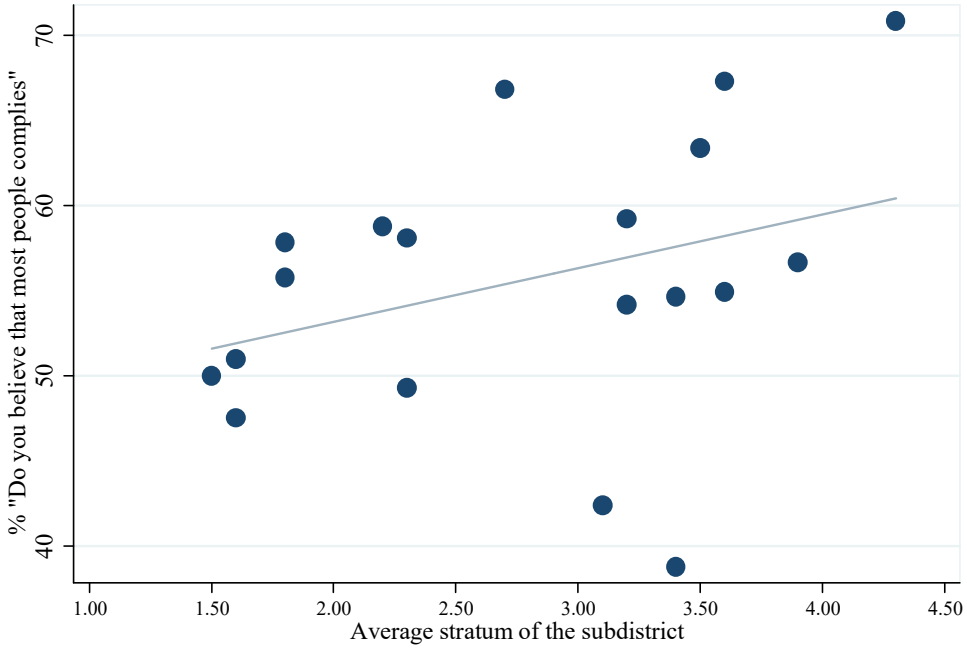


Figure 9. Expectations of compliance by others



Source: Own calculations based on data from 2020 Bogota's Citizenship Culture Survey

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