Prevalence of SARS-CoV-2 antibodies in New York City adults, June–October, 2020: a population-based survey

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Summary: We estimate SARS-CoV-2 antibody prevalence among NYC residential adults from June–October 2020 with serosurvey and self-reported data, enabling reliable estimates citywide and by demographic and socioeconomic groups. This population-based survey offers important confirmation of prior convenience-based serosurveys in NYC.

Abstract

Background: Serosurveys are important to ascertain burden of infection. Prior SARS-CoV-2 serosurveys in New York City (NYC) have used nonrandom samples. During June–October 2020, the NYC Health Department conducted a population-based survey to estimate SARS-CoV-2 antibody prevalence in NYC adults.

Methods: Participants were recruited from the NYC 2020 Community Health Survey. We estimated citywide and stratified antibody prevalence using a hybrid design: serum tested at the NYC Health Department using the DiaSorin LIAISON® SARS-CoV-2 S1/S2 IgG assay and self-reported antibody test results were used together. Prevalence was estimated using univariate frequencies and 95% confidence intervals (CI), accounting for complex survey design. Two-sided P-values ≤0.05 were statistically significant.

Results: There were 1074 respondents overall; 497 provided blood and 577 provided only a self-reported antibody test result. Weighted prevalence was 24.3% overall (95% CI: 20.7–28.3). Latino (30.7%, 95% CI: 24.1–38.2, p<0.01) and Black (30.7%, 95% CI: 21.9–41.2, p=0.02) respondents had a higher weighted prevalence compared with White respondents (17.4%, 95% CI: 12.5–23.7).

Conclusions: By October 2020, nearly 1 in 3 Black and 1 in 3 Latino NYC adults had SARS-CoV-2 antibodies, highlighting unequal impacts of the COVID-19 pandemic on Black and Latino adults in NYC.

Keywords: SARS-CoV-2; antibody prevalence; seroprevalence; population-based; New York City

Background

In March 2020, New York City (NYC) was the first epicenter of the 2019 novel coronavirus disease (COVID-19) pandemic in the United States [1]. Early in the outbreak there was limited testing capacity and health care was prioritized for people with severe illness [2]. Case surveillance data alone do not reflect the magnitude of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in NYC. The presence of SARS-CoV-2 antibodies suggests prior infection and can contribute to an understanding of asymptomatic or mild infections otherwise not detected through traditional surveillance. Population level seroprevalence can help determine the population proportion previously infected and the proportion with possible humoral immunity against SARS-CoV-2.

Past SARS-CoV-2 serological surveys of NYC residents have used convenience samples [3–6] or assessed seroprevalence in specific populations [7,8]. Seroprevalence estimates ranged from 6.9–23.6% in the general NYC population [3–6] and 13.7–31.2% for NYC healthcare personnel [7,8] from February–July 2020. While studies of clinical laboratory residual serum and other convenience-based sampling might be subject to selection bias and might have limited data for analysis by demographic and socioeconomic variables, they can be rapidly deployed to provide timely seroprevalence estimates during a public health emergency. Currently lacking from the literature are population-based, representative surveys that estimate antibody prevalence in the general NYC adult population overall and for priority demographic groups [9].

During June 1–October 9, 2020, the NYC Department of Health and Mental Hygiene (DOHMH) conducted a representative cross-sectional survey using serosurvey data and self-reported test results to estimate SARS-CoV-2 antibody prevalence in NYC.

Methods

Telephone Survey

Participants were recruited from the ongoing NYC Community Health Survey (CHS), a cross-sectional telephone survey used to assess health and risk behaviors of New Yorkers [10]. The CHS uses a disproportionate stratified random sample to help assure geographic representativeness across the city. Participation goals are set for each of 42 United Hospital Fund neighborhoods which are defined by contiguous ZIP Codes. Using random digit dialing, a sample of landline and cellular telephone numbers was created to reach non-institutionalized adult NYC residents (≥18 years). Interviews were conducted in English, Spanish, Russian, and Chinese.

Respondents were asked about demographics, underlying health conditions, employment, and social distancing (see Supplementary Table 1). Respondents were categorized into neighborhood poverty level based on the population percentage in a respondent's zip code living below the federal poverty level (FPL) per the American Community Survey (ACS) 2014-2018, with imputation of missing cases [11]. Categories were low (<10% below FPL), medium (10–20% below FPL), and high poverty (>20% below FPL). Respondents were asked if they experienced fever, cough, shortness of breath, sore throat, or loss of taste or smell within the past 30 days. If not, they were asked if they experienced these symptoms since February 2020. All respondents were asked if they believed they previously had COVID-19. All respondents were asked 'There is a test to detect antibodies to the virus that causes COVID-19. The test is usually done with a blood sample. Have you ever had an antibody test for COVID-19?' If yes, we asked respondents what their prior SARS-CoV-2 antibody test result was. Irrespective of previous serological testing, we invited all respondents to participate in antibody testing.

Specimen Collection and Testing

For each consenting participant, a phlebotomist conducted an at-home blood draw to collect 5 ml of whole blood in a serum separator tube. On the same day, samples were transported at 4°C to the NYC Public Health Laboratory where serum was separated from the specimen and tested for SARS-CoV-2 IgG antibodies using the DiaSorin LIAISON® SARS-CoV-2 S1/S2 IgG assay [12]. The test has a reported 97.6% positive and 99.3% negative percent agreement with RT-PCR testing at the time of infection [12]. Peer reviewed literature on this assay described specificity ranging from 90.5% to 98.9% with varying sensitivity depending on the timeframe of antibody detection after positive PCR test for SARS-CoV-2 [13–15].

The NYC DOHMH Institutional Review Board determined this as public health surveillance. The Centers for Disease Control and Prevention (CDC) reviewed this activity; it was conducted consistent with applicable federal law and CDC policy.[Ψ] Informed consent was obtained from participants before specimen collection.

Power Calculations

Power calculations were performed using population estimates from the 2019 CHS to assure ability to reliably detect antibody prevalence. We calculated the sample size necessary to achieve a relative standard error (RSE) <0.30 for a range of hypothetical prevalence rates of 5–30%. For our survey, an RSE >0.30 indicates an estimate is potentially unreliable. Accounting for survey design artifacts and assuming ≥10% antibody prevalence, with 1000 participants, we could make a citywide antibody prevalence estimate with a RSE <0.30. Assuming ≥15% antibody prevalence, with 2200 participants, we

[Ψ] See e.g., 45 C.F.R. part 46.102(I)(2), 21 C.F.R. part 56; 42 U.S.C.§241(d); 5 U.S.C.§552a; 44 U.S.C.§3501 et seq.

could make antibody prevalence estimates stratified by race/ethnicity with a RSE <0.30 for White, Black, and Latino New Yorkers. We aimed to recruit between 1000-2200 participants with the knowledge that with higher antibody prevalence, a smaller sample size would be necessary to achieve a stable estimate overall or in stratified analyses.

Data Analysis

To generate a representative estimate of antibody prevalence among the NYC non-institutionalized adult residential population, CHS data were weighted adjusting for varying selection probabilities and potential overlapping landline and cell phone sampling frames. Survey weights were adjusted to 2014–2018 ACS [11] population control totals using SAS code rake_and_trim_G4_V5.sas [16]; final weights were scaled to adjust for potential nonresponse bias.

We used American Association for Public Opinion Research standard definitions (revised 2016) to calculate annual CHS Cooperation Rate #3 and Response Rate #3 [17]. Cooperation Rate #3 is the number of survey participants, divided by the number in the sample who were contacted and determined as eligible. Response Rate #3, a more conservative estimate, is the number of survey participants who complete the survey, divided by those who completed plus partial completes, refusals, non-contacts, and cases of unknown eligibility. People with unknown eligibility lacked live contact by an interviewer to determine eligibility. These could have included business or non-working numbers (both ineligible). People with unknown eligibility typically comprise most of the denominator; the denominator was adjusted to estimate the proportion of unknown but likely to be eligible people. The 2020 CHS cooperation and response rates were 74.4% and 7.4%, respectively.

Univariate prevalence estimates and 95% confidence intervals (CI) were generated. Combined antibody test results, including self-reported test results, were used for all analyses to estimate citywide and stratified prevalence. For those who provided both a blood specimen and a self-reported test result, only serosurvey specimens tested by DOHMH were used in analyses. Data were stratified by demographics. T-tests were used to compare antibody prevalence by sex, age, race/ethnicity, borough of residence, place of birth, language of interview, neighborhood poverty level, and health insurance status. We assessed estimate reliability based on RSE, sample size, and CI width. To determine if prevalence differed between the two groups, a multivariable logistic regression model was constructed to see if there were increased odds of having a positive test result if the respondent self-reported versus provided a blood specimen for the serosurvey, while controlling for sex, race/ethnicity, age, borough of residence, language of interview, and neighborhood poverty level. We used SAS EG v7.15 and SUDAAN 11.0.1 accounting for weight and complex survey design. Two-sided P-values ≤0.05 were statistically significant.

Results

From June–October 2020, 1074 respondents completed the survey; of these, 497 provided whole blood, and 577 provided only self-reported antibody test results. Of 1074 respondents, 442 were males and 628 females. Respondent ages (in years) varied: 18–44 (n=458), 45–64 (n=406), and ≥65 (n=210). Respondents were Asian or Pacific Islander (n=112), Black (n=194), Latino (n=309), Other (n=29), and White (n=428). They were distributed geographically and by neighborhood poverty level: Bronx (n=222), Brooklyn (n=330), Manhattan (n=226), Queens (n=232), and Staten Island (n=64); low (n=217), medium (n=425), and high neighborhood poverty (n=415) (Table 1).

The overall weighted SARS-CoV-2 antibody prevalence, including those who provided a blood specimen and those who only provided a self-reported result, was 24.3% (95% CI, 20.7–28.3); it was 21.2% (95% CI: 16.6–26.6) among respondents who provided blood for this serosurvey and 26.9% (95% CI: 21.7–

32.8) among respondents only with a self-reported result. Participants who only self-reported a test result had increased non-significant odds of having a reported positive test (odds ratio=1.47, 95% CI: 0.95–2.27).

Ninety-one respondents provided both a blood sample and self-reported antibody result. Among these, 81 had concordant results (89.0%), and ten (11.0%) had discordant results: four respondents self-reported a positive test result and were negative for antibodies upon testing; six respondents self-reported a negative test result and were positive for antibodies upon testing.

When examining combined weighted results from the serological tests and self-reported data, antibody prevalence was similar by sex. Respondents aged 18–44 years had higher prevalence (26.4%, 95% CI: 21.0–32.7, p= 0.018) compared with respondents aged ≥65 (15.1%, 95% CI: 9.2–24.0). Latino (30.7%, 95% CI: 24.1–38.2, p= 0.021) and Black (30.7%, 95% CI: 21.9–41.2, p= 0.004) respondents had a significantly higher prevalence compared with White respondents (17.4%, 95% CI: 12.5–23.7). Antibody prevalence among respondents living in the Bronx was nearly double compared with respondents living in Manhattan (32.4%, 95% CI: 23.6–42.6, p= 0.009 vs 17.1%, 95% CI: 11.6–24.4). Antibody prevalence was similar among respondents born outside of the U.S. (26.0%, 95% CI: 20.7–32.0, p= 0.440) compared with U.S.-born respondents (23.0%, 95% CI: 18.2–28.6). Non-English-speaking respondents (35.1%, 95% CI: 26.6–44.6, p= 0.013) had higher prevalence than English-speaking respondents (22.3%, 95% CI: 18.4–26.8). Respondents living in neighborhoods with high neighborhood poverty had higher prevalence compared with those living in low neighborhood poverty (31.6%, 95% CI: 25.4–38.6, p= 0.029 vs 19.8%, 95% CI: 12.8–29.4). Respondents without health insurance had a higher prevalence compared with those with health insurance (37.6%, 95% CI: 23.8–53.7, p= 0.078 vs 23.3%, 95% CI: 19.6–27.5) (Table 1).

Antibody prevalence varied among respondents with different underlying conditions. Respondents with asthma had a lower prevalence than those without it (11.7%, 95% CI: 6.6–19.9, p<0.001 vs 26.8%, 95% CI: 22.7–31.4). Respondents with obesity (body mass index (BMI) ≥30 and ≤100) had a higher prevalence compared with those who had BMI <25 (34.0%, 95% CI: 26.8–42.1, p= 0.008 vs 20.5%, 95% CI: 15.0–27.4) (Table 2).

There were 681 respondents currently employed, self-employed, or who recently lost their job because of the pandemic. Among these, antibody prevalence of respondents mostly working outside of the home was higher but not significantly different (30.0%, 95% CI: 23.5–37.4, p= 0.059) compared with the prevalence of those mostly working from within the home (20.9%, 95% CI: 15.1–28.1). Among all respondents, there was a higher prevalence among those who reported staying at home none or some of the time, avoiding interacting with others outside except for essential needs (31.8%, 95% CI: 25.3–39.2, p= 0.004), compared with respondents who reported staying at home all or most of the time (19.7%, 95% CI: 15.8–24.3) (Table 3).

Antibody prevalence was significantly greater, more than three times higher, among respondents who reported COVID-19-like illness symptoms at some point between February 2020 until survey administration (43.6%, 95% CI: 36.7–50.7, p<0.001) compared with those who did not report any of these symptoms (13.0%, 95% CI: 9.3–17.9). People who thought they had experienced COVID-19 (not mutually exclusive with those who reported COVID-19-like illness) had higher prevalence (81.2%, 95% CI: 72.8–87.4, p<0.001) compared with those who did not think they had COVID-19 (9.5%, 95% CI: 6.5–13.6) (Table 4).

Discussion

Nearly 1 in 4 adult NYC residents had evidence of SARS-CoV-2 infection by October 2020. This is among the highest antibody prevalence reported for a U.S. jurisdiction during the first wave of the COVID-19 pandemic and it is the first population-based survey conducted in NYC of SARS-CoV-2 antibody prevalence [3–6, 18–22]. These data represent an important contribution to understanding the true extent of the pandemic in NYC, particularly by allowing for stratification by race/ethnicity and neighborhood poverty.

Our study suggests disparities in SARS-CoV-2 antibody prevalence across racial/ethnic subgroups in NYC, consistent with other NYC and U.S.-based studies reporting COVID-19 infection by race/ethnicity [4, 6, 23–25]. Nearly 1 in 3 Black and 1 in 3 Latino respondents had SARS-CoV-2 infection by October 2020. Respondents without health insurance had higher prevalence than those with it, however, wide CIs limit interpretation. While sample sizes are small, among those without health insurance, 58.8% (40/68) were Latino, and 52.5% (21/40) of Latino respondents without health insurance had SARS-CoV-2 antibodies. We also observed prevalence differences by borough of residence, language of interview, and neighborhood poverty level. Considering the varied demographic composition of NYC boroughs [26], our findings are congruent with other data indicating higher SARS-CoV-2 infection rates in areas of concentrated poverty due to multiple factors that increase exposure risk [27–28].

Respondents who worked mostly outside the home had a higher prevalence compared with those who worked mostly from within the home. As Black and Latino people are overrepresented in several essential industries, workplace related exposures might be contributing to higher antibody prevalence among Black and Latino respondents [6, 29]. Overall, our findings illustrate how the COVID-19 pandemic unequally impacted NYC residents, with Black and Latino New Yorkers and those from poorer neighborhoods more

likely to have had previous SARS-CoV-2 infection. These inequities result from myriad structural, racial, and economic inequalities that drive NYC health disparities [25, 28–30].

Our combined weighted citywide seroprevalence estimate is consistent with New York State Health Department data of NYC residents visiting grocery stores, which found 22.7% seropositivity during April 19–28, 2020 [4]. A cross-sectional serosurvey of routine care patients at Mt Sinai Hospital in NYC found 19.1% prevalence in the week ending on April 19, and up to 61.7% among urgent care patients [5]. A NYC Serosurvey of adult residents found a 23.6% prevalence from May 13– July 21,2020 [6]. Using residual commercial laboratory specimens, a CDC nationwide serosurvey estimated 25.1% of metro New York residents had antibodies during July 27–August 13, 2020, similar to our citywide estimate [20]. While prior studies differ in methodology and sample, our study provides important confirmation of prior estimates in NYC during this time and also offers the ability to examine estimates based on demographic and socioeconomic variables.

We chose to conduct phlebotomy in participants' homes to reduce potential biases associated with sampling in specific locations that would require participants to travel to or only testing persons potentially more likely to be ill. Home specimen collection enabled us to include respondents who lacked access to transportation or health care, or who were uncomfortable leaving their home during the pandemic. We combined antibody test results for this survey with self-reported antibody results collected via telephone survey to increase our sample size to estimate stratified antibody prevalence with greater precision. Including self-reported test results also helped to minimize selection bias in two ways. First, it included individuals who previously had an antibody test and didn't want the test to be repeated. During the time of this serosurvey, antibody testing was publicly available including at several city-run mass serology sites and some people didn't want to undergo repeat phlebotomy. Second, including self-reported results allowed us to survey individuals who preferred not having a phlebotomist visit their home during a pandemic, which was a common reason respondents declined specimen collection. While

controlling for demographic variables, we found that respondents with only self-reported results had elevated yet non-significant odds of having a positive result compared with respondents that provided blood. We hypothesize that individuals who self-reported a positive antibody test might have been less inclined to repeat serology compared with those who self-reported a negative antibody test.

The validity of self-reported medical test results varies in the literature according to the disease of interest and the survey population [31–33]. In our study, among respondents with both serosurvey and self-reported antibody data, we found substantial agreement (89%) between an individual's self-reported result and serosurvey tested result. The handful of discordant results had plausible biological and epidemiological explanations, including waning antibodies [34–36], COVID-19 infection after the initial self-reported test, reporting bias, or incorrect recall.

While initially SARS-CoV-2 seroprevalence was believed to be a proxy for cumulative infections [9], it is now well-documented that individuals with asymptomatic or mild SARS-CoV-2 infections might not produce antibodies, have limited antibody response, or have waning antibodies [20, 34, 36]. Other studies have tracked the decline in seroprevalence in NYC from April to July 2020 [5, 7]. Our survey did not require respondents with self-reported antibody results to recall the date of their previous antibody testing, nor the manufacturer of the serological assay. Survey respondents who self-reported a test result that was conducted between March 2020, when commercial SARS-CoV-2 assays became available [37], and our study period in June 2020, might have included individuals who were positive at the time of testing but seroconverted by June. Our antibody prevalence estimates likely underestimate cumulative infections overall; however, the self-reported data might overestimate antibody prevalence by including individuals who by June through October were no longer antibody positive. Additionally, considering the varied performance of different SARS-CoV-2 serologic assays, respondents with self-reported antibody results

might have been tested with a low performing assay, increasing potential for false positive or negative test results [37].

Telephone survey response rates have been declining for years, which is consistent with the low 2020 CHS response rate [38]. One limitation of a low response is the potential for non-response bias; the prevalence among those that declined survey participation is unknown. While declining survey response rates indicate potential nonresponse bias, they are not a direct measure of nonresponse bias [39].

Additional limitations include the following: aside from respondents who provided both a specimen and self-reported result, the remaining self-reported test results were not further verified, so recall bias could not be assessed. Among those who provided a blood specimen, the median time between survey administration and blood draw was 16 days. Some subgroups with small sample sizes should be interpreted with caution. Finally, this survey included only non-institutionalized adults; results cannot be extrapolated to other populations like children or those residing in congregate settings.

At the population level, representative cross-sectional surveys provide important data about the extent of the pandemic. While other research is ongoing to understand immunity against the SARS-CoV-2 virus, our population-based prevalence estimates help inform an understanding of which NYC populations are most at risk and those that might still be susceptible to SARS-CoV-2 infection. This work offers an important baseline of SARS-CoV-2 antibody prevalence in NYC following the first wave of the COVID-

19 outbreak and before mass vaccination. A unique feature of our survey is that it uses a hybrid approach to estimate SARS-CoV-2 antibody prevalence using a representative population-based sample of NYC residents. The findings highlight the considerable SARS-CoV-2 transmission in NYC, particularly in Black and Latino populations, and communities with high neighborhood poverty, strengthening evidence of how structural racism led to an unequal burden of COVID-19 in NYC. Future analyses should further examine individual and neighborhood characteristics associated with having SARS-CoV-2 antibodies to identify upstream policy and public health levers for more equitable and targeted public health interventions.

Footnote Page

Potential conflicts of interest

All No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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Table 1: SARS-CoV-2 Antibody Prevalence Among Adult New York City (NYC) Residents, Stratified by Demographic Variables, June–October 2020, NYC Community Health Survey

	N[a]	# Positive	Weighted % Positive[b]	95% CI	P-value
Overall	1074	227	24.3	20.7–28.3	
Provided blood for serosurvey	497	100	21.2	16.6–26.6	---
Only provided self-reported result	577	127	26.9	21.7–32.8	---
Sex Assigned at Birth					
Male	442	87	22.0	16.8–28.2	ref
Female	628	137	25.9	21.1–31.4	0.315
Age in years					
18–44	458	107	26.4	21.0–32.7	0.018
45–64	406	88	25.0	19.6–31.3	0.040
≥ 65	210	32	15.1	9.2–24.0	ref

Race/Ethnicity[d]					
Asian or Pacific Islander	112	19	19.9[c]	11.2–32.7	0.690
Black	194	52	30.7	21.9–41.2	0.021
Latino	309	87	30.7	24.1–38.2	0.004
Other (includes multi-racial)	29	7	25.4[c]	10.0–51.3	0.477
White	428	61	17.4	12.5–23.7	ref
Borough					
Bronx	222	55	32.4	23.6–42.6	0.009
Brooklyn	330	69	24.6	18.4–32.0	0.113
Manhattan	226	43	17.1	11.6–24.4	ref
Queens	232	50	24.8	17.7–33.5	0.137
Staten Island	64	10	23.7[c]	9.7–47.3	0.520
US born					
Yes	640	112	23.0	18.2–28.6	ref
No	431	114	26.0	20.7–32.0	0.440
Language of Interview					
English	911	167	22.3	18.4–26.8	ref
Non-English	163	60	35.1	26.6–44.6	0.013
Neighborhood Poverty Level[e]					
Low poverty (< 10%)	217	33	19.8	12.8–29.4	ref
Medium poverty (10%–20%)	425	76	20.5	15.5–26.6	0.886
High poverty (≥ 20%)	415	117	31.6	25.4–38.6	0.029
Health Insurance Coverage					
Yes	1004	204	23.3	19.6–27.5	ref
No	68	23	37.6[c]	23.8–53.7	0.078

Employment Status					
Employed	583	125	26.2	21.3–31.9	0.301
Unemployed	160	35	22.1	14.7–31.9	0.933
Not in labor force[f]	326	66	21.7	15.5–29.4	ref

[a] Missing data were excluded from analysis so co-variates do not always sum to 1074.

[b] Antibody Prevalence was estimated accounting for complex survey design and weighting to the NYC adult residential population.

[c] Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30%, or the 95% confidence interval half-width is greater than 10 or the sample size is too small, making the estimate potentially unreliable.

[d] Black, White, and Asian/Pacific Islander do not include Latino. Latino ethnicity includes Hispanic or Latino of any race.

[e] Neighborhood poverty level based on the percentage of population in a respondent's zip code living below the federal poverty level per the American Community Survey (ACS) 2014-2018

[f] People not in the labor force includes individuals who identified themselves as a homemaker, student, retired, or unable to work.

Table 2: SARS-CoV-2 Antibody Prevalence Among Adult New York City (NYC) Residents with Underlying Health Conditions, June–October 2020, NYC Community Health Survey

	N[a]	# Positive	Weighted % Positive[b]	95% CI	P-value
Diabetes					
Yes	109	21	21.3[c]	12.7–33.6	0.556
No	961	206	24.7	20.8–29.0	ref
Hypertension					
Yes	324	70	25.1	18.8–32.6	0.804
No	747	156	24.0	19.7–28.9	ref
Asthma					
Yes	181	25	11.7	6.6–19.9	<0.001
No	892	202	26.8	22.7–31.4	ref
Obesity					
Normal and Underweight: <25 BMI[d]	395	67	20.5	15.0–27.4	ref
Overweight: 25≤ BMI <30	363	67	20.4	15.0–27.2	0.983
Obese: 30≤ BMI ≤100	300	90	34.0	26.8–42.1	0.008
Heart Disease					
Yes	80	14	19.6[c]	10.1–34.6	0.439
No	992	213	24.6	20.9–28.8	ref
Chronic Obstructive Pulmonary Disease					

Yes	52	7	19.2[c]	7.5–41.1	0.552
No	1019	219	24.4	20.7–28.5	ref
Weakened Immune System					
Yes	92	18	22.0[c]	11.5–38.0	0.742
No	973	206	24.3	20.6–28.6	ref

[a] Missing data were excluded from analysis so co-variates do not always sum to 1074.

[b] Antibody prevalence was estimated accounting for complex survey design and weighting to the NYC adult residential population.

[c] Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30%, or the 95% confidence interval half-width is greater than 10 or the sample size is too small, making the estimate potentially unreliable

[d] BMI = Body Mass Index

Table 3: SARS-CoV-2 Antibody Prevalence Among Adult New York City (NYC) Residents, Stratified by Working from Home and Ability to Socially Distance, During June–October 2020, NYC Community Health Survey

			Weighted		
	N[a]	# Positive	% Positive[b]	95% CI	P-value
Mostly working from home[c]	351	60	20.9	15.1–28.1	ref
Mostly working outside of the home[c]	330	89	30.0	23.5–37.4	0.059
Staying at home and avoiding interacting with others outside of the home during the past 14 days[d]					
Some or none of the time	382	95	31.8	25.3–39.2	0.004
All or most of the time	688	130	19.7	15.8–24.3	ref

[a] Missing data were excluded from analysis so co-variates do not always sum to 1074.

[b] Antibody prevalence was estimated accounting for complex survey design and weighting to the NYC adult residential population.

[c] Only respondents who were currently employed or self-employed, or recently lost their job, were asked about mostly working from home or outside of the home (N=681).

[d] Respondents were asked "During the past 14 days, how often have you been staying at home and avoiding interacting with others outside your household aside from getting essential needs? Essential needs include getting groceries, prescriptions filled, doing laundry, etc."

Table 4: SARS-CoV-2 Antibody Prevalence Among Adult New York City (NYC) Residents, Stratified by Those who Either Reported Experiencing COVID-19-Like Illness or Believed They had COVID-19, During June–October 2020, NYC Community Health Survey

	N[a]	# Positive	Weighted % Positive[b]	95% CI	P-value
Reported COVID-19-like illness[d]					
Yes	393	153	43.6	36.7–50.7	< 0.001
Probably, not sure	11	4	44.9[c]	16.3–77.4	0.080
No	589	61	13.0	9.3–17.9	ref
Believed to have had COVID-19[e]					
Yes	186	141	81.2	72.8–87.4	<0.001
Probably, not sure	164	32	21.6[c]	13.8–32.2	0.016

No	636	46	9.5	6.5–13.6	ref

[a] Missing data were excluded from analysis so co-variates do not always sum to 1074.

[b] Antibody prevalence was estimated accounting for complex survey design and weighting to the NYC adult residential population.

[c] Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30%, or the 95% confidence interval half-width is greater than 10 or the sample size is too small, making the estimate potentially unreliable.

[d] Respondents were asked about experiencing symptoms indicative of COVID-19-like illness in the past 30 days. If respondents did not experience any symptoms indicative of COVID-19-like illness in the past 30 days, they were asked "Since February 2020 until now, do you remember if you experienced any of the following? A fever, cough, shortness of breath, sore throat, or loss of taste or loss of smell?" (N=993).

[e] Respondents who experienced symptoms of COVID-19-like illness in the past 30 days were asked whether or not they believed the symptoms were associated with COVID-19 infection. If respondents did not experience any symptom of COVID-19-like illness in the past 30 days, or if they did not think they had COVID-19 within the past 30 days, they were asked "Since February 2020 until now, do you think you may have had the Coronavirus or COVID-19?" (N=986).

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