A Study implementation

This Appendix describes the design and implementation of the RECOVER serological study. The study was designed and implemented in collaboration with NORC at the University of Chicago, and the University of Chicago Wilson Antibody Biology Laboratory. Appendix A.1 discusses the construction of the sampling frame and the sampling and randomization procedures. Appendix A.2 describes outreach and follow-up procedures, and additionally discusses the materials sent to invited households. These materials are reproduced in Appendix A.3. This study, its design, and its implementation were approved by the IRB at the University of Chicago (IRB20-0721).

A.1 Sampling and randomization procedures

NORC constructed a sampling frame of approximately 1.2 million household addresses in the city of Chicago based on address data from the United States Postal Service Computerized Delivery Sequence File (CDSF).[8] The CDSF contains a record for every mail delivery point in the U.S. and these records are updated monthly.

NORC then randomly sampled 882 household addresses from the sampling frame for the RECOVER study. All addresses had an equal probability of being randomly sampled. These 882 household addresses were randomly (and with equal probability) assigned to one of three compensation arms: 374 addresses were assigned to the $0 arm, 374 addresses were assigned to the $100 arm, and 134 addresses were assigned to the $500 arm.

A.2 Outreach and follow up procedures

Each household in the RECOVER study sample was sent a package that contained a self-administered blood collection kit, an invitation, and a consent form with a short questionnaire. All households received material that was identical in all aspects except for minor modifications relating to compensation for participating (i.e. returning a blood sample) depending on the assigned incentive arm. In particular, households in the $0 arm were not told about financial compensation for participating, and households in the $100 and $500 compensation arms were notified that they would receive $100 and $500 for participating, respectively.

The blood collection kit included instructions on self-administering and returning a blood sample.[9] The written material explained the purpose of the study, provided information on financial compensation for participating (if applicable), and explained which member of the household should participate and how to participate, and provided contact information. Invitees were additionally provided a toll-free phone number to call with any questions about the study, procedures, their participation, or rights as a research participant. Appendix

[8] The software program used to create the sampling frame is retained by NORC.

[9] On the instruction card, a link to video instructions for taking the sample was provided (https://vimeo.com/286513641), and invitees were reminded that they could call the toll-free line to have a phone interviewer from NORC walk them through the sample-taking process.

Exhibits A.1, A.2, and A.3 respectively depict the invitations sent to households in the $0, $100 compensation, and $500 compensation arms.

The consent form noted that the purpose of the study was to learn how many people had already been exposed to the virus, that the study had received IRB approval, that participants' data would be securely stored, that they would not receive the result of the test, and that compensation (if offered) would be received when the Wilson laboratory received the blood sample. The consent form concluded with a request for the participant's signature and a short questionnaire. The first part of the consent form differed very slightly depending on the assigned incentive arm: Appendix Exhibits A.4, A.5, and A.6 respectively depict the first part of the consent forms sent to households in the $0, $100 compensation, and $500 compensation arms. The second part of the consent form was uniform across compensation arms, and is depicted in Appendix Exhibit A.7.

After all packages were sent, NORC additionally sent up to three weekly reminder postcards to all sampled households who had not yet returned a kit. Appendix Exhibits A.8, A.9, and A.10 respectively depict the postcards sent to households in the no compensation, $100 compensation, and $500 compensation arms. NORC also conducted up to three weekly phone calls to these households.[10] If a non-usable sample was received by the laboratory, NORC contacted households to inform them that their sample was not usable. Households were offered the option of receiving a replacement kit to attempt to take their sample again.[11] If households refused to receive a replacement kit, the interviewer would explain that they would not receive payment. If households agreed to receive a replacement kit, a new kit was mailed to the participant. There was no extra payment or penalty for having to retake one's sample. As soon as the second sample was received by the laboratory, the participant was sent their payment, even if this second sample was also unusable.

[10]Since the sampling frame itself does not contain any telephone number information, phone numbers were appended to the sample once it was selected using data from commercial providers.

[11]Reasons for a non-usable sample include an empty or not-attempted kit or a kit with insufficient blood sample. The research team was informed by the kit manufacturer that their product returns a total of 1.8% unusable samples. When empty or not-attempted kits were sent back, NORC also attempted to assist the participant in understanding the required conditions of participation and compensation via phone call.

A.3 Materials

Exhibit A.1: *Invitation sent to households, incentive level $0*

THE UNIVERSITY OF CHICAGO

HELP US LEARN ABOUT COVID-19 IN CHICAGO!

Dear Fellow Chicagoan,

We launched the RECOVER study to learn about how many Chicagoans have had COVID-19. You can help your community by helping us understand how the virus has affected different parts of the city.

It is fast, easy, and safe to take part in this study.

You are among a small number of people scientifically chosen to represent others in your area.

Your participation is important!

HERE'S HOW IT WORKS:

1 **Collect a small blood sample at home in just a few minutes using the kit you received.**

2 **Mail the kit to our research team using the pre-paid packaging.**

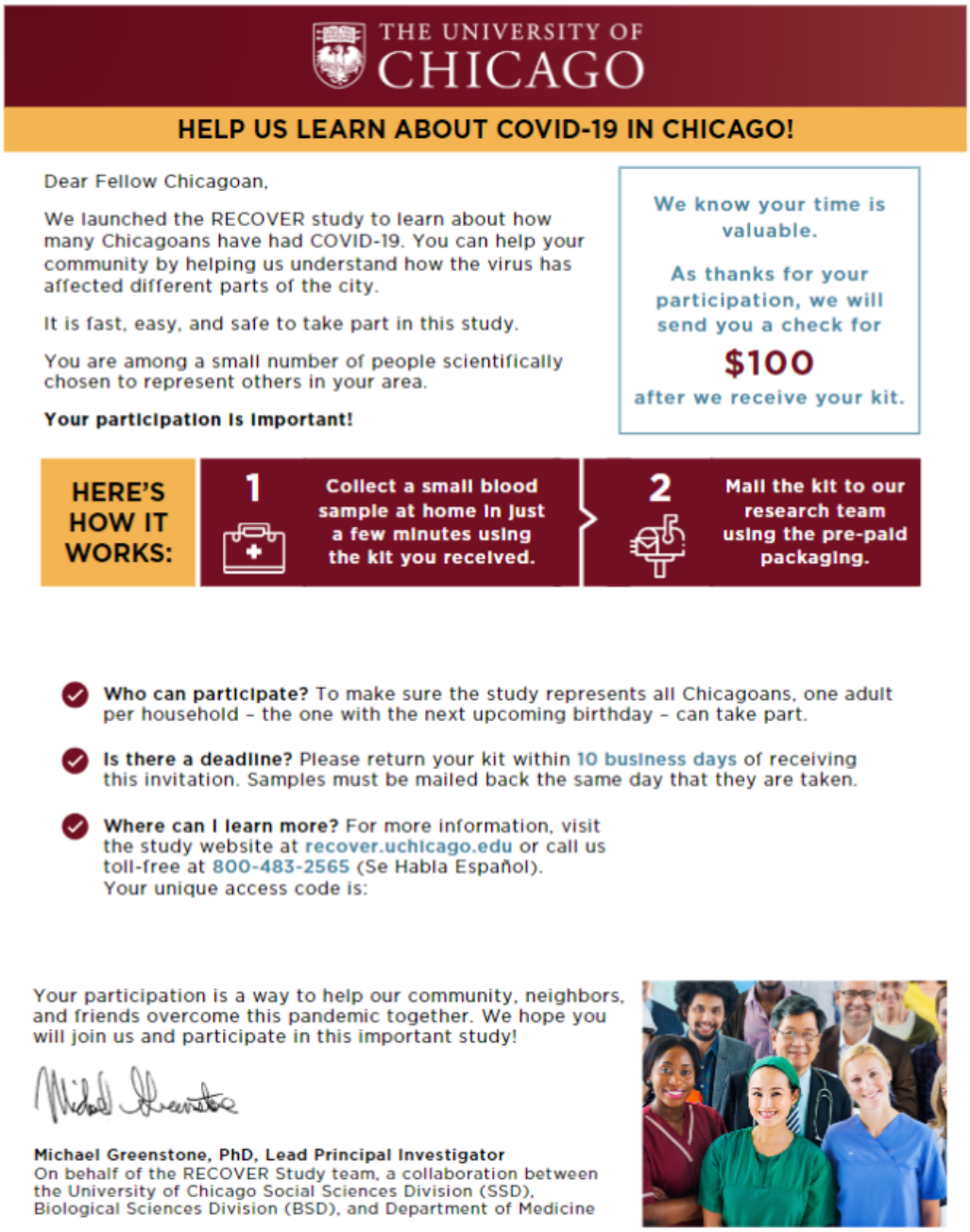
We know your time is valuable. We thank you for your participation!

- **Who can participate?** To make sure the study represents all Chicagoans, one adult per household – the one with the next upcoming birthday – can take part.
- **Is there a deadline?** Please return your kit within 10 business days of receiving this invitation. Samples must be mailed back the same day that they are taken.
- **Where can I learn more?** For more information, visit the study website at recover.uchicago.edu or call us toll-free at 800-483-2565 (Se Habla Español).
  Your unique access code is:

Your participation is a way to help our community, neighbors, and friends overcome this pandemic together. We hope you will join us and participate in this important study!

Michael Greenstone, PhD, Lead Principal Investigator
On behalf of the RECOVER Study team, a collaboration between the University of Chicago Social Sciences Division (SSD), Biological Sciences Division (BSD), and Department of Medicine

Exhibit A.2: *Invitation sent to households, incentive level $100*



THE UNIVERSITY OF CHICAGO

HELP US LEARN ABOUT COVID-19 IN CHICAGO!

Dear Fellow Chicagoan,

We launched the RECOVER study to learn about how many Chicagoans have had COVID-19. You can help your community by helping us understand how the virus has affected different parts of the city.

It is fast, easy, and safe to take part in this study.

You are among a small number of people scientifically chosen to represent others in your area.

Your participation is important!

We know your time is valuable.

As thanks for your participation, we will send you a check for

$100

after we receive your kit.

HERE'S HOW IT WORKS:

1 **Collect a small blood sample at home in just a few minutes using the kit you received.**

2 **Mail the kit to our research team using the pre-paid packaging.**

- **Who can participate?** To make sure the study represents all Chicagoans, one adult per household – the one with the next upcoming birthday – can take part.
- **Is there a deadline?** Please return your kit within 10 business days of receiving this invitation. Samples must be mailed back the same day that they are taken.
- **Where can I learn more?** For more information, visit the study website at recover.uchicago.edu or call us toll-free at 800-483-2565 (Se Habla Español).
  Your unique access code is:

Your participation is a way to help our community, neighbors, and friends overcome this pandemic together. We hope you will join us and participate in this important study!

Michael Greenstone, PhD, Lead Principal Investigator
On behalf of the RECOVER Study team, a collaboration between the University of Chicago Social Sciences Division (SSD), Biological Sciences Division (BSD), and Department of Medicine

Exhibit A.3: *Invitation sent to households, incentive level $500*

THE UNIVERSITY OF CHICAGO

HELP US LEARN ABOUT COVID-19 IN CHICAGO!

Dear Fellow Chicagoan,

We launched the RECOVER study to learn about how many Chicagoans have had COVID-19. You can help your community by helping us understand how the virus has affected different parts of the city.

It is fast, easy, and safe to take part in this study.

You are among a small number of people scientifically chosen to represent others in your area.

Your participation is important!

We know your time is valuable.

As thanks for your participation, we will send you a check for

$500

after we receive your kit.

HERE'S HOW IT WORKS:

1 **Collect a small blood sample at home in just a few minutes using the kit you received.**

2 **Mail the kit to our research team using the pre-paid packaging.**

- **Who can participate?** To make sure the study represents all Chicagoans, one adult per household – the one with the next upcoming birthday – can take part.
- **Is there a deadline?** Please return your kit within 10 business days of receiving this invitation. Samples must be mailed back the same day that they are taken.
- **Where can I learn more?** For more information, visit the study website at recover.uchicago.edu or call us toll-free at 800-483-2565 (Se Habla Español).
  Your unique access code is:

Your participation is a way to help our community, neighbors, and friends overcome this pandemic together. We hope you will join us and participate in this important study!

Michael Greenstone, PhD, Lead Principal Investigator
On behalf of the RECOVER Study team, a collaboration between the University of Chicago Social Sciences Division (SSD), Biological Sciences Division (BSD), and Department of Medicine

Exhibit A.4: *Consent form: key information, incentive level $0*

THE UNIVERSITY OF CHICAGO
RECOVER Study

Investigators: Michael Greenstone, Magne Mogstad, Azeem Shaikh,
Alex Torgovitsky, Ali Hortaçsu, Sarah Cobey, Patrick Wilson
University of Chicago, 1126 E. 59th Street, Chicago, IL 60637
Phone Number: (773) 702-0759 | Protocol Number: IRB20-0721

Consent Form for Participation in a Research Study

KEY INFORMATION

You are being invited to participate in a research study about COVID-19 in Chicago. The purpose of this section is to give you key information to help you decide whether to participate.

WHAT IS THE STUDY ABOUT?
The purpose of this study is to learn how many people have already been exposed to the virus that causes COVID-19, known as SARS-CoV-2, including those that had mild or no symptoms. We will conduct antibody tests in blood samples collected from a random sample of Chicagoans.

WHAT DOES PARTICIPATION INVOLVE?
Participation involves taking a small blood sample, using the kit we sent you. This is done from your home and completed in just a few minutes. The kit is safe and easy to use. You will mail the sample back to our laboratory, following the instructions provided in the kit box.

WHO CAN PARTICIPATE?
One adult (18+) from your household can participate. It is important that our sample is random. We ask that the adult with the next upcoming birthday participates. If that person is not available or does not want to participate, we ask that no other person in the household participates.

WHAT ARE KEY REASONS I MIGHT CHOOSE TO PARTICIPATE?
We hope that you will participate in this study to help us understand how the disease has spread in Chicago. We know your time is valuable, and we appreciate your participation.

WHAT ARE KEY REASONS I MIGHT CHOOSE NOT TO PARTICIPATE?
This study involves collecting a small blood sample by self-administering a finger prick. You may feel momentary, mild discomfort which will fade within a minute or two. You may decide not to participate if you are not comfortable self-administering the finger prick.

ARE THERE ANY COSTS FOR PARTICIPATING?
No. You will not incur any costs for participation.

WHAT ABOUT CONFIDENTIALITY?
Study data will be handled confidentially. While there are always risks of data breach in any research study, our data is stored on secure servers that minimize this risk.

DO I HAVE TO TAKE PART IN THE STUDY?
Participation is completely voluntary. You will not lose any services, benefits, or rights that you normally have if you choose not to participate, or if you choose to leave the study at any time.

QUESTIONS?
Call to speak to a member of our team: 800-483-2565. For questions about your rights as a research subject, call the Biological Sciences Division (BSD) Institutional Review Board (IRB): 773-702-6505.

If you would like to participate, please return the final page of this consent form with your sample. We will not be able to process your sample without a signed consent form.

Exhibit A.5: *Consent form: key information, incentive level $100*

THE UNIVERSITY OF CHICAGO
RECOVER Study

Investigators: Michael Greenstone, Magne Mogstad, Azeem Shaikh, Alex Torgovitsky, Ali Hortaçsu, Sarah Cobey, Patrick Wilson
University of Chicago, 1126 E. 59th Street, Chicago, IL 60637
Phone Number: (773) 702-0759 | Protocol Number: IRB20-0721

Consent Form for Participation in a Research Study

KEY INFORMATION

You are being invited to participate in a research study about COVID-19 in Chicago. The purpose of this section is to give you key information to help you decide whether to participate.

WHAT IS THE STUDY ABOUT?
The purpose of this study is to learn how many people have already been exposed to the virus that causes COVID-19, known as SARS-CoV-2, including those that had mild or no symptoms. We will conduct antibody tests in blood samples collected from a random sample of Chicagoans.

WHAT DOES PARTICIPATION INVOLVE?
Participation involves taking a small blood sample, using the kit we sent you. This is done from your home and completed in just a few minutes. The kit is safe and easy to use. You will mail the sample back to our laboratory, following the instructions provided in the kit box.

WHO CAN PARTICIPATE?
One adult (18+) from your household can participate. It is important that our sample is random. We ask that the adult with the next upcoming birthday participates. If that person is not available or does not want to participate, we ask that no other person in the household participates.

WHAT ARE KEY REASONS I MIGHT CHOOSE TO PARTICIPATE?
We hope that you will participate in this study to help us understand how the disease has spread in Chicago. We know your time is valuable. To thank you for your participation, we will send you a check for **$100** when our laboratory receives your blood sample.

WHAT ARE KEY REASONS I MIGHT CHOOSE NOT TO PARTICIPATE?
This study involves collecting a small blood sample by self-administering a finger prick. You may feel momentary, mild discomfort which will fade within a minute or two. You may decide not to participate if you are not comfortable self-administering the finger prick.

ARE THERE ANY COSTS FOR PARTICIPATING?
No. You will not incur any costs for participation.

WHAT ABOUT CONFIDENTIALITY?
Study data will be handled confidentially. While there are always risks of data breach in any research study, our data is stored on secure servers that minimize this risk.

DO I HAVE TO TAKE PART IN THE STUDY?
Participation is completely voluntary. You will not lose any services, benefits, or rights that you normally have if you choose not to participate, or if you choose to leave the study at any time.

QUESTIONS?
Call to speak to a member of our team: 800-483-2565. For questions about your rights as a research subject, call the Biological Sciences Division (BSD) Institutional Review Board (IRB): 773-702-6505.

If you would like to participate, please return the final page of this consent form with your sample. We will not be able to process your sample or compensate you without a signed consent form.

Exhibit A.6: *Consent form: key information, incentive level $500*

THE UNIVERSITY OF CHICAGO
RECOVER Study

Investigators: Michael Greenstone, Magne Mogstad, Azeem Shaikh, Alex Torgovitsky, Ali Hortaçsu, Sarah Cobey, Patrick Wilson
University of Chicago, 1126 E. 59th Street, Chicago, IL 60637
Phone Number: (773) 702-0759 | Protocol Number: IRB20-0721

Consent Form for Participation in a Research Study

KEY INFORMATION

You are being invited to participate in a research study about COVID-19 in Chicago. The purpose of this section is to give you key information to help you decide whether to participate.

WHAT IS THE STUDY ABOUT?
The purpose of this study is to learn how many people have already been exposed to the virus that causes COVID-19, known as SARS-CoV-2, including those that had mild or no symptoms. We will conduct antibody tests in blood samples collected from a random sample of Chicagoans.

WHAT DOES PARTICIPATION INVOLVE?
Participation involves taking a small blood sample, using the kit we sent you. This is done from your home and completed in just a few minutes. The kit is safe and easy to use. You will mail the sample back to our laboratory, following the instructions provided in the kit box.

WHO CAN PARTICIPATE?
One adult (18+) from your household can participate. It is important that our sample is random. We ask that the adult with the next upcoming birthday participates. If that person is not available or does not want to participate, we ask that no other person in the household participates.

WHAT ARE KEY REASONS I MIGHT CHOOSE TO PARTICIPATE?
We hope that you will participate in this study to help us understand how the disease has spread in Chicago. We know your time is valuable. To thank you for your participation, we will send you a check for **$500** when our laboratory receives your blood sample.

WHAT ARE KEY REASONS I MIGHT CHOOSE NOT TO PARTICIPATE?
This study involves collecting a small blood sample by self-administering a finger prick. You may feel momentary, mild discomfort which will fade within a minute or two. You may decide not to participate if you are not comfortable self-administering the finger prick.

ARE THERE ANY COSTS FOR PARTICIPATING?
No. You will not incur any costs for participation.

WHAT ABOUT CONFIDENTIALITY?
Study data will be handled confidentially. While there are always risks of data breach in any research study, our data is stored on secure servers that minimize this risk.

DO I HAVE TO TAKE PART IN THE STUDY?
Participation is completely voluntary. You will not lose any services, benefits, or rights that you normally have if you choose not to participate, or if you choose to leave the study at any time.

QUESTIONS?
Call to speak to a member of our team: 800-483-2565. For questions about your rights as a research subject, call the Biological Sciences Division (BSD) Institutional Review Board (IRB): 773-702-6505.

If you would like to participate, please return the final page of this consent form with your sample. We will not be able to process your sample or compensate you without a signed consent form.

Exhibit A.7: *Consent form and questionnaire*

RETURN THIS PAGE WITH THE COMPLETED BLOOD SAMPLE KIT.

CONSENT: I have read and understood the information in the consent form, including the objectives of the study and procedures. I understand that my participation is voluntary, and that I do not have to sign this form if I do not want to be part of this research study.

By signing below, I confirm my eligibility and I agree to participate in this study.

* REQUIRED FIELD

First name: * _____

Middle name: _____

Last name: * _____

Signature: * _____

Date: * _____ **Time:** * _____

Email: * _____ **Phone #:** * _____

We will only use your email & phone number to contact you about your participation in this study.

Please provide the following information that will help us better analyze COVID-19 infection rates in Chicago:

1. **What is your age?** * _____ years
2. **What is your gender?** *
   - ☐ Male
   - ☐ Female
   - ☐ Other
   - ☐ Prefer not to answer
3. **Which one or more of the following best describes your race? Please check all that apply.** *
   - ☐ White
   - ☐ Black or African American
   - ☐ American Indian or Alaska Native
   - ☐ Asian
   - ☐ Native Hawaiian or Pacific Islander
   - ☐ Other
   - ☐ Prefer not to answer
4. **Are you of Hispanic, Latino, or Spanish origin?** *
   - ☐ Yes
   - ☐ No
   - ☐ Prefer not to answer
5. **What was your household's approximate total income from all sources in 2019?** *
   - ☐ Less than $20,000
   - ☐ $20,000 to less than $50,000
   - ☐ $50,000 to less than $100,000
   - ☐ $100,000 or more
   - ☐ Prefer not to answer

Would you like to be contacted in the future about other COVID-19 research opportunities?

If yes, you may be contacted by other researchers and provided with more information and a separate consent form. Your answer to this question will not affect your participation in this study.

- ☐ Yes, I would like to be contacted about other COVID-19 research studies
- ☐ No, please do not contact me about other COVID-19 research studies

LAB USE ONLY **KIT CODE:** ___ ___ ___ - ___ ___ ___ - ___ ___ ___ **TEST CODE:** ___ ___ ___

Exhibit A.8: *Reminder postcard, incentive level $0*

Exhibit A.9: *Reminder postcard, incentive level $100*

Exhibit A.10: *Reminder postcard, incentive level $500*

B Data sources and variable definitions

Our empirical analysis uses data collected from the serology study described in Section 2. We link the study data to a set of (five digit) zipcode-level characteristics we collect from three sources: the American Community Survey, the Chicago Health Atlas, and the City Health Dashboard. We provide information on each source and the obtained variables below.

American Community Survey. We obtain neighborhood demographics from the 2019 American Community Survey 1-year estimates. We classify a zipcode as: (1) higher poverty if the percentage of households below 1.5 times the poverty line is above 30% (and lower poverty otherwise); and (2) majority minority if the share of adults identifying as non-Hispanic white is below 50% (and majority White otherwise).

Chicago Health Atlas. We obtain zipcode-level health measures from the Chicago Health Atlas, a portal developed by the Chicago Department of Public Health and Population Health Analytics Metrics Evaluation Center at University of Illinois Chicago. More specifically, we obtain the uninsurance rate and five diagnose-specific hospitalization rates. The uninsurance rate is defined as the average percentage of residents without health insurance between 2016 and 2020. Diagnose-specific hospitalization rates are defined as the age-adjusted number of hospitalizations discharges for a given diagnose per 10,000 people in 2017, excluding discharges to Veterans Administration hospitals. We obtain these hospitalization rates for the following diagnoses: (1) alcohol-related; (2) drug-related (which include amphetamines, cannabis, cocaine, drug induced mental disorders, hallucinogens, opioids, sedatives, hypnotics, anxiolytics, tranquilizers, barbiturates, and other drugs); (3) mood and depressive disorders (which include bipolar and manic depressive disorders); (4) behavioral health (which include substance use disorder and mental disorders); and (5) preventable (defined as conditions that could be managed in a clinic setting).

City Health Dashboard. We obtain additional health and labor market measures from the City Health Dashboard, a portal developed by NYU Langone Health. The dashboard provides data at the census tract level, which we aggregate to the ZIP code level via population-weighted averages using Census relationship files. The following measures are obtained from this source: (1) annual unemployment rate, defined as the percentage of individuals at least 16 years that were unemployed and seeking work at any point in 2020; (2) credit insecurity index, defined as the proportion of local residents who have limited access to credit, either because they have no credit history or have negative credit outcomes; (3) COVID-19 local risk index, which measures, on a scale between 1 and 10, the potential for COVID-19 infection and risk for more severe COVID-19 outcomes and risks at the zipcode-level; and (4) Share of smoking adults, defined as the percentage of adults aged 18 years or above reporting to be current smokers in 2019.

C Comparable COVID-19 serological surveys

Bobrovitz et al. (2021) perform a systematic review of serological studies with the goal of identifying and subsequently synthesizing studies that tested for COVID-10 antibodies. We use their metadata to identify studies that, like ours, invited a random sample of subjects from a pre-specified geographic region in the United States to be tested for COVID-19 antibodies. Our goal in doing so is to understand common practices of such serological surveys and to contextualize our serological survey. In what follows, we first describe our process of identifying such studies using metadata from Bobrovitz et al. (2021)'s systematic review. We then discuss the data we collected for each study we identify. We conclude by presenting our findings.

C.1 Identification of comparable serological studies

Bobrovitz et al. (2021) identify 968 serosurveys conducted between January 1, 2020 and December 31, 2020 that, among other requirements, tested participants for COVID-19 antibodies and reported a sample size, study date, location, and seroprevalence estimate (see Figure 1 of Bobrovitz et al. (2021) for additional details). The metadata for these studies is publicly-available.

We seek to identify studies which invited a random sample of subjects from a geographic region in the United States to be tested for COVID-19 antibodies. We accomplish this goal in two steps. First, we use variables constructed by Bobrovitz et al. (2021) to restrict to studies that were (1) conducted in the United States, (2) used an appropriate sample frame, and (3) used a probability sample.[12] Nineteen studies satisfy these restrictions.

Second, we restrict to the subset of these studies that (1) were published in a scientific journal, (2) defined the target population to be subjects in a geographic region (up to age restrictions, such as excluding children), and (3) invited either the entire target population or a random subsample of the target population. Thus, of the nineteen studies, we excluded three studies that were not from scientific journals, two studies whose target population were respectively prisoners and hospital and/or clinic patients, two studies that constructed their invited samples using market research firms that maintain proprietary samples, and three studies that constructed their invited samples using participants from other surveys. The remaining nine studies satisfy our requirements, and constitute our analysis sample of studies.

C.2 Measuring survey implementation and participation rates

For each study in our analysis sample, we use the metadata of Bobrovitz et al. (2021) to collect (when possible) the outreach method, the number of invited subjects, the number of

[12] Bobrovitz et al. (2021) code a study as using an appropriate sample frame if the sample frame 'described and it approximated the target population' (see item 1 of the metadata) and code a study as using a probability sample if the study used a probability sampling method or the entire sample (see item 2 of the metadata). See the supplementary materials of Bobrovitz et al. (2021) for additional details.

participant subjects, and the offered incentive for participation. Outreach methods could be mail, in-person, online, phone, or any combination of these. We take the number of invited subjects to be the number of subjects who were initially invited to participate in the study, and take the number of participant subjects to be the number of subjects who submitted to be tested for COVID-19 following the study's implementation. The unit for subjects is defined based on the unit targeted by the initial serosurvey invitation. For example, if invites were sent to households but the invitation allowed multiple individuals within a household to participate, subjects correspond to households. When the study includes mail-only as an outreach method and reports invited and participant numbers for mail-only, we use the mail-only results. Two members of the research team independently performed these data collection steps, and there were no conflicts.

C.3 Results of our systematic review

We obtained outreach methods and number of invited subjects and participants for all nine studies. The average participation rate over the nine studies is 12.5% (median: 11.3%, min: 0.4%, max: 23.6%). Four studies either exclusively used mail or reported mail-only results, and the average participation rate for these is 9.0% (median: 8.3%, min: 3.1%, max: 16.5%). These participation rates are comparable to the participation rates we obtained in our serosurvey without financial incentives (6.2%) and with $100 in financial incentives (16.8%). The participation rate we obtain when offering $500 in financial incentives (29.1%) is greater than the maximum participation rate of these studies.

Only three studies explicitly reported financial incentives (or lack thereof) for participation. The offered incentive (participation rate) for each of these three studies was: $10 (16.5%), $50-$100 (7.8%), and $60-$100 (11.3%). For the latter two studies, variations in the amounts were non-random and were used to increase participation rates for certain groups.

Taken together, our results yield three conclusions. First, participation rates in serological surveys that invite a random sub-sample of subjects from a geographic region in the United States are typically low and consistent with the participation rates we obtained in our study. Second, mail is a common form of outreach in serological surveys, with 44% of studies employing this method. Third, financial incentives for participation are rarely explicitly mentioned. In the few studies that do explicitly mention financial incentives, the amounts range from $10-100 and are either assigned uniformly or varied non-randomly.

D Proof of sharpness

Equations (3) and (4) show that γ and $\eta(z)$ are point identified for any value of $\eta(\bar{z})$ such that these expressions remain in the $[0,1]$ interval for each z. From (3), we see that $\gamma \in [0,1]$ if and only if $\eta(\bar{z}) \in [0, 1-\rho(\bar{z})]$. When $\eta(\bar{z}) = 0$, (4) reduces to $(\rho(\bar{z}) - \rho(z))/\rho(\bar{z})$, which is between 0 and 1 as long as $\rho(z)$ is an increasing function of z. On the other hand, when $\eta(\bar{z}) = 1 - \rho(\bar{z})$, (4) reduces to $\eta(z) = 1 - \rho(z)$, which is also between 0 and 1. We conclude that if $\rho(z)$ is increasing in z, then setting $\rho(\bar{z}) = \alpha$ for any $\alpha \in [0, 1-\rho(\bar{z})]$ implies that γ and $\eta(z)$ are point identified via (3) and (4). Taking the union of these points across all $\alpha \in [0, 1-\rho(\bar{z})]$ produces the bounds given in (5).

It remains to be shown that the model can rationalize the data when $\eta(\bar{z})$ is set to any $\alpha \in [0, 1-\rho(\bar{z})]$, and $\rho(z)$ is given, and weakly increasing. To show this, we take α as given and construct a distribution of (C_i, H_i) that is independent of Z_i and (i) reproduces the given $\rho(z)$ for each z, when responses are determined via (1), while (ii) satisfying $\eta(\bar{z}) = \alpha$. The construction proceeds by reversing the logic of the identification argument. First, set the marginal contact rate to be

$$\gamma \equiv \mathbb{P}[C_i = 1] = \frac{\rho(\bar{z})}{1-\alpha}.$$

Next, set the hesitancy rate at each z to be

$$\eta(z) = \left(\frac{\rho(\bar{z}) - \rho(z)}{\rho(\bar{z})} \right) (1-\alpha) + \alpha.$$

Any increasing function defined on a subset of the real line and contained between 0 and 1 can be extended (perhaps non-uniquely) to a proper distribution function.[13] As noted above, both γ and $\eta(z)$ are within 0 and 1, and $\eta(z)$ is decreasing in z, because $\rho(z)$ is increasing in z. Extend $1-\eta(z)$ to a proper distribution function Φ. We use Φ to define a joint distribution of (C_i, H_i) that is independent of Z_i and given by

$$\begin{aligned} & \mathbb{P}[C_i = 1, H_i \leq h] = \gamma \Phi(h) \\ \text{and} \qquad & \mathbb{P}[C_i = 0, H_i \leq h] = (1-\gamma)\Phi(h). \end{aligned}$$

This joint distribution satisfies (i) and (ii) by construction. *Q.E.D.*

[13] The proof is trivial in the scalar case; see Lemma 2 of Torgovitsky (2019) for a generalization to the vector case.

E Additional results

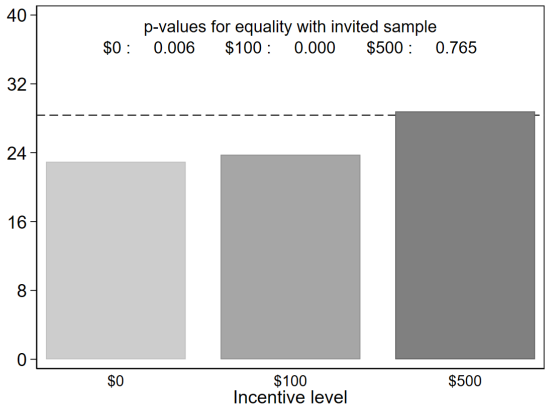
Table E.1: *Correlation between neighborhood characteristics*

	Majority Non-White ZIP	Higher poverty ZIP	Uninsured rate	Preventable hospitalization rate	Drug-related hospitalization rate	COVID local risk index
Majority Non-White ZIP	1.000	0.714	0.688	0.565	0.369	0.761
Higher poverty ZIP	0.714	1.000	0.518	0.649	0.550	0.826
Uninsured rate	0.688	0.518	1.000	0.327	0.112	0.550
Preventable hospitalization rate	0.565	0.649	0.327	1.000	0.872	0.763
Drug-related hospitalization rate	0.369	0.550	0.112	0.872	1.000	0.639
COVID local risk index	0.761	0.826	0.550	0.763	0.639	1.000

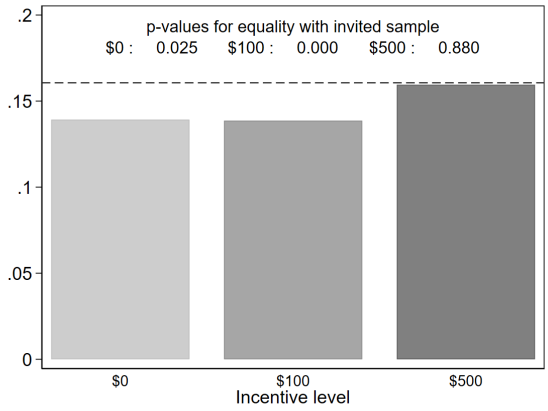
Notes: This table presents, for the invited sample, the degree of correlation between the household characteristics considered in Section 6.

Figure E.1: *Effect of hesitancy on representativeness: additional characteristics*

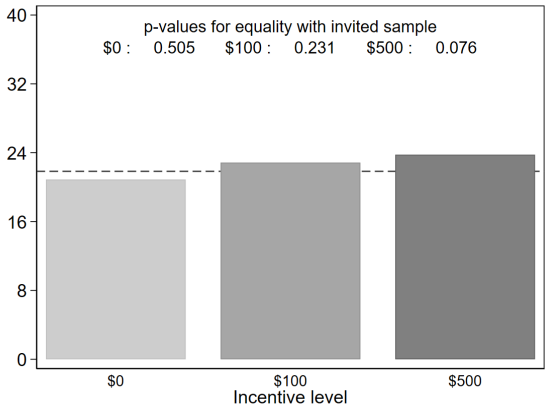
(a) *Credit insecurity index*



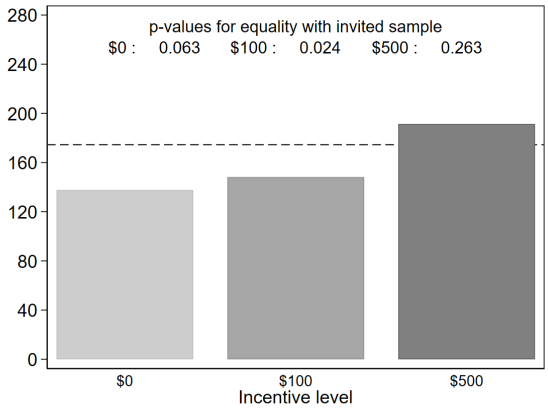
(b) *Share of smoking adults*



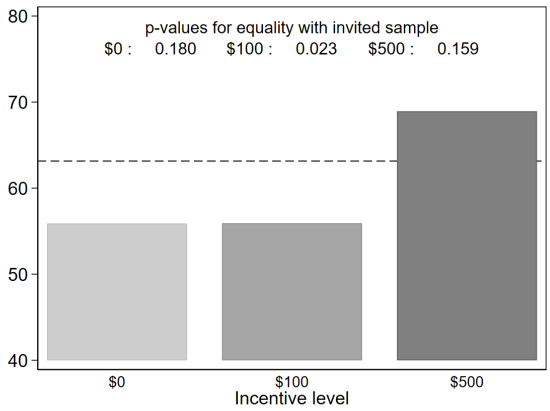
(c) *Alcohol related hospitalization rate*



(d) *Behavioral health hospitalization rate*



(e) *Mood and depressive disorder hospitalization rate*



Notes: See notes for Figure 4