

Automated Chat Application Surveys Using WhatsApp^{*†}

Jennifer Fei¹, Jessica Sadye Wolff¹, Michael Hotard¹, Hannah Ingham²,
Saurabh Khanna^{1,3}, Duncan Lawrence¹, Beza Tesfaye⁵, Jeremy Weinstein^{1,4},
Vasil Yassenov¹, and Jens Hainmueller^{1,4,6}

¹Immigration Policy Lab, Stanford University.

²Slalom Consulting, LLC.

³Graduate School of Education, Stanford University.

⁴Department of Political Science, Stanford University.

⁵Mercy Corps.

⁶Graduate School of Business, Stanford University.

October 29, 2020

*Jennifer Fei and Jessica Sadye Wolff contributed equally to this work.

†Corresponding author: Jens Hainmueller. Email: jhain@stanford.edu.

Abstract

We present a method to conduct automated surveys over WhatsApp, a popular cross-platform messaging service. The method relies on a combination of the WhatsApp Business API as well as the Twilio and Google platforms to design the survey flow, send and receive survey messages automatically, and facilitate data processing. Respondents complete the survey entirely within the WhatsApp application in the form of a chat conversation. WhatsApp surveys incur relatively low costs to both respondents and researchers and facilitate continued engagement with mobile populations as users can retain their WhatsApp number even if they change SIM cards and phone numbers. We describe the use of this method with two case studies where we surveyed refugees and migrants in Colombia, as well as resettled refugees in the U.S. The case studies offer preliminary evidence that automated surveys over WhatsApp provide a viable alternative for surveying and panel data collection. While the method is not without limitations, it offers a promising research tool with opportunities for diverse implementation and empirical study given the widespread global use of WhatsApp. We offer documentation and a public code repository as supplementary materials to support researchers in applying this method in other contexts.

Keywords: survey methods, panel data, mobile populations

1 Introduction

Traditional data collection methods present limitations for researchers and non-profit organizations alike. In-person and phone-based surveys can be time-intensive and costly to implement, especially if collecting panel data over time. It can also be difficult to maintain panel data and stay in touch with respondents when there are changes in contact information or location, especially among mobile populations. Automated and semi-automated short message service (SMS) on mobile phones have been used by researchers to both collect survey data (Tomlinson et al., 2009; Henderson and Rosenbaum, 2020) as well as conduct experimental interventions (Buntaine et al., 2018; Hainmueller et al., 2018). However, this method is limited by the potential costs of SMS messages, including those for respondents, the challenges of navigating country-specific rules and regulations for mobile networks, and the reliance on mobile phone numbers which may be unstable or too costly over time for mobile populations and low-income populations using pre-paid plans.

In this study, we propose a data collection method that leverages automated surveys over WhatsApp, a popular cross-platform messaging application. While this method is not without limitations, it offers some important advantages compared to traditional survey data collection. First, respondents complete the survey in a familiar messaging platform as if it were a text message conversation, rather than through an unfamiliar survey platform such as Qualtrics. Second, using WhatsApp is cost effective and scalable compared to SMS messages due to lower messaging fees and accessibility over a cellular network or WiFi. Third, the method facilitates maintaining contact with mobile populations since WhatsApp numbers may remain stable even when SIM cards and phone numbers change. Fourth, with more than 2 billion active monthly users (Clement, 2020), WhatsApp has the potential to reach a wide range of respondents.

We illustrate the use of the method with two case studies surveying refugees and migrants in Colombia, and refugees in the U.S. These case studies demonstrate how the method is a viable method for data collection in certain contexts and suggests its potential for wider

applicability. To support the implementation of this method more broadly, we offer documentation and a public repository of code as supplementary materials to support researchers in applying this method in other contexts.

2 Methodology

As described in Figure 1, our survey method is based on linking together three commercial tools - the WhatsApp Business API, as well as the Twilio and Google platforms. As a first step, researchers must collect WhatsApp contact numbers and obtain consent from research participants to be contacted via WhatsApp. Second, researchers need to be granted access to the WhatsApp Business API by verifying their organization through the Facebook Business Manager.¹ Third, researchers design the survey flow using Twilio’s Studio tool. Twilio is a cloud communications platform that facilitates access to the WhatsApp Business API and provides web service APIs and software to set up and send the WhatsApp surveys. Twilio Studio enables the researcher to design survey questions in a visual interface. Fourth, researchers send the first survey message to each survey participant, who can then respond to the survey via WhatsApp messages in a predetermined sequence. We automate this process using Google Apps Scripts and the Twilio for WhatsApp API to send the survey to a contact list of respondents’ WhatsApp numbers hosted in a password-protected Google Sheet. Fifth, respondents then complete the survey entirely within the WhatsApp platform in the form of a chat conversation. Finally, researchers can export survey responses from each WhatsApp survey into a Google Sheet. To do so, we use a Twilio Function to send message content from WhatsApp to a second password-protected Google Sheet via the Google Sheets API.

¹WhatsApp is owned by Facebook, which is why this access must be granted through the Facebook Business Manager.

3 Case Studies

To test the method, we implemented WhatsApp panel surveys with refugee and migrant populations in Colombia and refugees in the U.S., two mobile populations that are typically difficult to survey.² For further detail on the questionnaire design, response rates, and summary statistics see the Supplementary Materials.

3.1 Venezuelan Refugees and Migrants in Colombia

In partnership with the humanitarian organization Mercy Corps we implemented a survey to evaluate a cash assistance program for Venezuelan refugees and migrants who had recently arrived in Colombia. Households completed a vulnerability screening to determine their eligibility for cash assistance. Each head of household that completed the screening was given the option to consent to follow-up surveys on WhatsApp. Individuals who agreed were sent follow-up surveys 3, 6, and 9 months later over WhatsApp and were notified that they will receive \$1.43 in phone credit (5000 Colombian pesos) upon survey completion.

The top panel in Table 1 shows some key metrics from the first follow-up survey conducted 3 months after the initial screening. In the baseline screening, 3,237 participants consented to be contacted via WhatsApp out of 3,916 total households screened from March to May 2020. Of those that consented, 2,172 provided a valid WhatsApp number. Of those, 1,651 started and 1,625 completed the follow up WhatsApp survey (98% completion rate). The median survey duration was 14.5 minutes with 31 messages. 89% of completed surveys could be matched back to baseline data by comparing WhatsApp number, sex, and first name to verify a respondent’s identity. The average cost per completed survey over WhatsApp was \$0.37 in messaging fees.

²The study in Colombia was completed under Stanford IRB Protocol 54716. The study in the U.S. was completed under Stanford IRB Protocol 56000.

3.2 Resettled Refugees in the U.S.

In partnership with Lutheran Immigration and Refugee Service (LIRS), a refugee resettlement agency in the U.S., we are implementing a rapid response outreach survey to reach resettled refugees who arrived in the US between 2010-2020. After conducting a baseline survey (online and phone), we are deploying monthly follow-up surveys over WhatsApp and SMS in seven languages to determine how LIRS' refugee clients have been impacted by COVID-19 over time. Both active opt-in consent and follow-up contact information were gathered in the baseline survey.

The bottom panel in Table 1 shows key metrics from the first follow up survey one month after the baseline survey. For the baseline survey, we attempted to contact 8,814 individuals by email, text message, or phone, of which 1,676 consented to participate in the study. Of those participants, 803 individuals consented to be re-contacted via WhatsApp and 783 provided a valid WhatsApp number.³ Among those with valid WhatsApp numbers, 343 started the follow up survey via WhatsApp and 278 completed it (81% completion rate). The median survey duration was 10 minutes with 19 questions. 93% of completed surveys could be linked back to baseline data by comparing WhatsApp number and year of arrival in the U.S. The average cost per completed survey was \$0.32 over WhatsApp.⁴

4 Advantages and Limitations

Automated WhatsApp surveys offer advantages to both researchers and respondents compared to traditional survey methods. One advantage is that the method facilitates collecting panel data using short, recurring surveys. If respondents move locations, they may choose to retain their WhatsApp number which may reduce attrition over time. Data from the two case studies revealed that respondents do maintain WhatsApp numbers with country

³An additional 236 respondents completed the baseline survey and consented to receive follow-up surveys via SMS.

⁴See Table A.2 in the supplementary materials for response rates for respondents who consented to an automated SMS version of the survey as an alternative to WhatsApp.

codes that differ from their country of residence. Implementing surveys over WhatsApp also increases accessibility for respondents while decreasing costs. The method engages respondents on a commonly-used messaging platform in a conversation format, rather than an unfamiliar survey platform. Users can access WhatsApp on cellular networks or over WiFi (and WhatsApp messaging may be included at no additional cost in mobile plans in some contexts), which reduces costs for participants to complete the survey. Although the average messaging fees per completed survey were low, these costs do not account for staff time needed to learn and set up the WhatsApp surveys. We estimate this upfront process to take approximately 10-20 hours of accessing, learning, and testing systems before implementation readiness. This general method can also be adapted for chat applications beyond WhatsApp.

There are several limitations of the method that are worth considering. First, the method is not suitable for complex question formats or in-depth qualitative responses. Second, the method is not useful for surveying populations with limited mobile phone usage, WhatsApp familiarity, or (digital) literacy. The selection bias concerns of this limitation demand careful consideration. Third, business verification is required to access the WhatsApp Business API. Therefore, WhatsApp surveys may be most compatible for partnership-based or institutional research, rather than a study conducted by an individual researcher. Fourth, the WhatsApp Business API requires obtaining proactive consent, known as "opt-in," through a communication channel outside of WhatsApp before initiating a conversation with respondents. Regulations require senders to clearly establish their identity, such as through a business logo and website link, and to communicate a participant's rights, such as offering the ability to skip questions or stop the survey. Even though each question of the WhatsApp survey runs automatically once the survey is initiated, WhatsApp Business API policies require active monitoring and a way to transfer conversations to a human agent to provide support if needed. Lastly, WhatsApp numbers are sometimes shared amongst a group of individuals (e.g., a household using one mobile phone). Therefore, if the goal is to ensure

that responses are linked to a specific individual, it is useful to include identity verification questions such as year of birth to merge with existing administrative or baseline data on the respondent. The WhatsApp Business API retains end-to-end encryption between the researcher and all respondents, but it is important to consider how the use of each platform in this method, as well as shared phones amongst multiple respondents, may affect data privacy and confidentiality.

5 Conclusion

Using two case studies of surveying refugees and migrants in Colombia and the U.S., this study offers preliminary evidence that chat application surveys, specifically using the WhatsApp Business API, is a viable data collection method. We also provide extensive technical documentation to guide other researchers and practitioners who are interested in the implementation of this method. Using automated WhatsApp surveys offers an alternative to traditional data collection methods that minimizes costs and enables continued engagement especially with mobile populations. To date, humanitarian organizations have not yet leveraged chat applications for client engagement, measurement, and evaluation ([Quintanilla and Stoll, eds, 2017](#)). Therefore the method introduced here has the potential to be broadly applicable across diverse areas in partnership-based social science research.

Acknowledgments

The authors would like to thank Mercy Corps, specifically Jen Daum, John Sandoval, and David Hernandez, and Lutheran Immigration and Refugee Service (LIRS), specifically Laura Wagner, for their partnership and commitment to innovation to improve client engagement and research. We are grateful to Slalom, especially Nima Niakan and Samantha Ingram, Twilio Impact Corps, especially Michael Ruggiero, and David Scales for development and design guidance.

Funding

Funding for the project with Mercy Corps in Colombia was provided by the UK Foreign, Commonwealth & Development Office, awarded through Innovations for Poverty Action's Peace & Recovery Program. We also acknowledge funding from the Charles Koch Foundation and the Stanford King Center on Global Development. These funders had no role in the data collection, analysis, decision to publish, or preparation of the manuscript.

Figures and Tables

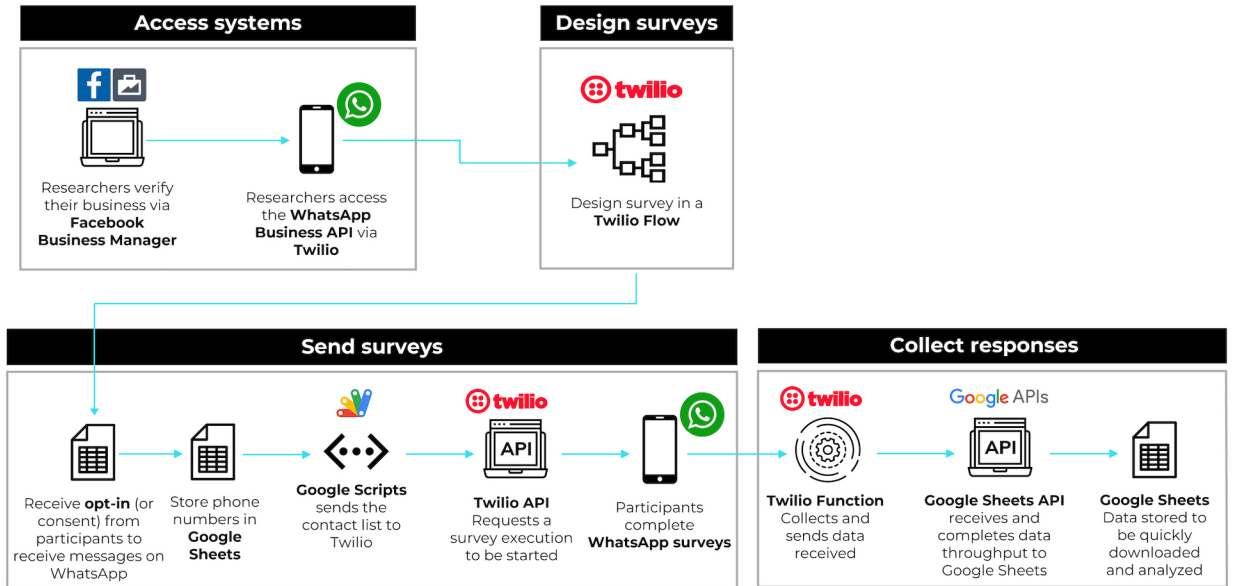


Figure 1: Survey software infrastructure and implementation flow

Panel A: Venezuelan Refugees in Colombia				
		Count	Percentage	
Consented to a WhatsApp survey		3,237	–	
Provided a valid WhatsApp number		2,172	–	
	Survey started	1,651	76.0%	
	Survey completed	1,625	74.8%	
	Completion rate	–	98.4%	
	P10	Median	Mean	P90
Messages to completion	27	31	30.7	34
Minutes to completion	8.3	14.5	19.9	34.2
Panel B: Resettled Refugees in the U.S.				
		Count	Percentage	
Consented to a WhatsApp survey		803	–	
Provided a valid WhatsApp number		783	–	
	Survey started	343	43.8%	
	Survey completed	278	35.5%	
	Completion rate	–	81.1%	
	P10	Median	Mean	P90
Messages to completion	18	20	20.8	24
Minutes to completion	4.1	10.6	20.7	51.1

Table 1: **Response and Completion Rates.** The follow-up period for the survey in Colombia (Panel A) was 3 months and for the survey in the U.S. (Panel B) it was 1 month. The survey in Colombia required a minimum of 22 inbound messages to complete, and the survey in the U.S. required a minimum of 13 inbound messages. The number of inbound messages sent and the duration to completion statistics refer to the subsamples of responders who completed the surveys. Duplicate WhatsApp numbers are collapsed to single observations.

References

- Buntaine, Mark T., Ryan Jablonski, Daniel L. Nielson, and Paula M. Pickering,** “SMS texts on corruption help Ugandan voters hold elected councillors accountable at the polls,” *Proceedings of the National Academy of Sciences*, 2018, 115 (26), 6668–6673.
- Clement, J.,** “Most popular messaging apps,” Technical Report 2020.
- Hainmueller, Jens, Duncan Lawrence, Justin Gest, Michael Hotard, Rey Koslowski, and David D. Laitin,** “A randomized controlled design reveals barriers to citizenship for low-income immigrants,” *Proceedings of the National Academy of Sciences*, 2018, 115 (5), 939–944. Publisher: National Academy of Sciences Section: Social Sciences.
- Henderson, Savanna and Michael Rosenbaum,** “Remote Surveying in a Pandemic: Research Synthesis,” Technical Report 2020.
- Quintanilla, Jacobo and Philippe Stoll, eds,** “Humanitarian Futures for Messaging Apps,” Publication, International Committee of the Red Cross, Geneva, Switzerland 2017.
- Tomlinson, Mark, Wesley Solomon, Yages Singh, Tanya Doherty, Mickey Chopra, Petrida Ijumba, Alexander C Tsai, and Debra Jackson,** “The use of mobile phones as a data collection tool: a report from a household survey in South Africa,” *BMC medical informatics and decision making*, 2009, 9 (1), 1–8.
- Walwema, Josephine,** “The WHO Health Alert: Communicating a Global Pandemic with WhatsApp,” *Journal of Business and Technical Communication*, 2020, p. 1050651920958507. Publisher: SAGE Publications Inc.

A Appendix

Supplementary Materials

Technical Documentation and How-To Manual

To enable implementation of this survey method, we created a comprehensive How-To Manual, which is available [here](#). As shown in Figure A.1, the How-To Manual provides a step-by-step guide to implementing the method. We include screenshots, code snippets, and video tutorials to guide users. Additionally, our [GitHub](#) repository provides all of the code required to build and execute surveys, including those in multiple languages.

Questionnaire Design and Response Validation

Researchers have a number of options when designing automated chat-style surveys. Advancements in chat application automation have given rise to a range of chatbots that operate using the WhatsApp Business API for commercial, government, or nonprofit purposes to engage with customers and clients (see [Walwema \(2020\)](#) for an example). Our approach is unique from this type of chatbot, which responds to inbound messages with relevant information, in that we initiate conversations with respondents to conduct data collection with a specific population. To do so, we used a series of multiple choice questions with each answer option having an associated number (e.g., 1,2,3) as shown in Figure A.2. We asked respondents to enter the number of their response for each question. Given Twilio Studio allows for response validation that can be as simple as a list of specific values, this numeric response approach narrowly defines the set of potentially valid responses. This approach also creates a streamlined user experience for respondents as they do not need to type out long answers that might correspond to the multiple-choice answer options. We also asked a few text entry questions (e.g. “What year did you arrive in the United States? (for example, 2000)”) and validated responses using regular expressions.

Summary Statistics

Table A.1 presents summary statistics for several covariates among matched and not matched research participants for Venezuelan refugees (Panel A) and resettled refugees in the U.S. (Panel B). ‘Matched’ respondents completed the follow-up survey and could be matched to an individual in the baseline survey. ‘Not matched’ participants include non-responders and follow-up survey responses we could not match to the baseline survey. Among Venezuelan refugees in Colombia, matched individuals had higher income ($p=0.003$) and possibly higher probability of being unemployed ($p=0.072$) and falling below the vulnerability threshold ($p=0.081$). Among resettled refugees in the U.S., matched individuals were less likely to be female ($p=0.002$), and less likely to be from Afghanistan ($p=0.010$) and Somalia ($p=0.002$).

Figure A.3 shows the cumulative distribution functions of the number of messages (left) and minutes (right) to survey completion. The black line shows the values for the Colombia survey and the blue line does the same for the U.S. survey. The Colombia survey took more messages, on average, to complete, while there is significant overlap in the time duration to completion between the two surveys.

Response Rates

To calculate comparable response rates across the two cases, we restricted each sample to valid WhatsApp numbers provided by research subjects who consented to receive follow-up messages, either as part of their program registration (Colombia) or baseline survey (United States). We are able to validate WhatsApp numbers through the WhatsApp Business API and Twilio message log by attempting to send a message to every number and observing any delivery failures or errors. Message delivery failures resulting from numbers that are not registered on WhatsApp have a unique error code and so can be easily identified. For instance in the U.S. sample, 803 respondents provided a WhatsApp number and consented to receive messages, and 20 (2.5%) of those numbers resulted in delivery failures associated with

unregistered numbers. We define ‘survey started’ as a valid response to the first question in each respective survey and ‘survey completed’ as a valid response to the final identity verification question in each respective survey. We used different approaches to verify the identity of respondents in each case. In the Colombia case, we used WhatsApp number, sex, and the first three characters of the respondent’s first name to match a completed WhatsApp survey to the baseline program registration data. In the U.S. case, we used WhatsApp number and the year a refugee reported arriving in the U.S. (year of arrival) to merge WhatsApp responses to the baseline survey data we previously collected.

Automated SMS Surveys

In the baseline survey of refugees in the U.S., any respondent who did not provide a WhatsApp number was asked if they would provide a cellphone number and whether they would like to receive follow-up surveys via text message (SMS). Because individuals self-selected into providing (or not providing) a WhatsApp number or SMS number and the samples may differ in observable and unobservable ways, we cannot draw any firm conclusions as to whether the response rate for each sample is linked to the mode (WhatsApp or SMS) of the survey. We do, however, provide the response rates to the SMS automated survey for descriptive purposes in Table [A.2](#). Systematically comparing response rates on WhatsApp as compared to other survey modes is an opportunity for further experimental research.

Panel A: Venezuelan Refugees in Colombia			
	Matched	Not Matched	<i>p</i> -value
Birth year	1985.545 (0.252)	1984.996 (0.442)	0.811
Female	0.732 (0.012)	0.714 (0.017)	0.407
Unemployment	0.348 (0.013)	0.302 (0.021)	0.072
Income	3.836 (0.090)	4.324 (0.140)	0.003
Vulnerable	0.161 (0.010)	0.133 (0.013)	0.081
Family size	3.333 (0.036)	3.299 (0.063)	0.491
N	1,450	722	
<i>F</i> statistic			0.033

Panel B: Resettled Refugees in the U.S.			
	Matched	Not Matched	<i>p</i> -value
Birth year	1982.350 (0.619)	1981.977 (0.461)	0.629
Female	0.246 (0.027)	0.349 (0.021)	0.002
Unemployment	0.243 (0.027)	0.233 (0.019)	0.754
Income	1.374 (0.043)	1.410 (0.032)	0.498
Family size	4.800 (0.137)	4.938 (0.107)	0.427
Country of origin			
Iraq	0.183 (0.024)	0.196 (0.018)	0.663
Congo	0.210 (0.026)	0.170 (0.017)	0.189
Afghanistan	0.107 (0.020)	0.174 (0.017)	0.010
Ukraine	0.063 (0.015)	0.059 (0.011)	0.822
Somalia	0.016 (0.008)	0.057 (0.010)	0.002
Other	0.421 (0.031)	0.344 (0.021)	0.042
N	258	525	
<i>F</i> statistic			0.013

Table A.1: **Covariate Balance Test for Matched and Non-matched Responders.** Standard errors shown in parenthesis. The income covariate is defined on a scale of 0-8 for Venezuelan refugees and on a scale of 1-5 for refugees resettled in the U.S. The *p*-values refer to two-sided significance tests on the difference in means between the two groups.

	Count	Percentage
<u>Resettled Refugees in the U.S. (1-month follow-up)</u>		
Consented to survey with a valid cellphone number	238	
Survey started	59	24.8%
Survey completed	52	21.8%

Table A.2: **Response Rates - SMS Survey**

6. Collecting & Exporting Survey Responses

You will use Twilio & Google to

- Set up a data export infrastructure to collect survey responses
- Track usage statistics & request quota increases for the Google Sheet API
- Design a data export infrastructure that sends messages from Twilio to a Google Sheet response database
- Collect and store survey results

6.1. Create a new project in the Google API Console

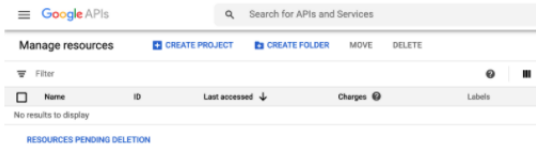
1	Follow this link to create a project in the Google API Console. Note: you will need a Google account that has permissions to use the Google API Console.	
2	Sign in, and click "Create Project" from the upper right hand corner.	 The screenshot shows the Google APIs console interface. At the top, there is a search bar labeled "Search for APIs and Services". Below that, the "Manage resources" section is visible, featuring buttons for "CREATE PROJECT", "CREATE FOLDER", "MOVE", and "DELETE". A "Filter" dropdown is also present. Below the buttons, there is a table header with columns for "Name", "ID", "Last accessed", "Charges", and "Labels". The table currently shows "No results to display". At the bottom of the screenshot, there is a link for "RESOURCES PENDING DELETION".

Figure A.1: Example of How-To Manual's step-by-step instructions

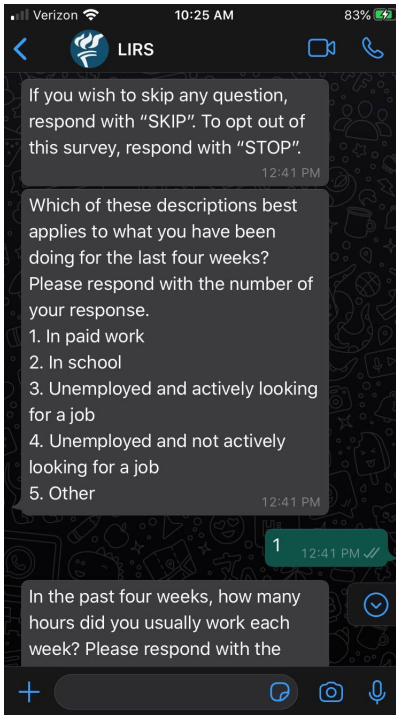


Figure A.2: Multiple choice questions and numeric entry validation on WhatsApp

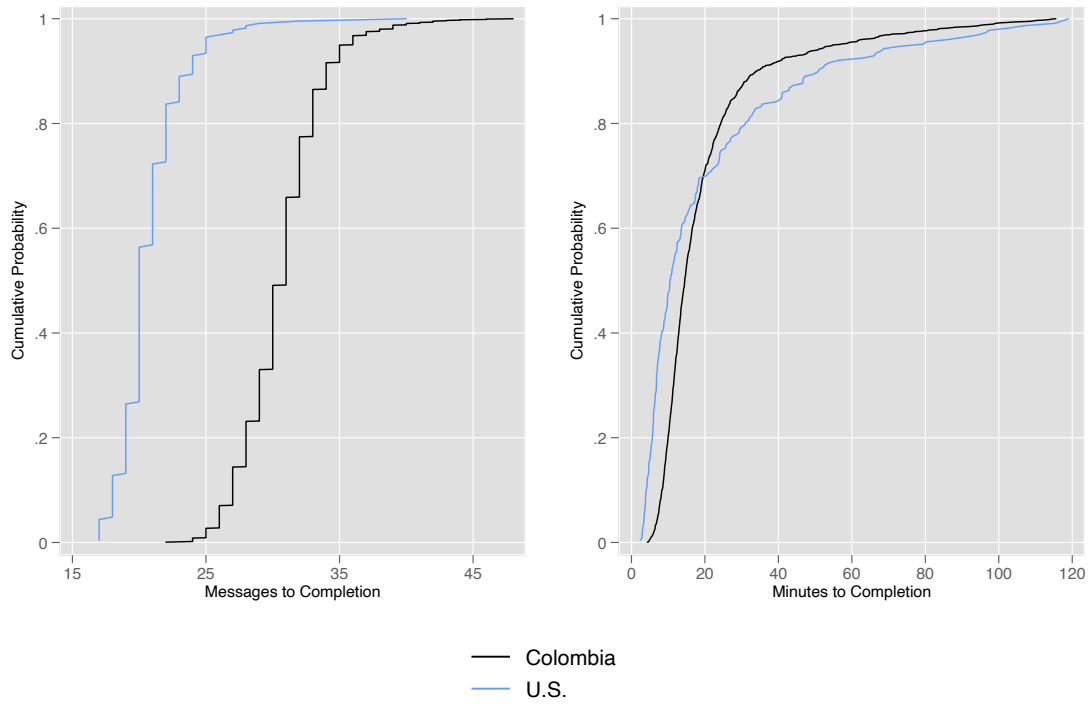


Figure A.3: **Number of Messages and Minutes to Survey Completion.** All statistics are based on a sample of responders who have completed the surveys.

Survey Questionnaire: Venezuelan Refugees in Colombia

Note: this survey was sent to participants in Spanish. The English translation is provided here.

Intro: Hello! Thank you for completing the interview for VenEsperanza with Mercy Corps in [month]. It is time to complete the three month survey that you gave us permission to complete. The survey will be open to complete for the next 24 hours. To begin, please respond YES.

1. Thank you for agreeing to complete the three month survey. It will only take a few minutes to answer. You will receive 5000 pesos in phone credit on the provider of your choice after completing the survey. If you wish to skip any question, respond with "skip". This survey should be completed by the person who was previously interviewed by Mercy Corps. Were you interviewed by Mercy Corps in [month]?

1. Yes

2. No

2. Do you still live in Colombia?

1. Yes

2. No

3. What country are you living in?

4. What city do you currently live in?

5. Who moved?

1. Only me

2. My family and I

3. Only my family

6. Have you or your family moved to another town/city in the past three months?

1. Yes

2. No

7. Have you or your family moved to a new house in the same city in the past three months?

1. Yes

2. No

8. What type of employment, if any, did you have in the past month?

1. Employee (private business or government)

2. Self-employed (taxi, carpenter, electrician, etc.)

3. Informal employment (irregular daily work, casual worker)

4. I was not employed

9. How much income did your household earn in the past month?

0. 0 (no income)

1. 1 to 25,000 pesos

2. 25,001 to 50,000

3. 50,001 to 100,000

4. 100,001 to 150,000

5. 150,001 to 200,000

6. 200,001 to 250,000

7. 250,001 to 400,000

8. 400,000 or more

10. Did your household receive cash assistance in the last month as a part of the VenEsperanza program or another assistance program?

0. 0 (no income)
1. 1 to 25,000 pesos
2. 25,001 to 50,000
3. 50,001 to 100,000
4. 100,001 to 150,000
5. 150,001 to 200,000
6. 200,001 to 250,000
7. 250,001 to 400,000
8. 400,000 or more

11. What is the type of housing you have lived in for the past month? Please respond with the number (1-5).

1. House or apartment
2. Room or hotel
3. Shared roof/tenancy
4. Improvised room or shelter for more than five days
5. Living on the street

12. The housing you live in is:

1. Owned by you
2. Rented
3. Passenger accommodation or on the street

4. Squatting / in care / accommodation in exchange for work
 5. Doesn't apply
13. On average during the last week, how many meals were consumed in your house per day?
1. Less than 2 meals per day
 2. 2 meals per day
 3. 3 meals or more
14. On average during the last week, how many days did your household have to reduce the size of meal portions?
0. None
 1. 1 day
 2. 2 days
 3. 3 days
 4. 4 days
 5. 5 days
 6. 6 days
 7. 7 days
15. Which sources of information do you trust the most when it comes to advice about prevention of coronavirus?
1. Friends/family
 2. Posts I see on social media or WhatsApp
 3. Information I receive from government

4. Information I receive from NGOs
 5. None
16. In general, how would you rate your physical health?
1. Excellent
 2. Very good
 3. Good
 4. Fair
 5. Poor
17. In the past month, have you or another adult in your household accessed medical care?
1. No, I did not seek medical care
 2. I wanted to seek medical care, but could not afford it
 3. I wanted to seek medical care, but didn't know where to go
 4. Yes, I received medical care
18. In the past 7 days, how many days have you stayed at home all day without going out at all and without receiving any visits?
0. None
 1. Only one day
 2. Some days
 3. Almost all days
 4. All days
19. How many children under the age of 18 are in your household?
20. How many of these children are enrolled in school?

21. What share of school days have these children been in school, online or in person, over the last month?

1. All school days
2. Most school days
3. Some school days
4. No school days

22. Thank you for taking the time to answer these questions. We would like to send you COP 5000 in airtime to thank you for your participation. The recharge will arrive in two days. Should I send the airtime to this number?

1. Yes
2. No, but send it to another number If you don't want the recharge,respond with number 3.
3. All days

23. To what phone number should I send the airtime?

24. What network do you use with that number, so that we can send the correct airtime?

25. To confirm that you have finished the survey, can you send the year you were born? (e.g. 1980)

26. What is your gender?

1. Female
2. Male
3. Prefer not to answer

27. If you were to change your number or lose your phone, and we wanted to get in touch with you to follow up, is there someone else we could contact? Would you like to provide a second contact number?

1. Yes

2. No

28. What is the second contact number?

29. Please retype the second contact number to confirm.

30. What is the name of the person who owns this second contact number? Thank you for your participation in our survey and we will contact you again in three months. Have a good day!

Survey Questionnaire: Resettled Refugees in the U.S.

Note: this survey was sent to participants in seven languages (English, Spanish, French, Russian, Arabic, Farsi, and Swahili). The English version is provided below.

Intro: Hello, thanks for agreeing to participate in the LIRS/Stanford follow-up survey. We are reaching back out to ask you a few questions about how things are going this month. To begin this short survey, respond YES.

1. Which of these descriptions best applies to what you have been doing for the last four weeks?
 1. In paid work
 2. In school
 3. Unemployed and actively looking for a job
 4. Unemployed and not actively looking for a job
 5. Other

2. In the past four weeks, how many hours did you usually work each week?
 1. 0
 2. 1-10
 3. 11-20
 4. 21-35
 5. 36 or more

3. In the past four weeks, have you received any money from unemployment benefits?
 1. Yes
 2. No

4. What was the total amount of unemployment compensation you received over the last four weeks?

1. \$0-\$500
2. \$501-\$1000
3. \$1001-\$1500
4. \$1500-\$2000
5. \$2001

5. In the last four weeks, which of the below best describes your living situation?

1. House
2. Apartment
3. Mobile home
4. Other type of housing
5. No housing (homeless)

6. Is your current house, apartment, or mobile home...?

1. Owned free and clear
2. Owned with a mortgage or loan (including home equity loans)
3. Rented
4. Occupied without payment of rent

7. Did you pay your last month's rent or mortgage on time?

1. Yes
2. No
3. Payment was deferred

8. In the last four weeks, which of these statements best describes the food eaten in your household?

1. Enough of the kinds of food (I/we) wanted to eat
2. Enough, but not always the kinds of food (I/we) wanted to eat
3. Sometimes not enough to eat
4. Often not enough to eat

9. In the last four weeks, did you or anyone in your household get free groceries or a free meal?

1. Yes
2. No

10. How confident are you that your household will be able to afford the kinds of food you need for the next four weeks?

1. Not at all confident
2. Somewhat confident
3. Moderately confident
4. Very confident

11. Would you say your health in general has been excellent, very good, good, fair, or poor?

1. Excellent
2. Very good
3. Good
4. Fair

5. Poor

12. During the last four weeks, about how often did you feel nervous?

1. All of the time

2. Most of the time

3. Some of the time

4. A little of the time

5. None of the time

13. At any time in the last four weeks, did you delay getting medical care?

1. Yes

2. No

14. In the past four weeks, how have children in this household received education from their school?

1. In-person instruction at school

2. Distance learning only (online or using paper materials)

3. Both in-person instruction and distance learning

4. Neither in-person instruction nor distance learning

5. School closed due to scheduled vacation or break

6. Not applicable

15. Which type of distance learning education have your children received?

1. Online only (self-paced or real-time)

2. Paper materials only

3. Both online and paper materials

16. How often is the Internet available to children for educational purposes?

1. Always available
2. Usually available
3. Sometimes available
4. Rarely available
5. Never available

17. What year were you born? (for example, 1980)

18. What year did you arrive in the United States? (for example, 2000)