Let's Call! Using the Phone to Increase Acceptance of COVID-19 Vaccines*

Alex Armand† Mattia Fracchia‡ Pedro C. Vicente§

October 4, 2021

Abstract

Vaccinating against COVID-19 is the main hope to end the current pandemic. We develop and test experimentally three phone-based cumulative interventions to increase COVID-19 vaccine acceptance in Mozambique. First, the provision of a simple positive message informing about these vaccines. Second, the activation of social memory on the country's success in eradicating wild polio. Finally, the inoculation against fake news by developing among participants a critical view towards misleading information. We find that the combination of the three interventions increases COVID-19 vaccine acceptance and trust in institutions.

JEL codes: O12, D83, D91, I12, I15

Keywords: COVID-19, vaccines, acceptance, hesitancy, information, trust, social memory, fake news, misinformation, inoculation theory, Mozambique, Africa.

*We thank Cátia Batista, Sandra Sequeira, and Inês Vilela for helpful suggestions. We thank seminar and workshop participants at FCDO, IGC, IIES, and Nova SBE for helpful comments. We are grateful to a large number of individuals who have made this project possible. First of all, we thank the IGC Mozambique Country Office, in particular Egas Daniel. We are also grateful to Lucas Ismael, Frederica Mendonça, Alberto Mucauque, Imamo Mussa, Simão Paiva, Ismail Rendrá, and Manuel Xavier for outstanding field coordination and/or research assistance. We also convey a word of appreciation to all enumerators we worked with in this project. We acknowledge funding from the IGC. Ethics clearance was given by Universidade Nova de Lisboa. The study was pre-registered at the American Economic Association (Armand, Fracchia, and Vicente, 2021). All remaining errors are our responsibility.

†Nova School of Business and Economics – Universidade Nova de Lisboa, NOVAFRICA, CEPR, and Institute for Fiscal Studies. Email: alex.armand@novasbe.pt.

‡Nova School of Business and Economics – Universidade Nova de Lisboa, and NOVAFRICA. Email: mattia.fracchia@novasbe.pt.

§Nova School of Business and Economics – Universidade Nova de Lisboa, NOVAFRICA, and BREAD. Email: pedro.vicente@novasbe.pt.

The COVID-19 pandemic has heavily impacted low- and middle-income countries, and led to widespread food insecurity and falling living standards (Egger et al., 2021). The control of the pandemic and the beginning of a resilient recovery process will rely on rapid and widespread access to COVID-19 vaccines (Figueroa et al., 2021). Given the sudden emergence of both the disease and the corresponding vaccines, there is little time to work on ensuring their widespread acceptance (Solís Arce et al., 2021; Lazarus et al., 2021). Especially where fact-checking is limited (Barrera et al., 2020), misconceptions about novel vaccines easily circulate, with pronounced negative consequences at global level.[1]

This study focuses on three main challenges to vaccine acceptability: the lack of information, the low level of trust in institutions, and the widespread circulation of fake news in the population (Bursztyn et al., 2020). We designed and implemented three information-provision interventions targeting the referred threats. The first intervention (labeled as *endorsement*) conveys basic information about COVID-19 vaccination along with a positive message endorsing it. The second intervention (labeled as *social memory*) levers the social memory of the country's success in eradicating wild polio through vaccination to enhance trust in institutions. The third intervention (labeled as *inoculation*) consists of a structured interaction to raise awareness, develop a critical view towards misleading information, and minimize sharing of fake news. We test these interventions cumulatively following our pre-analysis plan (Armand, Fracchia, and Vicente, 2021) and measure treatment effects on COVID-19 vaccine acceptance and trust in institutions. We employ two sources of data: a panel phone survey and a set of behavioral measures based on text messages (SMSs). The latter are observable and costly actions which allow minimizing concerns about social desirability biases.

We find that the combination of all the three interventions effectively increases the acceptance of COVID-19 vaccines and improves the levels of trust in health institutions. While social memory and inoculating against fake news are particularly important in driving effects on vaccine acceptance, effects on trusting institutions seem to stem primarily from simple endorsements. We do not find evidence that social desirability biases these effects.

This study contributes to the vast and diverse literature on information provision interventions (Haaland, Roth, and Wohlfart, Forthcoming). Studying the effects of our proposed interventions offers new evidence on how information campaigns can influence health in developing countries (Dupas, 2011), and in particular acceptance of COVID-19 vaccines.

[1] Gørtz et al. (2020) provide evidence that hesitancy with respect to one specific vaccine can easily spread to others.

Recent literature shows that simple but credible information on COVID-19 prevention can prove effective at increasing the adoption of preventive behaviors (Banerjee et al., 2020; Alsan and Eichmeyer, 2021; Armand, Augsburg, and Bancalari, 2021), but evidence on the effectiveness of alternative designs remains limited and is a fast-growing field (see, e.g., Alsan et al., 2021).

In addition to communicating credible information, stimulating social memory can have important consequences on the behavior of the targeted population. Evidence shows that historical abuse can have long-lasting effects on demand for health services and trust in health institutions. In the US, the disclosure of the Tuskegee Study of Untreated Syphilis in the Negro Male led to an increase in medical mistrust and mortality among African-American men (Alsan and Wanamaker, 2018). In Central Africa, higher exposure to colonial medical campaigns forcing individuals to receive injections with dubious efficacy and serious side effects is associated with lower vaccination rates and levels of trust in medicine today (Lowes and Montero, 2021). In addition, interested political forces can lever social memory: anti-vaccine propaganda in Pakistan by the Taliban, building on social memory related to American operations in the country, led to strong and lasting negative effects on vaccination rates (Martinez-Bravo and Stegmann, 2021). The *social memory* intervention we study in this paper explores the potential of building on positive collective memory instead.

Most information campaigns do not involve active interactions with the targeted population. Moreover, short-term corrective campaigns may not be enough to counteract misconceptions (Vosoughi, Roy, and Aral, 2018; Carey et al., 2020), which are widespread in relation to COVID-19 vaccines. Corrections of misleading information that was initially perceived as trustworthy can be ineffective in memory updating and can also backfire (Ecker, Lewandowsky, and Tang, 2010; Nyhan and Reifler, 2010; Lewandowsky et al., 2012). Interactions have been shown to be effective in the psychology literature to counteract misinformation: Inoculation Theory (McGuire, 1964) has been identified as an effective and reliable tool to achieve resistance to persuasion (Miller et al., 2013), especially in relation to argumentation related to false or misleading news (Cook, Lewandowsky, and Ecker, 2017). Inoculation Theory has already been successfully applied to health messaging (Miller et al., 2007) and to increase the adoption of recommended behaviors against COVID-19 (van der Linden, Roozenbeek, and Compton, 2020). Our *inoculation* intervention contributes to the understanding of its effectiveness in the field of vaccine acceptance.

1 Context

Mozambique has been hit by the pandemic while trying to recover from the hidden debt crisis of 2016 which resulted in state default, the continued insurgency in the northern province of Cabo Delgado, which started in 2017, and the tropical cyclones of 2019.[2] In 2020, the country's economy registered its first contraction in 28 years, with 850,000 people estimated to have slipped into poverty (World Bank, 2021a). Mozambique is expected to slow down on its path towards meeting the Sustainable Development Goals (SDGs), setting back the progress made over the past decades (UNICEF, 2021).

Considering the supply of vaccines, Mozambique benefits from the global initiative COVAX, a multilateral venture to ensure equitable access to the vaccine in low and middle income countries.[3] Other international partners are also expected to contribute to expand this coverage and strengthen the systems required to supply and deploy the vaccine (Ministry of Health of Mozambique, 2021b,c). However, multiple challenges remain to effectively roll out the vaccines (Shretta et al., 2021). The national health system needs to ensure functioning cold chains, correct identification of vulnerable groups, and extensive outreach of patients in remote areas. The Mozambican infrastructure is weak with only 56% of health care facilities with access to basic water services and only 43% with basic sanitation services (World Health Organization, 2020). The health worker density is well below the average in Sub-Saharan Africa (SSA), with 0.08 physicians per 1,000 people (0.23 per 1,000 in SSA), and 0.68 nurses and midwives per 1,000 people (0.99 per 1,000 in SSA) (World Bank, 2021b).

Turning to the demand for vaccines, not only Mozambique has high prevalence of positive views about vaccination, but also high vaccination coverage. The large majority of the population believes that vaccines are effective (87%), safe (93%), and important for children to have (98%) (Wellcome Global Monitor, 2018). Looking at vaccine coverage in 2020, vaccination rates were 91% for Tubercolosis (BCG), 79% for Diphtheria, Tetanus and Pertussis (DTP1), 81% Measles (MCV1), and 73% for Polio (Pol3) (World Health Organization, 2021). High levels of acceptance and take-up of traditional vaccines for children might not translate into high take-up rates of the novel COVID-19 vaccines among adults. We discuss acceptance of COVID-19 vaccines in our sample in Section 4.1.

[2] Mozambique registered the first case of COVID-19 on March 1st of 2020.

[3] COVID-19 Vaccines Global Access (COVAX) is a global initiative aimed at equitable access to COVID-19 vaccines led by the Global Alliance for Vaccines and Immunisation (GAVI), the World Health Organization (WHO), the Coalition for Epidemic Preparedness Innovations (CEPI), and the United Nations Children's Fund (UNICEF).

2 Experimental design

2.1 The interventions

We analyze the impact of three interventions disseminating information. The *endorsement* intervention consists in a simple message providing some information about vaccination against COVID-19 and endorsing this vaccine. The message blends together information about the risks of the disease, detailing the health concerns about oneself and others, and the benefits of getting vaccinated. The *social memory* intervention consists in a message reminding respondents about the immunization campaign that led to the successful eradication of wild polio in Mozambique. The goal is to increase the level of trust in the national health system by levering a success story from the recent past. The *inoculation* intervention includes a structured interaction between the enumerator and the respondent, which aims at raising awareness about the mechanisms behind the formation and diffusion of unverified and potentially misleading information on vaccination against COVID-19. In this way, respondents are meant to develop a critical view towards unverified information and minimize its sharing. Appendices A.1–A.3 provide the scripts used in each intervention.

The interventions are implemented cumulatively: a pure control group (C) receives no intervention, another group receives only the *endorsement* intervention (treatment 1 or T1), an additional group receives both the *endorsement* and the *social memory* interventions (treatment 2 or T2), and a final group receives the *endorsement*, the *social memory*, and the *inoculation* interventions (treatment 3 or T3). We implemented the interventions as part of our endline phone survey. In addition, because outcomes of interest include behavioral measures collected in the period after the endline survey (see Section 2.3), our phone call interventions were supplemented with text messages reinforcing the content of each intervention.[4]

2.2 Sampling and randomization

We contacted a sample of 2,916 respondents from two previous projects implemented in the Greater Maputo area (1,509 respondents) and in the Cabo Delgado province (1,407 respondents). The Greater Maputo area is composed by Maputo City, the capital of Mozambique

[4]These text messages were sent to participants' mobile phones 10 weeks after the conclusion of the endline survey. They were implemented cumulatively like the main interventions. Note that the text message corresponding to T3, i.e., including the *inoculation* intervention, summarized the concluding statement of the *inoculation* phone call intervention. The specific phrasing of these text messages is included in the Online Appendix.

and home to a population of 1.1 million, and the surrounding Maputo Province, home to a population of 2.3 million (Mozambique National Institute of Statistics, 2021). In August 2021, Maputo City had the highest number of cumulative COVID-19 cases (4,693.74 per 100,000 inhabitants) and the highest mortality rate (2.03 percent) in the country (Ministry of Health of Mozambique, 2021a). The Cabo Delgado province is the northernmost province of Mozambique and is home to a population of 2.6 million (Mozambique National Institute of Statistics, 2021). This primarily rural province has had, over the same period, a lower number of COVID-19 cases (142.47 per 100,000 inhabitants) and mortality rate (0.33 percent) (Ministry of Health of Mozambique, 2021a). The province presents extraordinary challenges due to the conflict situation, initiated in October 2017, when insurgents started perpetrating violent attacks on civilians and military alike (Armand et al., 2020).

The *Maputo sample* was composed of micro-entrepreneurs in the markets of the Greater Maputo area who participated in the baseline survey of Batista, Sequeira, and Vicente (2021). These micro-entrepreneurs had been selected by in-field random sampling in 23 urban and peri-urban markets in Maputo and its satellite city, Matola. Stratification was based on the gender of the respondent and the type of establishment (stall vs store). The *Cabo Delgado* sample was composed of household heads who participated in the baseline survey of Armand et al. (2020). These household heads were chosen to represent 206 communities in Cabo Delgado, randomly drawn from the list of all 421 polling locations in the sampling frame, stratified on urban, semi-urban, and rural areas.[5]

We set up two phone survey teams in Maputo and in Pemba, the capital of the Cabo Delgado province. The teams were able to speak in local languages. Appendix Figure B1 presents a timeline of the data collection. All respondents received a token of appreciation of 100 Meticais in airtime (around US$ 1.6 as of June 2021). We conducted the baseline survey between October 30th and November 30th of 2020. We completed up to two attempts to contact each phone number in separate days. A total of 862 respondents completed the survey, 554 in Maputo and 308 in Cabo Delgado. We conducted the endline survey between February 18th and March 6th of 2021. We made up to seven attempts to contact each phone

[5] Batista, Sequeira, and Vicente (2021) evaluated the impact of business training vis-à-vis a mobile savings intervention on micro-entrepreneurs business outcomes. The baseline was conducted between October 2013 and April 2014, with the main follow-up survey implemented in July–November 2015. Armand et al. (2020) tested whether community information can counteract the potential rise of a political resource curse after a substantial natural gas discovery. The baseline survey was conducted in August–September 2016, and the follow-up in August–September 2017. For both samples, we are considering only respondents who have at least one contact phone number recorded. These represent 95.6% of the respondents in the sample of Batista, Sequeira, and Vicente (2021), and 61.7% in the sample of Armand et al. (2020).

number in separate days. A total of 712 respondents completed the survey, 448 in Maputo and 264 in Cabo Delgado.

We randomly allocated each respondent of the baseline survey to a different treatment following individual-level randomization stratifying on the region of residence (Maputo and Cabo Delgado), age group (under 40, between 40 and 50, between 50 and 60, over 60), and gender. Given the nature of our interventions, we randomly assign respondents to enumerators, while accounting for the enumerators' province of residence and language spoken. Figure D1 shows the allocation of participants to each treatment group.

2.3 Data

Measurements include multiple sources of data: a baseline and an endline phone surveys, as well as behavioral measures based on SMS technology. The baseline survey questionnaire included detailed questions about the respondents' economic status, behaviors over the past seven days, attitudes towards a future vaccine, and perceptions about the government's response to the pandemic.[6] The endline survey questionnaire kept some of the questions about the respondents' economic status, most of those related to behaviors over the past seven days and perceptions about the government's response, expanded the section on attitudes towards COVID-19 vaccines, added a new section on trust in institutions, and several questions to account for the potential presence of social desirability bias. Appendix D analyzes attrition from baseline to endline.

Survey measures are supplemented with behavioral measures based on SMSs. After the endline survey, we sent respondents three different invitations through text messages to the contact numbers provided by the respondents. For each invitation we activated a dedicated phone number, which remained active for the whole duration of the service. The first invitation offered a subscription to a free SMS information service providing regular updates on COVID-19 vaccination in Mozambique. Respondents had to reply "Yes" to subscribe to the service. The second invitation asked recipients to send anonymous feedback to the Ministry of Health on its performance handling the pandemic. The third invitation asked recipients to report a specific rumor about COVID-19 for fact-checking. Additionally, they could flag a phone number to which they wanted us to send the fact-checked information.[7]

[6] In the questionnaire, we referred to a COVID-19 vaccine without specifying the producer. Pfizer and Biontech received the first authorization of their COVID-19 vaccine on December 2nd, 2020 (UK Medicines & Healthcare Products Regulatory Agency, 2020), after our baseline survey.

[7] Appendices C.1–C.3 provide more details about the invitations, including the exact scripts.

Following the invitations, we sent weekly reminders until the moment of subscription (in the case of the first invitation) or until the moment the SMS services were terminated (11 weeks after the completion of the endline survey). These behavioral text messages involve costly actions far away from enumerator influence on the part of survey respondents, which are less likely to be prone to desirability biases relative to survey questions.[8]

Table D1 provides an overall description of respondents' characteristics by looking at the mean of the pure control group. Forty percent of our respondents are female, the average age of the respondents is 46 years, and the average household size is of 5 members. Seventeen percent have completed at least 12 years of schooling. Turning to religion, 37 percent are Protestant, 29 percent Catholic, and 24 percent Muslim. The total individual income over the week previous to the interview was of 2,933.99 Meticais (US$ 46.51 as of June 2021).

3 Estimation strategy

Appendix D presents balance tests on baseline characteristics for all respondents across the three treatment arms, when compared to the pure control group. Simple mean comparisons are supplemented with a joint F-test to verify balance across all variables jointly. We run 24 tests and find no statistically significance. Because the randomization procedure was able to identify comparable groups, namely in terms of demographic characteristics of the respondents, we can estimate impacts using follow-up comparisons of outcomes. To estimate treatment effects, we first consider the following specification:

$$y_i = \alpha + \beta_1 \mathrm{T1}_i + \beta_2 \mathrm{T2}_i + \beta_3 \mathrm{T3}_i + X_i'\gamma + \epsilon_{ib} \quad (1)$$

where y_i is the outcome of interest (assumed to be measured in such a way that higher values signify better outcomes). Treatment indicators are binary variables taking value 1 if the respondent is assigned to the corresponding treatment group, and 0 otherwise. X_i is a set of controls including the strata indicators used for randomization (see Section 2.2), and enumerator fixed effects. Finally, ϵ_i is an idiosyncratic error term assumed to be clustered at the level of the enumeration area in the original sample.

When the outcome variable has a low autocorrelation, which is the case for many

[8]Similar measures were used in the context of voter education (Aker, Collier, and Vicente, 2017) and mobilization (Grácio and Vicente, 2021) in Mozambique.

of our survey outcomes, ANCOVA specifications maximizes statistical power (McKenzie, 2012). When the baseline values of the outcome variables are available, we therefore employ the following ANCOVA specification:

$$y_i = \alpha + \beta_1 \mathrm{T1}_i + \beta_2 \mathrm{T2}_i + \beta_3 \mathrm{T3}_i + X_i' \gamma + \delta y_{i0} + \epsilon_{ib} \tag{2}$$

where y_{i0} is the baseline value of the dependent variable. In Section 4, we present estimates of treatment effects using either equation (1) or equation (2), depending on the availability of baseline data.[9]

4 Results

4.1 COVID-19 vaccine acceptance

Table 1 shows estimates of treatment effects on the acceptance of the COVID-19 vaccines. We find a positive treatment effect of T3 on the direct indicator of acceptance. This intervention increases the willingness to take a COVID-19 vaccine in the future by 6 percentage points, significant at the 5 percent level (column 1). The estimates of the effect of T2 and T3 are statistically different from the one of T1, but they cannot be distinguished from one another. In line with this result, T3 increases also the respondents' willingness to be among the first to take a COVID-19 vaccine (column 2). The magnitude of this effect is 11 percentage points and significant at the 1 percent level. For this outcome, the estimate of the effect of T3 is statistically different from the one of T1, but it is not statistically different from the effect of T2. These effects are additional to the increase in the stated willingness to take the COVID-19 vaccine observed from baseline to endline (Appendix Figure B2).

Turning to beliefs about the COVID-19 vaccine, column (3) shows that T2 and T3 increase its perceived effectiveness by 7 and 8 percent, significant at the 1 and 5 percent levels of statistical confidence, respectively. T3 also increases respondents' perceived safety by 11 percent, significant at the 1 percent level (column 4). Note that this effect is significantly different from both T1 and T2, which isolates the specific importance of T3. Consistently, T3 leads to a 10 percent increase in the belief that COVID-19 vaccines do not have side effects, significant at the 1 percent level (column 5). Columns (6) and (7) report treatment

[9] Since the duration of endline survey is closely related to the delivery of interventions, Appendix F provides estimates of treatment effects accounting for the duration of the endline survey. Results are robust to this additional control variable.

effects on the most frequently cited reasons for taking or not taking the vaccine, respectively. We observe that T2 increases by 6 percentage points the likelihood of reporting '*protecting myself*' as a reason to take the vaccine (significant at the 10 percent level), while T3 reduces by 4 percentage points the likelihood of reporting '*side effects*' as a reason for not taking the vaccine.

We conclude that T3 is particularly effective at increasing stated acceptance of the COVID-19 vaccine. Moreover, both T2 and T3 are effective at improving the perceptions about vaccine effectiveness and safety. We do not find significant effects of T1. Overall there seems to be a particularly important role of inoculating against fake news in these outcomes.

4.2 Trust in institutions

Table 2 reports estimates of treatment effects on measures capturing the level of trust in institutions among the study participants. We find that T1 and T3 increase the perception that the government decides on COVID-19 vaccine provision in the population's best interest (column 1). The magnitudes of these effects are 5 and 7 percent, significant at the 5 and 1 percent levels of statistical confidence, respectively. The effect of T3 is significantly different from the effect of T2. Both T2 and T3 have positive effects on the belief that the government is purchasing high-quality vaccines, by 7 and 6 percent respectively (column 2). Consistently, we observe that T3 has a positive impact on the perception that the government is reacting appropriately to the COVID-19 crisis, with an effect size of 8 percentage points, significant at the 10 percent level (column 3). Turning to general perceptions about corruption (column 4), we observe that T3 reduces the perceived level of corruption of the local government by 10 percent, significant at the 10 percent level and significantly different from the effect of T2. Concerning the willingness to visit a health facility in case of infection with COVID-19 (column 5), the three treatments increase the reported intention to visit by 3 to 4 percentage points, with statistical significance ranging between 5 and 10 percent. We do not find any significant treatment effect on measures of perceived support of COVID-19 vaccines among the local leaders and the local community (columns 6 and 7), as expected given individual-level treatment and the short lag between the interventions and measurement.

Overall, we find positive impacts of all interventions on trusting governmental institutions, especially in the way they handle the COVID-19 pandemic and the corresponding vaccination process. Differences between treatments are not as clear as for vaccine acceptance, which is suggestive of a prominent role of the basic endorsement message in affecting participants' trust in institutions.

4.3 Social desirability and behavioral outcomes

Table 3 investigates the potential presence of social desirability bias in our treatment effects as measured through survey questions. While this is a common risk associated with survey measures and in particular experiments implemented in the context of surveys, we do not observe any consistent effect using the Socially Desirable Response Set Five-Item Survey (SDRS-5) (Hays, Hayashi, and Stewart, 1989). The index aggregates answers to questions about whether survey respondents take socially inappropriate behaviors. If anything, we find that T2 has a negative effect of 4 percentage points, significant at the 10 percent level, which goes in the opposite direction of social desirability. We also do not observe any significant effect on reported engagement in recommended preventive behaviors over the past week, or past reported behaviors and intentions related to the polio vaccination. Treatments effects on reported past behaviors would be particularly worrying with regards social desirability. While we do not identify any clear reasons for concern, we supplement results with an analysis of outcomes related to the behavioral text messages we implemented (see Section 2.3). As discussed above, the outcome variables based on these SMS services are likely to be less prone to social desirability when compared to survey measures. In Table 4 we analyze treatment effects on behavioral outcomes estimated using equation (1). This is because these measures are available only after the follow-up survey. We focus on whether participants subscribed to the service providing information related to COVID-19 vaccination, provided feedback to the Ministry of Health on the management of the pandemic situation, and/or requested fact-checking on rumors related to COVID-19.

We do not observe any significant treatment effect on subscribing to the information service (column 1). Differently, T1 increases by 0.16 the number of feedback messages sent by respondents to the Ministry of Health (column 2). This effect is statistically significant at the 5 percent level. We do not observe any significant impact on the total number of messages asking to debunk fake news to specific phone numbers (column 3). There are no significant differences between treatment effects in any of the three behavioral measures.

No systematic treatment effects emerge when employing behavioral measures. T1 seems to be particularly influential to incentivize interaction with the Ministry of Health, which could be interpreted as T1 inducing higher trust in institutions, consistently with some of the results in Table 2.

4.4 Aggregated treatment effects

In order to address potential concerns related to the testing of multiple hypotheses, we aggregate the main outcome variables presented Tables 1–4 into indices using the procedure of Kling, Liebman, and Katz (2007). We calculate within-sample z-scores for each individual outcome employing the mean and the standard deviation of the pure control group. We then obtain the unweighted average z-score for the relevant set of outcomes presented in each table. We consider the following indices: vaccine acceptance (outcomes in columns 1–5 of Table 1), trust in institutions (outcomes in columns 1–5 of Table 2), desirability bias (all outcomes of 3), and behavioral measures (all outcomes of 4).

Figure 1 summarizes estimates of treatment effect on these indices (Appendix E provides further details about estimates). We find significant treatment effects of T2 and T3 on vaccine acceptance. In particular, the effect of T3 is significantly different from that of T1 and T2, at the one and five percent levels, respectively. This suggests a clear impact of the messages on social memory and inoculation against fake news and a significant additional effect of the latter. All treatments are effective at increasing trust in institutions, with the effect of T3 significantly different from that of T2 at the ten percent level. Social desirability is not statistically different from the control group for each of the treatment groups, reinforcing that a bias is not present in our survey measures. Finally, we do not find any significant treatment effects on behavioral measures.

Appendix E provides estimates of heterogeneous treatment effects. We find no systematic differences in our treatment effects on acceptance of the COVID-19 vaccine, on trusting institutions, and on behavioral measures when interacting them with characteristics of our sample, such as gender, age, and indicators for the sub-sample (Maputo or Cabo Delgado). There are, however, some relevant exceptions. The Cabo Delgado sub-sample reacts less positively to T3 in all survey measures and to T2 in measures of trust in institutions. T1 elicits less positive reactions in behavioral measures among younger respondents and in trust in institutions among female respondents.

5 Concluding remarks

In this paper, we tested three cumulative interventions providing information aimed at increasing acceptance of COVID-19 vaccines in Mozambique. The full treatment, which includes an endorsement of COVID-19 vaccines, a reminder about a successful immunisation campaign in the past, and a structured interaction with participants inoculating against fake news about the COVID-19 vaccination, was successful at increasing acceptance of the vaccine and trust in institutions. These effects do not seem to be driven by social desirability.

Health authorities in developing countries like Mozambique may consider employing information campaigns incorporating the message components we study, with particular attention to the pre-bunking of fake news. While simple endorsements of the COVID-19 vaccine as well as messages activating positive social memory are particularly easy to communicate, the structured interaction inoculating against misleading information could be more difficult to replicate. Still, interactions in writing, in voice, or in video, could potentially lead to similar effects.

References

Aker, Jenny C, Paul Collier, and Pedro C Vicente. 2017. "Is Information Power? Using Mobile Phones and Free Newspapers during an Election in Mozambique." *Review of Economics and Statistics* 99 (2): 185–200.

Alsan, Marcella, and Sarah Eichmeyer. 2021. "Experimental Evidence on the Effectiveness of Non-Experts for Improving Vaccine Demand." *NBER Working Paper No.* 28593.

Alsan, Marcella, Fatima Cody Stanford, Abhijit Banerjee, Emily Breza, Arun G Chandrasekhar, Sarah Eichmeyer, Paul Goldsmith-Pinkham, Lucy Ogbu-Nwobodo, Benjamin A Olken, Carlos Torres et al. 2021. "Comparison of Knowledge and Information-seeking Behavior after General COVID-19 Public Health Messages and Messages Tailored for Black and Latinx Communities: a Randomized Controlled Trial." *Annals of Internal Medicine* 174 (4):484–492.

Alsan, Marcella, and Marianne Wanamaker. 2018. "Tuskegee and the Health of Black Men." *The Quarterly Journal of Economics* 133 (1): 407–455.

Armand, Alex, Britta Augsburg, and Antonella Bancalari. 2021. "Countering Misinformation with Targeted Messages: Experimental Evidence Using Mobile Phones." *CEPR Discussion Paper* DP16492.

Armand, Alex, Alexander Coutts, Pedro C Vicente, and Inês Vilela. 2020. "Does Information Break the Political Resource Curse? Experimental Evidence from Mozambique." *American Economic Review* 110 (11): 3431–53.

Armand, Alex, Mattia Fracchia, and Pedro C. Vicente. 2021. "COVID-19 Vaccine Acceptability in Mozambique." American Economic Association RCT Registry. February 18. https://doi.org/10.1257/rct.7228-1.0.

Banerjee, Abhijit, Marcella Alsan, Emily Breza, Arun G Chandrasekhar, Abhijit Chowdhury, Esther Duflo, Paul Goldsmith-Pinkham, and Benjamin A Olken. 2020. "Messages on Covid-19 Prevention in India Increased Symptoms Reporting and Adherence to Preventive Behaviors among 25 Million Recipients with Similar Effects on Non-recipient Members of their Communities." *NBER Working Paper No.* 27496.

Barrera, Oscar, Sergei Guriev, Emeric Henry, and Ekaterina Zhuravskaya. 2020. "Facts, Alternative Facts, and Fact Checking in Times of Post-truth Politics." *Journal of Public Economics* 182: 104123.

Batista, Catia, Sandra Sequeira, and Pedro C Vicente. 2021. "Closing the Gender Profit Gap." *CEPR Discussion Paper* DP15916.

Bursztyn, Leonardo, Aakaash Rao, Christopher P Roth, and David H Yanagizawa-Drott. 2020. "Misinformation during a Pandemic." *NBER Working Paper No.* 27417.

Carey, John M, Victoria Chi, DJ Flynn, Brendan Nyhan, and Thomas Zeitzoff. 2020. "The Effects of Corrective Information about Disease Epidemics and Outbreaks: Evidence from Zika and Yellow Fever in Brazil." *Science advances* 6 (5): eaaw7449.

Cook, John, Stephan Lewandowsky, and Ullrich KH Ecker. 2017. "Neutralizing Misinformation through Inoculation: Exposing Misleading Argumentation Techniques Reduces their Influence." *PloS one* 12 (5): e0175799.

Dupas, Pascaline. 2011. "Health Behavior in Developing Countries." *Annu. Rev. Econ.* 3 (1): 425–449.

Ecker, Ullrich KH, Stephan Lewandowsky, and David TW Tang. 2010. "Explicit Warnings Reduce but Do not Eliminate the Continued Influence of Misinformation." *Memory & cognition* 38 (8): 1087–1100.

Egger, Dennis, Edward Miguel, Shana S Warren, Ashish Shenoy, Elliott Collins, Dean Karlan, Doug Parkerson, A Mushfiq Mobarak, Günther Fink, Christopher Udry et al. 2021. "Falling Living Standards during the COVID-19 Crisis: Quantitative Evidence from Nine Developing Countries." *Science Advances* 7 (6).

Figueroa, J Peter, Maria Elena Bottazzi, Peter Hotez, Carolina Batista, Onder Ergonul, Sarah Gilbert, Mayda Gursel, Mazen Hassanain, Jerome H Kim, Bhavna Lall et al. 2021. "Urgent Needs of Low-income and Middle-income Countries for COVID-19 Vaccines and Therapeutics." *The Lancet* 397 (10274): 562–564.

Gørtz, Mette, Noel T Brewer, Peter Reinhard Hansen, and Mette Ejrnæs. 2020. "The Contagious Nature of a Vaccine Scare: How the Introduction of HPV Vaccination Lifted and Eroded MMR Vaccination in Denmark." *Vaccine* 38 (28): 4432–4439.

Grácio, Matilde, and Pedro C Vicente. 2021. "Information, Get-out-the-vote Messages, and Peer Influence: Causal Effects on Political Behavior in Mozambique." *Journal of Development Economics* 151: 102665.

Haaland, Ingar, Christopher Roth, and Johannes Wohlfart. Forthcoming. "Designing information provision experiments." *Journal of Economic Literature* .

Hays, Ron D, Toshi Hayashi, and Anita L Stewart. 1989. "A Five-item Measure of Socially Desirable Response Set." *Educational and Psychological Measurement* 49 (3): 629–636.

Kling, Jeffrey R, Jeffrey B Liebman, and Lawrence F Katz. 2007. "Experimental Analysis of Neighborhood Effects." *Econometrica* 75 (1): 83–119.

Lazarus, Jeffrey V, Scott C Ratzan, Adam Palayew, Lawrence O Gostin, Heidi J Larson, Kenneth Rabin, Spencer Kimball, and Ayman El-Mohandes. 2021. "A Global Survey of Potential Acceptance of a COVID-19 Vaccine." *Nature Medicine* 27 (2): 225–228.

Lewandowsky, Stephan, Ullrich KH Ecker, Colleen M Seifert, Norbert Schwarz, and John Cook. 2012. "Misinformation and its Correction: Continued Influence and Successful Debiasing." *Psychological Science in the Public Interest* 13 (3): 106–131.

Lowes, Sara, and Eduardo Montero. 2021. "The Legacy of Colonial Medicine in Central Africa." *American Economic Review* 111 (4): 1284–1314.

Martinez-Bravo, Monica, and Andreas Stegmann. 2021. "In Vaccines We Trust? The Effects of the CIA's Vaccine Ruse on Immunization in Pakistan." *Journal of the European Economic Association* (jvab018).

McGuire, William J. 1964. "Inducing Resistance to Persuasion. Some Contemporary Approaches." *Advances in Experimental Social Psychology* 1: 191–229.

McKenzie, David. 2012. "Beyond Baseline and Follow-up: The Case for More T in Experiments." *Journal of Development Economics* 99 (2): 210–221.

Miller, Claude H, Bobi Ivanov, Jeanetta Sims, Josh Compton, Kylie J Harrison, Kimberly A Parker, James L Parker, and Joshua M Averbeck. 2013. "Boosting the Potency of Resistance: Combining the Motivational Forces of Inoculation and Psychological Reactance." *Human Communication Research* 39 (1): 127–155.

Miller, Claude H, Lindsay T Lane, Leslie M Deatrick, Alice M Young, and Kimberly A Potts. 2007. "Psychological Reactance and Promotional Health Messages: The Effects of Controlling Language, Lexical Concreteness, and the Restoration of Freedom." *Human Communication Research* 33 (2): 219–240.

Ministry of Health of Mozambique. 2021a. "COVID-19 Weekly Reports." Available at https://www.misau.gov.mz/index.php/relatorio-situacional-semanal.

———. 2021b. "National Pandemic Response Plan for COVID-19 Update 2021." Available at https://www.misau.gov.mz/index.php/covid-19-planos-nacionais-e-vacinacao.

———. 2021c. "National Vaccination Plan against COVID-19." Available at https://www.misau.gov.mz/index.php/covid-19-planos-nacionais-e-vacinacao.

Mozambique National Institute of Statistics. 2021. "Mozambican Population in 2021." Updated at 08/08/2021 and available at http://www.ine.gov.mz/noticias/populacao-mocambicana-para-2021.

Nyhan, Brendan, and Jason Reifler. 2010. "When Corrections Fail: The Persistence of Political Misperceptions." *Political Behavior* 32 (2): 303–330.

Shretta, Rima, Nathaniel Hupert, Patrick Osewe, and Lisa J White. 2021. "Vaccinating the World Against COVID-19: Getting the Delivery Right is the Greatest Challenge." *BMJ Global Health* 6: e005273.

Solís Arce, Julio S, Shana S Warren, Niccolò F Meriggi, Alexandra Scacco, Nina McMurry, Maarten Voors, Georgiy Syunyaev, Amyn Abdul Malik, Samya Aboutajdine, Opeyemi Adeojo et al. 2021. "COVID-19 Vaccine Acceptance and Hesitancy in Low- and Middle-income Countries." *Nature Medicine* .

UK Medicines & Healthcare Products Regulatory Agency. 2020. "Regulatory approval of Pfizer/BioNTech vaccine for COVID-19." *Regulation 174 – Government of the United Kingdom* .

UNICEF. 2021. "Data Warehouse." Available at https://data.unicef.org/resources/.

van der Linden, Sander, Jon Roozenbeek, and Josh Compton. 2020. "Inoculating Against Fake News About COVID-19." *Frontiers in Psychology* 11: 2928.

Vosoughi, Soroush, Deb Roy, and Sinan Aral. 2018. "The Spread of True and False News Online." *Science* 359 (6380): 1146–1151.

Wellcome Global Monitor. 2018. "How does the world feel about science and health?" Available at https://wellcome.org/sites/default/files/wellcome-global-monitor-2018.pdf.

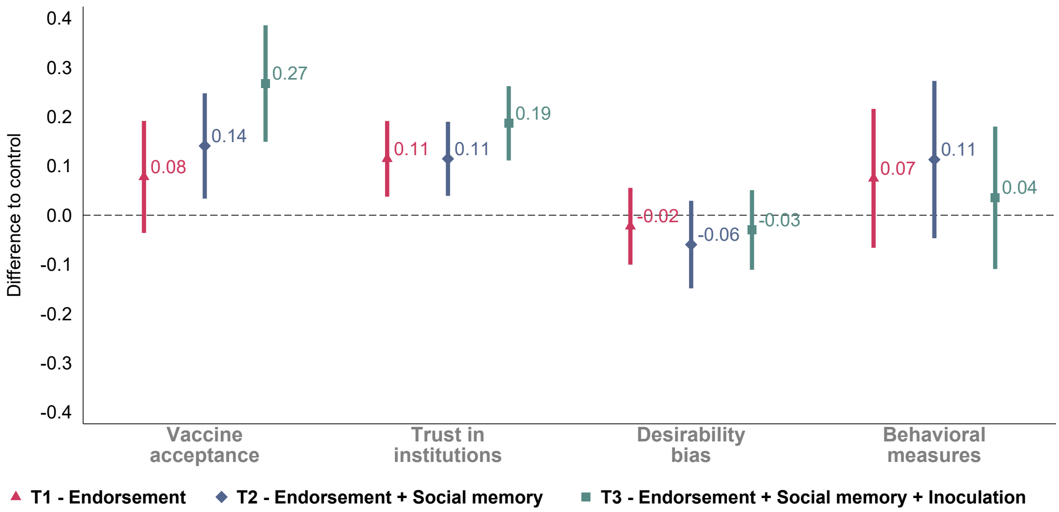
World Bank. 2021a. "Mozambique Economic Update." Available at https://www.worldbank.org/en/news/press-release/2021/03/04/mozambique-economic-update-growth-expected-to-rebound-by-2022.

———. 2021b. "World Development Indicators." Available at https://databank.worldbank.org/.

World Health Organization. 2020. "WASH in Health Care Facilities." Available at https://apps.who.int/immunization_monitoring/globalsummary/estimates?c=MOZ.

———. 2021. "Global Health Observatory data repository." Available at https://apps.who.int/gho/data/node.main.A824?lang=en.

Figure 1: Treatment effects on aggregated outcomes



Note. Estimates based on OLS regressions using equation (1). The coefficients are presented in Section E. Outcomes are grouped in indices that are built using the procedure in Kling, Liebman, and Katz (2007). The procedure is detailed in Section 4.4. The indices represent the following outcomes: (1) *Vaccine acceptance* includes the outcomes in columns (1)-(5) of Table 1; (2) *Trust in institutions* includes the outcomes in columns (1)-(5) of Table 2; (3) *Desirability bias* includes the outcomes of Table 3; (4) *Behavioral measures* includes the outcomes of Table 4. The full list of controls is presented in Section 3. Confidence intervals are built using statistical significance at the 10 percent level. Standard errors are clustered at the enumeration area level.

Table 1: Acceptance of COVID-19 vaccines

	Willingness to take vaccine	Would be among the first to take	COVID-19 vaccines are ..			Why take: protect myself	Why not take: side effects
			effective	safe	without side effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	-0.011	0.024	0.151	0.096	0.159	0.025	0.004
	(0.026)	(0.042)	(0.093)	(0.098)	(0.104)	(0.035)	(0.022)
T2	0.052	0.046	0.249***	0.144	0.045	0.063*	-0.019
	(0.033)	(0.050)	(0.095)	(0.105)	(0.096)	(0.034)	(0.027)
T3	0.059**	0.109***	0.260**	0.379***	0.304***	0.043	-0.040*
	(0.029)	(0.041)	(0.101)	(0.097)	(0.103)	(0.040)	(0.024)
N	698	691	685	683	688	698	698
Mean dep. variable (control)	0.870	0.645	3.418	3.315	2.960	0.778	0.070
Baseline	YES	NO	NO	NO	NO	YES	YES
R^2	0.102	0.164	0.107	0.116	0.156	0.100	0.059
Equality of treatment effects (p-values):							
T1=T2	0.051	0.565	0.259	0.632	0.259	0.186	0.378
T1=T3	0.008	0.056	0.225	0.000	0.151	0.622	0.063
T2=T3	0.850	0.243	0.907	0.020	0.023	0.582	0.389
T1=T2=T3=0	0.020	0.052	0.031	0.000	0.031	0.264	0.254

Note. Estimates based on OLS regressions. Columns (2)–(5) present estimates using equation (1), columns (1), (6), and (7) present estimates using equation (2). Depending on the column, the dependent variables are defined by the following. (1): indicator variable that takes value of 1 if respondent answered 'Yes' to the question: 'When a COVID-19 vaccine becomes available in the future, would you take it?', and 0 otherwise. (2): indicator variable that takes value of 1 if respondent answered 'Yes' to the question: 'Would you like to be among the first ones to get vaccinated against COVID-19 when the vaccine becomes available?', and 0 otherwise. (3)–(5): variables using a 5-item Likert scale that takes the values 1 'Strongly disagree,' 2 'Disagree,' 3 'Neither agree nor disagree,' 4 'Agree,' and 5 'Strongly agree' to measure agreement with the following statements: (3) 'The COVID-19 vaccines currently produced are effective in preventing the disease;' (4) 'The COVID-19 vaccines currently produced are safe;' (5) 'The vaccines against COVID-19 currently produced might bring some serious side effects' [Reversed]. (6): indicator variable that takes value 1 if respondent chose 'I want to protect myself from having COVID-19 in the future' in response to the question: 'Why would you take it?' - conditional on having answered 'Yes' to the question in (1), and 0 otherwise. (7): indicator variable that takes value 1 if respondent chose 'I would be concerned about possibility that the side effects from the vaccine are harmful' in response to the question: 'Why would you not take it?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Trust in institutions

	On vaccines, the Government .. decides in population's best interest	purchases highest quality	Appropriate COVID-19 reaction	Local government not involved in corruption	Willingness to visit health facility if infected	Leaders support vaccines	Community willing to take the vaccine
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	0.202**	0.111	0.003	0.218	0.037*	0.016	0.002
	(0.078)	(0.088)	(0.042)	(0.139)	(0.020)	(0.075)	(0.088)
T2	0.119	0.221**	0.035	-0.041	0.038**	0.023	0.118
	(0.079)	(0.100)	(0.041)	(0.115)	(0.017)	(0.087)	(0.074)
T3	0.258***	0.198**	0.079*	0.242*	0.031*	0.042	0.013
	(0.083)	(0.100)	(0.046)	(0.132)	(0.019)	(0.106)	(0.082)
N	692	687	680	631	710	681	695
Mean dep. variable (control)	3.606	3.306	0.628	2.494	0.946	3.578	3.547
Baseline	NO	NO	YES	NO	YES	NO	NO
R^2	0.237	0.161	0.195	0.120	0.076	0.067	0.095
Equality of treatment effects (p-values):							
T1=T2	0.373	0.320	0.430	0.054	0.972	0.935	0.138
T1=T3	0.467	0.311	0.126	0.858	0.707	0.798	0.902
T2=T3	0.090	0.820	0.312	0.017	0.696	0.855	0.158
T1=T2=T3=0	0.015	0.124	0.347	0.064	0.150	0.982	0.252

Note. Estimates based on OLS regressions. Columns (1), (2), (4), (6) and (7) present estimates using equation (1), columns (3), (5) present estimates using equation (2). Depending on the column the dependent variables are defined by the following. (1), (2), (4), (6) and (7): variables using a 5-item Likert scale that takes the values 1 'Strongly disagree,' 2 'Disagree,' 3 'Neither agree nor disagree,' 4 'Agree,' 5 'Strongly agree' to measure agreement with the following statements: (1) 'The national government is making decisions in your best interest with respect to which COVID-19 vaccines are provided;' (2) 'The national government purchases the highest quality COVID-19 vaccines available;' (4) 'Agents of your local government (provincial, district, or municipal) are involved in corruption'; (6) 'Leaders (religious, political, teachers, health care workers) in your community support the COVID-19 vaccines currently produced;' (7) 'People in your community/circle of friends are willing to take the COVID-19 vaccine'. (3): indicator variable that takes value 1 if respondent answered 'The reaction is appropriate' to the question: 'What do you think about the reaction of your country's government to the current COVID-19 outbreak?' (answers available: 1 'The reaction is very exaggerated,' 2 'The reaction is exaggerated,' 3 'The reaction is appropriate,' 4 'The reaction is insufficient,' 5 'The reaction is very insufficient'), and 0 otherwise. (5): indicator variable that takes value 1 if respondent chose an health facility in response to the question: 'If you thought you had COVID-19, where would you seek treatment?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Social desirability

	Social desirability index	Went to market (frequency)	Went to church or mosque	Washed hands more often	Used face mask	Household member received polio vaccine	Willingness to vaccinate newborn against polio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	-0.002	0.006	0.002	0.010	-0.001	-0.005	-0.031
	(0.018)	(0.155)	(0.026)	(0.031)	(0.008)	(0.031)	(0.021)
T2	-0.035*	-0.003	-0.008	-0.015	-0.007	0.011	-0.007
	(0.019)	(0.132)	(0.030)	(0.034)	(0.010)	(0.026)	(0.019)
T3	-0.016	0.171	-0.035	-0.014	-0.002	0.002	-0.007
	(0.018)	(0.135)	(0.031)	(0.039)	(0.009)	(0.029)	(0.019)
N	705	699	709	708	709	478	685
Mean dep. variable (control)	0.114	3.098	0.118	0.887	0.995	0.949	0.967
Baseline	NO	YES	YES	YES	YES	NO	NO
R^2	0.290	0.082	0.149	0.094	0.030	0.064	0.114
Equality of treatment effects (p-values):							
T1=T2	0.106	0.956	0.725	0.425	0.452	0.613	0.239
T1=T3	0.446	0.277	0.215	0.428	0.883	0.837	0.240
T2=T3	0.246	0.298	0.380	0.989	0.563	0.712	0.979
T1=T2=T3=0	0.286	0.570	0.622	0.832	0.875	0.957	0.477

Note. Estimates based on OLS regressions. Columns (1), (6), and (7) present estimates using equation (1), columns (2), (3), (4), and (5) present estimates using equation (2), which includes the lagged dependent variable (ANCOVA). Depending on the column the dependent variables are defined by the following. (1): index of equally-weighted variables recording as 1 the most extreme positive answer to the scale 1 'Definitely false,' 2 'False,' 3 'Don't know,' 4 'True,' 5 'Definitely true' in response to the following statements: 'I am always courteous even to people who are disagreeable;' 'There have been occasions when I took advantage of someone' [Reversed]; 'I sometimes try to get even rather than forgive and forget' [Reversed]; 'I sometimes feel resentful when I don't get my way' [Reversed]; 'No matter who I'm talking to, I'm always a good listener.' (2): variable that takes the values 1 'Never (0 days),' 2 'Once (1 days),' 3 'Some days (2-3 days),' 4 'Most days (4-6 days),' 5 'Every day (7 days)' in response to the question: 'In the past 7 days, how often did members of your household go to a market or food store?' (3): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'In the past 7 days, have you attended church or mosque, or gathered with people from outside your household to pray?', and 0 otherwise. (4): indicator variable that takes value 1 if respondent answered 'More' to the question: 'In the past 7 days, have you washed your hands with soap and water more often, less often, or about the same as you did before government closed schools?' (answers available: 'Less,' 'Same,' 'More,' 'Don't know'), and 0 otherwise. (5): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'In the last 7 days have you always worn a face mask or other nose/mouth covering when going out in public?', and 0 otherwise. (6): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'Has any member of your household ever received any vaccination drops in the mouth to protect (him/her) from polio?', and 0 otherwise. (7): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'If you had a newborn in the household would you want to vaccinate him/her against polio?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Behavioral measures based on SMS services

	Subscribed to information service on COVID-19 (1)	Total number of text messages to Ministry of Health (2)	Total number of text messages to debunk fake news (3)
T1	-0.034	0.157**	0.034
	(0.049)	(0.079)	(0.075)
T2	0.005	0.130	0.072
	(0.048)	(0.081)	(0.092)
T3	-0.062	0.058	0.107
	(0.055)	(0.078)	(0.079)
N	698	698	698
Mean dep. variable (control)	0.495	0.288	0.234
Baseline	NO	NO	NO
R^2	0.066	0.044	0.047
Equality of treatment effects (p-values):			
T1=T2	0.433	0.760	0.697
T1=T3	0.532	0.229	0.342
T2=T3	0.136	0.385	0.742
T1=T2=T3=0	0.501	0.184	0.536

Note. Estimates based on OLS regressions. Columns (1)–(4) present estimates using equation (1). (1): indicator variable that takes value 1 if respondent answered 'Yes' to the invitation to subscribe to the COVID-19 vaccine information service, and 0 otherwise. (2): total number of text messages received in response to the invitation to send feedback to the Ministry of Health on its management of the pandemic situation. (3): total number of text messages received in response to the invitation to send unverified information to be debunked to specific phone numbers. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

ONLINE APPENDIX

Let's Call! Using the Phone to Increase Acceptance of COVID-19 Vaccines

Alex Armand, Mattia Fracchia, Pedro C. Vicente

A Script of interventions

A.1 *Endorsement* intervention

During the endline phone survey, enumerators conveyed the following statement:

> *It is important to vaccinate against COVID-19 because it is dangerous. While elderly and ill people are at additional risk, COVID-19 is potentially deadly for anyone. When you vaccinate, you reduce the probability of contracting the virus and of spreading it to others. Your vaccination contributes to protecting you and others from death or severe illness due to COVID-19.*

We sent a reinforcement SMS text message 10 weeks after the conclusion of the endline survey with the following reminder:

> *COVID-19 vaccine reduces the chance that you will get the virus and pass it on to others. The vaccine helps protect yourself and others from death or serious illness caused by COVID-19.*

A.2 *Social memory* intervention

During the endline phone survey, enumerators conveyed the following statement:

> *Do you remember the time when it was common to have new cases of wild polio? Many people used to suffer from paralysis due to this terrible disease. Thanks to the polio vaccine, Mozambique now has wild polio-free status. In other words, there are no longer any new cases in the country! The World Health Organization (WHO) has stated: 'This success is the result of a sustained, collective and collaborative effort between the Ministry of Health, partners and the community. Only together we can achieve satisfactory results.'*

We sent a reinforcement SMS text message 10 weeks after the conclusion of the endline survey with the following reminder:

Get the COVID-19 vaccine when you have the opportunity. Thanks to the polio vaccine, Mozambique is free from wild polio. This was the result of collaboration between the health authorities and the community. Together, we have achieved good results.

A.3 *Inoculation* intervention

During the endline phone survey, enumerators guided respondents through the following interactive questions:

> *What is your worst fear about getting the COVID-19 vaccine? Let's now imagine the following situation: let's exaggerate what you told me and imagine your worst fear is a true fact that applies to everyone. What do you think will happen if you decide to spread to other people this imagined fact? What do you think will happen if many people do the same, i.e., share an exaggerated version of their own fears?*

Enumerators then conveyed the following statement to conclude the exercise:

> *A lot of information that circulates in person-to-person contact is not based on facts. We need to pay attention to official information, particularly when it relates to vaccines. Even more, we should think about the potential consequences when we decide to share information we are not sure about. Scientific evidence shows that the dissemination of false information can influence people's choices and lead to serious consequences.*

We sent a reinforcement SMS text message 10 weeks after the conclusion of the endline survey with the following reminder:

> *Pay attention to the official information about the COVID-19 vaccine. A lot of information circulating is not true. Sharing information you are not sure about can influence the choices of others with serious consequences. Vaccines improve the health of the country. Get the COVID-19 vaccine when you have the opportunity.*

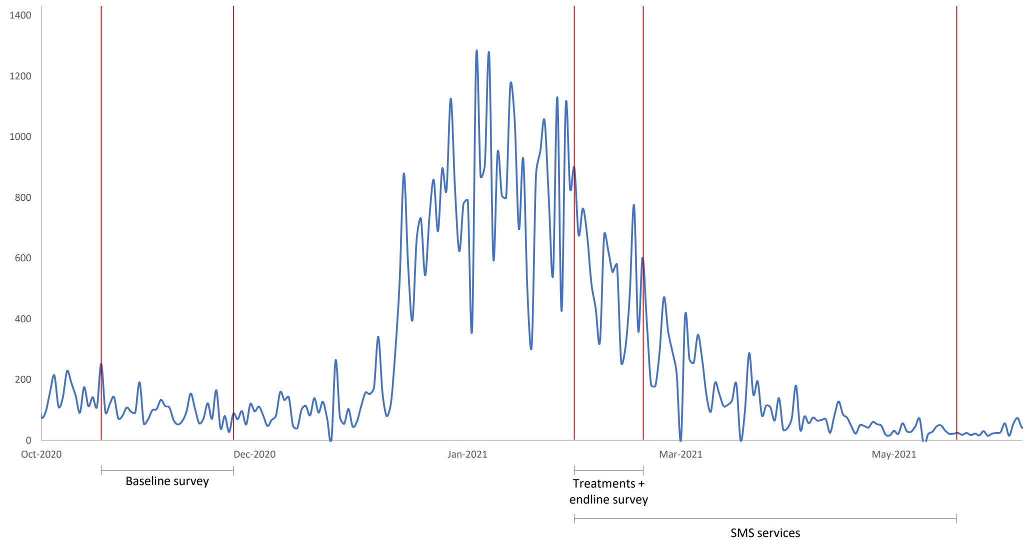
A.4 Calling protocol

We equipped each enumerator with a list of respondents. We then assigned respondents randomly while accounting for the enumerators' province of residence and language (see Section 2.2). Enumerators would make a single attempt for each contact in the list. Upon trying to contact the whole list, enumerators would reach out to the team supervisor to record a complete round. Upon the supervisor's authorization, enumerators would start a new round, following the same order for the missing respondents, i.e., those without a complete interview and who had not declined to participate. We created exceptions to the sequential progress in the list in case of unexpected interruptions in communication, rescheduled or incoming calls.

B Timeline

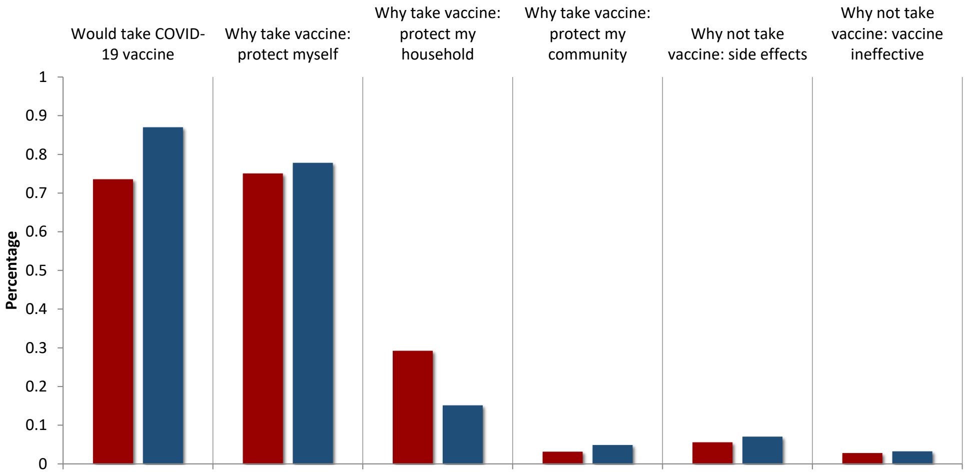
Figure B1 shows the timeline of measurements and interventions, superimposed on the rolling 7-day average of daily new confirmed COVID-19 cases over the entire duration of the study. Figure B2 shows the evolution of acceptance of the COVID-19 vaccine from the baseline to the endline survey across a range of survey questions. Baseline values are computed considering all respondents to the baseline survey, while the endline values consider only those respondents who were assigned to the control group, who did not receive any message under the study.

Figure B1: Evolution of COVID-19 cases and study timeline



Note. Timeline of measurements and interventions superimposed on the evolution of the rolling 7-day average of daily new confirmed COVID-19 cases in Mozambique, from October 16th of 2020 to May 3rd of 2021. The number of confirmed cases may be lower than the number of actual cases because of limited testing. Source: Our World in Data. The baseline survey was implemented between October 30th and November 30th of 2020; the treatments and the endline survey between February 18th and March 6th of 2021; the SMS services between February 18th and May 19th of 2021.

Figure B2: Evolution of acceptance of COVID-19 vaccine



Note. 'Baseline' reports the average answer computed considering all respondents to the baseline survey. 'Endline (control)' reports the average answer computed considering only those respondents to the endline survey who were assigned to the control group, who did not receive any message under the study. From left to right, the outcomes reported are defined by the following: (1) *Would take COVID-19 vaccine*: indicator variable that takes value of 1 if respondent answered 'Yes' to the question: 'When a COVID-19 vaccine becomes available in the future, would you take it?', and 0 otherwise.; (2) *Why take vaccine: protect myself*: indicator variable that takes value 1 if respondent chose 'I want to protect myself from having COVID-19 in the future' in response to the question: 'Why would you take it?' - conditional on having answered 'Yes' to the question in (1), and 0 otherwise.; (3) *Why take vaccine: protect my household*: indicator variable that takes value 1 if respondent chose 'I want to protect my family/members of my household against having COVID-19 in the future' in response to the question: 'Why would you take it?' - conditional on having answered 'Yes' to the question in (1), and 0 otherwise.; (4) *Why take vaccine: protect my community*: indicator variable that takes value 1 if respondent chose 'I want to protect my community against having COVID-19 in the future' in response to the question: 'Why would you take it?' - conditional on having answered 'Yes' to the question in (1), and 0 otherwise.; (5) *Why not take vaccine: side effects*: indicator variable that takes value 1 if respondent chose 'I would be concerned about possibility that the side effects from the vaccine are harmful' in response to the question: 'Why would you not take it?' - conditional on having answered 'No' to the question in (1), and 0 otherwise.; (6) *Why not take vaccine: vaccine ineffective*: indicator variable that takes value 1 if respondent chose 'I don't think vaccines are effective' in response to the question: 'Why would you not take it?' - conditional on having answered 'No' to the question in (1), and 0 otherwise.

C Behavioral text messages

The behavioral interventions were implemented in conjunction with the 'Associação NOVAFRICA para o Desenvolvimento Empresarial e Económico de Moçambique', the local partner of NOVAFRICA in Mozambique.

C.1 Information service on COVID-19 vaccination

The invitation message is as follows:

> *Do you want to receive updates about the Coronavirus vaccine in Mozambique from the NOVAFRICA team? If yes, please answer "YES" to this text message.*

The timing is the following: a first text message invitation is sent on the same day of the interview, followed by a reminder on the next day and a weekly reminder after that. The research team would stop sending invitations as soon as the respondent subscribes to the service. This SMS service is similar to the public information phone helpline that the Ministry of Health is establishing at the national level.

C.2 Feedback to the Ministry of Health

The invitation message is as follows:

> *Do you want to send a message, either praise or criticism, to the Ministry of Health? If yes, reply to this text message with your message. The NOVAFRICA team will communicate it to the Ministry. Thank you, NOVAFRICA.*

The timing is the following: a first text message invitation is sent on the same day of the interview, followed by a reminder on the next day and a weekly reminder after that. The research team would keep sending invitations even after respondents sent the first message. The Ministry of Health highlights the intention to proactively listening to the population and their concerns, doubts, fears, insecurity or lack of confidence in institutions.

C.3 Debunk fake news to specific phone numbers

The invitation message is as follows:

> *Identify false rumors about COVID-19 and contribute to the spread of truthful information. Send to this number the false rumors you have heard. You can also send*

a phone number to which you want the NOVAFRICA team to forward the correct information. Thank you, NOVAFRICA.

The timing is the following: a first text message invitation is sent on the same day of the interview, followed by a reminder the following day and a weekly reminder after that. The research team would keep sending invitations even after respondents sent the first message. The Ministry of Health already has a rumor monitor and mitigation mechanism, which uses the information received to mitigate rumors' impact on health behaviors.

D Balance across treatment arms and selective attrition

Figure D1 shows assignment to treatment groups of participants. Table D1 presents descriptive statistics of the sample and provides mean comparisons across treatment groups, including a joint test of equality to zero of all these differences. Table D2 presents descriptive statistics about attrition from the baseline to the follow-up survey, and provides evidence against the presence of selective attrition across treatment groups.

Figure D1: Assignment to treatment

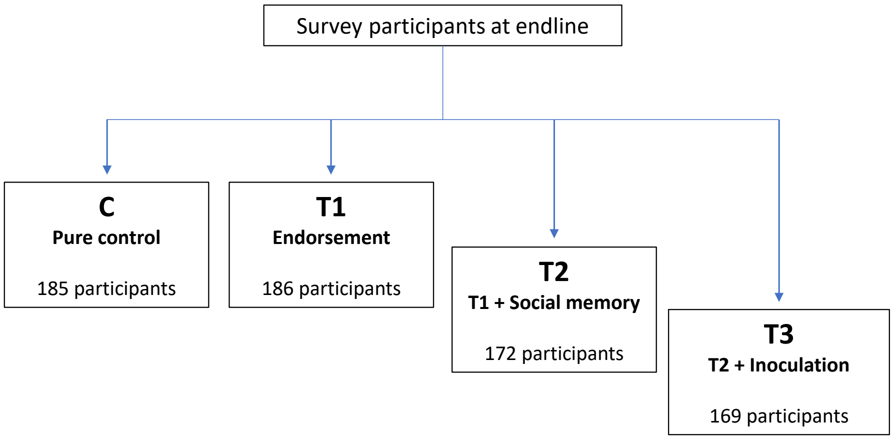


Table D1: Balance across treatment arms

	N (1)	Control mean (2)	T1 (3)	T2 (4)	T3 (5)	F-test pvalue (6)
Gender (female = 1)	713	0.40	-0.01	-0.03	-0.02	0.936
			(0.05)	(0.05)	(0.05)	
Age	712	46.21	0.69	-0.65	0.06	0.796
			(1.30)	(1.33)	(1.34)	
Household size	712	5.38	-0.18	-0.04	-0.08	0.951
			(0.31)	(0.32)	(0.32)	
Education - 12 years or more	713	0.17	0.01	-0.01	-0.05	0.491
			(0.04)	(0.04)	(0.04)	
Catholic	713	0.29	-0.08	-0.03	-0.06	0.371
			(0.05)	(0.05)	(0.05)	
Protestant	713	0.37	0.06	0.02	0.01	0.659
			(0.05)	(0.05)	(0.05)	
Muslim	713	0.24	0.06	0.02	0.06	0.469
			(0.04)	(0.05)	(0.05)	
Total income - past week	592	2933.99	734.33	72.11	618.26	0.275
			(452.40)	(463.96)	(470.51)	

Note. Column (1) reports the number of observations. Column (2) reports the sample mean of the pure control group. Columns (3), (4), (5) report estimates for each treatment indicator variable in equation (1). Column (6) reports the joint p-value of the F-test including all the treatments. A 90% winsorization was applied to *Total income - past week*. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table D2: Survey attrition from baseline to endline

	N	Control mean	T1	T2	T3	F-test pvalue
	(1)	(2)	(3)	(4)	(5)	(6)
Attrition	862	0.17	-0.02 (0.04)	0.04 (0.04)	0.05 (0.04)	0.177

Note. *Attrition* is defined as indicator variable equal to 1 if the respondent was interviewed at baseline and not interviewed at follow-up, and 0 otherwise. Column (1) reports the number of observations. Column (2) reports the sample mean of the pure control group. Columns (3), (4), (5) report estimates for each treatment indicator variable in equation (1). Column (6) reports the joint p-value of the F-test including all the treatments. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

E Treatment effects on aggregated outcomes

Table E1 provides estimates of treatment effects on the aggregated outcomes built using the procedure in Kling, Liebman, and Katz (2007) and detailed in Section 4.4. Table E2 shows instead estimates of heterogeneous treatment effects for the same indices.

Table E1: Treatment effects on aggregated outcomes

	Vaccine acceptance (1)	Trust in institutions (2)	Desirability bias (3)	Behavioral measures (4)
T1	0.078	0.115**	-0.022	0.075
	(0.069)	(0.046)	(0.047)	(0.085)
T2	0.141**	0.115**	-0.060	0.113
	(0.065)	(0.045)	(0.054)	(0.096)
T3	0.267***	0.187***	-0.030	0.035
	(0.071)	(0.046)	(0.049)	(0.087)
N	709	710	710	698
Mean dep. variable (control)	0.003	-0.001	0.000	0.000
Baseline	NO	NO	NO	NO
R^2	0.145	0.110	0.106	0.050
Equality of treatment effects (p-values):				
T1=T2	0.227	1.000	0.406	0.712
T1=T3	0.005	0.128	0.865	0.635
T2=T3	0.045	0.092	0.479	0.449
T1=T2=T3=0	0.002	0.001	0.726	0.637

Note. Estimates based on OLS regressions using equation (1). Outcomes are grouped in indices that are built using the procedure in Kling, Liebman, and Katz (2007). The procedure is detailed in Section 4.4. The indices are defined by the following outcomes: (1) *Vaccine acceptance* includes the outcomes in columns (1)-(5) of Table 1; (2) *Trust in institutions* includes the outcomes in columns (1)-(5) of Table 2; (3) *Desirability bias* includes the outcomes of Table 3; (4) *Behavioral measures* includes the outcomes of Table 4. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table E2: Heterogeneous treatment effects on aggregated outcomes

	Vaccine acceptance (1)	Trust in institutions (2)	Behavioral measures (3)
Gender			
T1 X Female	0.117	0.205**	-0.102
	(0.131)	(0.097)	(0.177)
T2 X Female	0.069	-0.019	-0.016
	(0.137)	(0.098)	(0.195)
T3 X Female	0.129	0.142	-0.205
	(0.142)	(0.117)	(0.156)
Age			
T1 X Under 40	0.061	-0.188	-0.333*
	(0.131)	(0.126)	(0.180)
T2 X Under 40	0.069	0.104	0.158
	(0.126)	(0.094)	(0.217)
T3 X Under 40	0.096	-0.049	-0.058
	(0.137)	(0.106)	(0.188)
Sample			
T1 X Cabo Delgado	0.020	-0.046	0.145
	(0.139)	(0.097)	(0.180)
T2 X Cabo Delgado	-0.022	-0.180*	0.237
	(0.128)	(0.095)	(0.212)
T3 X Cabo Delgado	-0.269*	-0.299***	0.293
	(0.142)	(0.093)	(0.187)
N	710	710	698

Note. Estimates based on OLS regressions using equation (1). Outcomes are grouped in indices that are built using the procedure in Kling, Liebman, and Katz (2007). The procedure is detailed in Section 4.4. The indices are defined by the following outcomes: (1) *Vaccine acceptance* includes the outcomes in columns (1)-(5) of Table 1; (2) *Trust in institutions* includes the outcomes in columns (1)-(5) of Table 2; (3) *Behavioral measures* includes the outcomes of Table 4. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

F Adding treatment duration as control

Table F1: Acceptance of COVID-19 vaccine

	Willingness to take vaccine	Would be among the first to take	COVID-19 vaccines are .. effective	safe	without side effects	Why take: protect myself	Why not take: side effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	-0.001	0.054	0.127	0.094	0.213*	0.028	-0.006
	(0.028)	(0.044)	(0.099)	(0.109)	(0.120)	(0.039)	(0.025)
T2	0.071*	0.106*	0.202*	0.140	0.153	0.069*	-0.039
	(0.042)	(0.054)	(0.117)	(0.132)	(0.133)	(0.042)	(0.037)
T3	0.075**	0.160***	0.220*	0.376***	0.394***	0.048	-0.057*
	(0.035)	(0.049)	(0.114)	(0.119)	(0.134)	(0.045)	(0.029)
N	698	691	685	683	688	698	698
Mean dep. variable (control)	0.870	0.645	3.418	3.315	2.960	0.778	0.070
Baseline	YES	NO	NO	NO	NO	YES	YES
Controls	Duration	Duration	Duration	Duration	Duration	Duration	Duration
R^2	0.102	0.168	0.108	0.116	0.159	0.100	0.061
Equality of treatment effects (p-values):							
T1=T2	0.042	0.192	0.423	0.661	0.559	0.155	0.267
T1=T3	0.007	0.030	0.306	0.001	0.084	0.580	0.039
T2=T3	0.916	0.324	0.852	0.021	0.035	0.565	0.489
T1=T2=T3=0	0.028	0.010	0.248	0.002	0.025	0.334	0.164

Note. Estimates based on OLS regressions. Columns (2)–(5) present estimates using equation (1), columns (1), (6), and (7) present estimates using equation (2), which includes the lagged dependent variable (ANCOVA). Depending on the column, the dependent variables are defined by the following. (1): indicator variable that takes value of 1 if respondent answered 'Yes' to the question: 'When a COVID-19 vaccine becomes available in the future, would you take it?', and 0 otherwise. (2): indicator variable that takes value of 1 if respondent answered 'Yes' to the question: 'Would you like to be among the first ones to get vaccinated against COVID-19 when the vaccine becomes available?', and 0 otherwise. (3)–(5): variables using a 5-item Likert scale that takes the values 1 'Strongly disagree,' 2 'Disagree,' 3 'Neither agree nor disagree,' 4 'Agree,' and 5 'Strongly agree' to measure agreement with the following statements: (3) 'The COVID-19 vaccines currently produced are effective in preventing the disease;' (4) 'The COVID-19 vaccines currently produced are safe;' (5) 'The vaccines against COVID-19 currently produced might bring some serious side effects' [Reversed]. (6): indicator variable that takes value 1 if respondent chose 'I want to protect myself from having COVID-19 in the future' in response to the question: 'Why would you take it?' - conditional on having answered 'Yes' to the question in (1), and 0 otherwise. (7): indicator variable that takes value 1 if respondent chose 'I would be concerned about possibility that the side effects from the vaccine are harmful' in response to the question: 'Why would you not take it?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table E2: Trust in institutions

	On vaccines, the decides in population's best interest	Government .. purchases highest quality	Appropriate COVID-19 reaction	Local government not involved in corruption	Willingness to visit health facility if infected	Leaders support vaccines	Community willing to take the vaccine
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	0.178**	0.091	0.248	0.030	0.006	0.050	0.048**
	(0.089)	(0.099)	(0.158)	(0.086)	(0.043)	(0.090)	(0.023)
T2	0.072	0.182	0.018	0.052	0.041	0.212**	0.059**
	(0.107)	(0.141)	(0.161)	(0.119)	(0.054)	(0.098)	(0.025)
T3	0.218**	0.165	0.290	0.067	0.084	0.093	0.049**
	(0.107)	(0.131)	(0.177)	(0.145)	(0.055)	(0.098)	(0.023)
N	692	687	631	681	680	695	710
Mean dep. variable (control)	3.606	3.306	2.494	3.578	0.628	3.547	0.946
Controls	Duration	Duration	Duration	Duration	Duration	Duration	Duration
Baseline	NO	NO	NO	NO	YES	NO	YES
R^2	0.237	0.161	0.121	0.067	0.195	0.097	0.080
Equality of treatment effects (p-values):							
T1=T2	0.275	0.460	0.095	0.834	0.447	0.067	0.534
T1=T3	0.619	0.439	0.768	0.755	0.137	0.656	0.939
T2=T3	0.072	0.866	0.019	0.882	0.327	0.116	0.565
T1=T2=T3=0	0.106	0.601	0.065	0.972	0.436	0.121	0.117

Note. Estimates based on OLS regressions. Columns (1), (2), (3), (4), and (6) present estimates using equation (1), columns (5), (7) present estimates using equation (2), which includes the lagged dependent variable (ANCOVA). Depending on the column the dependent variables are defined by the following. (1), (2), (3), (4), and (6): variables using a 5-item Likert scale that takes the values 1 'Strongly disagree,' 2 'Disagree,' 3 'Neither agree nor disagree,' 4 'Agree,' 5 'Strongly agree' to measure agreement with the following statements: (1) 'The national government is making decisions in your best interest with respect to which COVID-19 vaccines are provided;' (2) 'The national government purchases the highest quality COVID-19 vaccines available;' (3) 'Leaders (religious, political, teachers, health care workers) in your community support the COVID-19 vaccines currently produced;' (4) 'People in your community/circle of friends are willing to take the COVID-19 vaccine;' (6) 'Agents of your local government (provincial, district, or municipal) are involved in corruption". (5): indicator variable that takes value 1 if respondent answered 'The reaction is appropriate' to the question: 'What do you think about the reaction of your country's government to the current COVID-19 outbreak?' (answers available: 1 'The reaction is very exaggerated,' 2 'The reaction is exaggerated,' 3 'The reaction is appropriate,' 4 'The reaction is insufficient,' 5 'The reaction is very insufficient'), and 0 otherwise. (7): indicator variable that takes value 1 if respondent chose an health facility in response to the question: 'If you thought you had COVID-19, where would you seek treatment?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table E3: Social desirability

	Social desirability index	Went to market (frequency)	Went to church or mosque	Washed hands more often	Used face mask	Household member received polio vaccine	Willingness to vaccinate newborn against polio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
T1	-0.005	-0.035	-0.009	0.020	-0.000	-0.002	-0.033
	(0.020)	(0.169)	(0.028)	(0.038)	(0.009)	(0.032)	(0.021)
T2	-0.041*	-0.083	-0.029	0.005	-0.006	0.016	-0.011
	(0.024)	(0.173)	(0.034)	(0.052)	(0.009)	(0.030)	(0.018)
T3	-0.021	0.103	-0.052	0.002	-0.001	0.006	-0.010
	(0.022)	(0.168)	(0.035)	(0.052)	(0.008)	(0.034)	(0.020)
N	705	699	709	708	709	478	685
Mean dep. variable (control)	0.114	3.098	0.118	0.887	0.995	0.949	0.967
Controls	Duration	Duration	Duration	Duration	Duration	Duration	Duration
Baseline	NO	YES	YES	YES	YES	NO	NO
R^2	0.290	0.083	0.150	0.095	0.030	0.064	0.114
Equality of treatment effects (p-values):							
T1=T2	0.085	0.786	0.494	0.679	0.463	0.562	0.257
T1=T3	0.390	0.369	0.152	0.595	0.913	0.801	0.270
T2=T3	0.226	0.274	0.431	0.936	0.573	0.687	0.952
T1=T2=T3=0	0.285	0.694	0.447	0.892	0.884	0.927	0.463

Note. Estimates based on OLS regressions. Columns (1), (6), and (7) present estimates using equation (1), columns (2), (3), (4), and (5) present estimates using equation (2), which includes the lagged dependent variable (ANCOVA). Depending on the column the dependent variables are defined by the following. (1): index of equally-weighted variables recording as 1 the most extreme positive answer to the scale 1 'Definitely false,' 2 'False,' 3 'Don't know,' 4 'True,' 5 'Definitely true' in response to the following statements: 'I am always courteous even to people who are disagreeable;' 'There have been occasions when I took advantage of someone' [Reversed]; 'I sometimes try to get even rather than forgive and forget' [Reversed]; 'I sometimes feel resentful when I don't get my way' [Reversed]; 'No matter who I'm talking to, I'm always a good listener.' (2): variable that takes the values 1 'Never (0 days),' 2 'Once (1 days),' 3 'Some days (2-3 days),' 4 'Most days (4-6 days),' 5 'Every day (7 days)' in response to the question: 'In the past 7 days, how often did members of your household go to a market or food store?' (3): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'In the past 7 days, have you attended church or mosque, or gathered with people from outside your household to pray?', and 0 otherwise. (4): indicator variable that takes value 1 if respondent answered 'More' to the question: 'In the past 7 days, have you washed your hands with soap and water more often, less often, or about the same as you did before government closed schools?' (answers available: 'Less,' 'Same,' 'More,' 'Don't know'), and 0 otherwise. (5): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'In the last 7 days have you always worn a face mask or other nose/mouth covering when going out in public?', and 0 otherwise. (6): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'Has any member of your household ever received any vaccination drops in the mouth to protect (him/her) from polio?', and 0 otherwise. (7): indicator variable that takes value 1 if respondent answered 'Yes' to the question: 'If you had a newborn in the household would you want to vaccinate him/her against polio?', and 0 otherwise. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table E4: Behavioral text messages

	Subscribed to information service on COVID-19 (1)	Total number of text messages to Ministry of Health (2)	Total number of text messages to debunk fake news (3)
T1	-0.066	0.152*	0.071
	(0.046)	(0.087)	(0.082)
T2	-0.056	0.121	0.142
	(0.054)	(0.101)	(0.134)
T3	-0.114**	0.050	0.166*
	(0.057)	(0.091)	(0.097)
N	698	698	698
Mean dep. variable (control)	0.495	0.288	0.234
Controls	Duration	Duration	Duration
Baseline	NO	NO	NO
R^2	0.070	0.044	0.049
Equality of treatment effects (p-values):			
T1=T2	0.860	0.730	0.533
T1=T3	0.305	0.212	0.238
T2=T3	0.209	0.400	0.823
T1=T2=T3=0	0.240	0.300	0.396

Note. Estimates based on OLS regressions. Columns (1)–(4) present estimates using equation (1). (1): indicator variable that takes value 1 if respondent answered "Yes" to the invitation to subscribe to the COVID-19 vaccine information service, and 0 otherwise. (2): total number of text messages received in response to the invitation to send feedback to the Ministry of Health on its management of the pandemic situation. (3): total number of text messages received in response to the invitation to send unverified information to be debunked to specific phone numbers. The full list of controls is presented in Section 3. Standard errors (reported in parentheses) are clustered at the enumeration area level. Significance level: *** p<0.01, ** p<0.05, * p<0.1.