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The Power of Faith: Effects of an Imam-led Information Campaign on Labor Supply and Social Interactions

Alexandra Avdeenko[1]
Jakob Gärtner[2]
Marc Gillaizeau[3]
Ghida Karbala[4]
Laura Montenbruck[5]
Giulia Montresor[6]
Atika Pasha[7]
Galina Zudenkova[8]

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[1] World Bank, J-PAL, and Heidelberg University, Email: aavdeenko@worldbank.org
[2] World Bank and Heidelberg University, Email: jgaertner@worldbank.org
[3] World Bank and Center for Evaluation and Development, Email: marc.gillaizeau@live.fr
[4] Independent consultant, Email: ghida.karbala@outlook.com
[5] Stockholm University (Corresponding author), Email: laura.montenbruck@su.se
[6] University of Verona, Email: giulia.montresor@univr.it
[7] Center for Evaluation and Development, Email: pasha@c4ed.org
[8] TU Dortmund University and CEPR, Email: galina.zudenkova@gmail.com

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The Power of Faith: Effects of an Imam-led Information Campaign on Labor Supply and Social Interactions

Alexandra Avdeenko[*] Jakob Gärtner[†] Marc Gillaizeau[‡] Ghida Karbala[§]

Laura Montenbruck[¶] Giulia Montresor[‖] Atika Pasha[**] Galina Zudenkova[††]

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Abstract

We conduct a randomized controlled trial in rural Pakistan, comparing the effects of a remote awareness campaign with and without Imam-led loudspeaker endorsements on strategies to contain disease spread. Our results show that labor supply and social interactions decrease significantly only when religious leaders support the campaign, particularly among men. These results cannot be explained by differences in the mode or frequency of treatment across groups. Our findings—compatible with predictions from a model that analyzes the individual trade-off between prevention benefits and losses from forgone income—highlight the critical role of religious figures in shaping public responses to health crises.

JEL-Codes: I12, I18, D80, D81, O10, Z12

[*]World Bank, J-PAL, and Heidelberg University (aavdeenko@worldbank.org)
[†]World Bank and Heidelberg University (jgaertner@worldbank.org)
[‡]World Bank and Center for Evaluation and Development (marc.gillaizeau@live.fr)
[§]Independent consultant (ghida.karbala@outlook.com)
[¶]*Corresponding author*. Stockholm University (laura.montenbruck@su.se)
[‖]University of Verona (giulia.montresor@univr.it)
[**]Center for Evaluation and Development (pasha@c4ed.org)
[††]TU Dortmund University and CEPR (galina.zudenkova@gmail.com)

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1 Introduction

The effectiveness of information campaigns in shaping individual behavior hinges on the credibility and persuasiveness of the source of information. This is especially important in times of crises such as pandemics, when information is spread through a variety of channels, and individuals have to decide whom to trust. In many developing countries, skepticism towards governmental and health authorities undermines their ability to guide individuals' decisions on the adoption of health-beneficial behavior (Christensen et al., 2021). Religious institutions, on the other hand, enjoy widespread trust and have substantial influence over their adherents' beliefs and behavior (Stroebel and van Benthem, 2012; Bassi and Rasul, 2017; Condra et al., 2019; Moreno-Medina, 2023). Their role may be of particular importance during times of hardship, when the number of individuals practicing their religion increases as people seek solace in faith (Belloc et al., 2016; Bentzen, 2021).

In this study, we investigate whether information spread by religious leaders can effectively change individuals' attitudes towards health risks and their compliance with recommended health measures. We conduct a randomized controlled trial with NGO-beneficiaries from 886 rural villages in Pakistan, testing the effectiveness of a remote awareness campaign and its endorsement by religious leaders in the context of the COVID-19 pandemic. We randomly allocate each village to one of three experimental groups. Individuals in the respective villages either receive no information at all (control group), an information call by representatives of the NGO (*phone* group), or an information call by representatives of the NGO as well as loudspeaker announcements by Imams in their village, endorsing the content of the information call (*phone plus loudspeaker* group). During the awareness call, individuals receive information about the characteristics of the virus, as well as potential measures to protect oneself and others against an infection. The loudspeaker announcements are an abbreviated version of the call, summarizing the most important information.

We test the effects of the two treatments as compared to the control group, as well as compared to each other, on three main outcomes of interest: labor supply, social interactions, and the use of preventive measures. To get a better understanding of the channels leading to changes along these dimensions, we further look at the effects of the treatments on knowledge about the virus, as well as beliefs related to the likelihood of getting infected or infecting others, the severity of the virus, and the cost related to an infection. We measure these outcomes making use of information gathered during our endline survey, approximately two months after the treatment.

Our results show that the phone campaign endorsed by religious leaders via mosque loudspeakers led to a significant drop in labor supply. Individuals assigned to the *phone plus loudspeaker* treatment are 4.2 percentage points less likely to have worked outside home in the seven days prior to the endline interview—an 11% decrease as compared to the control group. The effect is driven by male individuals, who are ex ante substantially more likely to work than women, in particular outside home (50% versus 26%, respectively). In response to the treatment,

their likelihood of having worked outside home decreases by 4.8 percentage points as compared to a control group mean of 60%, and they work about half a workday per week (14%) less on average. We observe no changes in labor activity among women. Similarly, we find that male individuals in the *phone plus loudspeaker* group significantly decrease social interactions. We detect no changes in the use of preventive measures such as mask-wearing or hand-washing.

To rationalize our empirical findings, we introduce a parsimonious conceptual framework that analyzes individual decision-making with regard to labor supply—where most of the social interaction happens, especially for men—and (other) social activities during a health crisis. On the one hand, social distancing lowers infection and transmission chances and thus prevents the spread of the disease. On the other hand, it leads to losses from foregone labor income and disutility from foregone social activities and is thus practiced only when individuals believe in its effectiveness. The more credible and trustworthy the information about infection and transmission probabilities, treatment costs, and disease severity, the more adjustments of labor supply and social activities the model predicts, offering a rationale for the reported effects of the phone intervention publicly endorsed by religious leaders via loudspeaker announcements.

In line with the model, we find that the effects of the awareness campaign endorsed by religious leaders on labor supply and social interactions differ significantly from those of the awareness campaign alone, for which we detect no significant effects on behavior. This suggests that the campaign endorsement by religious leaders was indeed critical in generating the observed behavioral adjustments. The statistically significant difference in the effect sizes of the *phone plus loudspeaker* and the *phone* treatment emphasizes this finding. In response to concerns that additional messages distributed by Imams may affect outcomes through a reminder effect rather than through the credibility of the messenger, we provide additional suggestive evidence in support of our hypothesis. First, we find no evidence that differences in treatment intensity within the *phone plus loudspeaker* group affect outcomes. Second, we show that the effects of the treatment differ along the intensive margin of religiosity. Finally, information from our endline survey indicates a significant presence of information campaigns (implemented via both phone and loudspeakers) in our study area, reaching individuals across all experimental groups. However, individuals in the *phone plus loudspeaker* group are substantially more likely to report that announcements were made at a mosque, suggesting that our findings are indeed driven by the identity of the messenger. While these results do not rule out that a reminder effect may contribute to the magnitude of our results, they do help to illustrate that the identity of the information source plays a crucial role in generating the observed effects.

To get a better understanding of the mechanisms driving the behavioral adjustments outlined in the model, we consider the campaign's effects on knowledge and beliefs about the virus. While male individuals significantly adjust both labor supply and social interactions, these effects do not seem to be accompanied by changes in knowledge about the virus. Rather, the effects appear to be driven by increased concerns about the risk of transmitting the virus to others, suggesting a prosocial motive for changes in behavior. Among female individuals, on the other

hand, the *phone plus loudspeaker* treatment significantly increases knowledge, but this does not translate into adjustments of behavior. This absence of an effect may be partly due to a large and significant decrease in the perceived cost of getting infected among female respondents.

Our paper makes contributions to three strands of the literature: on the relationship between religion and economic outcomes, on the role of local elites, and on the effectiveness of information interventions in the context of widespread health crises. Previous work has shown that religious institutions can influence a wide array of outcomes, ranging from the economic and social, to the political sphere. This includes aspects such as criminal behavior (Sharma, 2017; Moreno-Medina, 2023), drinking and drug use (Gruber and Hungerman, 2008), human capital (Gruber, 2005; Becker and Woessmann, 2009), fertility and marital choices (Gruber, 2005; Bassi and Rasul, 2017), and political attitudes and participation (Basten and Betz, 2013; McClendon and Riedl, 2015; Freedman, 2020; Sperber and McClendon, 2022).[1] Most closely related, Stroebel and van Benthem (2012) find that the appointment of a local bishop with pro-contraception attitudes in Kenya substantially increased the use of condoms among Catholic married couples. Bassi and Rasul (2017), on the other hand, illustrate how persuasive messages related to fertility during Papal speeches in Brazil increased fertility in the long run, showing that the influence of religious leaders can go both ways. We contribute to this literature by providing evidence that messages distributed by religious leaders affect health-related beliefs *and* choices beyond fertility, the health choice most closely linked to religious doctrine.

Second, our paper adds to the literature on local elites and power holders in the context of low state capacity. Existing research studies the role of such elites in the implementation of local development projects (Dasgupta and Beard, 2007; Labonne and Chase, 2009; Beath et al., 2017; Casey et al., 2023), education (Reinikka and Svensson, 2004), local governance (Acemoglu et al., 2014; Sánchez de la Sierra, 2020), and with respect to land rights (Banerjee and Iyer, 2005; Goldstein and Udry, 2008). Much of this literature focuses on the potential negative effects of elites through elite capture (Bardhan, 2002; Bardhan and Mookherjee, 2006). By contrast, Sánchez de la Sierra (2020) finds that governance by local armed forces can have welfare-improving effects. Similarly, Balán et al. (2022) show how local elites can support the state in effectively implementing property tax collection. Most closely related to our own research, Vyborny (2021) shows how religious leaders can take on a crucial role in supporting the government in the implementation of policies aimed at containing the spread of the COVID-19 virus.[2] Her work looks at the effects of engaging with religious leaders on their likelihood

[1] Other dimensions studied in previous work are income (Gruber, 2005; Bryan et al., 2020), tax morale (Torgler, 2006), donations (Condra et al., 2019; Auriol et al., 2020), values of equality and harmony (Clingingsmith et al., 2009), attitudes towards immigrants (Ben-Nun Bloom et al., 2015), as well as economic growth (Campante and Yanagizawa-Drott, 2015; Cantoni, 2015) more broadly. In a recent contribution, Becker et al. (2024) unify this literature and present a framework that incorporates religion as an important factor which can either enhance or impede economic growth.

[2] Relatedly, Seabright and Raiber (2020) shows that increased offers of online church activities during the pandemic are positively correlated with the local pandemic situation in the US. This suggests that religious institutions could play an important role in supporting government policy during health crises not only in low, but

to inform congregants about governmental COVID-19 rules at mosques. Our research adds to these findings by highlighting the effects of a successfully implemented information campaign by religious leaders on individuals' beliefs and behavior related to the virus.

Lastly, we contribute to a growing body of work on the determinants of the effectiveness of information campaigns as key containment strategies in the context of health hazards such as the COVID-19 virus.[3] Research has shown that trust in the source of information plays a crucial role for the successful uptake of preventive behaviors by the public at large. Empirical evidence suggests that local influential figures may serve as key trustworthy disseminators of public health information—such as immunization reminders (Banerjee et al., 2019, 2021; Alatas et al., 2024) and COVID-19 preventive measures (Banerjee et al., 2020; Solís Arce et al., 2021; Vyborny, 2021)—to their communities. Religious leaders, who have substantial influence over adherents and credibility within their communities, may be particularly valuable partners in the implementation of public health efforts. During the 2014–2016 Ebola pandemic, religious leaders in Sierra Leone advocated for protective health practices such as hand-washing and safe burials (Greyling et al., 2016). Vyborny (2021) shows that one-to-one engagement with religious leaders motivates them to promote government policies to contain the spread of COVID-19 during religious gatherings.[4] On the outcome side, Abaluck et al. (2022) show that a combined mask distribution and promotion intervention featuring a religious component significantly increased mask use and reduced symptomatic COVID-19 infections. The study does, however, not look at the impact of communication by religious leaders separately. Relatedly, Armand et al. (2022) find that signalling social proximity—such as religious concordance—between the source and receiver of information helps dispel myths and misinformation in the context of the COVID-19 outbreak, thus contributing to the effectiveness of information campaigns. To the best of our knowledge, our study is the first to investigate the effects of public health information spread by influential religious figures on preventive behavior. In particular, we show that receiving messages by religious leaders significantly decreased labor supply and social interactions during the COVID-19 pandemic.

also in high capacity settings.

[3]While we focus here on information interventions specifically related to disease containment, scholars have shown that information can have positive effects along a variety of health-related dimensions, including the use of water purification (Ashraf et al., 2013), responses to maternal health risks (Ashraf et al., 2023), and risky sexual behavior (Dupas et al., 2018).

[4]While religious leaders can have substantial positive effects on the adoption of health-beneficial behavior, their role hinges on their support for the respective health measures. If they are skeptical of certain campaigns, their widespread influence has the potential to provoke behavior with adverse health effects. For instance, Jegede (2007) illustrates how conspiracy theories spread by religious leaders in Northern Nigeria led to a boycott of the Polio vaccination campaign. Similarly, Martinez-Bravo and Stegmann (2022) shows that an anti-vaccine propaganda campaign by the Taliban in Pakistan led to significant declines in immunization rates.

2 Background and Experimental Design

Our study was implemented during the COVID-19 pandemic in two provinces of Pakistan, Punjab and Sindh. In this setting, religion plays a major role. 97% of the population are Muslim and the vast majority of individuals (90%) considers religion to be very important in their lives (Pakistan Bureau of Statistics, 2017b; Haerpfer et al., 2022). Not surprisingly, a high level of trust in religious institutions and authorities is almost universal (97%) (Haerpfer et al., 2022). At the same time, trust in secular institutions is much lower. According to the latest wave of the World Value Survey in 2020, 53% of the respondents have little to no confidence in political parties (Haerpfer et al., 2022). Potentially even more important in the context of a global health crisis, only 39% of the interviewed individuals report having at least some confidence in the World Health Organization (WHO), and the vast majority (94%) agrees with the statement that, whenever science and religion conflict, religion is always right (Haerpfer et al., 2022). These facts emphasize the crucial role of religious institutions in shaping individuals' attitudes and behavior and highlight the importance of their support in effectively implementing containment strategies.

In Pakistan, the first COVID-19 cases were confirmed in March 2020, with local transmission rapidly spreading in densely populated cities. While the initial responses of Pakistan's provincial governments varied, a nationwide lockdown was imposed starting March 24, 2020, and lifted in phases beginning May 9, 2020.[5] In cooperation with the National Rural Support Program (NRSP), a local NGO, we implemented a COVID-19 awareness campaign in the time period between September and November 2020, after the first peak of cases.[6]

NRSP currently works with more than 3.5 million poor, primarily rural, households. To implement this project, NRSP provided us with all available phone numbers of their beneficiaries in Punjab and Sindh—more than 50,000 in total. We grouped these individuals geographically by revenue village, with the goal of interviewing around 15 randomly selected beneficiaries per village at baseline.[7] During the baseline survey, enumerators collected information on the socio-economic characteristics and health status of the respondents and their household members, their knowledge and perceptions related to COVID-19, as well as any preventive measures taken by the respondents or their household members. This data was collected between August and

[5]The authorities developed the National Action Plan for COVID-19 that provided guidelines for priority testing, social distancing, quarantine facilities, and standard operating procedures for events such as Ramadan, Eid, gatherings, ceremonies, and marriages. Further guidelines were also specified for educational institutions, tourism services, and air transportation.

[6]See https://coronavirus.jhu.edu/region/pakistan for an overview of COVID-19 cases in Pakistan over time.

[7]A revenue village is the smallest unit in the administrative hierarchy of Pakistan, with a median population of 2,259 inhabitants in the study area (Pakistan Bureau of Statistics, 2017a). We excluded all revenue villages for which less than 20 beneficiary phone numbers were available prior to the baseline survey. For the remaining revenue villages, the response rate to our baseline call lies at 39.5%. Since we do not have any pre-baseline information on the beneficiaries, we cannot, however, investigate whether selection into responding to our baseline call is correlated with respondent characteristics.

October, 2020.

We randomized each revenue village into one of three treatment conditions.[8] Out of a total of 904 villages, one third was randomly assigned to a pure control group, in which individuals received no awareness intervention at all. Three quarters of the remaining villages were allocated to receive awareness messages transmitted via phone calls only, and one quarter was allocated to receive COVID-19 loudspeaker announcements by religious leaders in addition to awareness phone calls.[9] The randomization was successful in generating a well-balanced sample with respect to the main baseline characteristics, with minor imbalances in terms of respondents' experiences with individuals being treated badly because of a COVID-19 infection, their beliefs about traditional healers being able to treat COVID-19, and their perceptions about the cost associated with contracting the COVID-19 virus. We summarize the experimental design in Table 1 and show randomization balance in Appendix Table B.1.

Table 1: Experimental Design

	Randomization		Endline		Final sample	
	Villages	Individuals	Villages	Individuals	Villages	Individuals
	(1)	(2)	(3)	(4)	(5)	(6)
Phone	452	5,399	448	3,399	445	3,183
Phone + loudspeaker	150	1,896	148	1,187	147	1,112
Control	302	3,640	297	2,344	294	2,188
Total	904	10,935	893	6,930	886	6,483

Notes: Columns (1) and (2) show the number of villages and individuals randomly assigned to the three experimental groups after the baseline survey. Columns (3) and (4) show the number of villages and individuals who responded to the endline survey. Columns (5) and (6) show the number of villages and individuals in the final sample, i.e., all individuals for whom we have information on the three main outcome indices (labor supply, social interactions, and preventive measures) at both baseline and endline. Changes in the amount of villages across stages reflect individual level attrition in villages with very few respondents to begin with. On average, villages which are not included in the final sample had four baseline respondents, as compared to thirteen in villages included in the final sample.

Our project included two additional experimental variations that we do not study independently in this paper. First, individuals in both the *phone* and the *phone plus loudspeaker* group were cross-randomized on the individual level to receive one of five different types of awareness calls. Whereas everyone received basic information about the virus, four out of five groups additionally received information with respect to either the severity of the virus, the risk of infection, the risk of infecting others, or the cost related to contracting the virus. We abstract from this variation and consider only the average effect of having received any type of awareness

[8]Prior to randomization, we excluded all individuals who did not consent to participating in any further interviews as well as individuals with disproportionally much missing information at baseline (above the 99th percentile).

[9]Due to budget as well as time constraints among the implementing staff, we could allocate only a smaller fraction of villages to the combined phone and loudspeaker treatment arm.

message.[10] Second, in a random third of the *phone plus loudspeaker* villages, NRSP employees additionally distributed COVID-19 information posters in public spaces. We control for assignment to the poster treatment throughout the regressions presented in this paper.

Awareness Phone Calls Our awareness calls consisted of (1) an introduction to what COVID-19 is and how it is transmitted, (2) a description of the main risk groups and symptoms of COVID-19, (3) information on recommended preventive behavior including hygiene practices, social distancing, and wearing of a mask, and (4) recommendations on how to react in case the respondent suspects that they or a household member are infected with the virus. The content was developed by the research team in Germany, and contextualized by local partners based in Pakistan. The campaign provided information circulated by reliable sources (e.g., the World Health Organization (WHO), University College London, John Hopkins Medicine, and the Center for Disease Control and Prevention), used simplified terms, and was available in Urdu and Sindhi, the two local languages spoken in the study area. The complete message scripts can be found in Appendix A. The awareness phone calls lasted 15 to 20 minutes and were conducted by trained employees of our local partner NRSP. To keep the respondents' attention, the call was designed in an interactive way, stopping and asking questions at times, and repeating information where necessary. Our monitoring data shows that we reached approximately 74% of all individuals assigned to receive an awareness call.

Awareness Loudspeaker Announcements Mosque loudspeakers are conventionally used in the study area to disseminate information to the public. This way of communication allows spreading messages widely without involving personal interaction. We mobilized Imams to make COVID-19 related announcements via mosque loudspeakers in 147 treated villages. Our implementing partner, NRSP, engaged its social mobilization staff to identify two community activists per village to interact with the Imams and convince them to make the announcements.[11] The community activists explained the content of the message to the religious leaders and, in cooperation with other community members, ensured its delivery via loudspeakers. The messages can be understood as a brief summary of the content transmitted during the phone calls.[12] The announcements, conducted on average twice per day on four days a week, were scheduled between noon and afternoon, especially on Jummah (the Friday Prayer), an important day of prayer for Muslims.

According to NRSP's monitoring statistics, the announcements were completed in every assigned village. As reported in Table 2, an average of 147 announcements were made per village in the course of the implementation period, which lasted approximately 22 days. On

[10] We do not control for the specific treatment message in our main specification, but discuss the robustness of our results to the inclusion of this indicator in Section 5.3.

[11] Community activists are members of the community who had worked with NRSP in the past and provided support for implementing various projects before our intervention.

[12] See Appendix A for the complete loudspeaker script.

Table 2: Descriptive Statistics on the Implementation of Loudspeaker Announcements

	Mean (1)	SD (2)	Min. (3)	Max (4)
# of announcements made per village	146.96	114.15	12	672
# of mosques/ places covered with announcements per village	6.58	4.89	1	28
# of days announcements were conducted in a village	21.66	4.02	11	26
# of villages covered with announcement per week	138.04	15.17	111	150
# of announcements made per village per week	24.88	22.19	0	112

Notes: The table reports summary statistics from the monitoring data on the implementation of loudspeaker announcements.

average, 25 announcements were delivered per week in 7 mosques per village.[13] As visible from the summary statistics, there is substantial variation in the amount of announcements made across villages. This likely reflects differences in the NGO's ability to engage with local religious leaders and motivate them to support the awareness campaign, and suggests that treatment intensity differs across villages assigned to the *phone plus loudspeaker* treatment. While we are unable to causally identify the effect of this variation due to its endogeneity, we will present heterogeneity analyses by treatment intensity to get a better idea of the correlation between treatment intensity and our outcomes of interest.

Following the implementation of our awareness campaign, we conducted an endline survey with individuals in both the treatment and control groups. The survey took place between December 2020 and January 2021, on average two months after the awareness call for treated individuals. We used this survey to elicit information about the main outcomes of interest, namely labor supply, social interactions, and preventive measures, as well as perceptions related to the COVID-19 virus. For consistency, in our final analysis, we include only those individuals for whom we have information on the three main behaviors related to the prevention of a COVID-19 infection at both baseline and endline.[14]

[13]We also ask individuals about both awareness calls and loudspeaker announcements they received at endline. We show descriptive statistics on self-reported take-up of such interventions—either by NRSP or another organization—by treatment group in Appendix Table B.2. While there is no significant difference across experimental groups with respect to the likelihood or recalling a COVID-19 related call, individuals assigned to the *phone* and *phone plus loudspeaker* treatments are significantly more likely to report having received information about the symptoms and transmission of, and preventive measures against, COVID-19 during such a call. Importantly, individuals in the *phone plus loudspeaker* treatment are also significantly more likely to report having received information via loudspeaker announcements made at a mosque.

[14]We present balance results for the final sample in Appendix Table B.3. The final sample is well-balanced across the main characteristics with few exceptions, in particular age, the perceived cost of getting infected, and individuals' knowledge with respect to traditional healers' ability of curing the COVID-19 virus.

3 Descriptive Statistics and Measurement

Descriptive Statistics Table 3 presents summary statistics for a wide range of baseline characteristics and baseline levels of COVID-19 related knowledge, perceptions, and behavior for the overall sample, as well as the male and female subsamples, respectively.

The average respondent is around 38 years old, male, completed four years of education (4^{th} grade), and either took on daily-wage jobs—e.g., construction work, factory work, or street vending—or did not work in the seven days preceding the baseline survey.[15] The average household has eight members, and average reported income in the seven days prior to the interview amounts to 841 Pakistan Rupees, then approximately 5.1 US dollars.[16]

At baseline, 86% of respondents reported to know the symptoms of COVID-19. The most widely known preventive measures included washing hands with soap (79%), wearing face masks (58%), and maintaining two meters distance from others (50%). Half of respondents thought they would die or recover with severe health damage if infected. Yet, only 29% of respondents had moderate to high concerns about getting infected, and 41% about infecting others.

The most widely practiced preventive measure was frequent and thorough hand-washing (76%), followed by wearing a face mask (45%) and maintaining two meters distance from others (40%). On average, 23% of respondents left their village in the seven days prior to the interview. 71% went to the market (respondents themselves or another household member), and 56% went to a religious institution. Finally, 38% of respondents worked outside home in the seven days prior to the survey, for on average five days.

The gender-differentiated baseline summary statistics reveal that at baseline, a considerably higher share of male, as compared to female, respondents had visited a mosque, church, or mandir in the seven days prior to the interview (75% versus 35%). Similarly, the labor behavior at baseline differs substantially between male and female respondents, with male individuals having worked substantially more frequently outside home than female individuals (50% versus 26%).

Outcome Measurement We aim to test the awareness campaign's impact on individuals' preventive behavior, knowledge, and perceptions related to the COVID-19 virus. In particular, we are interested in potential effects on labor supply, social interactions, and the use of preventive measures. To look at these topics, we make use of self-reported data from our endline survey.

[15] Based on our survey questions, we are unable to distinguish between individuals who did not work in the seven days prior to the baseline interview, but are otherwise active in the labor market—i.e., individuals who would likely be considered daily wage laborers—and inactive individuals. Non-daily wage laborers were employed as/in: skilled labor, personal business, self-cultivator/own farm, cultivation on contract, cultivation on partnership/share cropper, family helper, employer/business, livestock only.

[16] The conversion is based on the average exchange rate between August and October 2020—the three months in which baseline interviews were conducted—taken from https://www.exchangerates.org.uk.

Table 3: Baseline Characteristics

	Overall sample					Male subsample					Female subsample				
	Mean	SD	Min.	Max.	#	Mean	SD	Min.	Max.	#	Mean	SD	Min.	Max.	#
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A: Respondent Characteristics															
Panel B: COVID-19-related Knowledge															
Panel C: COVID-19 Perceptions															
Panel D: COVID-19-related Behavior															
Preventive measures															
Social interactions															
Labor supply															

Notes: The table reports summary statistics for the final samples used in the analysis. Columns (1) to (5) reports the mean, standard deviation, minimum value, maximum value, and number of observations for the overall sample, columns (6) to (10) for the male subsample, and columns (11) to (16) for the female subsample. Missing observations are due to respondents indicating that they do not know the answer to a question or do not wish to reply to a question (overall sample size: N = 6,483).

For each outcome of interest, we construct an index that combines several related variables. Following Kling et al. (2007), we build these indices in two steps. First, we standardize each variable by subtracting its control group mean and dividing by its control group standard deviation. We then compute a simple average of all standardized components of an index by summing the respective values and dividing by the number of components of an index.[17]

We construct three indices to investigate the effects of the treatment on individuals' behavior related to the virus. The *labor supply index* contains information about the frequency with which a respondent worked outside home in the week prior to the interview. The *social interactions index* combines information on visits received by the respondent, their participation in social and religious gatherings, market visits, and their handling of social interactions more generally. The *preventive measures index* includes information on the use of masks, hand-washing, and distancing of at least two meters as a means to reduce the risk of infection. Each of these indices increases in the extent to which an individual takes measures to contain the spread of COVID-19, i.e., with decreasing labor supply and social interactions, and increasing preventive measures.

To explore the effects on *knowledge*, we construct an index that measures an individual's level of information about the symptoms and transmission channels of COVID-19, as well as potential measures to prevent an infection. This index is larger the more informed an individual is. Finally, we want to explore changes in beliefs related to the virus. We use two indicator variables to capture whether an individual has moderate or high concerns about *getting infected* or *transmitting* COVID-19, respectively. To look at the *perceived cost of an infection*, we construct an index that combines information on the expected time necessary for recovery, as well as the estimated cost of treatment and foregone income due to time spent without working. Finally, we look at an indicator for the *perceived severity* of the virus, capturing whether individuals believe that one would die or recover from an infection with severe health damages, as compared to recovering fully or with less severe consequences. The three dummy variables and the index increase in the perceived risk of infection and transmission, the perceived cost of an infection, and the perceived severity of the virus. A complete list of the variables used in the construction of all indices can be found in Appendix Table B.4.[18]

Estimation Strategy To analyze the effects of our awareness campaign, we estimate the following equation using OLS:

$$Y_{iv} = \beta_0 + \beta^{ph} T_{iv}^{ph} + \beta^{ph\&ls} T_{iv}^{ph\&ls} + \eta X_{iv0} + \zeta + \epsilon_{iv}, \tag{1}$$

[17]Prior to standardization, all components of an index are coded such that a higher value can be interpreted in a consistent way. For example, in the labor index, all components are recoded such that a higher number reflects lower labor supply.

[18]Unless explicitly indicated, we include the single variables pre-specified in the pre-analysis plan (PAP). Wherever we do not have multiple outcomes of interest on one topic, we use the outcome variables without standardizing them.

where i indexes the phone number called to reach the respective individual and v indexes the revenue village.[19] T_{iv}^{ph} is an indicator for villages that were assigned to receive the awareness campaign via phone calls only, whereas $T_{iv}^{ph\&ls}$ is an indicator for villages assigned to the awareness campaign via phone calls and loudspeaker announcements. Hence, β^{ph} and $\beta^{ph\&ls}$ estimate the intention to treat (ITT) effects of the two treatment arms on the respective outcome of interest (Y_{iv}). X_{iv0} corresponds to a matrix of covariates that includes the baseline values of those village- and individual-level variables that were used in the randomization procedure, an indicator for whether a village was assigned to the poster treatment, as well as a variable capturing the baseline level of Y_{iv}. ζ represents enumerator fixed effects. Finally, standard errors are clustered at the village level.

4 Conceptual Framework and Hypotheses

In this section, we introduce a parsimonious analytical framework to formally analyze labor market behavior among the poor, who derive utility from consumption and social interactions, and incur health disutility from getting infected and transmitting the virus to their family members.

Consider a laborer who supplies labor l, where $0 \leq l \leq \bar{l}$, and gets labor earnings wl to consume, where w stands for their wage. Their utility from consumption is denoted by $U(wl)$, where $U'(\cdot) > 0$ and $U''(\cdot) < 0$. Furthermore, they participate in social interactions and activities s, where $0 \leq s \leq \bar{s}$, from which they derive utility $V(s)$, where $V'(\cdot) > 0$ and $V''(\cdot) < 0$.

The laborer can contract the COVID-19 virus and incur a health disutility α. Moreover, they can transmit the virus to their family members who, in turn, incur a health disutility β. One can think of α and β as any health damages and/or monetary costs (determined by the severity of the infection and/or the cost of getting treated) they and their relatives would undergo in this case.

To avoid health disutilities from contracting and transmitting the virus, the laborer can take preventive measures, such as mask-wearing and/or hand-washing. The intensity of their prevention effort is captured by the variable m, where $0 \leq m \leq \bar{m}$. The total cost incurred by the worker for taking these measures is given by $C(m)$, where $C'(\cdot) > 0$ and $C''(\cdot) > 0$.

We denote by $P(l, s, m)$ the laborer's probability of getting infected and incurring health disutility α and by $Q(l, s, m)$ their probability of getting infected and transmitting the virus to their family members, who subsequently incur health disutility β. $P(l, s, m)$ and $Q(l, s, m)$ are continuous and differentiable in all arguments, and increase with exposure to the virus (determined by the laborer's labor supply l and social interactions s), and decrease with the amount of preventive measures m they take, i.e., $P'_l(\cdot) > 0$, $P'_s(\cdot) > 0$, $P'_m(\cdot) < 0$, and

[19] We attempt to reach the same individuals over time and implement several checks to identify the respondent who gave consent to the research study. In practice, we are only certain that the same number was called. In some instances it may thus have happened that different individuals picked up the phone during the baseline, the awareness, and the endline call. To simplify notation, we will refer to individual-level observations while we actually capture contact-level observations attempting to verify whether we speak to the same individual over time.

$Q'_l(\cdot) > 0$, $Q'_s(\cdot) > 0$, $Q'_m(\cdot) < 0$. We assume increasing marginal probabilities of infection and transmission to capture the notions that a longer exposure to the virus makes every additional exposure more dangerous, and that the effectiveness of additional preventive measures falls as more measures are taken, i.e., $P''_{ll}(\cdot) > 0$, $P''_{ss}(\cdot) > 0$, $P''_{mm}(\cdot) > 0$, and $Q''_{ll}(\cdot) > 0$, $Q''_{ss}(\cdot) > 0$, $Q''_{mm}(\cdot) > 0$.

Initially the laborer has no ex-ante information about the exact levels of health disutilities α and β. We denote by $\tilde{\alpha}$ and $\tilde{\beta}$ their perceptions thereof. Neither do they have any ex-ante information about the probabilities of infection, $P(\cdot)$, and transmission, $Q(\cdot)$. We denote the perceived probabilities by $\tilde{P}(\cdot)$ and $\tilde{Q}(\cdot)$, respectively, and assume that they satisfy the same properties as $P(\cdot)$ and $Q(\cdot)$.

Suppose next that the laborer receives a signal about the actual health disutilities α and β from contracting and transmitting the virus, as well as about the actual probabilities $P(\cdot)$ and $Q(\cdot)$ of infection, transmission, and subsequent incurrence of these disutilities. With probability $r \in [0, 1]$, the laborer perceives the source of the signal as credible and thus interprets the signal as informative and fully revealing the actual expected health disutilities $P(\cdot)\alpha$ and $Q(\cdot)\beta$. Otherwise, with the remaining probability $1 - r$, they perceive the information source as non-credible and so regard the signal as non-informative, transmitting no information about the actual disutilities.

Upon reception of the signal, the laborer chooses their labor supply l, the amount of social interactions s, and the level of preventive measures m to maximize their net expected payoff. Given their ex-ante perceptions and the signal information, this amounts to their utilities from consumption and social interactions, the cost of taking preventive measures, and the actual and perceived expected health disutilities from contracting the virus and transmitting it to their family members:

$$\max_{l,s,m} \quad U(wl) + V(s) - C(m) - r\left(P(l,s,m)\alpha + Q(l,s,m)\beta\right) - (1-r)\left(\tilde{P}(l,s,m)\tilde{\alpha} + \tilde{Q}(l,s,m)\tilde{\beta}\right)$$

The first-order conditions are given by

$$\begin{aligned}
U'(wl)w &= r\left(P'_l(l,s,m)\alpha + Q'_l(l,s,m)\beta\right) + (1-r)\left(\tilde{P}'_l(l,s,m)\tilde{\alpha} + \tilde{Q}'_l(l,s,m)\tilde{\beta}\right) \\
V'(s) &= r\left(P'_s(l,s,m)\alpha + Q'_s(l,s,m)\beta\right) + (1-r)\left(\tilde{P}'_s(l,s,m)\tilde{\alpha} + \tilde{Q}'_s(l,s,m)\tilde{\beta}\right) \\
-C'(m) &= r\left(P'_m(l,s,m)\alpha + Q'_m(l,s,m)\beta\right) + (1-r)\left(\tilde{P}'_m(l,s,m)\tilde{\alpha} + \tilde{Q}'_m(l,s,m)\tilde{\beta}\right)
\end{aligned}$$

The laborer's net expected payoff is concave in l, s, and m. Assuming an interior optimum, their optimal choices denoted by l^*, s^*, and m^* are therefore characterized by the aforementioned first-order conditions. Intuitively, the first-order conditions require the laborer to equalize the expected marginal benefits from reducing health disutility (by decreasing labor supply and social interactions while increasing preventive measures) to the marginal costs of this reduction. The latter comprises the marginal disutilities from forgone labor earnings (and thus forgone

consumption) and forgone social interactions, as well as the marginal cost of taking preventive measures. The more credible the laborer perceives the source of information, i.e., the higher r, the more likely they are to respond to actual—rather than perceived—expected health disutilities to optimally reduce health risks for themselves and their family members.

We assume furthermore that the actual expected marginal health disutilities exceed the laborer's perceived expectations, i.e., the following inequality holds for every triple (l, s, m):

$$P'_k(l, s, m)\alpha + Q'_k(l, s, m)\beta > \tilde{P}'_k(l, s, m)\tilde{\alpha} + \tilde{Q}'_k(l, s, m)\tilde{\beta},$$

where $k = l, s, m$. In other words, the laborer's ex-ante perceptions fall below the actual expected marginal health disutilities. Thus, upon reception of a credible signal, they face stronger incentives to decrease labor supply or social interactions, or increase preventive measures, than if they were to only rely on their initial perceptions. Moreover, the more credible the laborer perceives the source of information, i.e., the higher r, the more informative they regard the signal, and so the stronger incentives they face to adjust their behavior:

$$l_r^{*'} < 0, s_r^{*'} < 0, m_r^{*'} > 0.$$

In the empirical analysis to follow, we investigate the effects of a randomized awareness campaign that provides information about the COVID-19 virus, as well as potential preventive measures to avoid an infection. We expect that treated individuals update upwards their perceptions about the marginal probabilities of infection and transmission, as well as the health and monetary disutilities from the virus. As a result, treated individuals are more likely to update upward their perceptions about the overall marginal benefit from reducing health disutility than those in the control group. Given our model predictions, we expect that a higher perceived marginal benefit of avoiding health damages and/or associated monetary costs, ceteris paribus, translates into larger decreases in labor supply, larger decreases in social interactions, and/or larger increases in preventive measures.

The extent to which individuals update their beliefs about COVID-19 crucially depends on the credibility of the information provided through the awareness campaign. The identity of the sender therefore plays an important role. As illustrated in Section 2, religion is of major importance in the Pakistani society, and the level of trust in and respect for religious figures is immensely high. We therefore expect the loudspeaker announcements made by Imams to boost the credibility and relevance of our campaign, leading to differentially high treatment effects among individuals who received both an awareness call and loudspeaker announcements rather than an awareness call alone.

In addition to differences in effect sizes depending on the treatment arm, we expect the effects of the awareness campaign to be heterogeneous along several individual level characteristics. First, we anticipate the effects to be larger among men, than among women. Persistent social norms and restricted physical mobility discourage women from participating in the labor market

and emphasize their traditional role as housewives (Field and Vyborny, 2022). Very few rural Pakistani women work—especially outside the house—, and as such there is little margin for adjustment of labor supply in response to the treatment. Men also participate more frequently in religious gatherings, especially prayers at the mosque.[20] Given their disproportionally high levels of exposure to the virus, our model predicts, ceteris paribus, higher health benefits from reducing labor supply and social interactions among men than among women. Assuming that the differential benefit also holds net of the cost of adjustment, we expect men to be more responsive to the treatment than women.

Moreover, we expect individual-level religiosity to correlate positively with the extent to which individuals react to the treatment. This is especially true for individuals who received loudspeaker announcements by Imams, as more religious individuals likely consider religious leaders to be more credible than individuals for whom religion plays a lesser role. In addition, evidence suggests that religiosity predicts pro-sociality (Kelly et al., 2024). Thus, more religious individuals are likely to disproportionally adjust their behavior in response to the treatment not only out of trust into their religious leaders, but also for altruistic reasons, wanting to protect their families and friends.

Finally, we are interested in understanding whether any observed behavioral changes in response to the treatment are motivated by specific changes in knowledge and perceptions related to the COVID-19 virus. We distinguish four potential channels: changes in knowledge about the virus, changes in beliefs about the probability of getting infected, the probability of transmitting the virus, the costs associated with an infection, and the severity of the disease. Based on our survey data, we construct indices to measure these beliefs and estimate the effects of the two treatment arms on each of them empirically.

5 Main Results

5.1 Treatment Effects on Labor Supply, Social Interactions, and Preventive Measures

In this section, we consider whether the two treatments were successful in adjusting individuals' behavior to reflect a more cautious dealing with the pandemic. Table 4 summarizes ITT estimates from equation 1 for the three indices of interest—labor supply, social interactions, and preventive measures. We present our estimates for the overall sample (Columns 1, 4, 7), as well as for male (Columns 2, 5, 8) and female respondents, separately (Columns 3, 6, 9). In this and all of the following tables, the first row presents the effects of the awareness campaign conducted via phone calls alone (*phone* treatment), while the second row shows the effects of the combined intervention via phone calls and loudspeaker announcements (*phone plus loudspeaker*

[20] In our sample, men go to the mosque on 3.4 days per week on average, whereas women go to the mosque on 1.4 days per week on average.

treatment). We show p-values for the significance of the difference between the two treatment arms, as well as p-values for the average effect of being treated with either the phone or the phone + loudspeaker treatment below.

Our results show that the awareness campaign conducted via phone calls alone did not have a statistically significant effect on any of the indices. What appears to have made a difference, though, is the additional assignment to loudspeaker announcements by Imams. In particular, the *phone plus loudspeaker* treatment led to a significant downward adjustment in labor supply by 0.06 standard deviations in the overall sample . The difference in effect sizes between the *phone* and the *phone plus loudspeaker* treatment is statistically significant. This is in line with the predictions from our model, which emphasize the crucial role of providing information through a credible and trustworthy source.

The effect on labor supply is driven by male individuals, for whom exposure to the combined treatment led to a decrease of 0.09 standard deviations in the labor supply index. Again, the difference in effect sizes between the *phone* and the *phone plus loudspeaker* treatment is statistically significant. The fact that we observe adjustments in labor among men, but not women, may well be driven by their much higher baseline participation in the labor market. This is true not only in our study area, but also more broadly in the context of Pakistan.[21]

We also find evidence, albeit somewhat weaker, for a downward adjustment in social interactions among male individuals who received the *phone plus loudspeaker* treatment by around 0.04 standard deviations. However, this effect does not significantly differ from that of the *phone* treatment. We detect no significant effects—neither overall, nor gender-differentiated—on the preventive measures index. It is worth mentioning, however, that hand washing, mask wearing, and distancing have increased throughout the study period in both the control and the two treatment groups (see Appendix Table B.5). This increase may be driven by the simultaneous implementation of other COVID-19 information campaigns in the study area, specifically targeting the most common preventive measures, and thus may explain why our campaign has no additional effect on preventive measures among individuals assigned to either of the two treatment arms.

Effects on the Components of the Labor Supply Index To better understand the observed adjustments in labor supply, we look at all components of the index separately. Figure 1 displays the effects of the *phone plus loudspeaker* treatment on the three components of the labor supply index for the overall sample and the male subsample, respectively.[22] We find significant reductions of labor supply at both the extensive and intensive margins, driven entirely by male

[21] In our sample, the share of male individuals who reported working outside home in the 7 days prior to the baseline interview amounts to 50%. For female individuals, it is as low as 26%. This is in line with the official statistics of the International Labour Organization, which report a female labor force participation rate of 33.6% in rural Pakistan (International Labor Organization, 2024). Tanaka and Muzones (2016) documents as a major self-reported reason for women not working outside home in Pakistan their family members' objection to the latter.

[22] Figure B.1 in the Appendix displays the effects for the female subsample.

Table 4: Effects on Labor Supply, Social Interactions, and Preventive Measures

	Less Labor Supply			Less Social Interactions			More Preventive Measures		
	All	Male	Female	All	Male	Female	All	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Phone	0.008	0.010	-0.011	0.008	0.007	-0.000	0.014	0.003	0.016
	(0.022)	(0.028)	(0.030)	(0.012)	(0.015)	(0.018)	(0.014)	(0.017)	(0.022)
Phone + loudsp.	0.060**	0.089**	0.049	0.014	0.044*	-0.007	0.014	0.011	0.010
	(0.031)	(0.044)	(0.044)	(0.017)	(0.024)	(0.025)	(0.024)	(0.030)	(0.035)
p-val phone=phone+loudsp.	0.077	0.064	0.133	0.709	0.128	0.760	0.989	0.785	0.850
p-val any treatment	0.395	0.382	0.975	0.437	0.362	0.926	0.295	0.781	0.489
Obs.	6,483	3,370	3,113	6,483	3,370	3,113	6,483	3,370	3,113
Villages	888	665	735	888	665	735	888	665	735
R^2	0.360	0.372	0.395	0.408	0.367	0.432	0.425	0.442	0.439
Control mean	-0.000	-0.205	0.224	0.000	-0.139	0.152	-0.000	-0.007	0.007
SD	0.946	0.940	0.901	0.548	0.475	0.582	0.621	0.590	0.653

Notes: The table shows treatment effects on summary indices of labor supply, social interactions, and preventive measures. Results are reported for the overall sample, and the male and female subsamples, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

individuals. In the overall sample, the share of individuals who reported working outside home in the seven days prior to the endline interview is 3.6 percentage points (7.4%) lower in the *phone plus loudspeaker* treatment group than in the control group (control group mean: 48.6%). It is also significantly lower than the share of individuals reporting to have worked outside home in the *phone* treatment group. When zooming in on male individuals, the magnitude of the reduction raises to 4.8 percentage points, a reduction of 8.0% as compared to the control group mean of 60%.

The assignment to phone calls and loudspeaker announcements by Imams also led to a significant drop in the number of days worked outside home. The decline amounts to about one-quarter of a workday in the overall sample (control group mean: 2.5) and almost half a workday in the male subsample (control group mean: 3.2). These effects are significantly larger than those of the *phone* treatment, for which we observe a negative, but insignificant coefficient for the number of hours worked outside home on the day prior to the interview. We do not find any effects on either of the components of the labor supply index for female respondents (see Figure B.1 in the Appendix).

We also test whether a reduction in the likelihood of working *outside* home is accompanied by an increase in the likelihood of working *from* home, but do not find evidence for a compensation effect. The majority of working individuals in our sample pursue daily-wage jobs, such as construction or factory work, which usually require presence at the workplace. At baseline, the share of individuals working from home is extremely low at only 4.4%, and even lower among men (2.7%). This indicates that the poor, mostly unskilled, individuals in our sample are largely unable to do their jobs from home and as such to compensate for a reduction in work outside home.[23]

Overall, these results suggest that the impact of our intervention on individuals' behavior is driven by the additional effort in villages in which religious leaders were mobilized to endorse the awareness campaign. In particular, as a result of involving religious leaders, male individuals responded by significantly reducing labor supply. The statistical significant difference in effect sizes between the *phone* and the *phone plus loudspeaker* for the labor supply index and the number of days worked outside home underlines this result. The magnitude of this reduction is striking given that the loudspeaker messages delivered by the Imams did not specifically address labor supply, but rather focused on preventive measures (hand washing, use of face masks, and social distancing). Leveraging on the authority of religious leaders may have created social pressure for compliance with COVID-19 safety measures more broadly, leading individuals to temporarily cut back on their activities.

Given the substantial effect on labor supply, it is natural to ask whether the reduction in working hours among individuals in the *phone plus loudspeaker* group translated into a

[23] In absence of a compensation effect, the decrease in overall labor supply leads to a significant decrease in weekly income of around 198.7 rupees among male individuals assigned to the *phone plus loudspeaker* treatment, a reduction of 11.5% as compared to the control group mean.

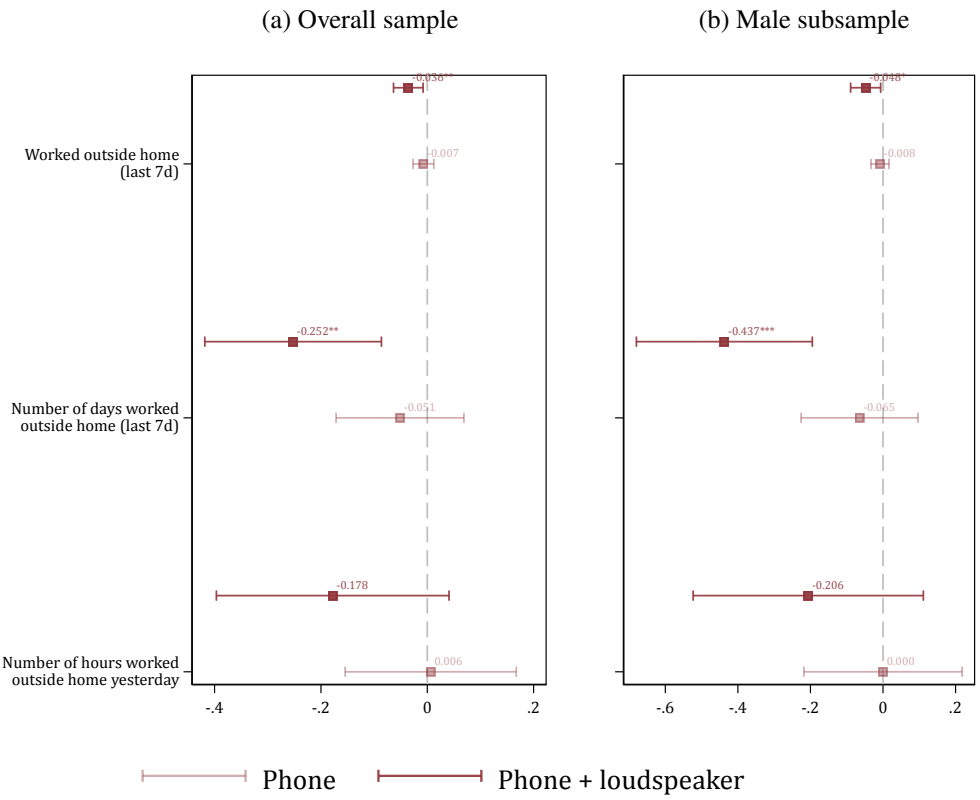

Figure 1: Effects on Single Outcomes of the Labor Supply Index: Overall Sample and Male Subsample

Notes: The graph shows treatment effects on the components of the labor supply index for the overall sample (left) and the male subsample (right). Point estimates are shown with 10% confidence intervals. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

reduction in infection rates. While we ask individuals to report their own, as well as their household members', health status, we observe very little incidences of sickness—likely due to underreporting. Anecdotal evidence from conversations with our implementing partner suggests that individuals in our study setting may have been uncomfortable reporting sickness out of fear that information might be shared with the government. This highlights once more the importance of trust in governmental and non-governmental actors trying to contain the spread of a disease. The small number of reports of sickness within our sample leaves us underpowered to identify any potential effects on self-reported infections.

5.2 Treatment Effects on Knowledge and Beliefs

To get a better understanding of the underlying drivers of the observed behavioral change, we turn to the campaign's effects on knowledge and beliefs related to the COVID-19 virus. Table 5 illustrates the effects of the two treatment arms on an index that combines indicators of COVID-19 knowledge. Overall, only the *phone plus loudspeaker* treatment led to significant increases in knowledge. However, the coefficient is not significantly different from that of the *phone* treatment.

Strikingly, the effects on knowledge are largely driven by female respondents, suggesting

that the changes in labor activities among male respondents cannot be explained by changes in knowledge about the virus. Women, on the other hand, have significant learning effects, but these effects do not translate into changes in behavior.[24] This may be partly due to the type of information that women retain from the awareness campaign.[25] On average, female respondents who received the *phone plus loudspeaker* treatment are 3.2 percentage points more likely to report that they know the symptoms of the COVID-19 virus, a 3.4% increase as compared to the control group. This subjective measure is in line with a significant increase of 0.27 correctly reported symptoms. Similarly, women in the *phone* group name on average 0.12 more correct symptoms (control group mean: 3.7). Finally, female respondents in the *phone* and the *phone plus loudspeaker* group are substantially more likely to know that the COVID-19 virus can be contracted by touching contaminated surfaces—3.3pp and 4.0pp, respectively, as compared to a control group mean of 77.5%.

Table 5: Effects on Knowledge

	More Knowledge		
	All	Male	Female
	(1)	(2)	(3)
Phone	0.020	0.003	0.033*
	(0.013)	(0.019)	(0.018)
Phone + loudsp.	0.042**	0.042	0.053*
	(0.019)	(0.027)	(0.027)
p-val phone=phone+loudsp.	0.248	0.139	0.440
p-val any treatment	0.050	0.571	0.033
Obs.	5,741	2,975	2,766
Villages	879	644	708
R^2	0.384	0.374	0.413
Control mean	0.007	0.061	-0.052
SD	0.526	0.499	0.549

Notes: The table shows treatment effects on the knowledge index. Results are reported for the overall sample, and the male and female subsamples, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Beyond purely factual knowledge, individuals may also update their subjective beliefs about the virus in response to the treatment. Thinking about the trade-off between the cost and benefit of adjusting behavior outlined in our analytical framework, four beliefs about the virus may

[24] In a related study from Sierra Leone, Levine et al. (2023) show that women have on average less knowledge about the COVID-19 virus. The authors argue that this may be due to differences in the social network structure of women and men, with more relevant information being spread in the latter. Our study shows how information transmitted individually by an organization that has historically engaged very closely with women in the community, as well as by key religious figures, can overcome such communication challenges.

[25] Figure B.2 in the Appendix illustrates the effects of the treatment on the components of the knowledge index for the overall sample as well as female respondents.

be particularly relevant determinants of behavioral changes: perceptions about the probability of infection, the transmission probability, the costs related to getting infected, and the severity of the disease. In Table 7, we report estimates on the four aforementioned perceptions for the overall sample, as well as the male and female subsamples, respectively. While perceptions about the cost of getting infected combine information on the perceived cost of treatment and forgone income based on the expected duration of the infection into an index, all other outcomes are coded as indicator variables.

Our findings reveal that both treatments had significant effects on the perceived risk of transmitting the virus to others. Individuals assigned to the *phone* (*phone plus loudspeaker*) treatment are on average 2.1 (3.2) percentage points more likely to have moderate or high concerns about infecting their household members with the virus—a 5% (8%) decrease as compared to the control group. While the coefficient is larger among individuals in villages in which the awareness campaign was endorsed by Imams, there is no significant difference between the two treatment effects. Looking at the male and female subsample separately, the effect remains significant only among men who received the *phone plus loudspeaker* treatment, who are about 4.3 percentage points more likely to have concerns about the transmission of the virus. This indicates that an increase in concerns about the health of others, rather than a concern for oneself, may have motivated the observed behavioral changes. These results emphasize once more the critical role of religion in motivating altruistic beliefs and behavior.

Finally, we observe a significant decrease in the perceived cost of getting infected with the COVID-19 virus among women exposed to the *phone plus loudspeaker* treatment as compared to both the control group and the *phone* treatment. While this result may reflect a realistic adjustment based on better knowledge of the characteristics of the virus, a lack of data on the actual cost of getting infected complicates the interpretation of the effect. Given that the monetary repercussions of a COVID-19 infection might be particularly important in the context of an extremely poor sample, the significant decrease in concerns about the latter may, however, add important context to why we observe no behavioral response among women in the *phone plus loudspeaker* group. The

5.3 Robustness of Results

We present results on the robustness of our main analyses in Appendix Tables B.6, B.8, and B.10. Our findings are robust to the exclusion of individual and village level characteristics as control variables, as well as to including only those individual level characteristics that are unbalanced across treatment arms.We also show additional specifications controlling for the specific treatment message received during the awareness call. While the results of these regressions do not directly serve as robustness check for the main findings, they provide interesting additional insights. Importantly, our main results capture the effects of any type of awareness call, as well as the combination of an awareness call and a loudspeaker announcement made by the Imam,

Table 7: Effects on Beliefs

	Higher Perceived Risk of Getting Infected			Higher Perceived Risk of Transmission			Higher Perceived Cost			Higher Perceived Severity		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Phone	0.010	0.012	0.001	0.021**	0.015	0.017	0.025	0.010	0.032	-0.009	-0.014	-0.011
	(0.010)	(0.013)	(0.016)	(0.009)	(0.011)	(0.015)	(0.029)	(0.041)	(0.044)	(0.013)	(0.020)	(0.019)
Phone + loudsp.	0.011	0.022	-0.007	0.032**	0.043**	0.010	-0.044	0.020	-0.114***	-0.018	-0.006	-0.016
	(0.016)	(0.021)	(0.024)	(0.015)	(0.020)	(0.022)	(0.038)	(0.066)	(0.042)	(0.019)	(0.026)	(0.030)
p-val phone=phone+loudsp.	0.944	0.613	0.744	0.417	0.164	0.723	0.082	0.876	0.004	0.646	0.763	0.857
p-val any treatment	0.298	0.283	0.957	0.008	0.054	0.285	0.638	0.764	0.930	0.350	0.484	0.518
Obs.	5,555	2,882	2,673	5,441	2,844	2,597	3,391	1,841	1,550	3,805	1,878	1,927
Villages	876	639	699	875	635	691	764	533	547	806	553	608
R^2	0.541	0.587	0.507	0.640	0.712	0.576	0.417	0.427	0.435	0.535	0.572	0.540
Control mean	0.375	0.349	0.403	0.412	0.378	0.450	0.008	0.051	-0.040	0.531	0.539	0.524
SD	0.484	0.477	0.491	0.492	0.485	0.498	0.850	0.906	0.780	0.499	0.499	0.500

Notes: The table shows treatment effects on the perceived risk of getting infected, the perceived risk of transmitting the virus, the perceived cost of getting infected, and the perceived severity of an infection. Results are reported for the overall sample, and the male and female subsamples, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

independently of the specific awareness message. By controlling for the specific message, the additional specifications show the effects of the basic awareness call, either independently or in combination with loudspeaker announcements.

The coefficients of these regressions are similar to the ones presented in the main part of the paper, suggesting that the average effects of the two treatment arms are comparable to the effects of the two treatments among individuals who received only the basic awareness message. However, while controlling for the treatment message reduces the effect size on labor supply among male respondents, the effect becomes significant among female respondents. This indicates that the additional treatment messages related to the perceived risks of infection and transmission, the perceived cost, and the perceived severity of the virus interact differently with the loudspeaker announcements depending on the gender of the respondent.

6 Heterogeneity of Treatment Effects

In what follows, we consider the heterogeneity of the campaign's treatment effects on labor supply with respect to two variables of interest: employment status and religiosity. As adjustments along the behavioral indices are entirely driven by male individuals, we focus our analysis on the male subsample. Results on both the overall, and the female subsample are presented in the Appendix.

Labor Supply by Baseline Employment Status Given the economically significant effect on labor activity and the potential effects that such reductions can have on income, it is important to understand who reduces working hours in response to the treatment. This can provide valuable insights into the mechanisms driving the effects on the labor index. To look at the effects of the treatment by employment type, we consider (1) men who did not work in the seven days prior to our baseline survey, (2) men who worked as daily wage laborers—e.g., in construction, factory work, or street vending—, and (3) men who worked in other types of jobs—e.g., in personal businesses, on their own farms, or as skilled laborers. The first category contains both long-term unemployed individuals and (daily wage) laborers who did not work in the week before the interview, but are otherwise active in the labor market. Based on our survey data, we cannot perfectly distinguish these two types of individuals. Yet, in the control group, 58% of those men who did not work at baseline indicate having worked in the seven days prior to the endline survey.[26] Thus, men actively seeking work seem to make up the majority of individuals in the first category. This also explains why we would expect any adjustments in labor supply for individuals not having worked at baseline.

Table 8 presents the results on the effects of being treated by employment status. As compared to the control group, the *phone plus loudspeaker* treatment led to a downward adjustment by

[26]This number is somewhat lower at 47% for the overall sample.

Table 8: Effects on Labor Supply by Employment Status: Male Subsample

	Less Labor Supply		
	No Work at BL	Daily Wage Laborer	Other Employment
	(1)	(2)	(3)
Phone	0.035	-0.037	-0.019
	(0.043)	(0.056)	(0.072)
Phone + loudsp.	0.093	0.196**	-0.012
	(0.058)	(0.099)	(0.107)
p-val phone=phone+loudsp.	0.326	0.011	0.950
p-val any treatment	0.253	0.917	0.802
Obs.	1,609	1,010	751
Villages	516	385	324
R^2	0.364	0.422	0.529
Control mean	-0.129	-0.289	-0.286
SD	0.939	0.909	0.973

Notes: The table shows treatment effects on the summary index of labor supply for the male subsample. The results are reported for individuals who did not work in the seven days prior to the baseline interview (1), individuals who worked as daily wage laborers (2), and individuals in other type of employments (3). Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

0.20 standard deviations among male daily wage laborers. The effect is significantly different from that of the *phone* treatment, for which we cannot detect any significant adjustments. The coefficient on the *phone plus loudspeaker* treatment is smaller and insignificant for individuals who did not work in the seven days prior, and negative, but statistically insignificant, for male individuals in other types of employment.[27] These findings suggest that individuals in more dire working conditions decreased working hours in response to the *phone plus loudspeaker* treatment, while those working, e.g., as skilled laborers, or as independent business men or farmers, did not.[28] Given that daily-wage laborers are likely to more heavily rely on their day-to-day earnings than individuals with more permanent jobs, one would probably expect them to be more reluctant in reducing labor.[29] At the same time, individuals with regular contracts, as well as those working on their own farms and businesses, may face more severe medium- and long-term consequences when deciding to reduce labor supply. In a context where labor protection is low, the decision of not coming to work may easily lead to job loss—a risk that laborers looking for a job on a daily basis do not face. Similarly, reducing labor on one's own farm or business may have longer-term consequences for productivity, and as such profits.

[27]Table B.12 in the Appendix shows the same pattern of results for the overall sample. However, the effects are attenuated, as there is no reaction to the treatment among female individuals in either of the three groups.

[28]Related to this finding, Alfonsi et al. (2024) show that the pandemic itself affected skilled and unskilled workers differentially: Whereas skilled workers were affected more heavily by lockdowns and related lay-offs, they were also quicker to recover.

[29]In line with this assumption, weekly income at baseline is significantly lower for daily wage laborers than for individuals with less precarious employment conditions.

Taking these differences into consideration, the marginal cost of temporarily reducing labor supply may appear lower for daily wage laborers, thus explaining why daily wage laborers, but not those with less precarious working conditions, reduce labor activities in response to the treatment.[30] Despite this potential explanation, these results bear the question of whether the observed effect on the labor index is in fact driven by individuals' *supply* of labor or is, to some extent, induced by a drop in local labor *demand*.

Loudspeaker announcements were assigned to entire villages and thus may not only have affected wage laborers, but potentially also their local employers. The latter, in turn, might have responded to the awareness campaign by reducing their demand for labor. As our sample is mainly composed of daily wage laborers, and contains only a small number of potential employers, we are unable to directly measure supply and demand effects in our data. However, we conduct several additional analyses to shed light on the underlying mechanisms to the extent possible with the data at hand. First, we look at the effects of the two treatments on the wage rate. If there was indeed a shortage in labor supply, we would—under the assumption that labor is immobile across villages—expect that wage rates increased in the *phone plus loudspeaker* group, but not in the other experimental groups. If, instead, the effect is driven by a lack of demand for labor, we would expect the surplus of laborers to negatively affect wage rates. While we find some indication for an increase in wages among those who received both the awareness call and loudspeaker messages, the effects are not significantly different from zero.

In a second step, we consider heterogeneity along individual level characteristics other than labor types as an indicator for whether we observe a supply or a demand side effect. Intuitively, if the driving force behind the reported labor adjustment is actually a drop in labor demand, non-work-related individual characteristics should be uncorrelated with the treatment effect. An individual level characteristic of major interest in the context of an effect driven by messages provided through an Imam is religion.

Heterogeneous Effects by Religiosity As illustrated in the previous section, the effects of our awareness campaign are entirely driven by the loudspeaker announcements made by Imams. Based on our hypothesis that this is due to the level of trust in and credibility of religious leaders, one would expect that these effects are higher among more, than among less religious individuals. In addition, empirical evidence suggests that religiosity predicts pro-sociality, another characteristic that may correlate with a higher likelihood of adopting behavior that could benefit one's own health, as well as the health of others (Kelly et al., 2024).

We measure religiosity using the number of days on which a mosque or church was visited

[30]The idea that changes in behavior take place among those for whom the marginal cost of adjustment is lowest can also be extended to the analysis of social interactions. We therefore consider the effects of the two treatments by ex-ante levels of social interactions—a proxy for individual level preferences for social interactions. We find that men with lower baseline levels of social interactions are more likely to reduce the latter in response to the *phone plus loudspeaker* treatment, suggesting that the cost of specific behavioral adjustments plays an important role in determining an individual's reaction to the treatment (see Appendix Table B.14).

Table 10: Effects on Labor Supply, Social Interactions, and Preventive Measures by Religiosity: Male Subsample

	Less Labor Supply		Less Social Interactions		More Preventive Measures	
	High Religiosity (1)	Low Religiosity (2)	High Religiosity (3)	Low Religiosity (4)	High Religiosity (5)	Low Religiosity (6)
Phone	-0.004	0.010	0.018	0.012	-0.024	0.032
	(0.043)	(0.040)	(0.021)	(0.022)	(0.028)	(0.025)
Phone + loudsp.	0.152**	0.031	0.011	0.065*	0.007	0.019
	(0.066)	(0.060)	(0.038)	(0.033)	(0.044)	(0.041)
p-val phone=phone+loudsp.	0.015	0.711	0.851	0.105	0.473	0.752
p-val any treatment	0.579	0.727	0.418	0.300	0.479	0.220
Obs.	1,480	1,825	1,480	1,825	1,480	1,825
Villages	466	562	466	562	466	562
R^2	0.401	0.391	0.417	0.382	0.459	0.470
Control mean	-0.243	-0.177	-0.161	-0.116	0.025	-0.035
SD	0.933	0.941	0.455	0.483	0.622	0.567

Notes: The table shows treatment effects on summary indices of labor supply, social interactions, and preventive measures for the male subsample. Results are reported for individuals with high and low levels of religiosity, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

in the seven days prior to the baseline interview. A man is considered to be *highly religious* when he visited the mosque more often than the average man in our sample, i.e., on at least four days.[31] Note that, while indicating the frequency with which a mosque was visited, higher religiosity is not expected to significantly predict the intensity of treatment. In fact, loudspeaker announcements at mosques are usually heard throughout the entire village and, in case of larger villages, announcements through multiple mosques guarantee larger coverage.

Table 10 displays the estimated effects on the labor supply, social interactions, and preventive measures indices for male individuals with high versus low religiosity.[32] In line with our hypothesis, we detect a significant effect for the *phone plus loudspeaker* treatment on the labor supply index for highly religious men only. This effect is statistically different from the effect of the *phone* treatment. At the same time, we find no evidence of highly religious male individuals reducing their social interactions. On the contrary, the downward adjustment of social activities in response to the awareness campaign seems to be driven by less religious men. As shown in Column (4), men who reported less than four mosque visits in the seven days prior to the baseline interview reduced social interactions by 0.07 standard deviations in response to the *phone plus loudspeaker* treatment. This suggests that individuals with both high and low levels of religiosity value information delivered by a religious leader, but choose different behavioral responses to decrease the risk of getting infected or infecting others. For instance, their valuation of religious gatherings may make highly religious men on average less willing to reduce social interactions (including mosque visits). Comparing the point estimates across the standardized indices does indicate, however, that the extent to which individuals adjust behavior is indeed positively correlated with the level of religiosity.

Alternative Explanations Given that the *phone plus loudspeaker* treatment differs from the *phone* treatment along several dimensions—in particular the mode of delivery, the frequency of delivery, and the identity of the messenger—it is natural to ask whether the additional effects of the loudspeaker announcements are indeed driven by the religious component of the treatment. While we are unable to perfectly disentangle the different channels through which the treatment could affect perceptions and behavior, we provide several pieces of suggestive evidence that are in line with our interpretation.

The most prominent concern is that loudspeaker announcements may act as a reminder rather than affecting individuals through a credibility channel. To investigate the reminding role of loudspeaker announcements, we look at heterogeneity of the *phone plus loudspeaker* treatment effects depending on the frequency with which announcements were made according to our monitoring data. We divide villages that received loudspeaker announcements into quintiles of

[31] The average is significantly lower for women, for whom two days of visits are above the average. Taking into account both women and men, high religiosity is defined as having visited the mosque or church on at least three days.

[32] Tables B.15 and B.16 in the Appendix display the corresponding estimates for the overall sample and female individuals, respectively.

announcement frequency and look at the effects of the treatment within each quintile. We find no consistent evidence of a relationship between the frequency of loudspeaker announcements made and our outcomes of interest. This is true in particular for male individuals, who show the most substantial responses to the treatment.[33] We also show that there is heterogeneity in the effects of the *phone plus loudspeaker* treatment depending on individual level religiosity, suggesting once more a link between the identity of the messenger and the effect of the treatment. While these results are insufficient to rule out that a reminder effect may in part explain our findings, they provide additional supportive evidence for our hypothesis that trust in the source of information matters.

Finally, information gathered during our endline survey shows that individuals in the control and both treatment groups are on average equally likely to report that they received a call about COVID-19. There is also no significant difference in the likelihood of reporting that they heard loudspeaker announcements about COVID-19 between the *phone* and the *phone plus loudspeaker* group (see Appendix Table B.2 for more details). However, individuals in the *phone plus loudspeaker* group are significantly more likely to indicate that these announcements were made from a mosque. This not only shows that individuals have—potentially repeatedly—received messages about the virus independently of the treatment assignment within our project. It also indicates that the main difference between information received by the *phone* and *phone plus loudspeaker* groups is in fact the identity of the sender, rather than the mode of distribution. Overall, while neither of the alternative channels can be fully excluded, these results alleviate concerns that our findings may be driven entirely by a reminder effect or a distribution mode effect and underline the importance of receiving information through a trusted source.

7 Conclusion

In this paper, we explore the role of religious leaders in shaping beliefs and preventive behavior in the context of health crises. We add to the literature by highlighting the importance of religious figures as supporters of government recommendations, thus crucially contributing to their containment strategies. To this end, we conducted a randomized remote awareness campaign endorsed by local religious leaders during the COVID-19 pandemic in rural Pakistan. We study the impact of the campaign on behavioral changes in labor supply and social interactions, as well as on the take-up of preventive measures.

To guide our empirical analysis, we build a stylized model that rationalizes individual decision-making in the context of a health crisis and predicts downward adjustments in labor supply and social activities in response to credible and trustworthy virus-related information. In line with our predictions, we find significant effects of the treatment on labor supply and social interactions among male individuals who were exposed to both an awareness call and

[33] We show the differential effects of the *phone plus loudspeaker* treatment by frequency quintile on the labor supply index in Appendix Figure B.3. Additional results are available upon request.

loudspeaker announcements by an Imam. Whereas this effect does not seem to be driven by changes in knowledge, men in the *phone plus loudspeaker* group significantly increased their concerns about transmitting the virus to others—suggesting a likely channel through which the treatment may have affected behavior. Despite significant increases in knowledge, we observe no effects on behavior among female individuals. This may be partly driven by a decrease in the estimated cost of getting infected. While our design does not allow us to causally disentangle the importance of religious leaders as providers of information from a potential reminder effect through additional messages, we provide suggestive evidence in support of the former interpretation.

Our study of the informational mechanism behind the influence of religion on economic and social outcomes opens interesting avenues for future research. Religious leaders simultaneously act as credible information sources and as trusted support providers in case of adverse shocks, suggesting several channels through which they may affect individual behavior. On the one hand, the effects might be driven by institutional credibility of religion-supporting organizations extended to their leaders as representative agents. On the other hand, the social proximity often developed as a result of repeated interactions between local religious leaders and adherents might play a decisive role in the trust building process and thus explain the reported effects. Disentangling these channels represents an important step forward for advancing our knowledge on the informational role of religious leaders in shaping economic performance and social behaviors.

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Appendices – For Online Publication

Appendix A Study Details

Survey Instruments We developed survey instruments for baseline and endline interviews and the awareness campaign. Every survey instrument was piloted and enumerators received a training on each of them separately. During the pilot, suggestions and feedback were collected about the questionnaires, including changing translations, correcting filters, rephrasing questions, and reducing the length of the questionnaires. All interviews were conducted via phone by personnel hired by NRSP. Enumerators used computer-assisted surveying to record responses. All survey instruments used simplified terms and were provided in Urdu and Sindhi, the two local languages spoken in the study area.

Consent In prior projects, every household was explicitly asked to consent to the storage of their phone numbers (by NRSP). For our project, respondents were asked to consent to the first interview and the participation in the research study. In a separate question, respondents were asked for consent to be called again for follow-ups. Information was only collected if participants explicitly confirmed that they were willing to participate in the interview, i.e., when they provided informed consent. During the baseline survey, enumerators were instructed to conduct interviews with any available household member that was above 18 and was registered in the databases of National Rural Support Programme (NRSP). The same household member was then re-interviewed at endline.

Baseline Survey During the baseline interviews, we collected information on topics including basic socio-economic characteristics, health status of the respondent and that of the household members, awareness about COVID-19, perceptions about COVID-19, and the preventive measures applied by the respondent and household members. While we inquired information about COVID-19, we also shared key, targeted messages read out to the respondent if they indicated that their answered revealed misconceptions or a lack of knowledge about the COVID-19 disease. Baseline interviews largely took between 15 and 40 minutes.

Remote Awareness Campaign The awareness campaign in form of a questionnaire contained mainly two parts: (1) Informative messages about COVID-19, which the enumerator read to the respondent and (2) a short test asking questions about the information that was just shared. The awareness call lasted between 10 and 20 minutes.

Endline Survey The endline survey covered a subset of modules and questions from the baseline questionnaire. This survey included questions on all outcomes analyzed in the impact evaluation and additionally a module on experiences with the interventions implemented in this study. It took between 10 and 25 minutes to be completed.

Estimation Sample For the final sample, we exclude all respondents for whom at least one of the three main outcome indices used in the analysis is not available. While this condition slightly decreases the number of observations, it allows to define a consistent sample across the main regressions, making results more comparable.

Phone Call Message The corona virus is a new respiratory disease originating from a virus that is highly contagious. The most common symptoms are fever, dry cough and tiredness. Most people who are infected may experience mild illness and recover, but the disease can develop more severely and even be fatal for others. In severe cases a person experiences breathing difficulty, chest pain or pressure, or loss of speech or movement. Please keep in mind that even if you feel healthy and do not develop symptoms you may still have contracted corona virus. Some people infected with corona virus show symptoms, but others do not show any symptoms. For this reason, it is impossible for you to recognize if another person is infected or not. Hence, there may be people feeling healthy who spread the virus and infect other people unknowingly. This makes it more difficult to stop the spread of corona virus than that of other diseases: it can also spread without visible symptoms.

The corona virus is mainly transmitted from person to person through two main modalities:

- Firstly, through small respiratory particles produced from a nearby infected person by coughs or exhales, which enter your mouth or nose.
- Secondly, when touching contaminated objects or other surfaces where droplets from an infected person landed and then touching your mouth, nose or eyes.

As a consequence, transmission is especially likely when people are in close contact with one another.

Because corona virus is a new disease, to date, there is no specific medicine recommended to prevent or treat the new corona virus. Also, please keep in mind that no traditional healing method can cure coronavirus. This means that the current situation of emergency may protract for many months from now. So, what can we do? Prevention. Three simple measures are highly effective in preventing the spread of corona virus: good hygiene, physical distancing from people, and wearing a face mask. These three are equally important measures, they need to be practiced together to be effective.

Let me tell you a bit about each preventive measure, starting with hygiene. First, wash your hands with water and soap. Normal soap is sufficient to kill the virus, without the soap the virus will stay on your hands. Also, you can use normal water, it is not necessary that water is boiled or purified. You should also refrain from touching your eyes, mouth, or face with your hands to prevent the virus from entering your body. Try to wash your hands as often as possible every day. This means at least 5 times per day. For example after you have been outside your household, after touching an item that could have been touched by other people, before, during and after preparing food, before eating, after coughing and sneezing, before and after taking care of an infected person, after defecating, after handling animals or animals‘ waste, or when hands are visibly dirty. An easy and cheap solution for the house could be to make use of a ’soapy’ water bottle. This can be produced out of any plastic bottle, filled with water mixed with soap. It is sufficient to use a small piece of soap for 1.5 liters. A small hole drilled in the cap allows the bottle to be used efficiently.
Because corona virus may spread when touching contaminated surfaces, it is also recommended to routinely clean surfaces frequently touched by you, like your phone, or touched by other people, with soap and water. It is recommended that your personal items such as a water bottle, cup, spoon, or towel are washed before sharing with other people, especially if they are sick. Remember touching a surface or an object that was touched by a person carrying the corona virus mean that you may also get infected.

Let me now talk about the second preventive measure, which is equally important: physical distancing. One infected person may quickly transmit the virus to many healthy people around

them. Remember that even people who look healthy may transmit the virus. The virus can travel from one person to another person. For this reason, you should not only refrain from touching others, e.g., from shaking hands, but also avoid visiting social events or public spaces when crowded, especially if indoors. This means that you might have to adjust how you do certain activities like prayer or other religious and non-religious activities. If you sneeze or cough and have the virus, particles travel in the air up to a few meters around you and you may infect a person that is close enough. If you open both your arms wide, this is about two meters: to stay safe, health experts recommend to keep at least two meters distance from others, anywhere outside your home. The virus may also stay in the air for some time after you sneeze or cough. You should make sure to have enough ventilation when at home or any other indoor place. If any member of your household is sick, then you should assist them while maintaining two meters distance (about 2 arms length) from them until they recover.

In addition, a third measure to prevent the spread of the virus is wearing a face mask covering your mouth and nose. It is important that you wear the mask whenever you are outside the house, or feeling sick. It is, however, especially recommended that you wear it when you are indoors and can not maintain a safe distance of 2 meters. If you use a face mask, you should not touch it while wearing it. Replace it with a new clean mask when it becomes damp. Do not re-use single use masks. When you do not wear a mask, it is recommendable to cover your mouth and nose with your flexed elbow or a tissue or towel/cloth when coughing or sneezing can be effective even when you are not sick. Also do not spit. Tissues should be disposed immediately after use. Towel, clothes or textile masks you use for these purposes should be boiled after use before hanging them to dry. Remember you need to do all three mentioned measures for highest protection level. The wearing of a mask should be used in addition to personal hygiene and social distancing. Alone, each measure will not be able to fully protect you or others around you from getting the virus.

Now, I will explain to you when you should suspect that you or any household member may have been infected with the corona virus and how to act in this case. You may suspect to be infected with corona virus if:

- you show any of the typical corona virus symptoms like fever, dry cough, or tiredness.
- OR you show any of the severe corona virus symptoms such as breathing difficulty, chest pain or pressure, or loss of speech or movement.
- OR you have been told by a public health official that you may be infected.
- OR you have been in contact with someone known to have corona virus.
- OR you have recently been in contact with people who were sick in or outside your household, or with travelers from other provinces or countries.

Usually, symptoms manifest after 5-6 days, but sometimes incubation of symptoms may take up to 14 days.

In case you suspect that you or any household member may be infected with corona virus but you have not been confirmed yet, it is important that you contact the health facilities, community leader or a trusted individual that can help while you stay at home (quarantine) in the meantime. You may also contact the helpline number 1166 put in place by the government of Pakistan. If you are confirmed to have corona virus, you should quarantine until you recover and follow the instructions of the health facility. There are different measures that you may take. You may either call a hospital or health facility or stay at home, isolate yourself from other people, make sure

you were a mask, clean your hands often, make sure that other household members do not share or touch objects you have used and monitor your symptoms closely. By doing so you protect your household and the community, especially the elderly and vulnerable people. Remember in summary, common symptoms are fatigue, dry cough and fever. Sever symptoms are chest pain or pressure, loss of speech or movement, difficulty breathing or shortness of breath. You can protect yourself by following the three measures explained: social distancing, wearing mask and washing hands. For additional measures you may always make sure that you clean all surfaces, avoid visiting public spaces such as market or mosque when crowded, avoid hand shakes, wear disposable gloves, avoid public transport, and protect older and ill people. It is important that you do not listen to rumors but rely on credible sources of information.

Loudspeaker Announcement Message The corona virus is a new respiratory disease originating from a virus that is highly contagious. The typical symptoms are fever, dry cough and difficulty when breathing. Most people who are infected may experience mild illness and recover, but it can be more severe or deadly for others. It may be possible that a person can get corona virus by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes. It is recommended by health experts that you practice "hand hygiene", by washing hands with soap frequently also recommend routine cleaning of frequently touched surfaces like your phone. Avoid large events and mass gatherings as they can contribute to the spread of corona virus. People in attendance at these events may be sick and can transmit the virus when they come in contact with other healthy people. Health experts recommend to maintain at least 2 meters (6 feet) distance to people outside your household. This is because when someone coughs or sneezes they spray small liquid droplets from their nose or mouth which may contain virus. If you are too close, you can breathe in the droplets, including the corona virus, if the person coughing has the disease. In case you suspect that you or one of your household members is infected of a virus, it is important that you contact the health facilities and stay home in the meantime. You may also contact the helpline number 1166 put in place by the government of Pakistan.

Appendix B Figures and Tables

Table B.1: Randomization Balance of Selected Individual Level Characteristics

Variable	Control Mean/SE (1)	Phone Mean/SE (2)	Phone + Loudspeaker Mean/SE (3)	T-test difference (1) - (2) (4)	(1) - (3) (5)	(2) - (3) (6)
Panel A. Baseline characteristics						
Female	0.521	0.511	0.555	0.010	-0.034	-0.044
	[0.023]	[0.019]	[0.032]			
Age	37.472	37.946	37.876	-0.473	-0.403	0.070
	[0.260]	[0.215]	[0.370]			
Illiterate / below primary education	0.512	0.513	0.489	-0.001	0.023	0.024
	[0.016]	[0.014]	[0.025]			
Wage for work performed outside home (last 7d)	749.598	838.094	738.353	-88.495	11.245	99.741
	[44.518]	[41.097]	[64.533]			
Household size	8.354	8.321	8.140	0.033	0.214	0.181
	[0.129]	[0.096]	[0.165]			
HH owns either land or livestock	0.637	0.620	0.614	0.017	0.023	0.006
	[0.016]	[0.012]	[0.024]			
Number of HH members above 60	0.453	0.458	0.448	-0.005	0.005	0.010
	[0.017]	[0.013]	[0.023]			
Number of HH members severely ill at the beginning of the year	0.204	0.229	0.223	-0.025	-0.019	0.006
	[0.014]	[0.012]	[0.022]			
Number of HH members sick with common COVID-19 symptoms (last 14d)	0.095	0.096	0.076	-0.001	0.019	0.020
	[0.014]	[0.008]	[0.011]			
Panel B. Variables of interest						
Worked outside home (last 7d)	0.351	0.383	0.344	-0.032	0.007	0.039
	[0.018]	[0.015]	[0.026]			
Number of hours worked outside home (yesterday)	2.385	2.468	2.279	-0.083	0.106	0.189
	[0.144]	[0.123]	[0.190]			
Traveled outside village for leisure (last 7d)	0.079	0.073	0.073	0.005	0.006	0.001
	[0.006]	[0.005]	[0.008]			
Had visits for a.l.1 day (last 7d)	0.256	0.271	0.283	-0.016	-0.027	-0.011
	[0.015]	[0.013]	[0.022]			
Practices all three main preventive measures	0.240	0.250	0.260	-0.010	-0.020	-0.009
	[0.017]	[0.014]	[0.024]			
Number of occasions after which respondent washes hands	3.037	3.098	3.174	-0.061	-0.137	-0.076
	[0.086]	[0.082]	[0.136]			
Able to list all three typical symptoms	0.137	0.144	0.146	-0.007	-0.009	-0.002
	[0.015]	[0.013]	[0.023]			
Able to list all three main preventive measures	0.292	0.304	0.316	-0.011	-0.023	-0.012
	[0.018]	[0.015]	[0.027]			
Heard of people treated badly because of their COVID-19 infection	0.079	0.069	0.050	0.010	0.029**	0.019
	[0.011]	[0.008]	[0.009]			
Knows that traditional healers cannot heal a COVID-19 infection	0.443	0.393	0.392	0.050**	0.051	0.001
	[0.019]	[0.016]	[0.028]			
Would like to get a COVID-19 test	0.590	0.584	0.560	0.006	0.030	0.024
	[0.016]	[0.013]	[0.023]			
Has moderate or high concerns of getting infected	0.313	0.309	0.269	0.004	0.044	0.040
	[0.021]	[0.018]	[0.027]			
Has moderate or high concerns of infecting others	0.437	0.423	0.405	0.014	0.032	0.018
	[0.024]	[0.020]	[0.033]			
Perceived average cost of getting infected	12577.717	17752.138	14365.035	-5174.422**	-1787.318	3387.104
	[1457.767]	[1678.042]	[2523.996]			
Thinks that COVID-19 is a severe disease	0.489	0.509	0.519	-0.020	-0.029	-0.010
	[0.023]	[0.020]	[0.033]			
All or some HH members have access to masks	0.745	0.746	0.780	-0.001	-0.035	-0.034
	[0.016]	[0.013]	[0.019]			
Received info on COVID-19 via NGO or mosque loudspeaker	0.108	0.103	0.119	0.005	-0.011	-0.016
	[0.011]	[0.009]	[0.016]			
Panel C. Data collection characteristics						
Individual part of first sample	0.797	0.807	0.843	-0.010	-0.047	-0.037
	[0.025]	[0.020]	[0.030]			
Individual with more than 5 imputations at baseline	0.110	0.100	0.111	0.010	-0.001	-0.011
	[0.009]	[0.007]	[0.013]			

Notes: The table shows randomization balance for selected individual level characteristics at baseline. Columns (1), (2), and (3) report means and standard errors among individuals in villages assigned to the control group, villages assigned to phone calls, and villages assigned to phone calls and loudspeaker announcements, respectively. Columns (4), (5), and (6) report t-tests for differences in means. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.2: Self-reported Take-up and Content of Awareness Calls and Loudspeaker Messages

Variable	Control		Phone		Phone + Loudspeaker		T-test difference		
	N/Clusters	Mean/SE	N/Clusters	Mean/SE	N/Clusters	Mean/SE	(1) - (2)	(1) - (3)	(2) - (3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Awareness calls									
Individual received information call about COVID-19	2153	0.860	3136	0.871	1092	0.860	-0.011	0.000	0.011
	[295]	[0.008]	[445]	[0.006]	[148]	[0.012]			
...on the symptoms, transmission, and preventive measures	1838	0.950	2710	0.965	933	0.973	-0.014**	-0.023***	-0.009
	[293]	[0.005]	[443]	[0.003]	[146]	[0.006]			
...on the severity of the virus	1828	0.907	2693	0.905	931	0.918	0.002	-0.011	-0.013
	[293]	[0.007]	[443]	[0.005]	[146]	[0.010]			
...on the cost of contracting the virus	1803	0.783	2667	0.792	920	0.796	-0.009	-0.013	-0.004
	[293]	[0.009]	[443]	[0.008]	[146]	[0.013]			
...on the likelihood of contracting the virus	1832	0.930	2699	0.934	933	0.950	-0.004	-0.019*	-0.016*
	[293]	[0.006]	[443]	[0.005]	[146]	[0.008]			
...on the likelihood of infecting others	1829	0.923	2693	0.931	924	0.934	-0.007	-0.011	-0.003
	[293]	[0.006]	[443]	[0.005]	[146]	[0.008]			
...asking for the health status of HH members	1838	0.970	2713	0.976	933	0.977	-0.006	-0.008	-0.002
	[293]	[0.004]	[443]	[0.003]	[146]	[0.006]			
...asking for help in spreading info about the virus in one's community	1813	0.881	2675	0.898	921	0.907	-0.017	-0.025*	-0.009
	[293]	[0.009]	[443]	[0.006]	[146]	[0.010]			
Shared content of the call with others	1850	0.925	2726	0.925	938	0.938	0.001	-0.013	-0.013
	[293]	[0.006]	[443]	[0.005]	[146]	[0.008]			
HH member received information call about COVID-19	1727	0.442	2557	0.437	867	0.419	0.005	0.024	0.019
	[293]	[0.013]	[442]	[0.010]	[145]	[0.017]			
Panel B: Loudspeaker messages									
Heard loudspeaker announcement informing about COVID-19	1753	0.441	2596	0.456	897	0.482	-0.015	-0.041*	-0.026
	[293]	[0.012]	[443]	[0.010]	[145]	[0.018]			
Announcement was made by at the mosque	769	0.843	1174	0.834	431	0.884	0.009	-0.041**	-0.050***
	[261]	[0.013]	[395]	[0.011]	[132]	[0.016]			

Notes: The table shows self-reported variables capturing the take-up awareness phone calls (Panel A) and the loudspeaker announcements (Panel B). Columns (1), (3), and (5) report the number of observations and clusters in villages assigned to the control group, villages assigned to phone calls, and villages assigned to phone calls and loudspeaker announcements, respectively. Columns (2), (4), and (6) show the respective mean values and standard errors. Columns (7), (8), and (9) report t-tests for differences in means. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.3: Balance of Selected Individual Level Characteristics—Final Sample

Variable	Control Mean/SE (1)	Phone Mean/SE (2)	Phone + Loudspeaker Mean/SE (3)	T-test difference (1) - (2) (4)	(1) - (3) (5)	(2) - (3) (6)
Panel A. Baseline characteristics						
Female	0.478	0.476	0.522	0.002	-0.044	-0.046
	[0.025]	[0.020]	[0.035]			
Age	37.878	38.648	38.087	-0.770*	-0.209	0.561
	[0.306]	[0.253]	[0.432]			
Illiterate / below primary education	0.503	0.508	0.473	-0.005	0.030	0.035
	[0.017]	[0.014]	[0.027]			
Wage for work performed outside home (last 7d)	778.255	871.414	793.327	-93.159	-15.071	78.087
	[48.296]	[44.958]	[71.070]			
Household size	8.458	8.451	8.263	0.007	0.196	0.189
	[0.134]	[0.107]	[0.192]			
HH owns either land or livestock	0.651	0.634	0.624	0.017	0.027	0.010
	[0.017]	[0.013]	[0.026]			
Number of HH members above 60	0.446	0.445	0.432	0.001	0.014	0.013
	[0.019]	[0.015]	[0.025]			
Number of HH members severely ill at the beginning of the year	0.212	0.236	0.247	-0.023	-0.034	-0.011
	[0.015]	[0.014]	[0.026]			
Number of HH members sick with common COVID-19 symptoms (last 14d)	0.089	0.101	0.088	-0.012	0.001	0.013
	[0.011]	[0.010]	[0.013]			
Panel B. Variables of interest						
Worked outside home (last 7d)	0.363	0.397	0.364	-0.035	-0.001	0.033
	[0.019]	[0.017]	[0.029]			
Number of hours worked outside home (yesterday)	2.519	2.593	2.496	-0.074	0.023	0.097
	[0.162]	[0.134]	[0.228]			
Traveled outside village for leisure (last 7d)	0.074	0.079	0.078	-0.004	-0.004	0.001
	[0.008]	[0.006]	[0.010]			
Had visits for a.l.1 day (last 7d)	0.249	0.273	0.278	-0.024	-0.029	-0.005
	[0.016]	[0.014]	[0.025]			
Practices all three main preventive measures	0.262	0.264	0.283	-0.002	-0.021	-0.019
	[0.019]	[0.016]	[0.029]			
Number of occasions after which respondent washes hands	3.147	3.200	3.306	-0.053	-0.159	-0.107
	[0.095]	[0.091]	[0.145]			
Able to list all three typical symptoms	0.146	0.143	0.144	0.003	0.002	-0.001
	[0.017]	[0.013]	[0.025]			
Able to list all three main preventive measures	0.316	0.322	0.337	-0.005	-0.021	-0.015
	[0.021]	[0.017]	[0.031]			
Heard of people treated badly because of their COVID-19 infection	0.086	0.077	0.058	0.009	0.027	0.018
	[0.014]	[0.009]	[0.012]			
Knows that traditional healers cannot heal a COVID-19 infection	0.455	0.406	0.400	0.049*	0.055	0.006
	[0.020]	[0.017]	[0.031]			
Would like to get a COVID-19 test	0.600	0.588	0.579	0.012	0.021	0.009
	[0.017]	[0.014]	[0.025]			
Has moderate or high concerns of getting infected	0.292	0.290	0.256	0.001	0.036	0.034
	[0.022]	[0.019]	[0.029]			
Has moderate or high concerns of infecting others	0.411	0.401	0.405	0.010	0.006	-0.004
	[0.025]	[0.021]	[0.035]			
Perceived average cost of getting infected	13825.755	18224.833	15755.040	-4399.078*	-1929.285	2469.794
	[1830.595]	[1839.834]	[3169.798]			
Thinks that COVID-19 is a severe disease	0.493	0.513	0.517	-0.020	-0.024	-0.004
	[0.026]	[0.021]	[0.036]			
All or some HH members have access to masks	0.773	0.757	0.783	0.016	-0.009	-0.025
	[0.016]	[0.014]	[0.022]			
Received info on COVID-19 via NGO or mosque loudspeaker	0.100	0.096	0.101	0.003	-0.001	-0.004
	[0.011]	[0.009]	[0.016]			
Panel C. Data collection characteristics						
Individual part of first sample	0.791	0.783	0.813	0.008	-0.022	-0.030
	[0.027]	[0.023]	[0.038]			
Individual with more than 5 imputations at baseline	0.064	0.052	0.058	0.011	0.006	-0.005
	[0.010]	[0.007]	[0.013]			

Notes: The table shows balance for selected individual level characteristics at baseline for the final analysis sample. Columns (1), (2), and (3) report means and standard errors among individuals in villages assigned to the control group, villages assigned to phone calls, and villages assigned to phone calls and loudspeaker announcements, respectively. Columns (4), (5), and (6) report t-tests for differences in means. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.4: Component Variables by Index

Index	Indicators
Labor supply	- Has worked outside home in last 7 days
	- Number of days worked outside home in last 7 days
	- Number of hours worked outside home yesterday
Social interactions	- Has received visits for at least one day in last 7 days
	- Number of days with visits in last 7 days
	- Went to the mosque, church or mandir in last 7 days
	- Number of days went to the mosque, church, or mandir in last 7 days
	- Attended any social gathering in last 7 days
	- Had at least one social contact outside home in last 7 days
	- Number of social interactions not restricted in last 7 days
	- Did not restrict social contact for at least 1 day
	- Number of days not restricted social contact
	- Received visits for at least 1 day in the past 7 days from another town
	- Respondent or HH member went to the market in last 7 days
Preventive measures[1]	- Practices the three common preventive measures
	- Number of preventive measures practiced
	- At least some HH member wore mask when leaving home in the last 7 days
	- Number of occasions after which individual washes hands
Knowledge[2]	- Reports to know the symptoms of the COVID-19 virus
	- Correctly reports the three most common symptoms of COVID-19 (fever, dry cough, fatigue)
	- Number of correctly reported symptoms
	- Correctly reports the three most common preventive measures (hand-washing, mask-wearing, distancing)
	- Number of correctly reported preventive measures
	- Knows that an asymptomatic person can spread the virus
	- Knows that one can contract the virus by touching contaminated surfaces
	- Number of correctly indicated transmission channels (out of the above two)
	- Number of correctly reported emergency measures when infection is suspected
Perceived infection risk	- Has moderate or high concerns of getting infected
Perceived transmission risk	- Has moderate or high concerns of infecting other household members
Perceived cost	- Perceived total cost of getting infected
	- Perceived cost of being ill for one week
	- Perceived number of weeks required for recovery if infected
	- Perceived cost of one week treatment or medication if infected
Perceived severity	- Thinks one would die or recover with severe health damages if infected

Notes: The table reports the components of each outcome index.
[1]Other than pre-specified, we do not include an indicator for whether individuals have changed their way of participating in religious congregational activities due to COVID-19 (e.g., by distancing themselves from others). This is due to the fact that the relevant information to define this variable was not collected at endline.
[2]Other than pre-specified, the knowledge index does not contain an indicator for whether an individual has previously heard about the COVID-19 virus. This is due to the nearly universal awareness of COVID-19 at endline and its insufficient value in characterizing knowledge about the virus.

Table B.5: Changes in the Use of Preventive Measures across Treatment Arms (BL to EL)

Variable	Control Villages		Phone Call (only) Villages		Phone Call + Loudsp. Villages		T-test (1)-(2)	T-test (1)-(3)	T-test (2)-(3)
	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	Mean difference	Mean difference	Mean difference
	(1)		(2)		(3)		(4)	(5)	(6)
Panel A. Overall sample									
Δ Hand washing	1627	0.077	2354	0.049	815	0.065	0.028	0.012	-0.016
	[287]	[0.020]	[421]	[0.017]	[141]	[0.024]			
Δ Distance	1633	0.072	2355	0.079	818	0.100	-0.007	-0.028	-0.021
	[287]	[0.025]	[421]	[0.021]	[141]	[0.038]			
Δ Mask wearing	1485	0.207	2151	0.190	754	0.196	0.017	0.010	-0.007
	[287]	[0.027]	[418]	[0.021]	[139]	[0.036]			
Δ Practices the 3 common preventive measures	1897	0.059	2816	0.068	980	0.059	-0.009	-0.000	0.009
	[292]	[0.022]	[441]	[0.018]	[146]	[0.032]			
Δ # of preventive measures practiced	1896	0.580	2815	0.557	980	0.628	0.023	-0.048	-0.071
	[292]	[0.096]	[441]	[0.085]	[146]	[0.145]			
Δ A.l. 1 HHm wore mask when leaving home (last 7d)	1569	0.061	2234	0.073	819	0.056	-0.012	0.005	0.017
	[277]	[0.011]	[411]	[0.011]	[141]	[0.013]			
Panel B. Male subssample									
Δ Hand washing	858	0.047	1257	0.036	408	0.037	0.011	0.010	-0.001
	[205]	[0.025]	[307]	[0.023]	[97]	[0.027]			
Δ Distance	859	0.050	1259	0.061	410	0.107	-0.011	-0.057	-0.046
	[205]	[0.035]	[307]	[0.027]	[97]	[0.048]			
Δ Mask wearing	806	0.186	1170	0.154	380	0.145	0.032	0.041	0.009
	[203]	[0.036]	[299]	[0.029]	[96]	[0.041]			
Δ Practices the 3 common preventive measures	984	0.028	1479	0.042	489	0.047	-0.013	-0.019	-0.005
	[213]	[0.032]	[327]	[0.026]	[102]	[0.043]			
Δ # of preventive measures practiced	984	0.397	1479	0.401	489	0.507	-0.004	-0.110	-0.106
	[213]	[0.126]	[327]	[0.109]	[102]	[0.176]			
Δ A.l. 1 HHm wore mask when leaving home (last 7d)	909	0.059	1273	0.082	430	0.058	-0.022	0.001	0.024
	[207]	[0.013]	[304]	[0.014]	[97]	[0.017]			
Panel C. Female subssample									
Δ Hand washing	769	0.111	1097	0.064	407	0.093	0.047	0.017	-0.030
	[224]	[0.029]	[323]	[0.023]	[111]	[0.039]			
Δ Distance	774	0.097	1096	0.100	408	0.093	-0.003	0.004	0.007
	[224]	[0.034]	[323]	[0.029]	[111]	[0.054]			
Δ Mask wearing	679	0.231	981	0.232	374	0.249	-0.001	-0.017	-0.016
	[220]	[0.036]	[317]	[0.027]	[106]	[0.052]			
Δ Practices the 3 common preventive measures	913	0.092	1337	0.097	491	0.071	-0.005	0.021	0.026
	[239]	[0.026]	[348]	[0.024]	[119]	[0.042]			
Δ # of preventive measures practiced	912	0.776	1336	0.729	491	0.747	0.047	0.029	-0.018
	[239]	[0.122]	[348]	[0.121]	[119]	[0.207]			
Δ A.l. 1 HHm wore mask when leaving home (last 7d)	660	0.064	961	0.061	389	0.054	0.002	0.010	0.007
	[211]	[0.015]	[307]	[0.013]	[112]	[0.017]			

Notes: The table shows changes in the use preventive measures between baseline and endline across treatment arms for the overall sample (Panel A), the male subsample (Panel B), and the female subsample (Panel C). Columns (1), (2), and (3) report the number of observations and clusters, and the mean and standard deviation in villages assigned to the control group, villages assigned to phone calls, and villages assigned to phone calls and loudspeaker announcements, respectively. Columns (4), (5), and (6) report the t-test for differences in mean values. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

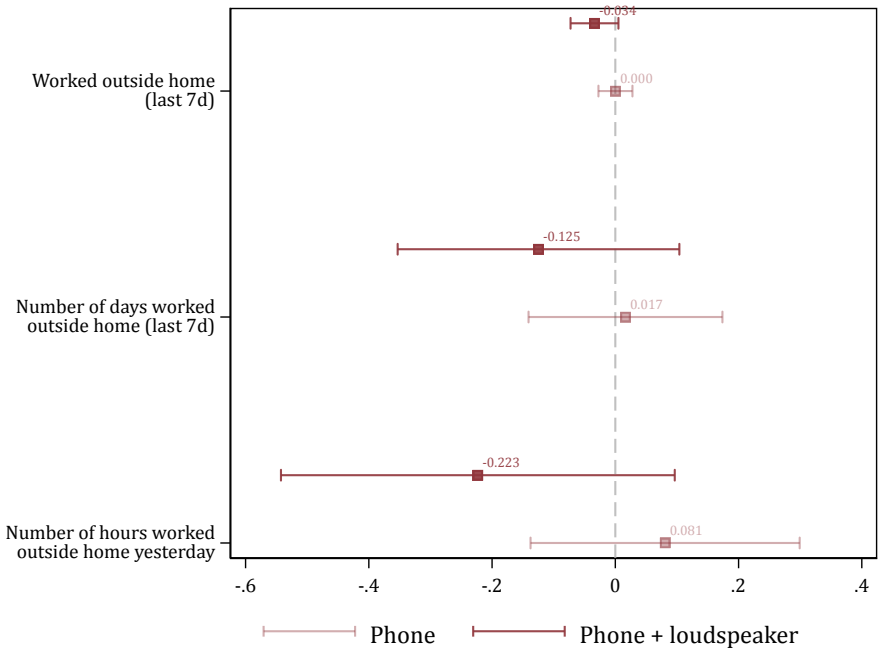

Figure B.1: Effects on Single Outcomes of Labor Supply Index: Female Subsample

Notes: The graph shows treatment effects on the components of the labor supply index for the female subsample. Point estimates are shown with 10% confidence intervals. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

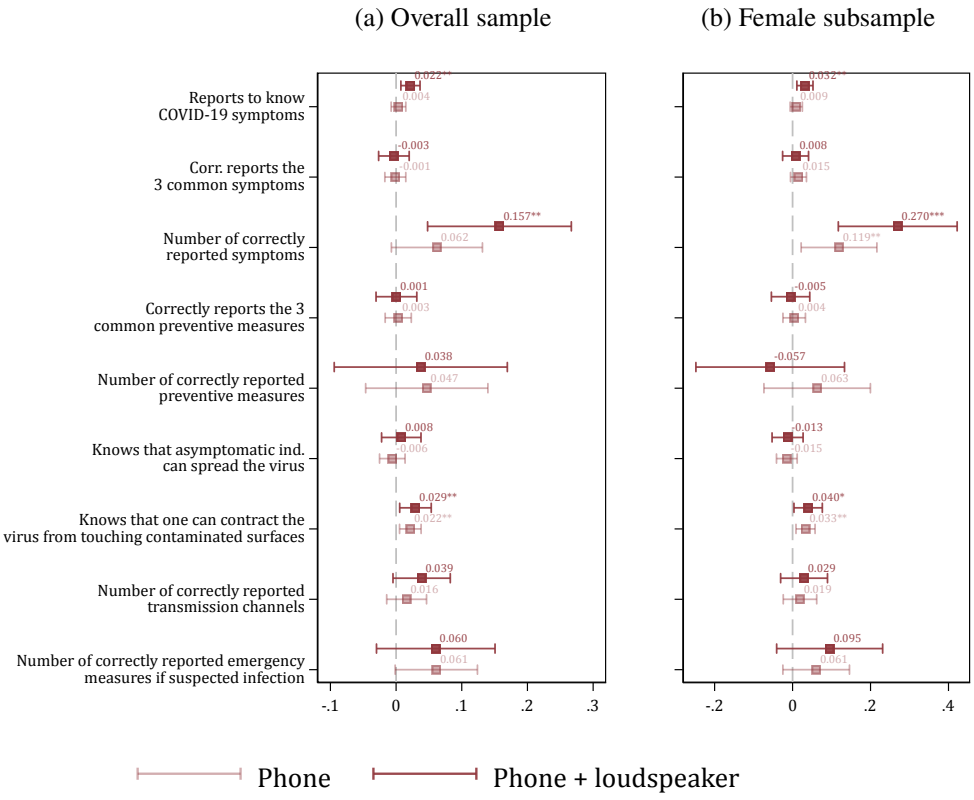

Figure B.2: Effects on Single Outcomes of the Knowledge Index: Overall Sample and Female Subsample

Notes: The graph shows treatment effects on the components of the knowledge index for the overall sample (left) and the female subsample (right). Point estimates are shown with 10% confidence intervals. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.6: Robustness—Overall sample

	Main specification (1)	Posters (2)	(2) + unbalanced (3)	(3) + T message (4)	Main spec. + T message (5)
Panel A. Behavior					
Less Labor Supply					
Phone	0.008	0.013	0.008	0.017	0.013
	(0.022)	(0.024)	(0.024)	(0.033)	(0.031)
Phone + loudsp.	0.060**	0.078**	0.079**	0.087**	0.064*
	(0.031)	(0.032)	(0.032)	(0.040)	(0.038)
Less Social Interactions					
Phone	0.008	-0.000	0.002	0.014	0.019
	(0.012)	(0.014)	(0.014)	(0.020)	(0.018)
Phone + loudsp.	0.014	0.023	0.024	0.036	0.025
	(0.017)	(0.019)	(0.020)	(0.024)	(0.022)
More Preventive Measures					
Phone	0.014	0.012	0.013	0.005	0.007
	(0.014)	(0.014)	(0.014)	(0.020)	(0.020)
Phone + loudsp.	0.014	0.020	0.021	0.013	0.007
	(0.024)	(0.025)	(0.025)	(0.027)	(0.026)
Panel B. Knowledge					
More Knowledge					
Panel C. Beliefs					
Higher Perceived Risk of Getting Infected					
Phone	0.010	0.011	0.011	0.021	0.020
	(0.010)	(0.010)	(0.010)	(0.015)	(0.015)
Phone + loudsp.	0.011	0.013	0.013	0.023	0.022
	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)
Higher Perceived Risk of Transmission					
Phone	0.021**	0.019**	0.020**	0.030**	0.032**
	(0.009)	(0.009)	(0.009)	(0.013)	(0.013)
Phone + loudsp.	0.032**	0.033**	0.033**	0.043**	0.044**
	(0.015)	(0.014)	(0.014)	(0.018)	(0.019)
Higher Perceived Cost					
Phone	0.025	0.021	0.021	-0.011	-0.009
	(0.029)	(0.028)	(0.028)	(0.034)	(0.035)
Phone + loudsp.	-0.044	-0.038	-0.039	-0.072	-0.079*
	(0.038)	(0.039)	(0.039)	(0.045)	(0.045)
Higher Perceived Severity					
Phone	-0.009	-0.009	-0.009	-0.017	-0.017
	(0.013)	(0.013)	(0.013)	(0.019)	(0.019)
Phone + loudsp.	-0.018	-0.016	-0.015	-0.023	-0.026
	(0.019)	(0.019)	(0.019)	(0.023)	(0.024)

Notes: The table shows treatment effects on the main outcomes of interest using several different specifications. Column (1) shows the base specification presented throughout the main paper, including individual and village level characteristics, the baseline level of the outcome of interest, enumerator fixed effects, and an indicator for the poster treatment. Column (2) controls for the outcome at baseline and the poster treatment, and employs enumerator fixed effects. Column (3) augments the specification in Column (2) by adding individual level characteristics that are unbalanced across the three experimental groups. Column (4) adds a control for the individual level assignment to a specific awareness message during the phone call. Finally, Column (5) uses all controls from the main specification and adds to this the indicator for the specific treatment message. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.8: Robustness—Male subsample

	Main specification (1)	Posters (2)	(2) + unbalanced (3)	(3) + T message (4)	Main spec. + T message (5)
Panel A. Behavior					
Less Labor Supply					
Phone	0.010	0.022	0.018	-0.029	-0.034
	(0.028)	(0.029)	(0.029)	(0.044)	(0.044)
Phone + loudsp.	0.089**	0.086**	0.087**	0.044	0.048
	(0.044)	(0.043)	(0.042)	(0.054)	(0.057)
Less Social Interactions					
Phone	0.007	0.005	0.006	0.008	0.010
	(0.015)	(0.016)	(0.015)	(0.024)	(0.024)
Phone + loudsp.	0.044*	0.046*	0.044*	0.046	0.048
	(0.024)	(0.026)	(0.026)	(0.030)	(0.029)
More Preventive Measures					
Phone	0.003	-0.000	0.001	-0.029	-0.025
	(0.017)	(0.017)	(0.017)	(0.025)	(0.025)
Phone + loudsp.	0.011	0.008	0.009	-0.019	-0.016
	(0.030)	(0.030)	(0.030)	(0.034)	(0.034)
Panel B. Knowledge					
More Knowledge					
Panel C. Beliefs					
Higher Perceived Risk of Getting Infected					
Phone	0.012	0.013	0.013	0.014	0.012
	(0.013)	(0.013)	(0.013)	(0.019)	(0.019)
Phone + loudsp.	0.022	0.019	0.020	0.021	0.022
	(0.021)	(0.021)	(0.022)	(0.026)	(0.025)
Higher Perceived Risk of Transmission					
Phone	0.015	0.016	0.015	0.014	0.016
	(0.011)	(0.010)	(0.010)	(0.017)	(0.017)
Phone + loudsp.	0.043**	0.041**	0.041**	0.040	0.045*
	(0.020)	(0.020)	(0.020)	(0.024)	(0.025)
Higher Perceived Cost					
Phone	0.010	0.009	0.006	-0.031	-0.032
	(0.041)	(0.040)	(0.040)	(0.051)	(0.054)
Phone + loudsp.	0.020	0.024	0.028	-0.012	-0.024
	(0.066)	(0.068)	(0.067)	(0.073)	(0.072)
Higher Perceived Severity					
Phone	-0.014	-0.011	-0.011	-0.031	-0.030
	(0.020)	(0.018)	(0.018)	(0.028)	(0.030)
Phone + loudsp.	-0.006	-0.015	-0.015	-0.035	-0.021
	(0.026)	(0.026)	(0.026)	(0.032)	(0.033)

Notes: The table shows treatment effects on the main outcomes of interest using several different specifications. Column (1) shows the base specification presented throughout the main paper, including individual and village level characteristics, the baseline level of the outcome of interest, enumerator fixed effects, and an indicator for the poster treatment. Column (2) controls for the outcome at baseline and the poster treatment, and employs enumerator fixed effects. Column (3) augments the specification in Column (2) by adding individual level characteristics that are unbalanced across the three experimental groups. Column (4) adds a control for the individual level assignment to a specific awareness message during the phone call. Finally, Column (5) uses all controls from the main specification and adds to this the indicator for the specific treatment message. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.10: Robustness—Female subsample

	Main specification (1)	Posters (2)	(2) + unbalanced (3)	(3) + T message (4)	Main spec. + T message (5)
Panel A. Behavior					
Less Labor Supply					
Phone	-0.011	0.008	0.002	0.057	0.035
	(0.030)	(0.030)	(0.030)	(0.041)	(0.041)
Phone + loudsp.	0.049	0.060	0.060	0.115**	0.096*
	(0.044)	(0.043)	(0.043)	(0.052)	(0.052)
Less Social Interactions					
Phone	-0.000	0.008	0.010	0.023	0.014
	(0.018)	(0.018)	(0.019)	(0.027)	(0.027)
Phone + loudsp.	-0.007	-0.001	0.001	0.015	0.008
	(0.025)	(0.024)	(0.024)	(0.031)	(0.032)
More Preventive Measures					
Phone	0.016	0.024	0.026	0.045	0.031
	(0.022)	(0.022)	(0.022)	(0.030)	(0.030)
Phone + loudsp.	0.010	0.034	0.037	0.055	0.024
	(0.035)	(0.040)	(0.040)	(0.043)	(0.039)
Panel B. Knowledge					
More Knowledge					
Panel C. Beliefs					
Higher Perceived Risk of Getting Infected					
Phone	0.001	0.007	0.008	0.032	0.021
	(0.016)	(0.016)	(0.016)	(0.022)	(0.023)
Phone + loudsp.	-0.007	0.009	0.009	0.032	0.014
	(0.024)	(0.024)	(0.024)	(0.027)	(0.028)
Higher Perceived Risk of Transmission					
Phone	0.017	0.023	0.024	0.047**	0.039*
	(0.015)	(0.015)	(0.015)	(0.020)	(0.021)
Phone + loudsp.	0.010	0.023	0.023	0.047*	0.033
	(0.022)	(0.020)	(0.020)	(0.025)	(0.027)
Higher Perceived Cost					
Phone	0.032	0.025	0.031	0.001	0.002
	(0.044)	(0.043)	(0.043)	(0.048)	(0.049)
Phone + loudsp.	-0.114***	-0.110***	-0.105***	-0.135**	-0.141**
	(0.042)	(0.038)	(0.039)	(0.055)	(0.056)
Higher Perceived Severity					
Phone	-0.011	-0.002	-0.004	0.000	-0.015
	(0.019)	(0.019)	(0.019)	(0.027)	(0.028)
Phone + loudsp.	-0.016	-0.004	-0.002	0.002	-0.020
	(0.030)	(0.030)	(0.030)	(0.037)	(0.037)

Notes: The table shows treatment effects on the main outcomes of interest using several different specifications. Column (1) shows the base specification presented throughout the main paper, including individual and village level characteristics, the baseline level of the outcome of interest, enumerator fixed effects, and an indicator for the poster treatment. Column (2) controls for the outcome at baseline and the poster treatment, and employs enumerator fixed effects. Column (3) augments the specification in Column (2) by adding individual level characteristics that are unbalanced across the three experimental groups. Column (4) adds a control for the individual level assignment to a specific awareness message during the phone call. Finally, Column (5) uses all controls from the main specification and adds to this the indicator for the specific treatment message. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.12: Effects on Labor Supply by Employment Status: Overall Sample and Female Subsample

	Less Labor Supply					
	No Work at BL		Daily Wage Laborer		Other Employment	
	All	Female	All	Female	All	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Phone	0.023	-0.005	-0.048	-0.070	-0.020	0.067
	(0.029)	(0.036)	(0.043)	(0.074)	(0.059)	(0.132)
Phone + loudsp.	0.059	0.056	0.155**	0.022	0.002	0.215
	(0.037)	(0.054)	(0.067)	(0.093)	(0.093)	(0.206)
p-val phone=phone+loudsp.	0.303	0.216	0.002	0.317	0.801	0.428
p-val any treatment	0.282	0.857	0.747	0.477	0.778	0.495
Obs.	3,734	2,125	1,664	654	1,085	334
Villages	815	629	555	295	454	217
R^2	0.364	0.421	0.382	0.466	0.472	0.554
Control mean	0.068	0.234	-0.103	0.163	-0.104	0.293
SD	0.937	0.903	0.933	0.905	0.979	0.872

Notes: The table shows treatment effects on summary indices of labor supply, social interactions, and preventive measures for the overall sample and the female subsample, respectively. Results are reported for individuals with high and low levels of religiosity, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.14: Effects on Social Interactions by Baseline Socialization: Male Subsample

	Less Social Interactions	
	Below Median Prior Social Interactions	Above Median Prior Social Interactions
	(1)	(2)
Phone	-0.000	0.001
	(0.021)	(0.022)
Phone + loudsp.	0.093**	-0.009
	(0.037)	(0.032)
p-val phone=phone+loudsp.	0.011	0.757
p-val any treatment	0.391	0.979
Obs.	1,689	1,681
Villages	510	547
R^2	0.389	0.393
Control mean	-0.179	-0.099
SD	0.467	0.480

Notes: The table shows treatment effects on the summary index of social interactions for the male subsample. Results are reported for individuals with below and above median baseline levels of social interactions. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.15: Effects on Labor Supply, Social Interactions, and Preventive Measures by Religiosity: Overall Sample

	Less Labor Supply		Less Social Interactions		More Preventive Measures	
	High Religiosity (1)	Low Religiosity (2)	High Religiosity (3)	Low Religiosity (4)	High Religiosity (5)	Low Religiosity (6)
Phone	0.017	0.003	0.014	0.006	0.001	0.022
	(0.038)	(0.029)	(0.020)	(0.016)	(0.022)	(0.018)
Phone + loudsp.	0.079	0.039	-0.027	0.014	0.006	0.036
	(0.058)	(0.038)	(0.034)	(0.022)	(0.033)	(0.027)
p-val phone=phone+loudsp.	0.275	0.324	0.224	0.706	0.872	0.589
p-val any treatment	0.455	0.709	0.721	0.601	0.926	0.157
Obs.	2,126	4,071	2,126	4,071	2,126	4,071
Villages	593	828	593	828	593	828
R^2	0.391	0.357	0.397	0.409	0.433	0.437
Control mean	-0.182	0.088	-0.103	0.054	-0.014	0.008
SD	0.947	0.932	0.507	0.559	0.618	0.625

Notes: The table shows treatment effects on summary indices of labor supply, social interactions, and preventive measures for the overall sample. Results are reported for individuals with high and low levels of religiosity, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.16: Effects on Labor Supply, Social Interactions, and Preventive Measures by Religiosity: Female Subsample

	Less Labor Supply		Less Social Interactions		More Preventive Measures	
	High Religiosity (1)	Low Religiosity (2)	High Religiosity (3)	Low Religiosity (4)	High Religiosity (5)	Low Religiosity (6)
Phone	0.028	-0.018	0.009	0.002	0.069	0.012
	(0.079)	(0.036)	(0.043)	(0.022)	(0.051)	(0.026)
Phone + loudsp.	-0.045	0.070	-0.122	-0.008	0.022	0.030
	(0.111)	(0.052)	(0.074)	(0.031)	(0.066)	(0.037)
p-val phone=phone+loudsp.	0.529	0.064	0.075	0.733	0.507	0.591
p-val any treatment	0.832	0.996	0.749	0.991	0.194	0.549
Obs.	613	2,279	613	2,279	613	2,279
Villages	280	634	280	634	280	634
R^2	0.515	0.399	0.549	0.429	0.497	0.450
Control mean	-0.007	0.275	0.051	0.175	-0.068	0.028
SD	0.968	0.879	0.605	0.576	0.601	0.665

Notes: The table shows treatment effects on summary indices of labor supply, social interactions, and preventive measures for the female subsample. Results are reported for individuals with high and low levels of religiosity, respectively. Significance levels are indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

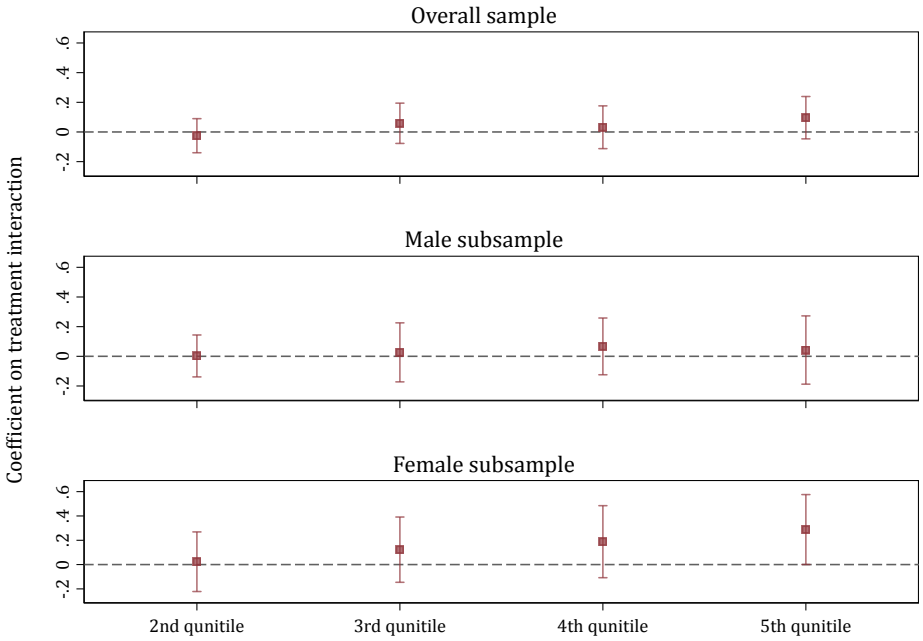

Figure B.3: Effects on Labor Supply by Treatment Frequency

Notes: The graph shows differences in the effects of the *phone plus loudspeaker* treatment across quintiles of treatment frequency (as compared to the first quintile). Point estimates are shown with 10% confidence intervals.