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Experimental evidence from Pakistan

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Lotteries are an effective strategy for increasing booster uptake: Experimental evidence from Pakistan

Abstract

Background: Regular boosters will be necessary for the continued management of COVID-19, but current booster uptake is low in LMICs.

Methods: We conducted a field experiment at a large, urban hospital in Pakistan where we offered “opt-in” booster shots on-the-spot. Participants were randomized into one of four behavioral treatment messages, *vaccine mandates* (boosters may be required for travel, work), *side-effects minimization* (boosters have minimal side effects), *vaccine manufacturer (*updated choice of vaccines) and a *lottery arm* (a chance to win a cash-prize).

Results: The cash-prize lottery treatment showed the highest booster uptake (42 percentage points, $p<0.01$). Though smaller in magnitude, we found significant results for the *vaccine mandates* and *side-effects minimization* arms.

Discussion: The use of cash incentives may be a practical way to increase voluntary booster uptake when vaccines are also made easily and freely available to the public both for future pandemic preparedness but also for routine care.

Introduction

There is increasing recognition that regular COVID-19 boosters will be necessary for the continued management of the COVID-19 pandemic (1). Booster vaccination offers strong protection against COVID-19, particularly for older adults and people with chronic health conditions (2) (3). As the efficacy from primary vaccination wanes, absent regular boosters, especially among vulnerable segments of the population, it is possible that we will see recurring annual surges in COVID-19 hospitalizations.

Currently, COVID-19 booster uptake is low in most countries (4) and many low- and middle-income countries never achieved widespread uptake of primary COVID-19 vaccines. This is due to a combination of constrained access to vaccines and widespread vaccine hesitancy towards COVID-19 vaccines. Studies have found a number of contributors to COVID-19 vaccine hesitancy including concerns about vaccine safety and efficacy (5) (6) (7), belief that certain illnesses make one ineligible for vaccination (8), requesting time off from work to get vaccinated (9) (10), perceived health status and future-oriented anxiety (11) , concerns about side effects, (12) occurrence of unwanted reactions after vaccination (13), perception that COVID-19 is just a conspiracy for boosting corporate profits, (14) and distrust in the government (15). Each of these attitudinal beliefs has contributed towards low uptake of the COVID-19 vaccines and boosters.

To counter widespread hesitancy and raise vaccination rates to levels sufficient to achieve herd immunity, many governments adopted various forms of vaccine mandates or passports to compel vaccination. Vaccine mandates have generally been found to have been highly effective at bringing up primary vaccination rates despite widespread hesitancy (16) (17) (18) (19). However, mandates have other downsides including the potential to seed suspicion and distrust of vaccines in ways that may be counterproductive to future vaccination efforts or may backfire (20). While mandates were arguably ethically justifiable at encouraging primary vaccination against COVID-19 (21), they may be less practical for encouraging booster uptake, especially as the

recommendations on booster frequency continue to evolve (22). It is unclear how perceptions of continued mandates might affect willingness to boost.

Efforts to encourage booster uptake will therefore face an even steeper challenges than primary vaccination given the widespread perception that the threat from COVID-19 has subsided (23) and the declining enforcement of COVID-19 vaccine mandates. An alternative to mandates, which are frequently considered unnecessarily coercive, are strategies grounded in the theory of behavioral “nudges.” Behavioral nudges offer choice preserving alternatives to health mandates that aim to steer the public in health enhancing directions with minimal force by correcting cognitive biases in decision-making. Nudges can improve voluntary compliance with public health guidelines, including vaccinations (24).

Behavioral nudges that may be especially useful for increasing COVID-19 vaccine uptake include approaches that influence default choices (e.g., opt-out and opt-in vaccine offers), correct loss aversion associated with side-effects, positively frame the value of vaccines and use reward based financial incentives. However, which of these approaches is likely to be most effective, especially for booster uptake has received limited attention in the vast literature on overcoming vaccine hesitancy, despite its immediate policy relevance.

Convenience is a major factor that has been found to influence vaccine uptake (25). Simply making vaccination easily available or setting it as a default choice in a clinical encounter can have profound effects on uptake. Default options and opt-out approaches exploit the tendency of people to accept the status quo when an option is presented as standard or prescribed. Studies from other health interventions (i.e., HIV testing and organ donation) that use default options suggest that they may be a viable strategy to increase the uptake of COVID-19 vaccinations (26) (27). However, previous research indicates that using an opt-in approach may be preferable for more controversial vaccinations, such as HPV vaccines, where parents are more likely to consent when they can opt-in(28).

Other research centered around vaccine side effects finds that positive framing that minimize side effects (29) (30), messages about collective health consequences of not vaccinating (31), vaccine safety/efficacy (32) (33) and personal health benefits (34) can shape vaccine intentions. Framing of side-effects can especially play an important role in shaping vaccine intentions. For example, in a study in the UK found that positive framing of risk minimization increased booster intention for the unfamiliar vaccine but reduced intention for the vaccine previously received (35). Complementing risks of side-effects with equivalent risks from non-vaccination can correct probability neglect, or the tendency to overrate small risks and underrate larger risks (36).

Framing of the quality or efficacy of vaccines may also influence uptake as perceptions that COVID-19 vaccines are ineffective are a major reason provided for hesitancy to take the vaccines around the world. Research highlights that the type and source of vaccines can influence outcomes; a study in Jordan found that the Pfizer vaccine was the preferred choice (37) , while in Bangladesh study participants were skeptical towards vaccines manufactured in India, US and Europe (38). A study from Brazil found that Brazilians, who overall have high vaccine acceptance, were more likely to reject vaccines developed in China and Russia, as compared to vaccines from the US or England. A study from Israel found that the general public was willing to accept any vaccine with efficacy is above 90% and a USA/UK country of origin rather than China or Russia (39) (40) (41). While mRNA vaccines have efficacy rates up to 95%, Chinese and Russian vaccines are of much lower efficacy. Yet, these are the vaccines that were initially most available in LMICs. National origins of vaccines can thereby serve as a cognitive short-cut signaling their likely efficacy.

Financial incentives have been found to be effective to promote a variety of health behaviors and have also been explored as a means to increase vaccine uptake (42). Lotteries are one type of financial incentive that have been used to increase COVID-19 primary vaccination. In theory, while cash incentives might help people change their behavioral health decision-making (43) (44) (45), studies on the association between

lottery programs and vaccine uptake have found mixed results (46) (47) (48) A study on Ohio's Vax-A-Million initiative found that the monetary incentive scheme led to an increase in the vaccination uptake in the state population (49). Similar results were found in a randomized controlled trial in Sweden, where monetary payments led to an increase in the vaccination rates (50). Yet, others only find a marginal impact of financial incentives in curbing vaccine hesitancy; a randomized controlled trial in California found that small monetary incentives and other behavioral nudges do not considerably increase vaccination rates (51).

While a number of studies have examined the use of lotteries in the U.S. context towards incentivizing primary vaccination (52) (53) (54), fewer studies have focused on the use of behavioral nudges and economic incentives in low- and middle-income countries, overall or to incentivize booster uptake (55) .

In this study, we conduct a field experiment in Pakistan, a lower-middle income country in South Asia, to understand vaccine hesitancy and if behavioral interventions can lead to an increase in uptake of the COVID-19 boosters. The field experiment was conducted at a large, urban hospital in Pakistan where we offered "opt-in" booster shots on spot (outcome variable) and randomized behaviorally informed messages related to mandates, side-effects, quality of vaccines and financial incentives through entry into a lottery.

COVID-19 vaccinations have proved to be challenging in Pakistan over time. In February 2020, the Ministry of Health, Government of Pakistan confirmed the first case of COVID-19 in Karachi (56) . COVID-19 vaccines were first rolled out in February 2021, however, vaccine hesitancy has been widespread among the population. In an attempt to encourage uptake, various measures were proposed, including restrictions on mobile access for the unvaccinated, mandatory proof-of-vaccination certificates for staff at schools and other public places, and travel restrictions for the unvaccinated (57) (58) (59) (60). COVID-19 booster shots were made available for individuals over the age of 30 in January 2022 to ensure continued protection against the virus (61). According to recent estimates, Pakistan has a population of 231 million. As of May 2023, 63.6

percent of Pakistanis had received the full vaccine dose, 74.9 percent had received at least one dose, and 23 percent had received a booster shot(62).

Study Data and Methods

Study design and participants

We conducted a five-armed randomized control trial at a large, urban hospital in Lahore, Pakistan, between December 21, 2022 and January 25, 2023. Randomization was carried out at the individual level. Enumerators collected data through a digital data collection platform, SurveyCTO. Verbal consent given by the participants was recorded digitally by enumerators on tablets. Respondents were given a nominal participation fee (Rs 100, USD 0.35).

Patients who visited the hospital for routine care were recruited as they entered the hospital. Our target population comprised individuals who had not previously received one or both doses of the booster shot, or had not gotten vaccinated against COVID-19. If participants met the eligibility criteria, their consent to participate in the survey was obtained. Participants were then randomly assigned to the control group or to receive one of the four behaviorally informed messages incentivizing them to receive the booster shot. Participants were asked a series of questions to understand vaccine preferences, and their demographic and behavioral characteristics. At the end of the survey participants were offered “opt in” booster shots; enumerators asked the participants if they were willing to sign up for the booster shot (or primary vaccination for those who were not previously vaccinated) during their visit to the hospital that day. (see **Annex A** & **Annex B**). Participants could then walk over to the vaccination site within the same hospital.

The treatment being administered to each respondent was not known beforehand by the enumerators as assignment to the behaviorally informed messages was done through the randomized sequence generated on SurveyCTO. Respondents were asked for their mobile phone numbers during the course of the study for disbursing the participation fee. A follow-up telephone survey was then administered on February 14,

2023 using the mobile phone information to assess whether they had received their vaccine or booster shot on the same day or subsequent to their visit. Both the surveys were designed in English and were translated in Urdu for better comprehension by the local population (see **Annex B**).

Support was received from a member of the government of Punjab's immunization team for conducting the study. In addition, the hospital management and staff gave permission to conduct the study and also agreed to give on site boosters. The Institutional Review Board Research and Development Solutions (RADS), Pakistan gave ethical clearance for this study.

Intervention groups

The four intervention arms of the experiment were: Vaccine Mandates (T1) emphasizing that boosters may be required for certain travel destinations and work; *Side-Effects Minimization (T2)* focused on the safety of the vaccine/booster and minimal side effects; *Manufacturer of the vaccine* (T3) informed participants they could get Pfizer or Moderna versions of the booster and not the earlier Chinese or Russian vaccines and *Lottery (T4)* emphasized that if participants agreed to get the booster, their name would be entered in a lottery, a chance to win PKR 30,000 (see **Annex A**). After administering the treatment messages, the respondents were asked by the enumerators if they wanted to get signed up for the booster shot during their visit to the hospital that day. Respondents who said yes were given information about where to access the booster clinic. The consent for signing up for the booster shot is used as a measure of the participant's willingness/intention to get vaccinated.

Control arm

No behaviorally informed messages were administered to the participants in the control group. Rather, they were informed about the onsite clinic and asked about their intent to get signed up for the booster shot during their visit to the hospital that day.

Outcome measure

Our primary outcome captured an individual's willingness/intention to register for getting boosted. It is measured as a binary variable which takes on a value of 1 if the respondent consented to getting signed up for vaccination, and 0 otherwise.

Follow-up survey

A short follow-up survey with a subset of 744 randomly selected participants was conducted via telephone on February 14, 2023 to ask if they had received the booster shot. We surveyed a subset of the original participants due to budget limitations.

There were two outcome variables which measured the 'uptake' of the COVID-19 booster shot: (i) *immediate vaccination* i.e., if the participant got vaccinated on the same day, and (ii) *subsequent vaccination* i.e., if the participant got vaccinated a few days later. The outcome variables are measured as binary variables and take on the value of 1 if the respondent got boosted and 0 otherwise.

Statistical analysis

We calculate demographic characteristics for our sample and present them in **Table 1.** For our primary analysis, we used ordinary least squares (OLS) model to regress an individual's willingness to register for getting boosted. We examined whether exposure to different treatments was associated with willingness to get the COVID-19 booster shot. We also re-estimate the same model after controlling for individual participant level covariates.

We used the same model for data from our follow up survey sample, using two outcome variables: immediate uptake of the vaccine, and subsequent uptake of the vaccine. Robust standard errors were computed across all models. All analyses were conducted using STATA MP (version 17).

Results

Main survey results

A total of 1,564 participants were approached and consented to participate in the survey. While 90% of respondents had received their primary vaccination, none had received the booster shot at the time of the study (**Figure 1**). Protection against COVID-19 (58 percent) and vaccine mandates (27 percent) were cited as the top two reasons for getting previously vaccinated. Concern about side effects (70 percent) and lack of trust in the vaccine (67 percent) were the top two reasons for hesitancy towards the COVID-19 vaccines among the 10% of the sample who had not vaccinated (**Table 1**).

The randomization procedure ensured that there was an equal split of participants among the treatment arms and the control group. (**Figure 1**). The sample was balanced on demographic characteristics. A summary of the key characteristics of the participants in the final analytic sample (total and disaggregated by treatment group) is presented in **Table 1**. (**see Annex C, Tables A1,A2**) The sample comprised of low to moderate income people, with slightly more females, but evenly balanced through the randomization. The full sample had 639 (41%) male participants and 921 (59%) female participants. Twenty-one percent of the respondents had never been to a school and 16 percent had completed high school. The average monthly income of respondents was PKR 34,000 (USD 149). Ten percent of the sample had never been vaccinated against COVID-19.

Across the full sample (n=1564), approximately, 16% (N=248) agreed to boost or vaccinate on spot after being delivered the randomized opt-in message. Approximately 4 percent(n=298) of participants in the control group were willing to register for the booster shot. By contrast, 45 percent of participants (n=151) in T4 (lottery arm) were willing to sign up for the booster shot. For T1 (vaccine mandates) , T2 (side-effects minimization) , and T3 (manufacturer of the vaccine), 11.64 percent(n=37), 9.08 percent (n=30) and 6.15 percent (n=19) of the participants were willing to sign up for the booster shot, respectively (**Table 2).**

We also analyzed results for participants who had not received their primary vaccination dose. Among those who had not been previously vaccinated (n=163), willingness to register for getting vaccinated was particularly high among the lottery arm. For the lottery arm(T4), 62.5 percent (n=30) of participants were willing to register for getting vaccinated. We also found statistically significant results for the lottery arm; the probability of willingness to register for the vaccine increased by 52.5 percentage points (CI: [0.34-0.70] p<0.01) (**Table 2**).

Table 3 presents the regression results (OLS) for the primary outcome (willingness to register for getting vaccinated). Our results indicate that exposure to three out of four treatments, in comparison with the control group, led to an increase in the probability of willingness to get boosted. Of these three experimental conditions, the highest uptake was for individuals getting the *cash-prize lottery treatment*; the probability of willingness to register for getting boosted increased by 42 percentage points(CI: [0.359, 0.474]p<0.01). For participants who received the *vaccine mandates treatment* arm, the probability of willingness to register for getting boosted increased by 8 percentage points, (CI: [0.038, 0.121, p<0.01). For the side-effects minimization treatment arm, the probability of willingness to register for getting boosted increased by 6 percentage points (CI: [0.021, 0.101],p<0.01). **(see Annex Figure A1)**

We included several variables in the regression model to understand the relationship between other covariates and the outcome variable. (see **Annex Table A3**). Education was a significant predictor of the willingness to register for getting vaccinated. Respondents who had completed intermediate (grade 12) or received higher education had higher probability of willingness to register for getting boosted as compared to respondents who had not received any education. The probability of willingness to register for getting boosted increased with the level of education. For instance, participants who had completed a Masters or professional degree had 29.7 percentage points higher probability of willingness to register for getting boosted(CI: [0.164, 0.429],p<0.01), while those who had completed grade 12 had 9.5 percentage points higher probability of willingness to register for getting boosted (CI: [0.035,

0.154]p<0.01). Age and income were also associated with the probability of willingness to register for getting boosted. An increase in respondent age was associated with lower probability of willingness to register for getting boosted (Coefficient: -0.002,p<0.05), while an increase in income was associated with higher probability of willingness to register for getting boosted (Coefficient: 0.150, p<0.01). Respondents who had gotten vaccinated against COVID-19 to protect themselves against the virus had higher probability of willingness to register for getting boosted (Coefficient: 0.054, p< 0.05).

Follow-up survey results

The follow-up sample comprised 744 participants. Fifty-seven percent of respondents were males and 43 percent were females. The average age of the participants was 39 years.

For the first outcome variable, i*mmediate vaccination* (if the participant got vaccinated on the same day) a total of 1.36 percent respondents (n=10) reported getting vaccinated the same day. For the second outcome variable, *subsequent vaccination* (if the participant got vaccinated a few days later) 7 percent (n=51) respondents reported getting vaccinated. (See **Annex C Table A4**)

The outcome variable, i*mmediate vaccination* had insignificant result across all four treatments. However, the outcome variable *subsequent vaccination* had significant results for the lottery arm. The probability of getting the booster short was higher by 20 percentage points as compared to the control arm (CI: [0.130, 0.269], p<0.01). (see **Table 4**, Annex **Figure 2**)

Discussion

In this study, using a five-arm randomized control trial we examined the effect of behaviorally informed messages on willingness to get boosted, and eventual booster uptake. We found substantial effects on willingness to boost against COVID-19 in three of our four intervention arms. Of the four treatment conditions, the highest uptake was for individuals getting the *cash-prize lottery treatment*; the probability of willingness to

register for getting boosted increased by 42 percentage points(CI: [0.359, 0.474, p<0.01). For participants who received the *vaccine mandates treatment* arm, the probability of willingness to register for getting boosted increased by 8 percentage points,(CI: [0.038, 0.121], p<0.01). For the side-effects minimization treatment arm, the probability of willingness to register for getting boosted increased by 6 percentage points (CI: [0.021, 0.101], p<0.01).

In the follow up survey, the outcome variable *subsequent vaccination* (if the participant got vaccinated a few days later) had significant results for the lottery arm. The probability of getting the booster shot was higher by 20 percentage points as compared to the control arm (CI: [0.130, 0.269], p<0.01).

Previous research finds mixed results on the use of financial incentives for encouraging vaccine uptake (63) (64). Evidence suggests that guaranteed immediate payments can be more effective in encouraging behavior change as compared to lotteries and gimmicks (65). A randomized control trial in Sweden found that a modest monetary incentive led to an increase in vaccination rates, with monetary incentives having a higher impact on vaccination uptake than other behavioral nudges (66). However, guaranteed modest monetary incentives may not be very practical or cost-effective in low- and middle-income country, setting or as way to motivate booster behavior. Lotteries, by contrast, while requiring a larger incentive, have the potential to be feasible and cost-effective in LMICs. Lotteries have also been shown to be effective in certain circumstances and may be appropriate for one-off booster shots that do not require a second shot. A study conducted in the US using synthetic control methods examined the effects of lotteries on first dose and complete vaccination rates in eighteen states. The results showed that lotteries had a positive impact on first-dose vaccination rates in fifteen states. However, for complete vaccination, over half of the states analyzed exhibited null or negative effects (67). The results of our study are consistent with previous research that finds that monetary incentives can lead to an increase in vaccine uptake (68).

In terms of other treatments, we find significant effects of the *vaccine mandates* arm and *side-effects minimization* arm in terms of willingness to get vaccinated. Using mandates to move the population towards vaccination has been advocated as a social incentive to increase vaccination by some (69), while others advocate for less coercive policy instruments (70). Similarly, positive framing of the vaccine can encourage uptake. For instance, in a recent study authors found that providing information about the effectiveness and safety of the COVID-19 vaccine, and framing possible side effects as temporary led to increased vaccination confidence in the US (71). Our results are consistent with such studies.

However, our findings do not indicate that references to the quality of the vaccine and manufacturer (*vaccine manufacturer arm*) had an impact on its uptake. According to previous research, the acceptance of vaccines is influenced by the origin of the vaccine (39) (40) (41). In a study conducted in Brazil, it was observed that Brazilians were more inclined to reject vaccines developed in China and Russia when compared to those developed in the US or England (39). It is possible that the results of our study might be driven by diverse preferences for vaccines among Pakistani's. For instance, in an online questionnaire administered to people in Pakistan in January 2021 (N=2158 respondents), 43.3 percent expressed a preference for the Chinese vaccine (72). Similarly, a survey conducted in July 2021 revealed that 36 percent of the participants favored Sinopharm and Sinovac, while 35 percent preferred Pfizer (73).

Our findings also shed light on the difference between intention and behavior in terms of getting vaccinated. In the main survey, the lottery arm, the vaccine mandates arm, and the side effects minimization arm were all significant. Yet, in the follow up survey, when participants were asked if they got vaccinated on the same day, an insignificant number actually followed through to vaccination while at the hospital. While a larger share did report vaccinating a few days later, only the lottery arm had significant results. Moreover, most of the participants stated that they had gotten vaccinated at different clinic/hospital instead of the hospital where the survey was conducted. Previous research provides several explanations for such behavior. Sheeran and Orbell (1998) in a study on

condom use argue that there can be a gap in intention and behavior due to situational factors (e.g. people may not find a vaccination center close by to get vaccinated). In our follow-up survey, we found that most the participants who got vaccinated later went to a nearby clinic instead of the hospital. This suggests that convenience is of utmost importance to people. However, concerningly, only 4% of respondents in the control arm agreed to get boosted on spot suggesting fairly low demand for boosters even if they are made conveniently available. This finding suggests that messaging does make a difference beyond mere availability. Both the mandate and the risk minimization arm increased uptake compared with merely offering the vaccine. However, only the lottery arm substantially increased willingness to boost. Other factors discussed by Sheeran and Orbell (1998) include, memory failures (e.g. failure to remember to perform a task), attitudinal factors (e.g. a mismatch between positive intentions and negative attitudes), and social influence (e.g. an inability to follow through because of peer pressure) (80). Consequently, measures can be devised to narrow the gap between intention and behavior and can be the focus of future work(74).

Limitations

There are several limitations of our analysis. *First,* the study had envisioned a vaccination booth would be set up very close to the survey team in order to facilitate on-spot vaccination. However, due to unforeseen logistical constraints at the hospital, the survey team was stationed at a different hospital wing from the vaccination site. We suspect the vaccination site being far away might have limited people's uptake. *Second*, the financial incentives we offered fostered high participation, but may themselves be considered a financial incentive constraining our ability to generalize from these findings.

Policy implications

There are several policy implications stemming from this analysis. The magnitude of our results for the lottery arm suggest that the use of cash incentives may be a practical and cost-effective mechanism for many LMICs to increase booster uptake as we show that even a modest cash incentive increased uptake.

While our results lend support for the use of financial incentives, there are arguments both for and against the use of financial incentives as a policy tool to promote vaccination. Critics argue that such incentives make health seeking behavior conditional on getting payments, and may negatively impact the morals and the general tendency of the individuals towards meeting social obligations (75). Those in favor of monetary vaccination incentives consider such payments useful as they can potentially cut back on indirect costs (76) and can bring attention to the importance of achieving high vaccination rates (77). They can also foster social responsibility by rewarding good behavior (78). The incentive structure however needs to be designed appropriately to get effective results. In case of primary vaccinations, entry into the lottery should be allowed only after complete vaccination for encouraging compliance at each stage (79). In the case of booster vaccination, financial incentives can encourage uptake for people who have already shown willingness to get vaccinated by getting primary vaccine shots, but just need a nudge to get boosted (80).

Our study design also enabled us to compare across different behavioral strategies. Correcting miscalculation of the risk of side-effects compared with the risk complications from COVID-19 was also an effective strategy to increase booster uptake by 8 percentage points. Likewise, reminding people that they may need vaccines to engage in other activities they value such as travel or work was sufficient to increase vaccine/booster uptake by 6 percentage points. This supports the efficacy of mandates at compelling uptake, though notably lotteries were more effective, which are less coercive and require less enforcement.

Conclusion

We conclude that the use of cash incentives may be a practical way to increase voluntary booster uptake when vaccines are also made easily and freely available to the public seeking routine care. Financial incentives may lead to increased vaccination uptake without limiting individual's freedom as in the case with mandates (81), and may act as a catalyst for fostering social responsibility by rewarding good behavior (82). This is likely a cost-effective mechanism for many low- and- middle income countries to

increase booster uptake as we show that even a modest cash incentive increased uptake. However, the continued ability of countries to offer free vaccination through on-site vaccine clinics remains in question and may depend on global vaccine donation programs.

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Tables and Figures

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Figure 1: Trial Profile

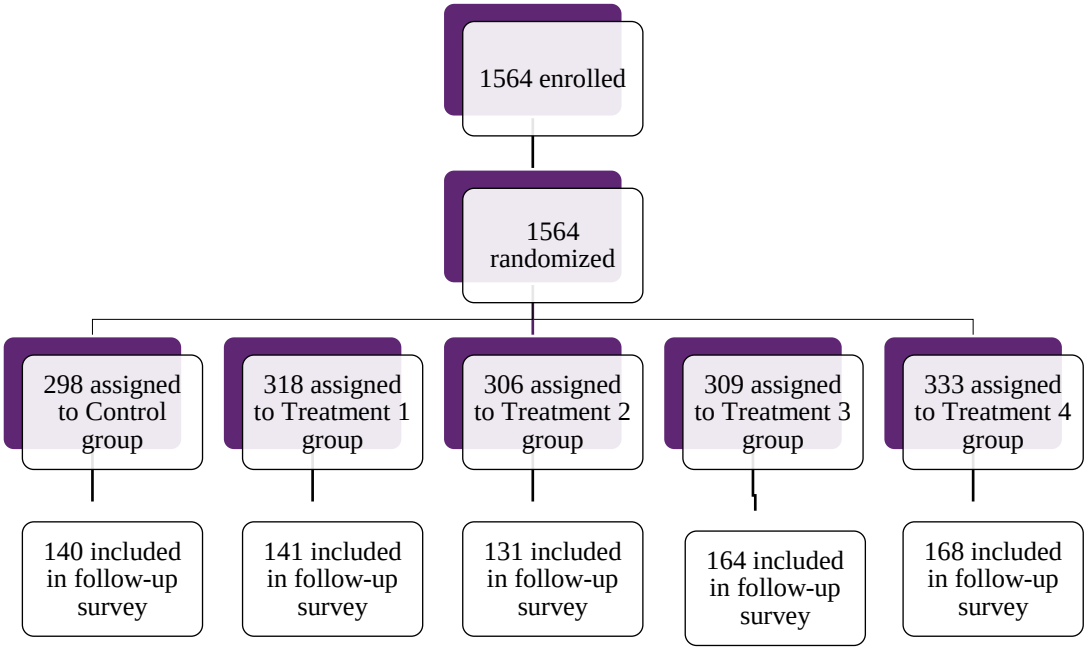


Table 1: Descriptive statistics

	Total (n= 1,564)	Control (n=298)	T1 (n=318)	T2 (n=306)	T3 (n=309)	T4 (n=333)
Age	42.43	42.48	41.98	43.07	43.05	41.65
	(11.66)	(12.01)	(10.83)	(12.02)	(11.64)	(11.79)

Gender						
Female	921 (58.89%)	171 (57.38%)	206 (64.78%)	174 (56.86%)	184 (59.55%)	186 (55.86%)
Male	639 (40.86%)	126 (42.28%)	110 (34.59%)	131 (42.81%)	125 (40.45%)	147 (44.14%)
Transgender	4 (0.26%)	1 (0.34%)	2 (0.63%)	1 (0.33%)		
Highest level of education						
Madrassah	147 (9.46%)	32 (10.81%)	28 (8.89%)	31 (10.16%)	20 (6.49%)	36 (10.91%)
Did not go to school	324 (20.85%)	69 (23.31%)	75 (23.81%)	61 (20.00%)	73 (23.70%)	46 (13.94%)
Dropped out before matric	228 (14.67%)	40 (13.51%)	49 (15.56%)	47 (15.41%)	52 (16.88%)	40 (12.12%)
Matric	425 (27.35%)	69 (23.31%)	96 (30.48%)	99 (32.46%)	82 (26.62%)	79 (23.94%)
Intermediate/F.A./F.Sc.	256 (16.47%)	63 (21.28%)	42 (13.33%)	41 (13.44%)	52 (16.88%)	58 (17.58%)
Bachelors	119 (7.66%)	21 (7.09%)	20 (6.35%)	20 (6.56%)	26 (8.44%)	32 (9.70%)
Masters/MPhil	45 (2.90%)	2 (0.68%)	4 (1.27%)	3 (0.98%)	3 (0.97%)	33 (10.00%)
M.B.B.S./L.L.B.	10 (0.64%)		1 (0.32%)	3 (0.98%)		6 (1.82%)
Monthly household income	34,368 (12540.16)	33,104 (10610.38)	33,576 (9359.84)	33,298 (11883.17)	34,410 (14307.91)	37,164 (15027.41)
Why did you get vaccinated the first time?*						
To protect against COVID 19	807 (57.60%)	153 (57.09%)	169 (59.51%)	152 (55.07%)	184 (63.89%)	149 (52.28%)
Because I was required to in order to go out/attend school/ or work	381 (27.19%)	69 (25.75%)	76 (26.76%)	70 (25.36%)	81 (28.13%)	85 (29.82%)
To protect others	271 (19.34%)	47 (17.54%)	49 (17.25%)	46 (16.67%)	65 (22.57%)	64 (22.46%)
Everyone I knew was vaccinating	160 (11.42%)	28 (10.45%)	33 (11.62%)	28 (10.14%)	30 (10.42%)	41 (14.39%)
My doctor told me to do it	90 (6.42%)	20 (7.46%)	16 (5.63%)	24 (8.70%)	11 (3.82%)	19 (6.67%)
Due to travel reasons	113 (8.07%)	22 (8.21%)	24 (8.45%)	23 (8.33%)	18 (6.25%)	26 (9.12%)

Vaccinated against COVID -19						
Yes	1,401 (89.58%)	268 (89.93%)	284 (89.31%)	276 (90.20%)	288 (93.20%)	285 (85.59%)
No	163 (10.42%)	30 (10.07%)	34 (10.69%)	30 (9.80%)	21 (6.80%)	48 (14.41%)
Why have not you gotten vaccinated? * *						
Concern about side effects	114 (69.94%)	22 (73.33%)	28 (82.35%)	20 (66.67%)	12 (57.14%)	32 (66.67%)
Do not trust the vaccines	109 (66.87%)	19 (63.33%)	22 (64.71%)	15 (50%)	14 (66.67%)	39 (81.25%)
Was not able to get the shot	10 (6.13%)	2 (6.67%)	1 (2.94%)	1 (3.33%)	1 (4.76%)	5 (10.42%)
Did not have time	1 (0.61%)					1 (2.08%)
Disease not that bad	2 (1.23%)			1 (3.33%)	1 (4.76%)	
Against religious beliefs						
Other reasons	10 (6.13%)	3 (10%)	1 (2.94%)	4 (13.33%)	2 (9.52%)	

Data are mean (SD), or n (%).
* For a multi-select response questions, the percentage total can exceed 100%.
**Only those who had not gotten vaccinated were asked their reasons to do so.

Table 2: Respondents consenting to register for getting the booster/vaccine shot by treatment group

Respondents consenting to register for getting the booster shot by treatment group (n=1564)					
	Control (n=298)	T1 (n=318)	T2 (n=306)	T3 (n=309)	T4 (n=333)
Willingness to register for getting the booster shot	11 (3.69%)	37 (11.64%)	30 (9.80%)	19 (6.15%)	151 (45.35%)
Respondents who had previously not vaccinated consenting to register for getting the vaccine shot by treatment group (n=163)					
	Control (n=30)	T1 (n=34)	T2 (n=30)	T3 (n=21)	T4 (n=48)
Willingness to register for getting	3 (10%)	3 (8.8%)	2 (6.6%)	2 (9.5%)	30 (62.5%)

the booster shot

Note: Data are n (%). **T1** *(Vaccine Mandates),* **T2** *(Side-effects minimization,* **T3** *(Manufacturer of the vaccine),* **T4** *(Lottery).*

Table 3: **OLS regression model showing relationship between treatment arms and willingness to register for getting vaccinated**

	Willingness to register for getting vaccinated
T1 *(Vaccine Mandates)*	0.079***
	(0.021)
	[0.038, 0.121]
T2 *(Side-effects minimization)*	0.061***
	(0.020)
	[0.021, 0.101]
T3 *(Manufacturer of the vaccine)*	0.025
	(0.018)
	[-0.010, 0.059]
T4 *(Lottery)*	0.417***
	(0.029)
	[0.359, 0.474]
Constant	0.037***
	(0.011)
	[0.015, 0.058]
Observations	1564

Robust standard errors in parentheses and 95% confidence intervals in square brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table 4: Follow up survey - OLS regression model showing relationship between treatment arms and vaccination status: (i) Got vaccinated the same day (ii) Got vaccinated many days later

	Got vaccinated the same day	Got vaccinated many days later
	OLS	OLS
Treatments		
T1 *(Vaccine Mandates)*	-0.015	0.028
	(0.015)	(0.023)
	[-0.0434141, 0.0135821]	[-0.0165282, 0.0728647]
T2 *(Side-effects minimization*	-0.007	-0.015
	(0.017)	(0.015)
	[-0.0393507, 0.0260023]	[-0.044384, 0.0150193]
T3 *(Manufacturer of the vaccine)*	-0.010	0.002
	(0.015)	(0.018)
	[-0.0398404, 0.0204141]	[-0.0326954, 0.0375826]
T4 *(Lottery)*	-0.010	0.200***
	(0.015)	(0.035)
	[-0.0398907, 0.0200155]	[0.1304951, 0.2688366]
Constant	0.022*	0.023*
	(0.013)	(0.013)
	[-0.0027517, 0.0468693]	[-0.0028096, 0.0479224]
Observations	733	720

Robust standard errors in parentheses and 95% confidence intervals in square brackets. * p<0.1, ** p<0.05, *** p<0.01.

Annexure

Annex A :Treatments

Treatment 1:
Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You can get the COVID-19 vaccine or booster. Vaccination and boosters may be required for certain travel destinations, work requirements or other types of activities. You just have to walk over to a room and they
will help register you and administer the shot on spot at no cost. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to get a COVID-19 vaccine or booster during your visit today?

Treatment 2:
Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. The vaccines and boosters are really safe. The overwhelming majority of people experience no side effects and can go about their day as usual. At worst, you might get a mild fever that will be over in a day or two, whereas getting COVID-19 can result in a long hospital stay or death. Elderly people are especially at risk of severe COVID-19 if they have not been boosted and the vaccines are safe for elderly people as well. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to get a COVID-19 vaccine or booster during your visit today?

Treatment 3:
Today we are offering a free COVID-19 vaccination clinic right here in the hospital. It is really easy to get vaccinated against COVID-19. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. The vaccines and booster shots being given today are all Pfizer or Moderna versions not the Chinese or Russian vaccines that were primarily available before. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to the COVID-19 vaccine or booster during your visit today?

Treatment 4:
Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. If you agree to get the vaccine your name will be entered in a lottery, a chance to win PKR 30,000. Can I sign you up to get the COVID-19 vaccine or booster during your visit today?

Control group:
Can I sign you up to get the COVID-19 vaccine or booster during your visit today?

Appendix B

Uptake Survey

Field	Question	Answer
enum_name (required)	Conducted By	

enum_other (required)	Please specify other		
resp_id (required)	Respondent ID		
screener_1 (required)	Hello, we are doing a survey today- can I ask you a quick question to determine if you are eligible?	1	Yes
		2	No
screener_2 (required)	Have you received a COVID-19 booster vaccine? In other words, have you completed the booster shots?	1	Yes
		2	No
screener_note	Thank you for your time. We are only speaking with people today who have not received a booster shot.		
consent (required)	Hello, we are surveying people today about their experience getting the COVID-19 vaccine. It will just take a few minutes of your time. Moreover, for giving us your precious time and to respond to our questions, we will give you PKR 100 as a participation fee. You will receive the amount within 24-48 hours. Are you willing to participate? Refusing to not participate will not have any consequences for you.		
Survey			
survey > section 1			
s1_q1 (required)	Gender of the respondent Enumerator to record	1	Male
		2	Female
		3	Transgender
s1_q2 (required)	What is your current age?		
s1_q3 (required)	What is your mother tongue?	1	Urdu
		2	Punjabi
		3	Sindhi
		4	Pushto
		5	Balochi
		6	Siraiki
		777	Other
s1_q3_o (required)	Please specify other		
s1_q4 (required)	What is the highest level of education completed by the respondent?	1	Did not go to school
		2	Dropped out before matric
		3	Matric
		4	Intermediate/F.A./F.Sc.
		6	Bachelors
		7	Masters/MPhil
		8	MBBS/LLB
		9	PhD

		5	Diploma Holder/Vocational Training
		0	Madrassah
		888	Do not know
		999	Refused to answer
s1_q5 (required)	What is the monthly income of the household?		
s1_q5_n (required)	Are you here for COVID-19 related treatment?	1	Yes
		2	No
s1_q5_n_1 (required)	Have you had COVID-19?	1	Yes
		2	No
s1_q5_n_2 (required)	How many times have you contracted the COVID-19 virus?		
s1_q6 (required)	Have you been vaccinated against COVID-19 yet?	1	Yes
		2	No
survey > section 1 > s1_g1			
s1_q7 (required)	Do you recall if you got just one shot or did you get two?	1	1
		2	2
		3	Something else
		888	Do not recall
s1_q8 (required)	Which of the following vaccines did you receive?	1	Pfizer
		2	Moderna
		3	Novavax
		4	Johnson & Johnson's Janssen
		5	CanSino
		6	Sputnik
		7	SinoVac
		8	SinoPharm
		888	Do not remember
s1_q9 (required)	Why did you get vaccinated the first time?	1	To protect against COVID
		2	Because I was required to in order go out/attend school or work
		3	To protect others
		4	Everyone I knew was vaccinating
		5	My doctor told me to do it
		6	Due to travel reasons
		777	Others
s1_q9_o (required)	Please specify other		
s1_q10 (required)	If no, why haven't you gotten vaccinated?	1	Concern about side effects
		2	Do not trust the vaccines
		3	Wasn't able to get a shot
		4	Didn't have time
		5	Disease not that bad
		6	Against religious beliefs
		777	Other
s1_q10_o (required)	Please specify other		

s1_q11_n (required)	The government is recommending that everyone over the age of 18 get a COVID-19 booster shot 6 months after they are fully vaccinated to maintain their protection against COVID-19. Were you aware of this recommendation?	1	Yes
		2	No
		3	Do not recall
		4	Not applicable
s1_q11 (required)	Have you had one booster shot yet?	1	Yes
		2	No
		3	Do not recall
		4	Not applicable
s1_q13 (required)	Can I sign you up to get a COVID-19 vaccine or booster during your visit today?	1	Yes
		2	No
s1_q14 (required)	Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You can get the COVID-19 vaccine or booster. Vaccination and boosters may be required for certain travel destinations, work requirements or other types of activities. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to get a COVID-19 vaccine or booster during your visit today?	1	Yes
		2	No
s1_q15 (required)	Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You	1	Yes
		2	No

	just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. The vaccines and boosters are really safe. The overwhelming majority of people experience no side effects and can go about their day as usual. At worst, you might get a mild fever that will be over in a day or two, whereas getting COVID-19 can result in a long hospital stay or death. Elderly people are especially at risk of severe COVID-19 if they have not been boosted and the vaccines are safe for elderly people as well. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to get a COVID-19 vaccine or booster during your visit today?		
s1_q16 (required)	Today we are offering a free COVID-19 vaccination clinic right here in the hospital. It is really easy to get vaccinated against COVID-19. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. The vaccines and booster shots being given today are all Pfizer or Moderna versions not the Chinese or Russian vaccines that were primarily available before. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. Can I sign you up to the	1	Yes
		2	No

	COVID-19 vaccine or booster during your visit today?		
s1_q17 (required)	Today we are offering a free COVID-19 vaccination clinic right here in the hospital. You just have to walk over to a room and they will help register you and administer the shot on spot at no cost. You can get the COVID-19 vaccine or booster. Even if you have already been boosted or vaccinated they can check if you are eligible for another dose. If you agree to get the vaccine your name will be entered in a lottery, a chance to win PKR 30,000. Can I sign you up to the COVID-19 vaccine or booster during your visit today?	1	Yes
		2	No
s1_q18 (required)	What is your mobile number so that we can register you in the raffle?		
s1_q18a (required)	What is your mobile number?		
s1_q18n (required)	Network	1	Jazz/Warid
		2	Ufone
		3	Telenor
		4	Zong
status_survey	Status of the survey	1	Completed
		2	Partial Complete
		3	Refused because of time
		4	Refused because of lack of interest
		5	Refused because of lack of trust
		6	Refused because of other reasons
		7	Unit was locked/empty

Follow-up survey

	Question	**Answer**
enum_name (required)	Conducted By	
enum_other (required)	Please specify other	

resp_id (required)	Household ID		
talk	Did someone pick the call?	1	Yes
		2	No
base_info	Contact: [contact_b] Gender: [gender_b] Age: [age_b]	1	Yes
		2	No
survey_confirm (required)	Did anyone survey you during your visit to Mayo hospital during the month of December 2022 or January 2023?	1	Yes
		2	No
consent (required)	Consent Statement		
Survey			
s1_q1	Were you offered to get vaccinated on spot?	1	Yes
		2	No
s1_q2	Did you get vaccinated the same day?	1	Yes
		2	No
s1_q3	Did you get vaccinated many days later?	1	Yes
		2	No
s1_q4	Have you since then got a booster / vaccine for COVID?	1	Yes, from Mayo
		2	Yes, from other clinic/hospital
		3	No
s1_q5	Do you know whether anyone else in your household got vaccinated/boosted that day at Mayo hospital or since that visit?	1	Yes
		2	No
s1_q5a	Number of members who got vaccinated?		
survey > repeat (1)			
survey > repeat (1) > s1_g			
s1_q6a	Who got vaccinated? Name		
s1_q6b	Gender who got vaccinated	1	Male
		2	Female
s1_q6c	Age		
s1_q7	At the hospital that day or later?	1	Yes, from Mayo same day
		2	Yes, from Mayo some other day
		3	Yes, from other clinic hospital
		4	No
status_survey	Status of the survey	1	Complete
		2	Refused
		3	Partial Refusal
		4	Did not pick up
		5	Wrong number

		6	Issues with the number
		7	Phone was powered off
		8	Rescheduled
		9	Original respondent number was given

Annex C

Table A1: Balance table

		(1)		(2)		(3)		(4)		(5)
		Control		**T1**		**T2**		**T3**		**T4**
Variables	N	Mean/(SE)	N	Mean/(SE)	N	Mean/(SE)	N	Mean/(SE)	N	Mean/(SE)
Age	297	42.485	314	41.981	306	43.065	308	43.045	333	41.652
		(0.697)		(0.611)		(0.687)		(0.663)		(0.646)
Gender										
Male	298	0.423	318	0.346	306	0.428	309	0.405	333	0.441
		(0.029)		(0.027)		(0.028)		(0.028)		(0.027)
Female	298	0.574	318	0.648	306	0.569	309	0.595	333	0.559
		(0.029)		(0.027)		(0.028)		(0.028)		(0.027)
Transgender	298	0.003	318	0.006	306	0.003	309	0.000	333	0.000
		(0.003)		(0.004)		(0.003)		(0.000)		(0.000)
Monthly income	291	33103.780	303	33575.776	289	33297.578	287	34410.453	324	37163.580
		(621.992)		(537.709)		(699.010)		(844.569)		(834.856)
Education										
Did not go to school	296	0.233	315	0.238	305	0.200	308	0.237	330	0.139
		(0.025)		(0.024)		(0.023)		(0.024)		(0.019)
Madrassah	296	0.108	315	0.089	305	0.102	308	0.065	330	0.109
		(0.018)		(0.016)		(0.017)		(0.014)		(0.017)
Dropped out before matric	296	0.135	315	0.156	305	0.154	308	0.169	330	0.121
		(0.020)		(0.020)		(0.021)		(0.021)		(0.018)
Matric	296	0.233	315	0.305	305	0.325	308	0.266	330	0.239
		(0.025)		(0.026)		(0.027)		(0.025)		(0.024)
Intermediate/F.A./F. Sc.	296	0.213	315	0.133	305	0.134	308	0.169	330	0.176
		(0.024)		(0.019)		(0.020)		(0.021)		(0.021)
Bachelors	296	0.071	315	0.063	305	0.066	308	0.084	330	0.097
		(0.015)		(0.014)		(0.014)		(0.016)		(0.016)
Masters/M.Phil./MBBS/LLB	296	0.007	315	0.016	305	0.020	308	0.010	330	0.118
		(0.005)		(0.007)		(0.008)		(0.006)		(0.018)
Vaccinated against COVID-19 (Yes==1)	298	0.899	318	0.893	306	0.902	309	0.932	333	0.856
		(0.017)		(0.017)		(0.017)		(0.014)		(0.019)

Reasons for getting vaccinated										
To protect against COVID-19	268	0.571	284	0.595	276	0.551	288	0.639	285	0.523
		(0.030)		(0.029)		(0.030)		(0.028)		(0.030)
Because I was required to in order to work/ travel	268	0.257	284	0.268	276	0.254	288	0.281	285	0.298
		(0.027)		(0.026)		(0.026)		(0.027)		(0.027)
To protect others	268	0.175	284	0.173	276	0.167	288	0.226	285	0.225
		(0.023)		(0.022)		(0.022)		(0.025)		(0.025)
Everyone I knew was vaccinating	268	0.104	284	0.116	276	0.101	288	0.104	285	0.144
		(0.019)		(0.019)		(0.018)		(0.018)		(0.021)
My doctor told me to do it	268	0.075	284	0.056	276	0.087	288	0.038	285	0.067
		(0.016)		(0.014)		(0.017)		(0.011)		(0.015)
Due to travel reasons	268	0.082	284	0.085	276	0.083	288	0.063	285	0.091
		(0.017)		(0.017)		(0.017)		(0.014)		(0.017)
Reasons for not getting vaccinated										
Concern about side effects	30	0.733	34	0.824	30	0.667	21	0.571	48	0.667
		(0.082)		(0.066)		(0.088)		(0.111)		(0.069)
Do not trust the vaccines	30	0.633	34	0.647	30	0.500	21	0.667	48	0.813
		(0.089)		(0.083)		(0.093)		(0.105)		(0.057)
Was not able to get a shot	30	0.067	34	0.029	30	0.033	21	0.048	48	0.104
		(0.046)		(0.029)		(0.033)		(0.048)		(0.045)
Did not have time	30	0.000	34	0.000	30	0.000	21	0.000	48	0.021
		(0.000)		(0.000)		(0.000)		(0.000)		(0.021)
Disease not that bad	30	0.000	34	0.000	30	0.033	21	0.048	48	0.000
		(0.000)		(0.000)		(0.033)		(0.048)		(0.000)
Against religious beliefs	30	0.000	34	0.000	30	0.000	21	0.000	48	0.000
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
Others	30	0.100	34	0.029	30	0.133	21	0.095	48	0.000
		(0.056)		(0.029)		(0.063)		(0.066)		(0.000)

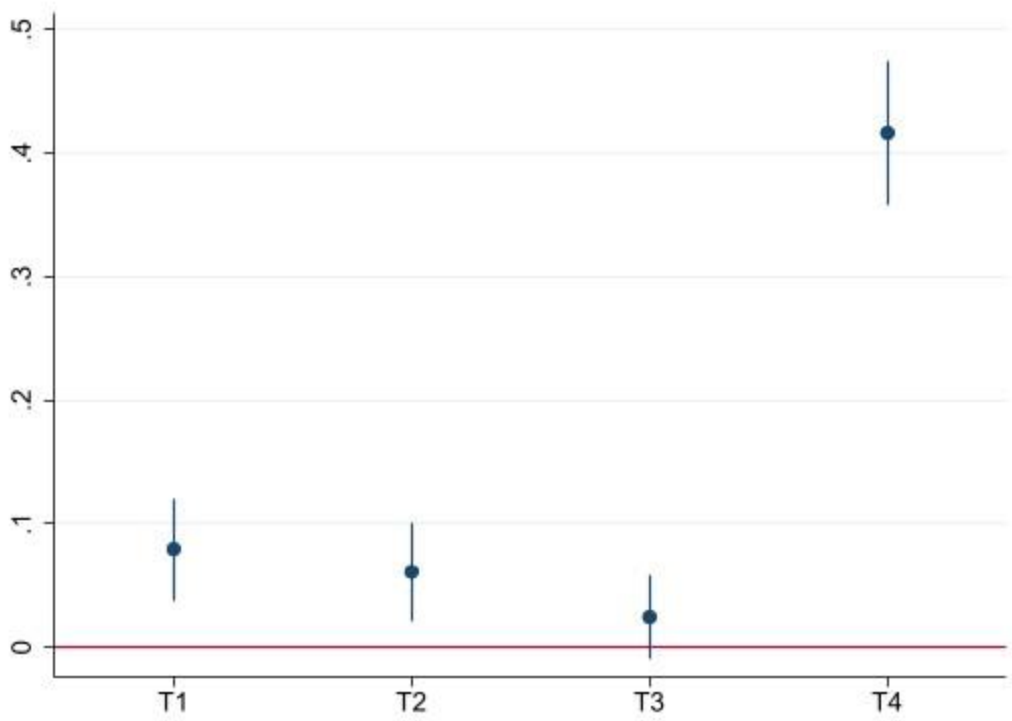
Table A2: Balance table , pairwise t-tests

		(C)-(T1)		**(C)-(T2)**		**(C)-(T3)**		**(C)-(T4)**
		Pairwise t-test		Pairwise t-test		Pairwise t-test		Pairwise t-test

Variables	N	Mean difference	N	Mean difference	N	Mean difference	N	Mean difference
Age	611	0.504	603	-0.581	605	-0.561	630	0.833
Gender								
Male	616	0.077**	604	-0.005	607	0.018	631	-0.019
Female	616	-0.074*	604	0.005	607	-0.022	631	0.015
Transgender	616	-0.003	604	0.000	607	0.003	631	0.003
Monthly income	594	-471.996	580	-193.798	578	-1306.673	615	-4059.800***
Education								
Did not go to school	611	-0.005	601	0.033	604	-0.004	626	0.094***
Madrassah	611	0.019	601	0.006	604	0.043*	626	-0.001
Dropped out before matric	611	-0.020	601	-0.019	604	-0.034	626	0.014
Matric	611	-0.072**	601	-0.091**	604	-0.033	626	-0.006
Intermediate/F.A./F.Sc	611	0.080***	601	0.078**	604	0.044	626	0.037
Bachelors	611	0.007	601	0.005	604	-0.013	626	-0.026
Masters/M.Phil./MBBS/LLB	611	-0.009	601	-0.013	604	-0.003	626	-0.111***
Vaccinated against COVID-19 (Yes==1)	616	0.006	604	-0.003	607	-0.003	631	0.043*
Reasons for getting vaccinated								
To protect against COVID-19	552	-0.024	544	0.020	556	-0.068	553	0.048
Because I was required to in order to work/ travel	552	-0.010	544	0.004	556	-0.024	553	-0.041

To protect others	552	0.003	544	0.009	556	-0.050	553	-0.049
Everyone I knew was vaccinating	552	-0.012	544	0.003	556	0.000	553	-0.039
My doctor told me to do it	552	0.018	544	-0.012	556	0.036*	553	0.008
Due to travel reasons	552	-0.002	544	-0.001	556	0.020	553	-0.009
Reasons for not getting vaccinated								
Concern about side effects	64	-0.090	60	0.067	51	0.162	78	0.067
Do not trust the vaccines	64	-0.014	60	0.133	51	-0.033	78	-0.179*
Was not able to get a shot	64	0.037	60	0.033	51	0.019	78	-0.037
Did not have time	.n	.n	.n	.n	.n	.n	78	-0.021
Disease not that bad	.n	.n	60	-0.033	51	-0.048	.n	.n
Against religious beliefs	.n	.n	.n	.n	.n	.n	.n	.n
Others	64	0.071	60	-0.033	51	0.005	78	0.100**

Figure A1: OLS regression model showing relationship between treatment arms and willingness to register for getting vaccinated



Note: **T1** *(Vaccine Mandates),* **T2** *(Side-effects minimization,* **T3** *(Manufacturer of the vaccine),* **T4** *(Lottery).*

Table A3: OLS regression model showing relationship between treatment arms and willingness to register for getting vaccinated

	Willingness to register for getting vaccinated
Variables	OLS
T1 *(Vaccine Mandates)*	0.073***
	(0.023)
	[0.028, 0.118]
T2 *(Side-effects minimization)*	0.071***
	(0.022)
	[0.028, 0.114]
T3 *(Manufacturer of the vaccine)*	0.022
	(0.019)
	[-0.014, 0.059]
T4 *(Lottery)*	0.352***
	(0.030)
	[0.293, 0.411]

Gender	
Female	Ref
Male	0.029
	(0.021)
	[-0.011, 0.070]
Age (years)	-0.002**
	(0.001)
	[-0.004, -0.000]
Monthly household income (logged)	0.150***
	(0.029)
	[0.092, 0.207]
Language	
Punjabi/Urdu	Ref
Sindhi and others*	-0.053
	(0.033)
	[-0.118, 0.012]
Education	
Did not go to school	Ref
Madrassah	0.046
	(0.040)
	[-0.032, 0.123]
Dropped out before Matric	0.034
	(0.025)
	[-0.014, 0.082]
Matric	0.074***
	(0.027)
	[0.022, 0.126]
Intermediate/F.A./F.Sc.	0.095***
	(0.031)
	[0.035, 0.154]
Bachelors	0.160***
	(0.041)
	[0.079, 0.241]
Masters/ M.Phil./ MBBS / LLB	0.297***
	(0.068)
	[0.164, 0.429]
Reasons for getting vaccinated	
To protect against COVID-19	0.054**
	(0.024)
	[0.008, 0.100]
Required in order to go out/attend school or work	-0.031
	(0.025)
	[-0.080, 0.017]

To protect others	-0.045**
	(0.021)
	[-0.087, -0.004]
Everyone I knew was vaccinating	-0.041
	(0.031)
	[-0.101, 0.020]
My doctor told me to do it	-0.067*
	(0.040)
	[-0.145, 0.011]
Travel reasons	-0.021
	(0.034)
	[-0.088, 0.046]
Constant	-1.520***
	(0.307)
	[-2.122, -0.918]
Observations	1334

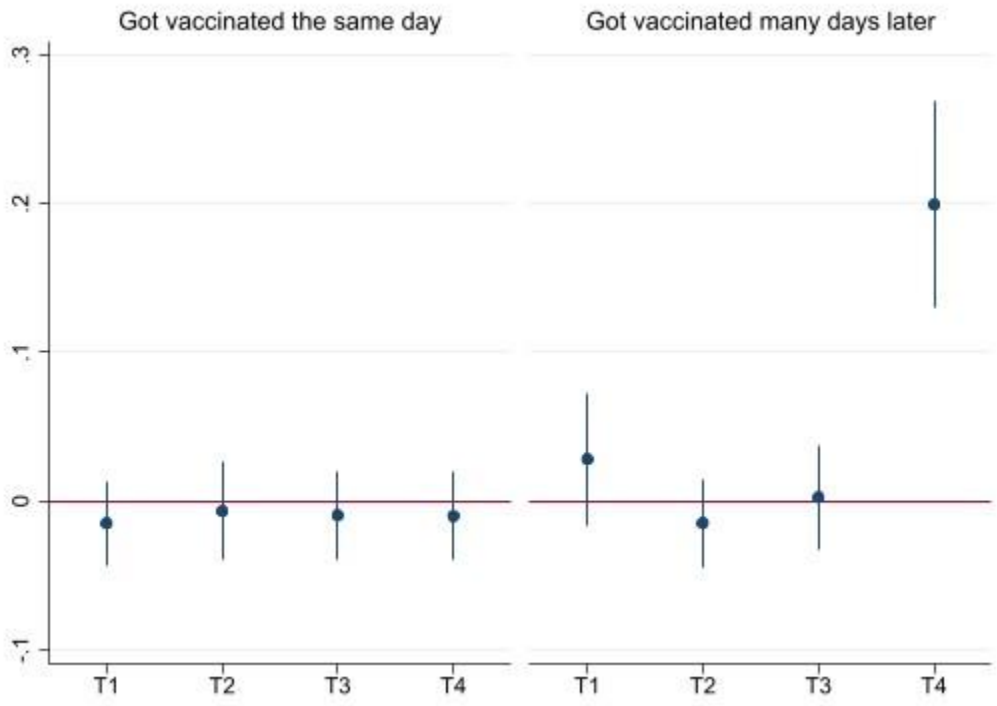
Note: Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
*Others include: Pushto, Balochi and Siraki and others.

Table A4: Follow up survey - respondents who got the booster shot by treatment groups

	Total (n= 744)	Control (n=140)	T1 (n=141)	T2 (n=131)	T3 (n=164)	T4 (n=168)
Got vaccinated the same day	10 (1.36%)	3 (2.21)	1 (0.71%)	2 (1.54%)	2 (1.23%)	2 (1.21%)
Got vaccinated many days later	51 (7.08%)	3 (2.26%)	7 (5.07%)	1 (0.79%)	4 (2.50%)	36 (22.22%)

Note: Data are n (%). **T1** *(Vaccine Mandates),* **T2** *(Side-effects minimization,* **T3** *(Manufacturer of the vaccine),* **T4** *(Lottery).*

Figure A2: Follow up survey - OLS regression model sho`wing relationship between treatment arms and vaccination status: (i) Got vaccinated the same day (ii) Got vaccinated many days later



Note: **T1** *(Vaccine Mandates),* **T2** *(Side-effects minimization,* **T3** *(Manufacturer of the vaccine),* **T4** *(Lottery).*

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