



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

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- COVID-19 booster uptake is believed to be low in most countries, however, it is increasingly being recognised that regular boosters are necessary to manage the pandemic.
- To understand if behavioural interventions can lead to an uptake of COVID-19 boosters, we conducted a survey with participants coming in for routine care to a major hospital in Lahore, Pakistan.
- Each person received a randomised message incentivising them to get the vaccine booster with information on travel requirements, vaccine safety, receiving Pfizer or Moderna vaccines, and a lottery entry to win money, and a control group who were asked if they would opt to get the booster during their visit.
- Of the four treatment arms, the only one that led to booster uptake was for signing up for the lottery entry. This shows that cash prize incentives may be a practical way to increase voluntary booster uptake for many low-and middle-income countries. Policymakers can look at the results of this study to decide how they move forward with increasing booster uptake.

## The challenge: Improving COVID-19 booster uptake

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It is increasingly recognised that regular COVID-19 boosters will be necessary for the continued management of the COVID-19 pandemic.<sup>1</sup> Currently, COVID-19 booster uptake is believed to be low in most countries.<sup>2</sup> Voluntary efforts to encourage booster uptake will face even steeper challenges than primary vaccination given the widespread perception that the threat from COVID-19 has subsided.<sup>3</sup> Strategies will not only need to address factors that shape hesitancy but may also benefit from literature on how behavioural “nudges” can improve voluntary compliance with public health guidelines.<sup>4 5 6 7 8</sup>

While in theory, cash incentives might help people change their behavioural health decision-making<sup>9 10 11</sup>, studies on the association between lottery programmes and vaccine uptake have found mixed results.<sup>12 13 14</sup> While a number of studies have examined the use of vaccine lotteries in the U.S. context towards incentivising primary vaccination<sup>15 16 17</sup>, fewer studies have focused on the use of behavioural nudges and economic incentives in low- and middle-income countries, overall or to incentivise booster uptake.<sup>18</sup>

## Overview of the research

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To understand vaccine hesitancy and if behavioural interventions can lead to an increase in uptake of the COVID-19 booster vaccine, we conducted field experiment at a large, urban hospital in Pakistan where we offered “opt-in” booster shots on spot (outcome variable) and randomised behaviourally-informed messages.

The survey was conducted between December 21, 2022 and January 25, 2023. Participants came in for routine care to a major hospital in Lahore, Pakistan, and were recruited on the basis of a pre-set eligibility criteria. The survey had two main components. The first focused on understanding vaccine preferences among respondents, and their demographic and behavioural characteristics. The second embedded a four-arm randomised evaluation within the survey to understand if endorsements can accelerate COVID-19 vaccination uptake.

Respondents were stopped on their way into the hospital by the study team and were randomised to receive four different messages incentivising them to receive a vaccine or booster, depending on their eligibility, during their visit to the hospital.

## Treatments

*Treatment 1: Vaccine Mandates.*

The first arm (*T1*) emphasised that boosters may be required for certain travel destinations, work etc.

*Treatment 2: Side-Effects Minimisation.*

The second arm (*T2*) focused on the safety of the vaccine/booster and minimal side effects.

*Treatment 3: Manufacturer of the vaccine.* The third arm (*T3*) informed participants they could get Pfizer or Moderna versions of the booster and not the earlier versions (Chinese or Russian vaccines).

*Treatment 4: Lottery.* The fourth arm (*T4*) emphasised that if participants agreed to get the booster, their name would be entered in a lottery, a chance to win PKR 30,000.

*Control group:* The control condition comprised of just asking if they could be signed up to get a COVID-19 booster during their visit that day.

**Fewer studies have focused on the use of behavioural nudges and economic incentives in low- and middle-income countries, overall or to incentivise booster uptake.**

## Outcome variable

The outcome variable captured an individual's willingness to get boosted. It is measured as a binary variable which takes on a value of 1 if the respondent consented to enrol in getting vaccinated, and 0 otherwise.

Descriptive analysis was first performed to understand the trends and underlying vaccine hesitancy, while regression modelling focused on testing statistical relationships between variables of interest.

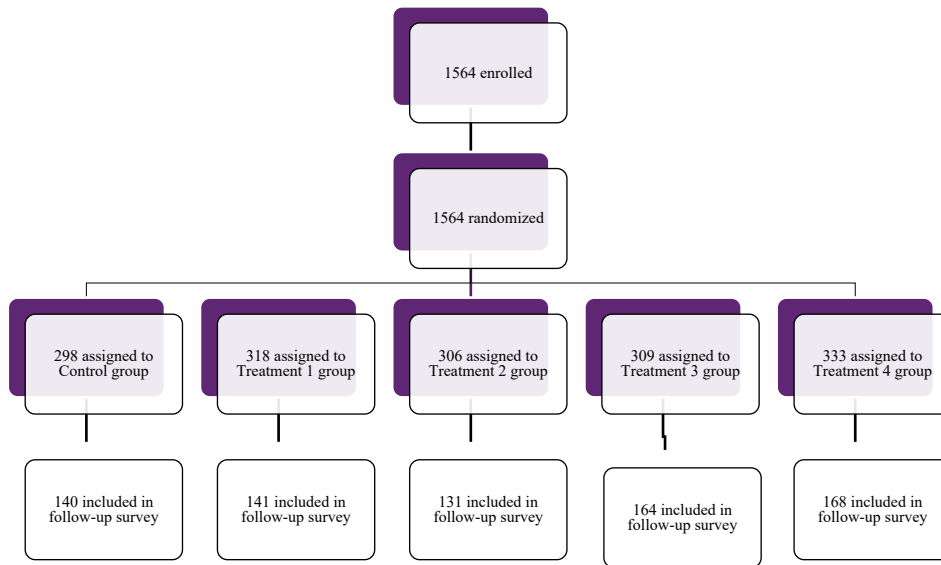
## Key findings

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### Descriptive results

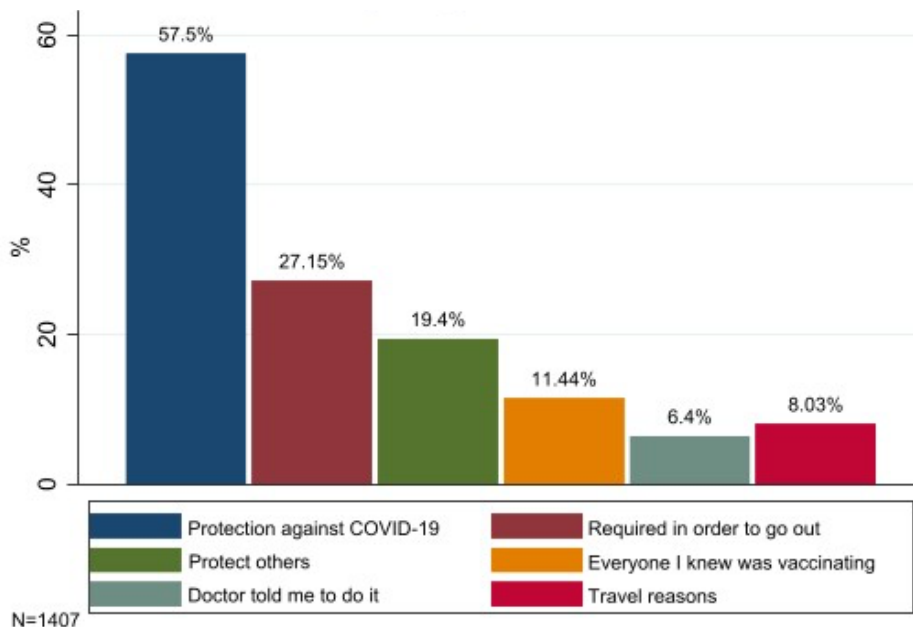
The sample comprised of 1,564 respondents who came in for routine care. There was roughly an equal split across the treatment groups (*see figure 1*)

**FIGURE 1: Trial profile**



Of the total sample, 41% were males and 59% females. The average age of the participants was 42 years. Twenty-one percent of the respondents had never been to a school and 16% had completed high school. The average monthly income of respondents was PKR 34,000 (USD 149), with a minimum of PKR 2400 (USD 11), and maximum of PKR 220,000 (USD 965). Ninety percent of the respondents had received the COVID-19 vaccine.

**FIGURE 2: Reasons for getting vaccinated the first time**

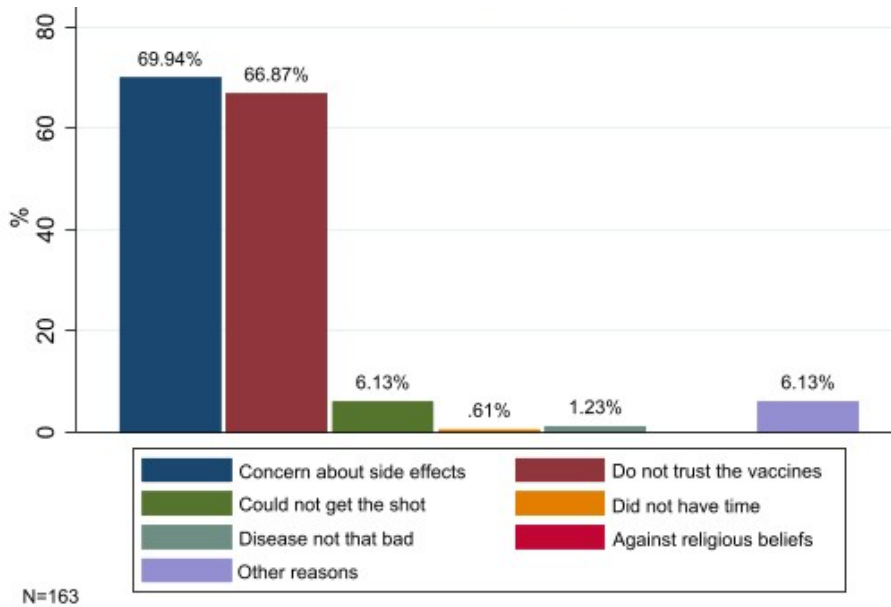


The top two reasons for getting vaccinated were to protect against COVID-19 (58%) and vaccine mandates (27%).

In terms of not getting vaccinated, concern about side effects (70%) and lack of trust in the vaccine (67%) were the top two reasons. (see figures 2 &3).

However, booster uptake was very low; 99.6% of respondents had not received the booster shot.

**FIGURE 3: Reasons for not getting vaccinated**



### Regression results

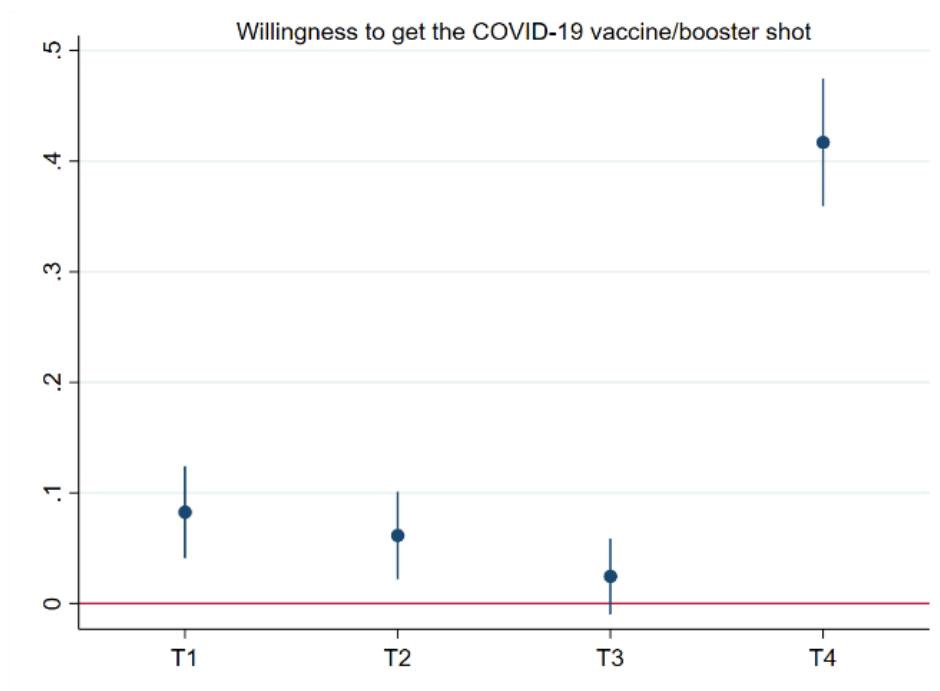
Of the four experimental conditions, the highest uptake was for individuals getting the cash-prize lottery treatment; the probability of willingness to get vaccinated increased by 42 percentage points. For individuals who received the *vaccine mandates* arm, the probability of willingness to get vaccinated increased by 8 percentage points, while for the *side-effects minimisation* arm it increased by 6 percentage points (see table 1 & figure 4).

**TABLE 1: OLS regression results (uptake survey)**

<i>Willingness to get the COVID-19 vaccine/booster shot</i>	
<b>T1 (Vaccine Mandates)</b>	0.079***
	(0.021)
<b>T2 (Side-effects minimization)</b>	0.061***
	(0.020)
<b>T3 (Manufacturer of the vaccine)</b>	0.025
	(0.018)
<b>T4 (Lottery)</b>	0.417***
	(0.029)
<b>Constant</b>	0.037***
	(0.011)
<b>Observations</b>	1564

Standard errors in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**FIGURE 4: OLS regression results (uptake survey)**



## Follow-up survey

A follow up survey was conducted via telephone on February 14, 2023. Seven hundred and forty-four participants from the original sample survey were randomly recruited using their contact numbers. An equal number of respondents were sampled across the treatment arms. We collected information on two outcome variables, *immediate vaccination* (if the participant got vaccinated on the same day), and *subsequent vaccination* (if the participant got vaccinated a few days later).

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

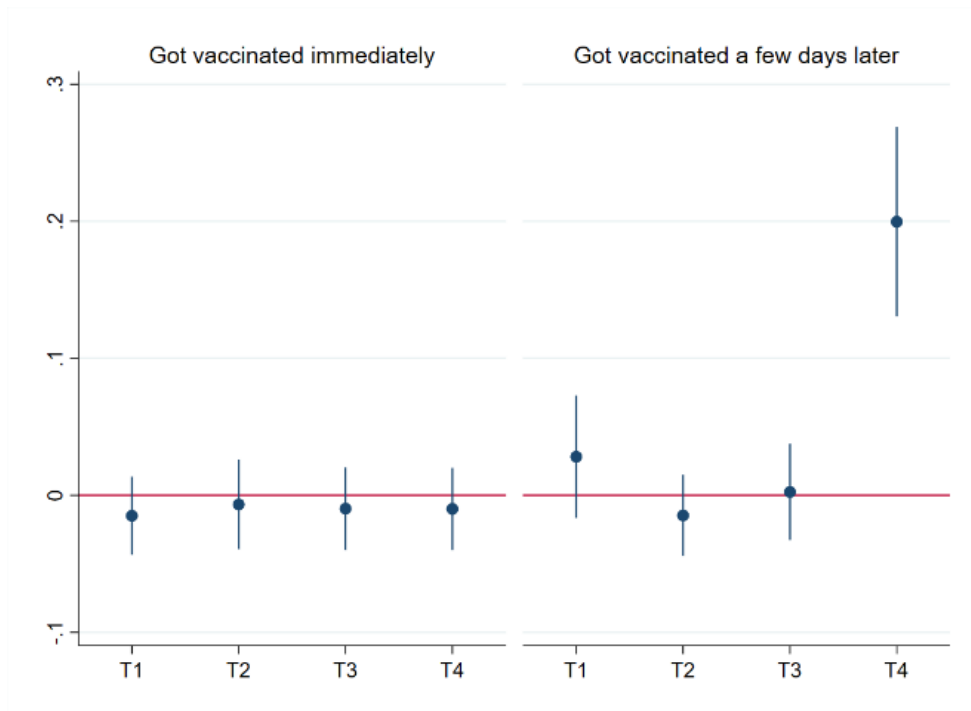
**TABLE 2: OLS regression results (follow up survey)**

	Immediate vaccination (Got vaccinated on the same day)	Subsequent vaccination (Got a booster vaccine for COVID -19 a few days later)
<b>T1</b>	-0.015 (0.015)	0.028 (0.023)
<b>T2</b>	-0.007 (0.017)	-0.015 (0.015)
<b>T3</b>	-0.010 (0.015)	0.002 (0.018)
<b>T4</b>	-0.010 (0.015)	0.200*** (0.035)
<b>Constant</b>	0.022* (0.013)	0.023* (0.013)
<b>Observations</b>	733	720

Standard errors in parentheses \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Of all the four experimental conditions, it was found that only entering individuals into a cash-prize lottery led to booster uptake. The probability of getting a booster shot increased by 20 percentage points when an individual received a cash-prize lottery treatment (see table 2 and figure 5).

FIGURE 5: Figure 5: OLS regression results (follow up survey)



## Policy and programme implications

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, and may act as a catalyst for cultivating civic responsibility by rewarding good behaviour.<sup>19 20</sup>

This is likely a cost-effective mechanism for many LMICs 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 programmes.



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