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CUSTOMIZING PERFORMANCE PAY TO OVERCOME HEALTH WORKER PROCRASTINATION IN PAKISTAN

Tailoring performance-based incentives according to health providers' innate characteristics reduced procrastination and increased polio vaccination in Pakistan.

Featuring an evaluation by James Andreoni, Michael Callen, Karrar Hussain, Muhammad Yasir Khan, and Charles Sprenger

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Polio remains endemic in only two countries as of 2020: Pakistan and Afghanistan. To date, there is no cure for the disease, but widespread vaccination campaigns have eliminated it in all other countries. In 2014, when this evaluation took place, polio vaccination rates in Pakistan hovered at about 70 percent.[1]

One of the many reasons why children remained unvaccinated is a tendency for individuals to procrastinate. Research shows that individuals are likely to place greater value on their time in the present than in the future. This concept helps to explain procrastination: it is common for people to put off a task that requires effort rather than completing it immediately. Procrastination can affect job performance: if workers delay numerous tasks to the future, they may run out of time to complete all of them or delay the task indefinitely. Curbing this tendency might be particularly important for job performance for time-bound tasks, such as conducting public health campaigns.

In partnership with the Department of Health in Lahore, Pakistan, researchers introduced a monitoring and incentive system for Lady Health Workers (LHWs) working on a polio eradication campaign to understand how individuals' tendency to delay work to the future affects their goal setting and effort.

Researchers measured how individual LHWs valued the future relative to the present and combined this information with existing evidence on the impact of performance-based incentives. Such incentives can improve health service delivery by awarding a monetary or social reward if the LHW meets a predetermined outcome. This enabled researchers to test whether customizing performance-based incentives according to individual preferences may be more effective than generic incentives when helping health workers to avoid procrastination.

KEY RESULTS:

Individually-tailored vaccination incentive plans were more effective than more generic ones. On average, LHWs who were offered vaccination plans with incentives designed to overcome their personal tendency to procrastinate were 10 percent away from equitably allocating their vaccinations across days one and two of the vaccination drive. Those receiving a generic plan were 15 percent away. LHWs receiving personalized plans also made greater progress toward their vaccination targets.

Health workers demonstrated a tendency to procrastinate. LHWs who decided three days in advance of the vaccination drive how to allocate their vaccination targets were more likely to more equitably distribute the targets, on average allocating 146.5 vaccines to the first day. Those making this decision on the morning of the drive were likely to allocate two to three fewer vaccinations to the first day and more to the second.

Health workers varied in the extent to which they allocated vaccinations to the second day relative to the first. While most LHWs preferred to vaccinate more on the second day regardless of when they made their allocation decision, their preferences ranged from equating 0.75 vaccinations on day one for every one vaccine on day two (showing a tendency to procrastinate) to equating 1.5 vaccines on day one with one vaccination on day two (preferring to front-load their vaccinations and not procrastinate).

EVALUATION

In the city of Lahore, LHWs administer a preventive oral polio vaccine through monthly two-day vaccination drives. Prior to the intervention, they went door-to-door to prespecified households to administer the vaccine and convene with their supervisor at the end of each day to self-report the number of vaccinations administered. LHWs earned a daily wage of 100 rupees (US$1 at the time of the evaluation), regardless of how many children they vaccinated.

The Department of Health in Lahore partnered with researchers to test the impact of customized incentives for LHWs on vaccination target completion. They aimed to incentivize LHWs to set manageable daily goals and not procrastinate. Each LHW in the program received a smartphone with a monitoring system in which she recorded vaccination information and uploaded a picture of each home and her vial of vaccine.

The intervention took place across two vaccination drives in November and December 2014 (see Figure 1). During each drive, LHWs were required to attempt 300 vaccinations. If an LWH met her daily goal on both days, she received a bonus of 1,000 rupees (US$10), ten times the daily wage. If not, she would receive her daily 100-rupee (US$1) wage.

The first drive measured each LHW's tendency to procrastinate. LHWs randomly received one of four possible trade-off rates that translated vaccinations on day one to vaccinations on day two. Each vaccination the LHW allocated to day two would reduce the number of vaccinations allocated to day one by one of four tested trade-off rates (see Table 1). Each LHW was then asked to distribute her 300 vaccinations target across the two days of the drive. Allocating more vaccinations to the second day indicated a greater tendency to procrastinate.

Researchers also studied how proximity to the start of the drive changed these preferences by randomly splitting the LHWs into two groups:

- *The advance group* submitted their vaccination allocation across the two days in advance of day one of the drive.
- *The immediate group* submitted their preference on the morning of day one.

FIGURE 1. TIMELINE AND GOALS OF THE TWO VACCINATION DRIVES

Drive 1: November 2014

Goals:

1. Identify individual tendency to procrastinate
2. Measure whether this tendency changes closer to the start of the drive

Drive 2: December 2014

Goals:

1. Test impact of tailored versus non-tailored performance incentives
2. Measure whether this impact changes closer to the start of the drive

TABLE 1. RANDOMIZATION DETAILS SHOWING THE DIFFERENT PROGRAM GROUPS IN DRIVES 1 AND 2 OF THE INTERVENTION

	PRIMARY PROGRAM	ALLOCATION DECISION	
		Advance Choice	Immediate Choice
DRIVE 1	R=0.9*	43 LHWs	41 LHWs
	R=1	46 LHWs	46 LHWs
	R=1.1	40 LHWs	38 LHWs
	R=1.25	45 LHWs	39 LHWs
DRIVE 2	Individually-tailored incentive plan	85 LHWs	84 LHWs
	Random incentive plan	88 LHWs	80 LHWs

*This is the vaccine trade-off rate that translated vaccinations on day one to vaccinations on day two. For example, an R of 0.9 meant that for each vaccination allocated to day two, the number of vaccinations allocated to day one would be reduced by 0.9. LHWs received one of four possible trade-off rates in Drive 1. For more information on trade-off rates, see Box 1.

The second drive tested the impact of individually-tailored vaccination incentive plans relative to more generic plans. The same LHWs were again split into the advance or immediate groups. LHWs who received performance-based incentives were further split into two groups:

- Half received an *individually-tailored vaccination plan* that helped them to overcome the procrastination tendencies identified in the first drive. For instance, those who preferred to delay more vaccinations to the second day received an incentive scheme in which vaccinations on the second day counted less toward their goal of 300 vaccination attempts. This encouraged the LHW to conduct more vaccinations on the first day so they could reach their target over the two days and receive the 1,000-rupee bonus.
- The other half received a *generic vaccination plan* based on preferences at least one LHW had indicated in the previous drive, but not their own.

A final group of LHWs served as a comparison group. They were monitored via the smartphone monitoring system but received a flat rate of 100 rupees per day (200 rupees per drive) and no incentive pay.

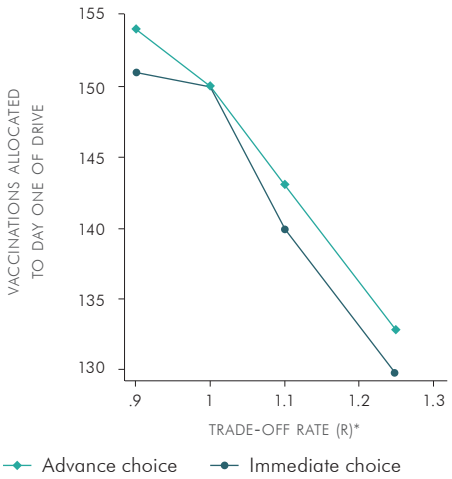
To measure the impact on polio vaccination across the two-day drives, researchers used data from the smartphone monitoring system. The data were aggregated in real time and were available to senior health administrators.

RESULTS

Providing individually-tailored incentives was more effective in achieving vaccination targets than more generic incentives. Among LHWs in the comparison group, 40.5 percent met their vaccination target over the two-day drive. Relative to those in the comparison group, LHWs who received any performance-based incentives made 15–17 percent more vaccinations. On average, those with individually-tailored vaccination plans were likely to more equitably allocate their targets across days 1 and 2, thereby showing less tendency to procrastinate and leave an unachievable number of vaccines to day two. Those receiving a generic contract were, on average, about 15 percent away from an equitable allocation, compared with 10 percent for those with individually-tailored plans. A tailored incentive policy was more effective in overcoming innate tendencies to procrastinate.

LHWs tended to discount the future. LHWs in the advance group made decisions three days in advance of the drive on how to allocate their vaccination targets across the two-day drive. These LHWs were likely to more equitably distribute the targets, on average allocating 146.5 vaccines to the first day. Meanwhile, LHWs in the immediate group decided on the morning of the vaccination drive how to allocate their targets. These LHWs on average allocated two to three fewer vaccinations to the first day, leaving more to the second. This indicated a preference toward procrastination—those making decisions for the same day as the drive considered the first day the "present" and preferred to put forth more effort in the future (the second day of the drive). However, LHWs making decisions in advance of the drive altogether were likely to view the two days more equally (Figure 2).

FIGURE 2. LHWS SETTING TARGETS IN ADVANCE CONSISTENTLY ALLOCATED MORE VACCINES TO DAY ONE



*This is the vaccine trade-off rate that translated vaccinations on day one to vaccinations on day two. For example, an R of 0.9 meant that for each vaccination allocated to day two, the number of vaccinations allocated to day one would be reduced by 0.9. LHWs received one of four possible trade-off rates in Drive 1. For more information on trade-off rates, see Box 1.

The extent to which LHWs procrastinated varied, with some LWHs showing a strong tendency to delay vaccinations and others showing a preference for completing work early. Researchers used allocation preferences identified in the first drive to calculate how greatly each LWH preferred to delay vaccination attempts into the future. There was a large variation, with some LHWs equating 0.75 vaccinations on day one with one vaccine on day two (showing a tendency to procrastinate) and others equating 1.5 vaccines on day one with one vaccination on day two (preferring to front-load their vaccinations and not procrastinate). When ranked by the tendency to procrastinate (where those in the first percentile showed the strongest tendency to do so), the 25th percentile of LHWs equated the effort of making one vaccination attempt on the second day with the effort of making 0.84 or 0.88 vaccination attempts on the first day, depending on when they made their allocation decision. These LHWs preferred to put a larger share of vaccinations off to the second day. The 75th percentile of LHWs—those less likely to procrastinate compared to the 25th percentile—demonstrated a preference for doing more work on the first day. They equated the effort of making one vaccination attempt on the second day with the effort of making 1.18 or 1.21 attempts on the first day.

BOX 1. HOW PROCRASTINATION RELATES TO INTERTEMPORAL CHOICE AND TIME DISCOUNT FACTORS

How people decide to complete a task now versus the future is known as *intertemporal choice* in economics. *Time discounting*, or the notion that people value the future less relative to the present, is a critical element of intertemporal choice. It explains why people tend to put off disagreeable tasks. For instance, saving for the future requires allocating money in the present to a savings account to benefit the individual in the future, rather than spending it on something that benefits them in the present.

The extent to which individuals discount time is driven by their personal *time discount factor*. This is the factor by which future benefits must be multiplied to obtain their present value. Those who value the future and present equally have a time discount factor of one. Someone who values benefits in the future less than benefits in the present have a time discount factor less than one, and individuals who value the future more than the present have a factor greater than one. For instance, if someone were indifferent between receiving $10 in the future and $8 in the present, they would have a time discount factor of 0.8.

In this study, LHWs with discount rates less than one allocated more vaccinations to the second day of the drive. The tailored incentive plans sought to change their allocation decisions by motivating them to complete more vaccinations on day one relative to day two.

POLICY LESSONS

Incentive structures that incorporate personal preferences can help individuals more equitably distribute goals over time. Individuals often prefer to put off tasks until the future, which can lead to task incompletion. This study indicates that identifying to what extent an individual tends to procrastinate and disincentivizing them from doing so with a personalized incentive structure can help to reduce procrastination and achieve goals. In addition to health worker performance, this design could be applied to a number of programs, such as retirement allocations and commitment savings products. While many such programs already implement measures to overcome procrastination more generally, this study indicates that personalized incentives can be still more impactful.

Implementing tailored incentives can be difficult if individuals misrepresent their preferences. Implementing tailored incentives requires an accurate understanding of an individual's tendency to procrastinate. By asking LHWs to choose vaccine allocations, Drive 1 of this study sought to identify each LHW's procrastination preferences. There was no evidence that LHWs chose an arbitrary allocation rather than their actual preferences. Had they done so, however, implementing tailored incentives in Drive 2 would have been difficult. Similarly, this is an important consideration for other programs that aim to identify and incorporate time preferences.

Real-time, easy-to-access data can make implementing tailored incentives easier and faster. Key obstacles to eliminating polio in Pakistan were that information about who was getting vaccinated was not being collected, and the LHWs' pay structure did not motivate them to perform more vaccinations. The preponderance of smartphones allowed researchers and the Department of Health in Lahore to develop a smartphone-based app that monitored LHW performance and enabled performance-based incentives. When individuals vary in their preferences to delay work, this type of technology to monitor performance and collect data can be used to tailor incentives and improve performance.

Featured Evaluation: Andreoni, James, Michael Callen, Yasir Khan, Karrar Jaffar, and Charles Sprenger. "Using Preference Estimates to Customize Incentives: An Application to Polio Vaccination Drives in Pakistan." Working Paper, July 2020.

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1 WHO and UNICEF. "Pakistan: WHO and UNICEF estimates of immunization coverage." 2019. https://www.who.int/immunization/monitoring_surveillance/data/pak.pdf

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