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Did you get your shots? Experimental evidence on the role of reminders☆

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ABSTRACT

Many families fail to vaccinate their children despite the supply of these services at no cost. This study tests whether personal reminders can increase demand for vaccination. A field experiment was conducted in rural Guatemala in which timely reminders were provided to families whose children were due for a vaccine. The six-month intervention increased the probability of vaccination completion by 2.2 percentage points among all children in treatment communities. Moreover, for children in treatment communities who were due to receive a vaccine, and whose parents were expected to be reminded about that due date, the probability of vaccination completion increased by 4.6 percentage points. The cost of an additional child with complete vaccination due to the intervention is estimated at about $7.50.

1. Introduction

Immunization is one of the most cost-effective strategies for improving child survival (Bloom et al., 2005). However, over 1.5 million children die of vaccine-preventable diseases every year, representing 29 percent of all child deaths under the age of five; the majority of these deaths occur among poor populations in developing countries (World Health Organization, 2014). In recent decades, countries have implemented different supply-side interventions to boost vaccination rates, including expanding access to health care facilities, implementing vaccination campaigns, and providing vaccines free of charge. These policies have surely contributed to increased vaccination rates. Nonetheless, in 2013 about 21.8 million children worldwide did not receive the recommended package of vaccines (World Health Organization, 2014). Hence, in a context of readily available supply, a critical question is how to further boost demand for vaccines in developing countries.

The low demand for vaccines exemplifies a more general pattern of limited demand for preventive health care in developing countries. This pattern seems paradoxical given evidence of substantial expected future gains of implementing a variety of preventive health care actions and the low cost associated with these actions (Bloom et al., 2005; Bleakley, 2007; Lucas, 2010). This puzzle has prompted substantial research aimed at understanding the underlying barriers that could explain such behavior. One potential barrier relates to a lack of information regarding future benefits of preventive health measures. Indeed, a series of experiments reviewed by Dupas (2011) shows that information campaigns can increase demand for preventive health care, though these interventions are typically insufficient to achieve universal adoption of promoted behaviors.

Another potential explanation for low demand for preventive health care is that individuals discount future benefits heavily or that they exhibit present-bias behavior. That is, individuals may

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properly value future gains of adopting certain healthy behavior but they may not want to sacrifice current consumption (or time) to achieve these gains. In the case of present-bias behavior, individuals decide to postpone certain health actions until a future date, but once the day arrives, they decide to postpone the required investments again (Loewenstein, 1992)[1]. To tackle this barrier, incentives can be introduced to provide individuals with present benefits for adopting certain behaviors. Consistent with this view, many countries have implemented conditional cash transfer (CCT) programs in part to promote increased coverage of certain health services including vaccination. Evidence suggests that these programs have typically generated improvements in vaccination rates, although the effects have been modest (Fiszbein et al., 2009). Moreover, conditional cash transfer programs typically require large public outlays. For example, a conditional cash transfer implemented in Nicaragua between 2000 and 2002 provided beneficiary families $224 per year if health conditionalities were met (Barham and Maluccio, 2009)[2].

A third explanation for low demand for preventive health care in developing countries is that sub-optimal decisions may be traced to reduced cognitive capacity produced by high levels of poverty (Mani et al., 2013). This line of research posits that individuals living in poverty must constantly manage limited resources and face difficult trade-offs; these constant preoccupations leave fewer cognitive resources available, which may, in turn, lead to poor decision-making. This approach suggests that certain simple public interventions, such as providing reminders, could be particularly helpful for individuals living in poverty to make better health decisions.

Providing reminders to parents about the coming due date of a vaccine for their children is a low-cost strategy that requires minimal conditions to scale up. Producing these reminders only requires information on the beneficiaries' birth dates and some efficient mode of communication with parents (e.g., via community health workers)[3]. Moreover, reminders in health care have been shown to be effective in developed countries and are routinely used in private sector settings[4]. However, these reminders are rarely used in developing countries and, more importantly, little is known about their effectiveness in increasing adoption of recommended health behaviors in these settings[5].

This paper presents experimental evidence on whether reminders can increase vaccination rates in developing countries. The intervention was implemented in rural communities in Guatemala. Through a program known as the Coverage Extension Program (PEC for its Spanish acronym), the government hired non-governmental organizations (NGOs) to provide a package of child and maternal health preventive services in clinics which in turn employ community health workers to promote attendance at the clinics. We randomly assigned clinics in our sample to either a treatment or a control group. In treatment communities, health workers received lists of children who were due to receive a vaccine at the clinic in the following month. The experiment took place in 2011 and 2012, and we assess the effects after six months of implementation.

Our main outcome of interest is an indicator variable for whether the child has received all vaccines recommended for his or her age (complete vaccination). As in other developing countries, in Guatemala coverage rates for vaccines due in the first months of life are high, but they decrease markedly for vaccines due after children turn one year old. That is, 86 percent of children 12 months old or younger received all vaccines recommended for their age, but this rate decreases to 67 percent for children between the ages of 18 and 48 months and to 42 percent for children between the ages of 48 and 53 months[6]. These patterns suggest that individuals recognize the value of vaccination and may be willing to incur the (time) costs involved in having their children vaccinated. This interpretation is consistent with survey results from the study area: 100 percent of mothers agreed that vaccination improves children's health, and 98 percent believed that their children would receive all recommended vaccines. Nonetheless, the decline in complete vaccination rates with child age shows that most families fail to follow through with their plans, suggesting that reminders may aid families in achieving full vaccination[7].

To measure the effects of the intervention on complete vaccination, in the main analysis we use administrative data from 130 clinics participating in the study; this corresponds roughly to 130 communities, although some clinics cover two communities. The main sample includes about 13,000 children who were one to five years old at the end of the intervention. The NGOs collected and maintained administrative data using the PEC's data platform. The data included a complete record of all health services provided to children (including vaccination) and their dates of birth. Because the NGOs conducted a census every year in the communities under analysis and because community health workers are expected to track births, deaths, and migration throughout the year, the records were considered to have high coverage of children residing in the area, according to public officials and NGO managers. About 85 percent of vaccination records coincide between the administrative data and the information in the vaccination cards held by families in these communities[8]. In addition to these administrative data,

[1] It is generally accepted that people prefer receiving rewards in the short term rather than in the future (DellaVigna, 2009; Loewenstein, 1992). Similarly, they would rather defer incurring costs. Exponential discounting could explain a parent's decision to put off vaccination if the expected costs of vaccination exceed the expected discounted benefits. However, various studies show that people's behavior reveals hyperbolic discounting or preferences that weigh current well-being against any future moment, in excess of what would be expected with exponential discounting (Thaler, 1991; Thaler and Loewenstein, 1992). Such preferences keep people from making certain investments that would yield future rewards.

[2] Fernald et al. (2008) present evidence from Mexico's CCT program. Banerjee et al. (2010) also find that in-kind incentive payments – in the form of lentils or dishes – increased vaccination rates in India. The authors note that the value of the incentive was very small in comparison to the estimated benefits of receiving the vaccines, suggesting that families are underestimating the value of the vaccinations or are heavily influenced by the immediate costs and benefits of obtaining vaccination. This is consistent with observations about hyperbolic discounting, such as those by O'Donoghue and Rabin (1999) and Thaler (1991).

[3] In contrast, although reminding beneficiaries of overdue vaccines could potentially be more effective, it may be infeasible in many developing countries. This is because providing such reminders requires a well-functioning electronic medical record system to identify children who have not received the expected vaccines given their age.

[4] A comprehensive review of the U.S. literature found median effects of these interventions on vaccination rates of 8 percentage points for studies published between 1980 and 1997 (Briss et al., 2000). A more recent review also documented positive effects of reminders on vaccination rates (Jacobson Vann and Szilagyi, 2005).

[5] One of the few studies on reminders in developing countries is the paper by Wakadha et al. (2013) that present results of a small-scale intervention that combined text messages with monetary and in-kind incentives to increase vaccination rates in rural Kenya. The study documented the feasibility of the intervention though effects were not ascertained because of the lack of a comparison group. Also, Blaya et al. (2010) report that mobile phone-based reminder systems in South Africa and Malaysia were effective in improving compliance with treatment regimens and attendance at appointments.

[6] Overall, the fraction of children younger than five years of age with complete vaccination was 67 percent.

[7] Vaccines given at later ages may be more easily forgotten by families. While vaccines given in the first year of life are administered relatively frequently (at birth, and at two, four, six, and 12 months of age), subsequent vaccines occur less frequently (the next vaccines are given at 18 and 48 months of age).

[8] We used administrative data as the main data source to have a large sample size and, hence, to be able to detect small effects. We feel that detecting small effects is important because, as this is a low-cost intervention, and small effects could translate into large increases in vaccination rates per dollar spent.