

## Science & Society

### Motivating vaccination with financial incentives

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**Governments and organizations often offer cash payments for vaccination. How effective are such payments? A literature review shows that incentives usually increase vaccination, especially for nonhesitant populations and when using guaranteed payments. Concerns about negative unintended consequences are unsupported. We also discuss open questions and avenues for future research.**

Widespread vaccination is crucial to mitigate the public health impacts of many diseases. Despite the efficacy and cost-effectiveness of vaccination, vaccination coverage usually falls short of public health goals such as herd immunity thresholds. To increase vaccination uptake, governments and public health agencies use a range of policies, including mandates, providing information, and nudges [1]. Another commonly proposed policy is offering financial rewards for getting vaccinated. For example, countries such as Australia or India, as well as NGOs operating in low-income countries, pay parents to complete the full vaccination schedule of their children. Recently, governments and organizations around the world have offered cash rewards for coronavirus disease 2019 (COVID-19) vaccination, ranging from a few dollars to hundreds of dollars per vaccination. But how effective are such payments?

Researchers across the social sciences, philosophy, public health, and medicine

have raised serious concerns about vaccination incentives, including that incentives for vaccination might decrease vaccination uptake [2–5]. The first central concern is that financial incentives might crowd out intrinsic and prosocial motivations to vaccinate [3,4], a potential problem as prosocial motivation plays a crucial role in vaccination [6]. A second concern is that financial incentives could convey that vaccination is unsafe, unpleasant, or less effective in improving health and might decrease trust in healthcare providers [5]. These negative effects on motivation, risk perceptions, and trust could then result in a decrease in vaccination rates.

Here, we discuss research on the impact of financial incentives on vaccination. We focus on high-quality randomized controlled trials (RCTs) with large sample sizes ( $n \geq 1000$ ) measuring actual vaccination uptake rather than intentions [7–14].

#### Do financial incentives for vaccination increase vaccination rates?

In sharp contrast to the worries that financial incentives decrease vaccination uptake, most studies find that incentives boost vaccination rates. Typically, incentives lead to large increases ranging from 4 to 20 percentage points [8–12,14]. Given how difficult it is to shift health behaviors, these are large effects, rendering the incentives highly cost-effective [9,12] and often more effective than subtle interventions such as nudges [8,9]. **Table 1** summarizes key insights from these studies.

Research shows that incentives can substantially increase vaccination rates for the flu vaccine, human papillomavirus (HPV) vaccine, and childhood immunizations including against measles, tuberculosis, polio, diphtheria, tetanus, and hepatitis B. For example, in a large-scale RCT involving US college students, a \$30 incentive for the

flu vaccine led to an eight percentage point increase in vaccinations [8]. A similar increase in vaccination uptake was found when 16–18-year-old girls in the UK were offered \$70 to complete the HPV vaccination schedule [10]. In low-income countries, studies primarily examined the impact of incentives on childhood immunization and found that small incentives to caregivers are also effective [11,12].

More recently, several studies have examined the effects of incentives for COVID-19 vaccination and found more mixed results. A large RCT in Sweden found that a \$24 monetary incentive increased vaccination rates by 4 percentage points [9]. Also in Sweden, incentives of \$20 increased COVID-19 booster shot uptake by 12 percentage points [14]. By contrast, two US studies could not detect statistically significant average effects [13,15].

#### When are incentives more effective?

That some studies have found no effect of incentives in certain circumstances raises the question of when exactly incentives are effective. Although the current state of evidence makes it challenging to provide more definitive answers, we highlight three potential factors that might affect the effectiveness of incentives.

A first factor is the vaccine hesitancy of the targeted population. Studies find smaller effects of incentives in more vaccine-hesitant populations [13,14]. For example, one of the US studies that found financial incentives for COVID-19 to be ineffective focused on a highly vaccine-hesitant population [13]. In general, we expect financial incentives to be most effective in populations where a large number of individuals are indecisive about whether to get vaccinated. By contrast, we anticipate that incentives will have less of an impact if the majority of individuals have clear preferences for or against vaccination.

Table 1. Key conclusions on the overall effectiveness of financial incentives for vaccination

|   |   |
|---|---|
| Are incentives for vaccination effective?   | Most studies find that incentives boost vaccination rates and a few studies find no statistically significant effect of incentives. No studies find that incentives decrease vaccination uptake.              |
| When do incentives work best?               | Incentives seem to be most effective for nonvaccine-hesitant populations, in contexts where people might delay or forget vaccination, and when guaranteed payments are offered instead of lottery incentives. |
| Do incentives have unintended consequences? | Moderate one-time financial incentives do not have negative unintended impacts on future vaccination, risk perceptions, trust, moral values surrounding vaccination, and feelings of coercion.                |

A second factor is the general context in which vaccination incentives are used. Incentives for the first dose of a COVID-19 vaccine were less effective than incentives for booster doses and other vaccinations [9,13–15]. The highly polarized political debate when COVID-19 vaccines were introduced likely led individuals to make active decisions about vaccination regardless of incentives. In contexts where vaccination is less salient, incentives might be more effective because they highlight the possibility of vaccination. With incentives, vaccination will be less easily overlooked or postponed.

Lastly, the structure of the incentive matters. Lotteries with a small chance of winning large prizes seem to be less successful in boosting vaccination rates compared with guaranteed payments. For example, several US states implemented lottery incentives to increase COVID-19 vaccination, but lotteries had small effects at best [15]. Another study showed that although lotteries could increase COVID-19 vaccination uptake, guaranteed payments equal to the lottery's expected value were more effective [14]. This contradicts the view of those who argue that lotteries with small probabilities of winning sizable prizes may be particularly effective, as people tend to overestimate low-probability events.

We conclude that incentives may be more effective for less vaccine-hesitant populations, in contexts where people might delay or forget vaccination, and when guaranteed payments are offered instead of lottery incentives.

### Are there negative unintended consequences of incentives?

Even if financial incentives do trigger an initial positive change in behavior, they could lead to lower vaccination uptake in the future when incentives are no longer offered or even contribute to a broader hesitation toward vaccination [2–5]. Only a limited number of studies have explored such unintended consequences of vaccination incentives. One recent study examined a wide range of potential unintended consequences of incentives for COVID-19 vaccines in Sweden and the USA [7]. This study found no evidence of negative unintended consequences on future vaccination uptake, morals, trust, and perceived safety, ruling out even small effect sizes. Other research has found that flu vaccine incentives positively affected the intention to receive future doses [8], and that financial incentives for the HPV vaccine did not adversely impact vaccine attitudes and knowledge [10].

Another argument against using financial incentives is that they might compromise people's sense of self-determination, making them feel coerced. While incentives may not feel coercive to wealthier individuals, they could be perceived as such by those with lower incomes facing financial difficulties [2]. However, studies indicate that participants' income or education levels do not influence the effectiveness of incentives [8,9]. Moreover, there is currently little evidence to suggest that vaccination incentives trigger feelings of coercion. A recent study ruled out even small effects of modest vaccination incentives on feelings of coercion and regret for both low- and high-income individuals [7].

While worries about negative unintended consequences persist, the available research to date does not support them. However, the existing evidence has several limitations. First, it is often overlooked that unintended consequences could also be positive: financial incentives may foster long-term vaccination habits, emphasize the social importance of vaccination, or boost vaccination rates among nonincentivized family members. Second, existing studies have primarily focused on one-time payments, leaving the consequences of repeated payments for vaccination unexplored. While repeated payments prompt habit formation, they might also weaken civic responsibility and establish expectations for continued rewards. Lastly, very little work has tested the positive (or potentially negative) impact of financial incentives of differing amounts on vaccination uptake. It is unclear, for example, what the impact would be if governments or nonprofits offered very high financial rewards to those who vaccinate (e.g., \$500). Further research is essential for a more complete understanding of the potential unintended harms and benefits of repeated incentives for vaccination and incentives of different sizes.

### Future directions

Financial incentives for vaccination offer a promising policy tool for motivating vaccination and increasing immunity. The rationale for financial rewards for vaccination is twofold. First, they help people who intend to vaccinate but fail to because they face obstacles such as inattention, forgetfulness, self-control issues, or vaccination hassles. Second, financial rewards help address

### Box 1. Open avenues for research on the impact of financial incentives for vaccination

- (i) Societal factors: the influence of societal context such as awareness and salience of vaccine availability, political polarization, and population characteristics on the effectiveness of incentives.
- (ii) Individual factors: the importance of individual factors such as personality, preferences, beliefs, and biases that may drive the effectiveness of incentives and may contribute to varying responses to different incentive structures.
- (iii) Incentive size: how individuals react to different incentive sizes and what the optimal incentive sizes are, considering both costs and effectiveness.
- (iv) Positive unintended consequences: potential additional favorable outcomes of financial incentives, such as long-term vaccination habits and increased vaccination rates among nonincentivized family members.
- (v) Repeated incentives: effectiveness and potential unintended consequences of using recurring incentives for vaccinations, considering both habit formation and potential erosion of civic duties or expectations for continued rewards.

that, in the case of an infectious disease, not vaccinating affects others, externalities that many people do not consider. While existing studies provide strong evidence that incentives increase vaccination rates, much is still unknown about when and why they work and about their potential unintended consequences, as summarized in [Box 1](#).

To advance our understanding of incentives, we urge for more large-scale randomized trials. Many existing studies focus on the impact of hypothetical incentives on vaccination intentions, but it is unclear whether people can accurately predict their own responses to incentives in hypothetical scenarios. Randomized trials that use real incentives and measure actual vaccination uptake can circumvent such issues. Furthermore, most existing studies do not explore heterogeneous treatment effects nor the impact of incentives on outcomes other than vaccination. Future studies should examine a broader range of outcomes, including future vaccination, moral values surrounding

vaccination and vaccine risk perception, and measure individual characteristics of participants, such as vaccine attitudes. We believe that carefully designed studies of this nature will be crucial to better understand when and why incentives work as well as any unintended consequences that may arise.

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#### Declaration of interests

No interests are declared.

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