COMMENT

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Pay-it-forward as a strategy to increase vaccine uptake



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Low vaccine coverage is a critical global health issue. The pay-it-forward strategy offers a promising solution by encouraging individuals who receive subsidies or free vaccines to donate for future recipients, fostering community engagement and trust in vaccine services. However, challenges remain for scaling up and sustaining this strategy and should be addressed through future largescale implementation trials.

Background

Vaccine uptake remains a significant public health challenge worldwide, despite vaccination being one of the most cost-effective interventions for preventing infectious diseases. In high-income countries, low uptake is often attributed to vaccine hesitancy, which is frequently driven by concerns related to vaccine safety, misinformation, and declining confidence in vaccination programs [1]. In low- and middle-income countries (LMICs), while organizations like the Global Alliance for Vaccines and Immunisation (GAVI) have addressed many funding barriers, other challenges persist. These include limited resources for implementation, insufficient community engagement, distrust in providers, and

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a lack of awareness about the benefits of vaccination and the risks of vaccine-preventable diseases [2]. Vaccine delay, defined as administering vaccines after the recommended age, is another critical issue [3]. This delay can lead to prolonged periods of susceptibility and increase the risk of outbreaks. Reasons for delay include parental concerns about overloading the immune system with multiple vaccines, scheduling difficulties, not receiving professional advice from healthcare providers, and a lack of understanding of the importance of timely vaccination [4]. Given these barriers, there is a clear need for innovative strategies that can address both motivational and practical obstacles to vaccine uptake.

How the pay-it-forward strategy works

Pay-it-forward is a complex multicomponent implementation strategy (Fig. 1) consisting of financial support to address fee-related barriers, educational contents to address individual-level awareness and knowledge barriers, and a community-engaged communication approach to address interpersonal- and organizational-level trust issues. Pay-it-forward approaches have been used in business for years to foster customer loyalty, enhance brand reputation, and encourage word-of-mouth marketing [5]. In recent years, it was adapted and applied in health settings, including calling for generosity from patients to volunteer for COVID-19 clinical trials during the pandemic. In the field of vaccination strategy research, the pay-it-forward model provides an individual with a subsidized vaccine and then offers them the opportunity to give a gift that helps others access vaccinations [6]. The gift can be contextualized based on local culture and public acceptance, e.g., from voluntary donation to writing a warm postcard message or sharing a book with others.



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Fig. 1 The user journey of pay-it-forward

The pay-it-forward strategy begins with a novel community-supported financial incentive to overcome part of financial barriers. Through crowdfunding or other fund-raising mechanisms, individuals can be supported to receive essential health services such as the HPV vaccine, influenza vaccines, and or other essential health services at lower or no out-of-pocket cost [6, 7]. For example, the cost of one-dose influenza vaccine can be covered by community donations, leveraging community assets and generosity to support access to care [7].

After individuals receive a vaccine, they are informed that the cost is covered by community donations. This aspect of the strategy may help foster a sense of gratitude and social responsibility. Participants are then invited to contribute back to the community, by donating or giving a gift to support future vaccine recipients. These social contributions hold potential to complement governmentled vaccination programs and help cover left-behind populations, thereby reducing disparities. In previous pay-it-forward practices, postcard messages have been used to engage and allow participants to express their gratitude. The act of sending postcards to subsequent participants promotes a positive feedback loop, encouraging further participation in the vaccination program [7]. The postcards also served as a priming tool, conveying important health education messages in an engaging and simple manner. These messages were co-developed with the target population and aim to address knowledge and awareness gaps [6]. For the HPV campaign, the postcards covered messages promoting HPV vaccination and informed about cervical cancer burden among the target population, the benefits of timely vaccination, vaccine safety, and protection effects. This priming nudge reinforces vaccination norms, encouraging recipients to get vaccinated and advocate for others to do the same.

Empirical evidence supporting effectiveness of the pay-it-forward strategy

The pay-it-forward approach lies in the upstream reciprocity mechanism, where people who receive help are more generous toward others [8]. This may strengthen community ties and build community trust, reducing vaccine delays or improving vaccine confidence and vaccine uptake. Empirical data from our studies provide support to these statements, as no other research groups have reported findings on the pay-it-forward strategy.

In our two-arm randomized controlled trial conducted in Chengdu, Western China, we observed a first-dose HPV vaccine uptake of 34.2% (55/161) in the pay-it-forward arm, compared with 17.5% (28/160) in the standard-of-care arm [6]. A lower proportion of participants in the pay-it-forward arm (65.6%, 105/160) experienced HPV vaccine delay, compared to 82.8% (130/157) in the standard-of-care arm [6]. For the influenza vaccine, our quasi-experimental trial in Guangdong showed that 74% (111/150) of participants in the pay-it-forward arm received the vaccine, compared to 37% (55/150) in the standard-of-care arm [7]. Participants in the pay-it-forward arm were also more confident about the influenza vaccine's safety (83% vs 67%), importance (88% vs 69%), and effectiveness (85% vs 62%) [7]. Another trial testing the pay-it-forward strategy in increasing chlamydia/gonorrhea testing among sexual minority men also demonstrated that the strategy positively impacted community engagement and trust [9].

Additionally, both quantitative and mixed-methods research data suggested that the pay-it-forward approach fosters reciprocity and social solidarity within communities. Participants in the pay-it-forward arm reported higher belonging scores (3.32 ± 0.74) compared to the pay-what-you-want (3.05 ± 0.72) and standard-of-care arms (3.09 ± 0.63) . Many participants expressed that witnessing generosity motivated them to reciprocate: "When you see someone else's heartwarming message, you want to help others and pass down the love" [7]. This sense of solidarity may improve vaccine coverage by increasing community buy-in and participation.

Challenges and mitigation strategies for sustaining positive impacts

Despite the potential of the pay-it-forward strategy to increase vaccination uptake in LMICs, there are several challenges in its implementation. First, as an innovative strategy, it requires implementers and target users to understand and accept the concept, which imposes a cognitive burden on these stakeholders. Cultural and contextual adaptations of the innovation characteristics (i.e., branding, contents, and delivery method) are desirable in order to tell a better story and lower barriers to cognitive participation. This is especially important in culturally collective settings, where values like shared responsibility and reciprocity are central. Framing the intervention around community benefits and local solidarity narratives can enhance acceptance. In individualistic contexts, adaptations might focus on personal altruism. Without these adjustments, the strategy risks misalignment with local values, limiting its effectiveness.

Further, the pay-it-forward model has been mostly implemented in face-to-face settings, requiring additional human resources and time efforts. Refining and simplifying the implementation process are needed to facilitate integration into routine practices and organizational uptake of the strategy. As digital tools become more powerful and influential, digitalizing the pay-it-forward approach could offer a direction. The use of social media and mobile health apps can lower geographical barriers to and improve accessibility of health programs and provide additional opportunities for crowd participation and health communications [10]. Our three-arm feasibility trial used a digitalized strategy to evaluate the feasibility and preliminary effectiveness of an onlinebased pay-it-forward approach in HPV vaccination programs. The trial is ongoing, and the results will provide valuable insights into how digital platforms can support vaccine uptake. Further details are available in the trial registry (ChiCTR2300079291, https://www.chictr.org. cn/showproj.html?proj=211101). But larger-scale trials are needed to examine the effectiveness and implementation process. Additionally, further efforts are required to evaluate the feasibility and adaptability in diverse LMICs.

Third, financial management and sustainability remain a challenge. When health programs involve public donations and financial incentives, effective finance management and transparency are essential to gaining trust from both participants and donors [11]. Partnering with established foundations or employing public financial reporting mechanisms may help ensure transparency and accountability [12]. Our previous studies have shown that in pay-it-forward arms, community donations can cover 12.7% of HPV vaccine costs and 31.6% of influenza vaccine costs [6, 7]. This suggests that pay-it-forward might serve as a complimentary model to government-led programs, but it is not a panacea and will not replace government's role in providing vaccination services.

Conclusions

The pay-it-forward strategy offers a novel, cost-effective, and community-driven approach to increase vaccine uptake. By partly addressing financial, motivational, and informational barriers, the pay-it-forward strategy has the potential to serve as a transitioning model to universal health coverage. While its application has primarily been tested in influenza and HPV vaccination contexts, previous studies have demonstrated its adaptability, suggesting it is a promising tool for application in other populations and areas. This includes preventive care for marginalized groups, such as migrant populations, refugees, and rural communities with limited healthcare access, as well as areas like maternal health, childhood immunizations, and other preventive health services.

Looking forward, future research should assess the long-term viability and sustainability of the pay-it-forward strategy, focusing on its ability to maintain community involvement and drive lasting behavior change. Integrating digital platforms and aligning pay-it-forward with existing health campaigns will be key to enhancing

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Authors' contributions

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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