

# User Incentives:

## Evidence on pro-equity interventions to improve immunization coverage for zero-dose children and missed communities

*Part of a series, this evidence brief presents results from a **rapid review** of the literature to understand the effectiveness and implementation considerations for selected interventions, including user incentives, which could help achieve more equitable immunization coverage, specifically helping to increase coverage and better reach zero-dose children and missed communities.*

EVIDENCE SUMMARY	
<p><b>What are user incentives?</b></p>	<p>Conditional user incentives are forms of financial or nonfinancial support provided to caregivers to encourage or reward certain care-seeking behaviors. These incentives may increase demand for child health care services, thus leading to improved immunization rates, particularly among vulnerable communities.</p>
<p><b>How effective are user incentives in reaching zero-dose children and missed communities?</b></p> <div data-bbox="228 1325 378 1476"> </div> <p>PROVEN INTERVENTION</p>	<p>Based on findings from a review of primary research studies, there is <b>proven</b> evidence that user incentives are effective for reaching children in vulnerable contexts and in areas with low vaccination coverage.</p> <p>Across 21 studies that assess effectiveness of user incentive programs on vaccination coverage, most found positive results. Importantly, many studies evaluated the effect of user incentives on vulnerable populations (e.g., low economic status, poorly performing districts) and found significant increases were achieved in reaching these groups with vaccination.</p> <p>User incentive programs were implemented <b>in all Equity Reference Group (ERG) settings, most frequently in remote rural and urban poor areas</b>. Research demonstrates that user incentive programs have the most success in improving vaccine coverage among <b>vulnerable populations and in areas with low baseline immunization coverage and low levels of vaccine hesitancy where demand-side—as opposed to supply-side—barriers are drivers of low uptake, and when incentives are sufficient to compensate for opportunity costs that may prevent uptake</b>. Additionally, user incentives have been shown to improve rates of full immunization coverage; however, their impact on reaching zero-dose children with immunization is less clear.</p>

<p><b>What are the main facilitators and barriers to implementation?</b></p>	<ul style="list-style-type: none"> <li>● <b>Facilitators</b> include small financial incentive amounts, incentives that increase over the immunization schedule, quasi-monetary incentives such as use of mobile phone minutes, and high mobile phone ownership.</li> <li>● <b>Barriers</b> include low perceived value of the incentive, high levels of migration, difficulties traveling to health facilities, and poor training/supervision of health care workers.</li> </ul>
<p><b>What are the key gaps?</b></p>	<p>Key gaps include a lack of evidence on the ideal incentive amount as well as financial and programmatic sustainability. Additionally, more evidence exists on financial incentives, specifically conditional cash transfers, than nonfinancial incentives.</p>

**INTRODUCTION**

**What are user incentives?**

This intervention includes the use of either financial or nonfinancial incentives for caregivers to increase demand for immunization services for their children. Certain incentives have been linked with improved immunization coverage for children in low- and middle-income countries (LMICs) (1). Financial incentives for users may include small mobile cash amounts, airtime for mobile phones, vouchers, conditional and unconditional cash transfers, or payment when children receive vaccinations (2). Nonfinancial incentives for users may include hygiene kits, food (e.g., a bag of lentils), household items (e.g., dishes), employment and skill training, or knowledge transfer (1). In this review, we focus solely on conditional financial and nonfinancial incentives. Incentives are considered conditional when beneficiaries must adhere to certain criteria or complete an action, such as taking their child to get vaccinated, to receive the reward (3).

**Why are user incentives relevant for reaching zero-dose children and missed communities?**

User incentives are a demand-side intervention often implemented in settings with low immunization coverage and areas of high poverty. Conditional incentives can serve as a “nudge” to caregivers to increase utilization of immunization services, which is necessary in communities where insufficient demand has led to a lack of progress in immunization rates (4). By increasing demand for health care services, including immunization, among vulnerable populations in LMICs, more zero-dose children and missed communities may be reached with vaccines.

**Why was this rapid evidence synthesis on user incentives undertaken?**

The overall goal of this activity was to synthesize existing evidence on the effectiveness and implementation of financial and nonfinancial incentives for caregivers/users to increase demand for health care services and improve childhood immunization. Through a comprehensive review of peer-reviewed and grey literature, this work aimed to:

1. Assess the effectiveness of interventions involving the use of **financial** incentives for caregivers/users in increasing demand and reaching vulnerable communities with immunization services.

2. Assess the effectiveness of interventions involving the use of **nonfinancial** incentives for caregivers/users in increasing demand and reaching vulnerable communities with immunization services.
3. Identify what types of user incentives demonstrate effectiveness or promising results related to vulnerable communities in different ERG settings.
4. Identify the main implementation considerations for utilizing **financial** incentives for caregivers/users to increase demand for immunization services, specific to reaching vulnerable communities, in different ERG settings.
5. Identify the main implementation considerations for utilizing **nonfinancial** incentives for caregivers/users to increase demand for immunization services, specific to reaching vulnerable communities, in different ERG settings.


Much literature has been published on the topic of user incentives, including many reviews and randomized controlled trials. Due to the multitude of evidence, this review consisted of literature that studied **conditional** financial or nonfinancial incentives and included **childhood immunization as an outcome** (either changes in immunization coverage or changes in demand for or utilization of immunization services). Additionally, this review was restricted to articles and reports that **included mention of vulnerable, marginalized, underserved, or otherwise disadvantaged communities** and focused on the use of **user incentives within the delivery of health care services in LMICs**. Additional information on the review methods is presented in Appendix A.

## RESULTS: What is known about user incentives?

A total of 47 eligible articles and reports were reviewed, including 16 reviews, 10 implementation studies, six effectiveness studies, and 15 studies relevant to both effectiveness and implementation. All studies included immunization as an outcome but were designed to impact a variety of maternal and child health outcomes.

### Overall categorization of effectiveness

*To help program planners assess whether an intervention, such as user incentives, should be considered for monitoring to help improve implementation of immunization activities for zero-dose children and missed communities, a categorization scheme is used below to rate interventions as: potentially ineffective, inconclusive, promising, or proven. A more detailed description of this categorization can be found in the general methodology for reviews in this series [linked on the evidence map website].*

Categorization	Rationale
 <p data-bbox="230 1766 415 1829">PROVEN INTERVENTION</p>	<p data-bbox="472 1465 1305 1724">Across 21 studies that assess effectiveness of user incentive programs on vaccination coverage, most found positive results. Importantly, many of these evaluated the effect of user incentives on vulnerable populations (e.g., low economic status, poorly performing districts) and found significant increases were achieved in reaching these groups with vaccination. Therefore, this intervention has been categorized as “proven.”</p> <p data-bbox="472 1755 1289 1896">User incentive programs were implemented in all ERG settings, most frequently in remote rural and urban poor areas. One study showed positive effects of user incentives in conflict/fragile settings, while another showed a conditional incentive program targeted to</p>

	<p>vulnerable girls was not effective. Research demonstrates that user incentive programs have success in terms of improving vaccine coverage among vulnerable populations and in areas with low baseline immunization coverage and low levels of vaccine hesitancy, where demand-side—as opposed to supply-side—barriers are drivers of low uptake, and when incentives are sufficient to compensate for opportunity costs that may prevent uptake. Additionally, user incentives have been shown to improve rates of full immunization coverage; however, their impact on reaching zero-dose children with immunization is less clear.</p>
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Details of included studies are provided below to better explain why user incentives are a proven approach to improving reach of childhood immunization, especially among vulnerable communities.

**Effectiveness: What is known about whether user incentives “work”?**

**What evidence has been synthesized previously on the effectiveness of user incentives?**

Sixteen reviews were identified as relevant to understanding how user incentives may impact immunization. While some reviews presented positive significant impacts on immunization, others found impacts were less substantial. Mentions of equity involved reaching hard-to-reach, vulnerable, and underserved groups. Certain articles noted that user incentives can improve immunization outcomes for these groups by addressing barriers, creating opportunities, and tackling basic needs.

**Within the 16 reviews, six found significant positive effects of user incentives.** Bright et al. (2017) examined 57 articles to evaluate how different interventions improved the health of children under 5 in LMICs. Studies revealed that both financial and nonfinancial incentives contributed to lessening monetary accessibility issues, removing barriers such as fees. This review also found challenges surrounding geographic accessibility can be addressed using conditional cash transfers (CCTs), as money can be used for transportation purposes (5). Cruz et al. (2017) reviewed five CCT initiatives across 17 articles to examine the effects of CCTs on children’s health. CCTs led to increased child immunization rates, decreased child morbidity, and reduced diarrhea and acute respiratory infections. However, some studies had contradictory results in terms of child mortality and nutritional outcomes. The review noted the CCT initiatives differed in terms of characteristics such as conditionalities, contexts, and implementation, potentially impacting study outcomes. In terms of equity, Cruz et al. (2017) found CCTs led to increased equality of health opportunities, as they served to improve the health of vulnerable children (6). To evaluate CCT use, Rezaei et al. (2022) assessed 68 articles. The review revealed that 17% of studies included vaccination rates as outcomes and among these, most (88%) showed statistically significant results. Two studies in the review exclusively analyzed immunization and showed significant results in vaccination rates for hepatitis B, Bacillus Calmette-Guerin (BCG), oral polio vaccine, diphtheria, pertussis, and tetanus, meningococcal vaccine, and hepatitis B vaccine (HBV) (7). In a review of 47 articles, Salam et al. (2014) examined effectiveness of district-level inputs for improving outcomes related to maternal and newborn health. The review found financial user incentives may have the ability to enhance maternal and newborn health (MNH) outcomes, including immunization. CCTs and maternal voucher schemes were noted to have the highest positive impacts (8). A review by Siddiqui et al. (2022)

explored 120 articles to understand how vaccine uptake can be enhanced through interventions, specifically for children and adolescents. While only four studies looked at outcomes related to incentives, and only two were included in the meta-analysis, results were positive. Financial incentives led to increases in immunization coverage by 67%. Evidence also showed financial incentives may improve human papillomavirus (HPV) vaccine series completion (9). Finally, a presentation from Gavi, the Vaccine Alliance on CCTs in immunization included many examples and recommendations. Authors demonstrated how CCTs have been extensively studied and provided examples of how CCTs led to increases in growth monitoring checkups, clinic visits, and pre-natal checkups in a wide variety of countries. From their literature review, some key findings included that a variety of different design factors—timing, frequency, and size of incentive as well as mechanism—have a large effect on results. They found positive results related to health and nutrition behavior, women’s empowerment, and health inequalities, but noted a lack of strong evidence for long-term outcomes, for which further research is necessary. Findings specific to immunization included that childhood vaccination significantly increased as a result of CCTs, and CCTs are most effective among children not reached by routine immunization. However, they also noted that CCTs alone are not sufficient to improve health inequalities when supply-side constraints are present. The authors also reported on a variety of barriers to implementation and offered strategies for moving forward, such as focusing in areas with high proportions of zero-dose children and exploring joining with other programs (3).

**Other reviews found mixed or inconclusive results, sometimes due to implementation challenges, often calling for further research.** Engelbert et al. (2022) reviewed 309 articles to understand the effectiveness of different interventions in increasing immunization outcomes for children in LMICs. The review found interventions focused on caregiver incentives and motivation were most frequently evaluated. However, less research examined nonmaterial incentives and pro-equity approaches. Authors stressed the need for future research focusing on vulnerable populations, including girls, zero-dose children, and those in hard-to-reach settings, as well as intermediate outcomes such as “health system capacity or barriers faced by caregivers” (10). In a review of 181 articles to evaluate strategies aimed at addressing vaccine hesitancy, Jarret et al. (2015) found incentive-based interventions, involving either conditional or unconditional cash transfers, were associated with a 10% or less increase in uptake of preventive health or vaccination. Nonfinancial incentives, however, showed positive effects on uptake of Expanded Programme on Immunization (EPI) vaccines in low-income settings and evidence that they may contribute to increased confidence and reduced vaccine hesitancy due to addressing basic needs. The review noted the importance this may have for targeting underserved groups (11). Eleven articles were assessed in Johri et al. (2015). This review aimed to understand how demand-side interventions could lead to positive routine childhood vaccination outcomes in LMICs. Four of 11 studies examined the effects of incentives, with two studying monetary incentives and two nonmonetary incentives, while the other seven described education or knowledge translation interventions. The review found education or knowledge translation interventions had larger effects than incentives; in incentive-related studies, intervention groups had higher immunization rates than control groups. Implementation challenges were noted in two articles on financial incentives, and three of four articles looking at incentives experienced issues related to lack of specificity in study scope and vaccine expertise in study planning (1). Munk et al. (2019) conducted a review to understand cost in relation to immunization interventions. Of 14 studies, two assessed cash transfers as a means to improve immunization coverage. These studies had contradictory results: one showed increases in coverage while the other showed slight decreases

(12). In a review of 27 articles, Omoniyi et al. (2020) found varying effects of incentives on vaccine uptake across four studies. One study found no increase in vaccination, one found increases but at an un-sustained level, one found significant increases, and another found solid increases but not enough for herd immunity. However, in terms of equity, one study found hard-to-reach communities demonstrated the largest increases in immunization. In some studies, control groups also saw increases in immunization, leading to little ability to accredit effects strictly to incentives. In addition, most studies on incentive-based interventions did not adequately model cost and benefits (13). Murray et al. (2012) examined demand-side financing interventions to understand how they affect use of maternal health services and in turn impact maternal health outcomes through reviewing 72 articles. Evidence on impact of service use, demand-side financing barriers, and preconditions for implementation of financial interventions were found among CCT, maternity service vouchers, and offset payments interventions. The authors noted more research is needed on the impacts of demand-side financing interventions on childhood immunization (14). Sixteen articles were explored in Owusu-Addo et al. (2014) to evaluate the impact of CCTs on children's health in LMICs. Five studies looked at incentives in relation to child health and immunization. Outcomes in terms of effectiveness varied as some studies reported increases in immunization, and some did not (15). Ranganathan et al. (2012) assessed how CCTs in LMICs can lead to better health and health behaviors. While 13 studies were included, only four provided information on CCTs in relation to immunization. There were mixed results. Certain studies showed positive results in tuberculosis (TB), diphtheria–pertussis–tetanus (DPT)/pentavalent, and polio vaccinations. By contrast, one study found no improvements in long-term immunization, and some studies did not find significant improvements in certain age groups (16).

An extensive report from researchers at Johns Hopkins University submitted to Gavi included two reviews and 10 studies that included financial incentives. One included systematic review and meta-analysis failed to find significant effects of financial incentives, such as microcredit, voucher schemes, and removal of user fees, on immunization coverage. The other included review (Cruz et al. 2017, also reviewed above) found positive effects of cash transfers on childhood immunization, while noting that CCTs alone are not sufficient to reduce vaccine inequity. Of 10 studies reviewed in the report, most focused on cash transfers and found associated increases in vaccine coverage, though this was dependent on vaccine and region. The results were mixed for the effects of CCTs on measles vaccination, for example (17).

Finally, one review showed neutral or no effects of user incentives on outcomes of interest, including immunization coverage. Oyo-Ita et al. (2016) analyzed 14 articles to understand how childhood immunization coverage can be improved by different interventions in LMICs. Three of these studies looked at incentives in relation to immunization. Results showed little to no effect of household monetary incentives when it came to full immunization coverage (18).

### What evidence exists on the effectiveness of user incentives specifically within immunization?

Twenty-one studies were identified as eligible that assess the effectiveness of user incentive programs on vaccination coverage. As this review was restricted to studies that included vaccination as an outcome, all included studies are relevant to immunization. **Most studies found that user incentives, including financial and nonfinancial across remote rural, urban poor, and conflict settings, had positive effects on vaccine coverage** (19–35). Many evaluated the effect of user incentives on populations in

vulnerable contexts (e.g., low economic status, poorly performing districts) and found significant increases in reaching these groups with vaccination.

Of the 21 effectiveness studies, three focused on nonfinancial incentives, with two finding clear positive impacts and one showing mixed results (20, 27, 36). For example, Banerjee et al. (2010) found that a monthly reliable immunization camp with nonfinancial incentives in the form of lentils and metal plates contributed to higher rates of full immunization (39%) compared to a monthly reliable immunization camp only (18%) and more than six-fold higher than control (6%) (20).

Of the studies examining financial incentives, many evaluated CCTs and found positive impacts on immunization coverage. For example, a RCT by Levine et al. (2021) in a remote rural area of northern Ghana found the intervention arm of the study that involved mobile financial incentives was associated with a 49.5% increase in coverage of timely infant vaccination compared to control, while the intervention arm involving voice call reminders was associated with 10.5% increased coverage (28). Grijalva-Eternod et al. (2023) randomized 23 internally displaced people (IDP) camps in Somalia to receive or not receive an intervention consisting of CCTs of US\$70 per household for three months (considered the emergency humanitarian phase) and US\$35 per household monthly for the next six months (considered the safety net phase), as well as an mHealth intervention. The CCT was conditional on taking children under 5 to a health screening. The CCT during the emergency humanitarian phase led to improved measles vaccination coverage (39.2% to 77.5%) and complete pentavalent coverage (44.2% to 77.5%). Coverage increased from baseline at the end of the safety net phase.

Only three studies found user incentive interventions did not impact childhood vaccination, including a CCT scheme focused on gender-related barriers (more details provided in Appendix B) (37–39). Notably, one study, which found no effect of a microcredit intervention on vaccination, faced implementation issues such that microcredit participation did not actually increase in the study areas, therefore limiting its possible effect (38). One study found mixed effects, with up-to-date vaccine coverage increasing in urban but not rural areas of one region (and an increase in rural areas of another region without the distribution of an incentive) (36).

More information on all effectiveness studies and their vaccine-specific results can be found in Appendix B.

### [What evidence exists on the effectiveness of user incentives outside of immunization?](#)

Even though this review was restricted to studies focused on vaccination, many articles presented additional outcomes. **User incentives had mixed effects on maternal and child health outcomes** other than immunization. Chakrabarti et al. (2021) found the Mamata CCT scheme was associated with increased antenatal care visits, breastfeeding counseling, and decreased anemia during pregnancy (22). Robertson et al. (2013) found cash transfers in a remote rural area of Zimbabwe had positive effects on birth registration and school attendance (29). Shei et al. (2014) found the Bolsa Familia program led to increased odds of growth monitoring visits and checkups for children under 7 in an urban slum of Brazil (31). Von Haaren et al. (2021) found a national CCT program in India had a long-term effect on utilization of public health facilities, which increased by 14% three to five years following delivery, and that spacing between births increased (35). Vanhuysse et al. (2022) found a CCT program in rural Kenya led to increased antenatal care appointments but had no impact on facility delivery nor postnatal care (34).



However, Ali et al. (2020) found modern contraceptive use did not increase from a voucher scheme (19). Grijalva-Eternod et al. (2023) found CCTs did not lead to improvements in indicators related to mortality, acute malnutrition, diarrhea, and measles infection (26). Similarly, Krishnan et al. found the CCT scheme in India targeting disadvantaged girls did not have a significant effect on girl child discrimination, fetal sex determination, breastfeeding, full diets, education, or sex ratio at birth (39).

### What evidence exists on the effectiveness of user incentives specific to reaching zero-dose children or missed communities?

One study focused specifically on missed children: Korir et al. (2018) looked at the effect of implementing a Directly Observed Oral Polio Vaccine (DOPV) intervention with nonfinancial incentives and found the proportion of missed children (both due to child absence or noncompliance) decreased in the intervention areas (27).

Although no other studies specifically mentioned zero-dose children or missed communities, much evidence presented is relevant to these populations. Some studies assessed the impact of user incentives on equity and found the **intervention is pro-equity, as improvements are concentrated among the lowest wealth quintiles**. For example, Ali et al. (2020) found improvements in a variety of indicators resulted from an intervention involving vouchers for health services for women were **concentrated among disadvantaged people compared to wealthy** in the intervention areas, including first-time use of modern contraception, knowledge of contraceptives, receipt of antenatal care, and delivery at health facilities (19). Chakrabarti et al. (2021) found that a CCT program in India called the Mamata scheme was associated with **decreased stunting in poor households** and increases in other indicators including antenatal care visits, iron-folic acid (IFA) tablets, neonatal tetanus injection, breastfeeding counseling, and vitamin A were more **concentrated among poor households** (22). Driessen et al. (2015) found an intervention involving routine immunization with financial incentives led to more than double the number of deaths averted compared to routine immunization without financial incentives, and this difference was due to a **large reduction in deaths among the lowest income quintiles**, which was the group targeted with incentives (40). Gibson et al. (2017) found financial incentives had **positive impacts among marginalized groups and had equitable effects across sociodemographic groups**: timely vaccination improved across sociodemographic characteristics (25).

Other studies focused only on vulnerable or impoverished populations and found positive results of user incentive interventions among these groups. Robertson et al. (2013) explored whether CCTs and unconditional cash transfer programs can have positive effects on vulnerable children in Zimbabwe. Households met inclusion criteria if they had children under 18 and had one of the following components: head of household was younger than 18; included at least one orphan, disabled person, or chronically ill person; or was in the lowest wealth quintile. Results revealed the cash transfer programs can have positive effects on vulnerable children, including birth registration, vaccination coverage, and school attendance (29). Shei et al. (2014) investigated the impact of Bolsa Familia, a large CCT program in Brazil that targets poor families, in a large urban slum. They found health care utilization improved among children in the slum, and there were positive effects on older siblings as well (31).

Many studies, including those above, that found positive results of user incentive interventions had target populations of vulnerable or poor people (19, 20, 29–33, 35, 37). As inclusion criteria for participation was restricted to certain income levels or other indicators of vulnerability, positive results are indicative of pro-equity improvements. It is important to note, however, that wealthier households



may not be similarly motivated by user incentives, and therefore CCTs and similar interventions may only be effective at improving maternal and child health indicators among highly impoverished populations (23).

On the other hand, one study did not find positive results related to equity: Krishnan et al. (2014) evaluated a CCT scheme in India started in 1994 that targeted disadvantaged girls. The CCT involved the following conditions: the girl had reached 18 years old and was unmarried, stayed in school until class 10, and was fully immunized. They found the program did not have significant effects on the outcomes of interest, including girl child discrimination, fetal sex determination, breastfeeding, full diets, education, and sex ratio at birth. There were improvements in some indicators for all genders, including educational levels, mean age at marriage, and immunization coverage, but these improvements were likely the result of long-term trends and not of the intervention. The authors note this indicates that **approaches to improve interventions that target universal coverage may be more effective at addressing gender-related barriers than interventions that are gender-specific** (39).

### Effectiveness of user incentives in specific settings and programmatic contexts

**User incentives are particularly effective among the poorest populations in both urban and rural settings.** Additionally, evidence suggests they can be effective in conflict-affected settings, as demonstrated by a study in internally displaced person camps (26). User incentive programs saw success in terms of vaccine coverage among vulnerable populations (e.g., low economic status, poorly performing districts) and particularly in populations where baseline immunization coverage was low.

## IMPLEMENTATION: What is known about “how” user incentives work?

In total, 25 studies and reports presented information relevant to the implementation of user incentives across ERG settings. Major barriers and facilitators to implementation reported are summarized below.

**Table 1. Barriers and facilitators to implementation of user incentives by ERG setting**

	Facilitators	Barriers
<b>Remote rural</b>	<p>Small financial incentive/CCT amounts (20, 25, 28, 30)</p> <p>Moderate/high levels of mobile phone ownership (25, 30, 41)</p> <p>Existing mobile-money network (25, 41)</p> <p>Use of mobile phone minutes as opposed to cash as an incentive (30)</p> <p>Small nonfinancial incentives to be cost effective (20)</p> <p>Intervention is implemented by community health volunteers (28)</p> <p>recruited from the community (30)</p> <p>Community engagement, such as with village elders (30)</p>	<p>Low perceived value/appeal of incentives (36)</p> <p>Weak mobile network (28)</p> <p>Hard to reach women without mobile phones (28)</p>

	Engagement of community members for promoting health (28)	
<b>Urban poor</b>	Use of certificates as an incentive for caregivers (42, 43) Sufficient supply of vaccines and storage equipment (43) Widespread vaccination outreach/information dissemination (43) Local leaders involved in community mobilization (43)	Staff shortages/overburdening (42, 43) Opportunity costs of visiting clinics, including concerns about employment security (42) Lack of understanding regarding the importance of (timely) vaccination (42)
<b>Conflict-affected</b>	One time condition for receiving cash transfer (26) Provision of home-based health record cards (26) Partnership with institutions (e.g., NGO, academic institution) that have experience in fragile circumstances (26)	Poor health infrastructure (26) Financial and human resource shortages (26) Insecurity (26) Highly mobile population (26) Limited knowledge/awareness about vaccination among caretakers (26)
<b>Gender-related barriers</b>	Political recognition/valuing of gender-related incentive schemes (39)	Use of incentives by political parties to win votes as opposed to a commitment to addressing the issue, which conflicted with “the need for accountability by bureaucrats” (39) Limited involvement and engagement of stakeholders including health departments, local governments, nongovernmental organizations (NGOs), and women’s groups (39) Complicated and unclear application requirements (39) Delays in receipt of incentive (39) Limited eligibility for the program, too many conditionalities (39) Stand-alone scheme as opposed to part of a larger system (39)
<b>Remote rural AND urban poor</b>	Same local health personnel work across campaigns/provide incentives (44) Simultaneous strengthening of health care supply (22) “Targeting multiple aspects of care-seeking, as opposed to a singular approach (e.g., only institutional births or only immunization)” (22) Active outreach/recruitment of target population into program (35)	Delays in receipt of CCTs by mothers (21) Informal payments required for beneficiaries to receive the CCTs (21) Participants must hold a bank account to be eligible (entry hurdles) (35) Self-selection of caregivers into the program (35)
<b>Other/not reported</b>	Small financial incentive/CCT amounts (4, 24, 45)	Lack of systematic dissemination of information about incentives that informed all potential beneficiaries (4)

<p>Timelines for CCTs, with increases in amounts over the immunization schedule (4, 24, 45)</p> <p>Combine CCTs with social networking interventions, other demand- and supply-side interventions (24, 46)</p> <p>Certain payment structure that participants can expect/rely on (as opposed to a lottery system) (24)</p> <p>Use of airtime as an incentive as opposed to mobile money (24); mobile recharges for prepaid phones (inexpensive, reliable, scalable, simple procurement and delivery) (4)</p> <p>Caregivers actively recruited by community health workers (CHWs) (47)</p> <p>High rate of mobile phone ownership (47)</p> <p>No vaccine supply shortages/supply system that can adjust to increases in demand (47)</p> <p>High quality data entry by program implementers through an existing government reporting system (47)</p> <p>Buy-in from key stakeholders (47)</p> <p>Use of administrative data (47)</p> <p>Training and supervision of front-line health workers (47)</p> <p>Implementation support, such as through a hotline or dedicated people at the district level (47)</p> <p>Experts who can troubleshoot the mobile money delivery system (47)</p> <p>Engagement of traditional leaders</p> <p>Use of cell phone data entry system for healthcare workers (as opposed to paper-based) (45)</p>	<p>Flat incentives (do not increase in amount over the immunization schedule), in any amount ((4)</p> <p>Concerns about loss of money, particularly among daily wagers (47)</p> <p>Lack of continuous government buy-in (47)</p> <p>Logistical problems related to provision of mobile payments (e.g., service providers putting restrictions on denominations, goods and services tax) (47)</p> <p>Issues with health worker performance related to entry of phone numbers (47)</p> <p>Administrative changes in villages (47)</p>
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Some studies described barriers and facilitators to implementing user incentives beyond programmatic considerations, including factors related to the wider context in which the user incentive program may be implemented. Characteristics related to context are included in Annex C.

**Implementation Outcomes**

Expanding on the barriers and facilitators summarized above, below is a summary of specific implementation considerations related to acceptability, cost, feasibility, etc.

## Acceptability

Provision of user incentives was a highly accepted intervention among caregivers, community members, and health care providers. Studies found both the incentives themselves were widely viewed as acceptable, and incentives led to increased acceptance of vaccines. For example, Akogun et al. (2020) reported 100% of community members responded that nonfinancial incentives contributed to their acceptance of the polio vaccine (44). Similarly, Korir et al. (2018) noted that community leaders in all intervention areas reported increased acceptance of the polio vaccine: “previously noncompliant parents now readily present their children for vaccinations owing to the attractive incentives given to eligible children and parents” (27). Additionally, Korir et al. (2018) found the incentives were accepted by the local government task force on immunization made up of traditional leaders and other stakeholders, who then worked to facilitate acceptance of the incentives among community members. Involving traditional rulers contributed to community awareness and acceptance as well, particularly among hesitant populations (27).

Banerjee et al. (2020) found that village level health workers believed incentives motivated community members to seek vaccines and compensated for common barriers such as long wait times and concerns about side effects. However, the authors reported the village-level health workers felt incentives were not sufficient to reach members of certain hard-to-reach populations who face larger obstacles, including migrant workers, daily wagers, and Muslims. This study also assessed the acceptability of financial incentives among caregivers and found many felt positively, explaining they motivated them to vaccinate their child. Accepting the incentives was associated with a desire for free things, “self-assessed poverty level,” or the feeling their government was caring for them (47). On the other hand, many caregivers responded that incentives were not the reason they sought immunization, but rather the benefits of immunization. However, authors note it may be “socially desirable” to report that incentives lack influence and caregivers may justify their reasoning for seeking immunization, as responding to incentives can be viewed as “greedy” or uneducated (47).

Direct recommendations from participants also indicate acceptability: vaccinators in the Cape Metropolitan District, South Africa, suggested providing certificates to caregivers (42). Participants including caregivers, community leaders, and health care workers in Lagos, Nigeria, similarly noted that certificates for immunization completion led to feelings of pride among caregivers (43).

Levine et al. (2021) found their mobile conditional cash transfer (mCCT) intervention “was widely acceptable to community members and caregivers” (28). Finally, Wakadha et al. (2013) reported their approach was acceptable to mothers, who provided positive feedback regarding their participation (41).

## Appropriateness

Incentives may be an appropriate intervention among some populations and not among others. For example, incentives are appropriate among caregivers who face barriers to vaccinating their children related to uncertainty, inconvenience, or opportunity costs. However, they may not be appropriate among communities facing more significant barriers such as strong negative beliefs regarding vaccines, religious or cultural beliefs, or larger sociodemographic issues (3, 30, 47).

Chandir et al. (2010) discuss how “the appropriateness of incentives in healthcare still remains controversial” and that further research is required. Incentives risk becoming unethical if beneficiaries become dependent on them, must engage in risky or degrading behavior to receive them, have strong

principles or beliefs against the behavior, or if the incentives are so large they convince people to engage in behaviors they are strongly averted to. Chandir et al. (2010) and others note that for vaccines, incentives are small, “do not involve high risk, do not compromise dignity of persons,” and are not coercive, which indicates appropriateness (23).

Multiple studies noted that **small** financial incentives should be used for a variety of reasons. Chandir et al. (2022) explained that small CCT amounts should be used because they are better for resource-constrained settings, are more cost effective/can reach more children, are not coercive as they are not large or significant enough to influence people who are strongly averted to vaccines, and do not “impose prohibitive conditionalities” (i.e., are accessible by the most marginalized, whereas larger CCTs might require a national identity card, bank account, etc.) (24). Banerjee et al. (2021) noted incentives should be small to enable scaling up, while still being significant to households (e.g., cover the cost of a kilogram of lentils or 100 minutes of airtime) (4). Some studies noted incentive amounts should be small so as not to be coercive, but rather overcome barriers or encourage people to take an action they are already in favor of or does not go against strong values or beliefs (23, 25, 30). Finally, Banerjee et al. (2010) and Levine et al. (2021) found small incentive amounts can be sufficient to effect change and account for barriers caregivers face in immunizing their children (such as concerns about side effects) and opportunity costs (20, 28).

### Costs

Costs of user incentive programs are of concern to implementers and researchers, and many investigators admitted the interventions are expensive. However, they also provided many justifications for the increased costs, including cost-effectiveness explanations when effectiveness was high, comparisons with other interventions designed to improve immunization coverage, and other benefits to communities of financial and nonfinancial incentives that mitigate the expense.

In a study in rural India, Banerjee et al. (2010) analyzed the efficacy of nonfinancial incentives for improving vaccination and compared them with an intervention that worked to improve service supply. In terms of cost, they found a combination of both interventions (provision of incentives and improving supply of services) was more cost effective than improving service supply on its own. This finding is important: **including incentives in the intervention reduced the cost per immunization**. The explanation for this result is that demand for immunization increased and, therefore, nurses were immunizing more children on their visits to the village. In other words, the incentive served as a behavioral nudge and allowed the system to reap the benefits of the existing available supply. In raw numbers, it cost US\$56 per immunization in the reliable service-only intervention and US\$28 in the reliable-service-and-incentive intervention to fully immunize a child due to more being immunized during the camps, open for the same amount of hours regardless of number of children, when incentives were involved. While the cost of providing an immunization with an incentive using existing health systems (about US\$17.35) is higher than the Indian health care budget per immunization (about US\$4), the authors noted this price tag is within the range that Gavi provides to member countries to vaccinate missed children—US\$20 per “extra child”—a relevant threshold as the intervention targets hard-to-reach children who are not vaccinated by India’s national immunization program (20).

Banerjee et al. (2021) studied which design of financial incentive in the form of mobile recharges would be most effective through four different groupings: a **high flat incentive** (INR 90 per immunization, INR 450 total); a **high sloped incentive** (INR 50 for each of the first three immunizations, INR 100 for the

fourth, and INR 200 for the fifth, for a total of INR 450); a **low flat incentive** (INR 50 per immunization, for a total of INR 250); and **low sloped incentive** (INR 10 for each of the first three immunizations, INR 60 for the fourth, INR 160 for the fifth, for a total of INR 250). The levels were based on the cost of a kilogram of lentils (INR 90), with the low level being about half. Caregivers were provided with one of the above methods each time they brought their child under the age of 1 for one of the five eligible vaccines (BCG, Penta-1, Penta-2, Penta-3, or Measles-1). Discussion in the study related to cost included that mobile recharges for phones were a cheap method of financial incentive, even at the high level. At the high level, incentives were still small enough to be feasible and scalable but large enough to be meaningful for households. Furthermore, the investigators stressed that immunization itself is an extremely cost-effective intervention, so even a slight increase in cost to provide incentives can still indicate cost effectiveness compared to other child health interventions. However, in exploring which combination of studied interventions (levels of incentives, SMS reminders, and influential ambassadors) was most cost effective, the authors found that a combination of information hubs and SMS reminders with no incentives was most cost effective compared to control, with a 9.1% increase in vaccinations per dollar. They noted the most effective form of incentives (high sloped) may not be cost effective at scale, though they may be cost effective in smaller areas with low immunization coverage, where its effectiveness would also likely be the highest (4).

Another paper studying the same intervention found the low sloped incentive (additional US\$61 per fully vaccinated child) was more cost effective than the high sloped scheme (additional US\$93 per fully vaccinated child). Neither the high slope nor low slope incentive intervention was as cost effective as the intervention known as “gossip seeds,” whereby people spread information in the village about vaccines, at additional US\$4.95 per fully vaccinated child. The authors concluded that determining whether low sloped incentives are cost effective in and of themselves is dependent on willingness to pay and other thresholds that need to be defined (47).

Chandir et al. (2022) implemented an intervention with seven arms, five of which were mCCTs that varied in amount (from US\$5 to 15 per fully immunized child), schedule (fixed versus increasing payments), design (definite versus lottery payment), and payment method (airtime versus mobile money); in addition to a reminder-only arm and a control arm. They found the most effective arm of their CCT study, which involved the low amount, increasing payments over the immunization schedule, and certain payment as opposed to lottery, cost US\$ 30 per additional fully immunized child (FIC) and positively affected FIC at 12 months and up-to-date coverage at 18 months. When they included participants and government costs and benefits, it cost US\$22 per additional FIC, with most of the cost due to new vaccine administration expenses. The authors reasoned that if the Pakistan government has enough resources to vaccinate 100% of their population, as they assert, then the marginal cost of vaccinating more children is zero and the cost per additional FIC is US\$8. They found administrative costs were low, and low mCCTs were less expensive than higher mCCTs. Considering different implementers’ perspectives, the authors noted if the implementer was concerned about households’ incomes, they should select a higher incentive amount (with a resulting increase in vaccinations), whereas an implementer in a resource-constrained setting might elect a small incentive and reach more participants (24).

Driessen et al. (2015) conducted a cost-effectiveness analysis comparing three measles vaccination interventions in Ethiopia: routine immunization, routine immunization with financial incentives, and mass campaigns. They assessed differences in outcomes by economic statuses among nearly 3 million

births across 10 years to understand the impact of different interventions on equity. They found while mass campaigns lead to higher vaccine coverage and deaths averted, they are more expensive, whereas routine immunization with financial incentives leads to increased demand among “more economically vulnerable households” (40). Additionally, routine immunization with financial incentives leads to more than double the deaths averted compared to routine immunization with no incentives. This difference was explained by the steepest decrease among the lowest two income quintiles. The financial incentive was US\$14 for individuals in the bottom two income quintiles, or about 10% of the income of someone in the bottom income quintile, and the authors assumed implementing financial incentives created administrative costs of 10% of vaccine costs for the government. The costs of each intervention reflected the coverage results: routine immunization with financial incentives cost 10 times as much as routine immunization without financial incentive (US\$22,590,000 compared to US\$2,158,000), whereas the mass campaigns were the costliest (US\$23 million). Another argument the authors presented concerns the change in expected household income: they show how routine immunization with financial incentives leads to the largest increases in income among the lowest two income quintiles. However, the incremental cost-effectiveness ratios are highest for routine immunization with financial incentives and lowest for routine immunization without incentives. The authors concluded there is no single clear “superior” approach – the value of each depends on the perspective of the implementer or policymaker. For example, mass campaigns would require large investments during each campaign, whereas routine immunization with financial incentives would involve investment distributed more equally over time. Similarly, mass campaigns will lead to more immediate benefits of increased vaccine coverage, whereas routine immunization with financial incentives will create higher demand among vulnerable populations in the longer term (40).

Von Haaren et al. (2021) looked at the cost effectiveness of a CCT intervention for women following delivery known as “IGMSY” for immunization and underweight outcomes. They found the cost of the program per additional FIC was approximately US\$659.88. They compared this to Banerjee et al. (2010) and note this cost is significantly higher than their nonfinancial incentive cost per additional FIC. However, they note this was expected as that was a targeted intervention whereas IGMSY was a cash transfer. They also compared cost per child prevented from being underweight between IGMSY (US\$2282.47) and a CCT program in Nicaragua (US\$6161.29). This three-fold difference indicates that IGMSY may have more cost-effective impacts on underweight outcomes (35).

Finally, some studies did not analyze or present firm conclusions related to cost, but stressed the need for cost-effectiveness analyses to be conducted on user incentive interventions (13, 25, 28, 30).

### Feasibility

Studies showed that implemented user incentives were largely feasible through a variety of approaches, including the use of mobile recharges, local partnerships, CHWs, and innovative data and monitoring systems. Some studies also discussed contextual and system-level challenges to feasibility.

For example, Banerjee et al. (2020) showed user incentives are feasible to implement, including at scale, as they are simple to roll out: mobile recharges are distributed automatically (dependent on a functioning server) (47). In another study of the same intervention, Banerjee et al. (2021) noted that mobile recharges for phones were a feasible mechanism for incentives as they are “cheap and reliable,” can be scaled up, and procurement and delivery are simple due to their “uniform quality and fixed price” (4). Grijalva-Eternod et al. (2023) found that having the cash transfer be conditional on a one-time



health screening led to the success of incentives for vaccination. They described how **partnering with an NGO that has been active in the area** for a long time as well as an **academic institution familiar with research in fragile settings** enabled the execution of this study in an environment with barriers. Additionally, using both health record cards and caregiver recall to ascertain children's vaccine status enabled data to be collected from the entire sample (26).

Levine et al. (2021) found that using community health volunteers, requiring minimal resources and engaging community members who were familiar with health promotion, their intervention was feasible. However, difficulties included system-level challenges such as availability and accessibility of health services and poor motivation and performance of health workers (28).

Gibson et al. (2017) spoke to the appropriateness of a specific incentive delivery method: mobile money. They noted that mobile money was highly accepted, was logistically simple to deliver, and did not involve the security risks of cash (25).

Finally, Seth et al. (2018) suggested using biometric data to validate caregivers for conditional incentives and providing incentives in the form of phone minutes was feasible, "robust, and tamper proof" (30). The authors explain how using biometrics for health interventions is scalable in low-resource settings, as commercial hardware for the approach is readily available, identification numbers, cards, or wrist bands can be used, and mobile and internet connectivity have become more widespread. In India, over one billion citizens are enrolled in a "biometric-based identification system (Aadhaar) for the targeted delivery of financial and other subsidies," which could be utilized for identification of subjects within immunization programs (30).

### Fidelity

Interventions with incentives were generally implemented with fidelity. Chandir et al. (2022) monitored the mCCTs intervention and electronic records showed that 16,490 airtime transfers and 3,291 mobile money payments were successfully completed during the study. They found only 0.3% of caregivers in the airtime intervention did not receive incentives due to incompatible phone numbers, and 14.4% in the mobile money intervention did not receive the incentive due to lack of national identity cards. Of eligible caregivers, 78.4% reported receipt of at least one mobile money payment and 82.9% reported receipt of at least one airtime payment (24). Wakadha et al. (2013) reported that 83% of the eligible women reported receiving the CCT and 89% retrieved the cash within three days of receiving the mobile phone credit (41). Poirier (2020) analyzed whether CCT programs in Bolivia, Colombia, Ecuador, and Peru were successfully targeted to the poorest subpopulations in each country. He found programs in Peru and Ecuador were targeted to populations with the lowest socioeconomic status (48).

However, one microcredit intervention was not able to be implemented as planned because CHWs were not appropriately assigned to villages due to coordination and logistical challenges. This led to changing the original intervention arm designs and, overall, negative results (38).

### Sustainability

Evidence on the sustainability of user incentives in terms of both long-term support for implementation and long-term impacts on outcomes is minimal. Chandir et al. (2010) found financial incentives are linked to improved vaccination coverage in the short term but noted a lack of evidence regarding intervention sustainability (23). Similarly, Gibson et al. (2017) noted that sustainability is often a concern

regarding incentive programs, and called for further studies, particularly in urban areas and those with poor immunization rates, before incentives can be recommended (25).

Participants in a study regarding childhood immunization in Nigeria recommended certificates of vaccination completion be provided to caregivers, partly because these might be more sustainable than other types of incentives (43).

## Existing evidence gaps and recommendations for future research

Many studies discussed the need to determine the ideal size for a financial incentive and the challenges associated with incentives that are either too large or too small among different populations. For example, Krishnan et al. (2014) discussed how even large financial incentives are likely to be insufficient to cause behavior change among wealthier populations (39). Levine et al. (2021) noted that the ideal incentive size will balance the largest impact possible with financial practicality depending on resource constraints and called for future research on this subject (28). While incentives that are too large could be considered coercive, infeasible, or involve risks related to corruption, incentives that are too small can effect limited change. Most studies determined small incentives can be most effective, as long as they are large enough to be meaningful to the beneficiary, but the optimal amount remains unclear and will likely depend on context.

Many studies discussed which form of financial incentive was best to implement: physical cash incentives, mobile money, or airtime, with differing results. One report described that physical cash incentives had to be used in North West Nigeria because of low phone ownership. This increased operational challenges but also increased the likelihood of caregivers being able to control the money (46). Levine et al. (2021) noted that 100% of mothers reported preference for cash sent via mobile phone as opposed to airtime as an incentive (28). On the other hand, Seth et al. (2018) found the use of mobile phone minutes was more effective than cash (30). Chandir et al. (2022) and Banerjee et al. (2021) described how airtime or mobile recharges were an effective incentive, with Chandir et al. (2022) showing the use of mobile phone minutes was more feasible than cash (4, 24). In terms of nonfinancial incentives, the potential logistical challenges of distribution were not discussed in any included article, demonstrating a gap in the literature. Which type of incentive should be implemented likely depends on contextual considerations, such as levels of mobile phone ownership, mobile money networks, and autonomy of women/caregivers to control the money received. Further research on which type of incentive in which context should be used would support implementers of user incentive programs. Additionally, user-centered design approaches based on an evidence-based theory of change and situational analysis may help ensure the user incentive interventions consider relevant factors and preferences related to type of incentive, such as rates of phone ownership.

Limited evidence was found in this review concerning gender considerations for user incentive programs. Some literature outside the scope of the review found that women beneficiaries faced safety issues when receiving cash transfers and that cash transfers can influence household decision-making for women (49). However, no evidence was found on how these gender factors may impact the effectiveness of user incentive interventions on immunization outcomes or how they should be considered in development and implementation of user incentive programs to target zero-dose or missed children with immunization.

Finally, the sustainability of user incentive programs also requires further research. If and how user incentive programs can be integrated into existing vaccination programs or financed and implemented by national governments is unclear, but important for program longevity. If programs that provide incentives to users are not sustained, this can lead to reduced trust in a community. Additionally, there is a need for studies on user incentives to assess the long-term impact on outcomes, as well as on program sustainability more generally.

## Limitations

Despite undertaking a comprehensive search strategy, this synthesis involved a rapid literature review; it is possible relevant citations were missed. Additionally, this review included only relevant peer-reviewed publications and publicly available grey literature sources. It is possible more evidence exists, especially programmatic data that might not be available through the sources searched. Publication bias, although not formally assessed, might be of relevance, especially if successful user incentive programs are more likely to be written about and published than unsuccessful ones. Some investigators noted that a barrier to studies on user incentives included lack of an appropriate comparison or control group and the presence of potential confounders (22, 36, 39, 41, 50). Finally, despite the use of standardized forms and trained staff members, data interpretation is somewhat subjective, especially given that formal, quantitative synthesis of outcomes was infeasible.

## Conclusions

### How to potentially shift pro-equity programming based on findings

Small user incentives can support impoverished households to overcome small barriers to childhood vaccination such as opportunity costs or slight hesitancy. However, incentives are likely not effective at convincing caregivers who have strong negative attitudes toward vaccines, nor be successful in areas where major supply-side barriers exist. To ensure financial sustainability and maximize impact, user incentives, particularly CCTs, should likely be co-implemented with other supply-based interventions, country-led programs, and local partners, particularly those with experience in hard-to-reach or conflict settings. Additionally, to maximize effectiveness, contain costs, and focus on pro-equity efforts, user incentive programs should target interventions to communities in vulnerable contexts and areas with a high prevalence of zero-dose children within countries. Finally, user-centered design supported by a thorough theory of change and situational analysis would help ensure user incentive interventions are adapted to local contexts.

### Based on the findings, should user incentive interventions with an equity perspective be brought to scale?

A plethora of studies on large-scale and long-term programs demonstrate that user incentive interventions are implementable at scale. However, costs varied widely, with many studies reporting cost effectiveness alongside high costs, which is an important consideration for scalability. As the goal of user incentive programs is to increase demand for health care services, they can only be successful if those health care services are accessible to communities. Therefore, user incentive programs should only be brought to scale in settings where there are not major supply-side constraints, or coupled with stable supply-side interventions. Other important considerations for whether user incentive interventions should be brought to scale include how well the program can be targeted to vulnerable

populations, whether conditionalities can be simple enough and adequately verified, and what the barriers to immunization are in the specific context (e.g., supply or demand related, strong cultural or religious beliefs). Scaling up user incentives might be an effective way to reach zero-dose children and missed communities, but a learning agenda—as well as further implementation research—tailored to specific contexts should be developed to better understand how to implement user incentives to maximize pro-equity outcomes.

## Appendix A. Review methods

### How was this evidence synthesis conducted?

**SEARCHING, DATA EXTRACTION, AND ANALYSIS:** The review followed a general methodology for all topics in this series. In brief, the methodology involved comprehensively searching electronic databases from January 2010 through March 2023, conducting a grey literature search, screening through all citations, and developing topic-specific inclusion criteria. Data were extracted into standardized forms, and results were synthesized narratively.

**INCLUSION CRITERIA:** We included studies that took place in low- or middle-income countries and involved communities, populations, or geographic areas described as vulnerable, marginalized, underserved, or otherwise disadvantaged. Studies needed to describe an intervention that included the use of financial or nonfinancial conditional incentives for users to increase demand of essential health services for children and presented data relevant to vaccination coverage (for effectiveness studies) or implementation of user incentives. We included both effectiveness studies (defined as using a multi-arm design or using pre/post or time series data to evaluate an intervention involving user incentives) and implementation studies (defined as any study containing descriptive or comparative data relevant to implementation outcomes).

### SEARCH RESULTS

- 472 articles were identified in the published literature search:
  - 375 articles were excluded during title and abstract screening for irrelevance, leaving a total of 97 articles for full-text review.
  - 54 articles were excluded during full-text review for a total of 43 studies:
    - 14 existing relevant reviews
    - 21 effectiveness studies
    - 23 articles related to implementation
- 15 potential articles were identified in the grey literature:
  - 9 reports were excluded for irrelevance, leaving a total of 4 reports:
    - 2 reports were included as relevant to implementation
    - 2 reports were included as existing reviews
- In total, 47 articles and reports were included:
  - 16 reviews
  - 21 effectiveness studies
  - 25 implementation studies/reports

## Appendix B.

Table 2. Categorization of the 21 effectiveness studies on user incentive interventions

Program Name (citation)	Location(s) (ERG setting or priority population)	Intervention type	Activities	Summary of results
The studies below show positive effects of user incentives on immunization:				
Greenstar-led multiple voucher model  Ali et al. (19)	Punjab, Pakistan  (lowest two wealth quintiles in underserved communities)	Financial (vouchers for health services)	Women are provided a booklet of vouchers that cover 13 health care visits, including postnatal care, child immunization, and family planning	<b>Modern contraceptive use did not increase, but vaccination rates did (14% for BCG and 5% for DPT, HBV and measles).</b> First-time use of modern contraception, knowledge of contraceptives, receipt of antenatal care, and delivery at health facilities were <b>more concentrated among disadvantaged people</b> compared to wealthy in the intervention areas.
Immunization campaigns with and without incentives  Banerjee et al. (20)	India  (remote rural)	Nonfinancial (lentils and metal plates)	Three intervention groups were implemented: (A) monthly reliable immunization camp; (B) monthly reliable immunization camp with nonfinancial incentives; and (C) control/no intervention	Rates of full immunization were the following among intervention groups A, B, and C, respectively: 18%, <b>39%</b> , and 6%. <b>The relative risk of full immunization for intervention B versus control was 6.7</b> and 2.2 for intervention B versus intervention A. Additionally, <b>full immunization was more likely among children in areas next to intervention B</b> villages compared to areas surrounding intervention A.
Janani Suraksha Yojana (JSY)  Carvalho et al. (21)	India  (all women in 10 low-performing states and marginalized women in high-performing states)	Financial (CCT)	JSY involves providing CCTs to pregnant women with low socioeconomic status to increase maternal health care service demand, particularly in rural areas.	The evaluation found improvements in maternal and child health indicators, particularly related to childhood vaccination. The CCTs led to the <b>largest increases in coverage of those vaccines with the lowest coverage rates</b> to start with, including polio at birth, DPT3 and polio, and measles, which ranged from 6–8% increases. The <b>treatment effect of JSY on the proportion of children</b>

				<b>aged 12–23 months who were fully vaccinated was 9%.</b>
Mamata Scheme  Chakrabarti et al. (22)	Odisha, India	Financial (CCT)	The Mamata scheme provides INR 5000 (about US\$70) to pregnant and lactating women at least 19 years old who meet conditions related to health care utilization.	The Mamata scheme was associated with <b>increased antenatal care visits, breastfeeding counseling, and child immunization, and decreased anemia</b> during pregnancy, when compared to other regions. Stunting and anemia among children under 5 decreased, and stunting decreased in poor households. Increases in other indicators, including antenatal care visits, IFA tables, neonatal tetanus injection, breastfeeding counseling, and vitamin A were <b>more concentrated among poor households.</b>
Food coupon incentives  Chandir et al. (23)	Karachi, Pakistan  (Urban poor)	Financial (food/medicine coupons)	The intervention provided food and medicine coupons equivalent to about US\$2.00 to caregivers that brought their children to be immunized at each visit until DTP3. Coupons could be used at six local stores but not exchanged for cash.	DTP3 vaccination was significantly higher in the intervention group compared to control when infants were enrolled in the program at BCG or DTP1. <b>“Incentives were associated with more than 2 times higher probability of DTP3 completion.”</b>
Small mCCTs to improve routine childhood immunization  Chandir et al. (24)	Karachi, Pakistan	Financial (mCCT)	The intervention included seven arms, including five mCCT arms which varied by amount (from US\$5 – 15 per fully immunized child), schedule (fixed vs. increasing payments), design (definite vs. lottery payment), and payment method (airtime vs. mobile money); a reminder-only arm and a control arm.	<b>Small mCCTs positively affect FIC at 12 months and up-to-date coverage at 18 months</b> with a cost of US\$23 per additional FIC. <b>Smaller, certain payments were more effective</b> than a larger payment lottery and <b>airtime payments performed better</b> than mobile money. These design factors were as or more important than the size of the incentive on FIC.
Mobile Solutions for	Western Kenya	Financial	Four intervention groups included: (1) control; (2) SMS reminders; (3) SMS	Intervention groups 3 and 4 (SMS reminders plus financial incentive) had a <b>modest effect on increasing</b>



Immunization (M-SIMU)  Gibson et al. (25)	(remote rural)		reminders with a 75 KES incentive (85 KES = US\$1), and (4) SMS reminders with a 200 KES incentive. The incentive groups involved money being sent to caregivers' mobile phones upon timely pentavalent or measles vaccination of their children.	<b>FIC</b> at 12 months. Notably, the study area had high baseline immunization coverage.
CCTs and mHealth audio messaging for malnutrition in IDP camps  Grijalva-Eternod et al. (26)	Somalia (conflict, IDP camps in the Afgooye Corridor, Mogadishu)	Financial	The program randomized 23 camps to receive or not receive the intervention, which consisted of CCTs of US\$70 per household monthly for 3 months (considered the emergency humanitarian phase) and US\$35 per household monthly for the next 6 months (considered the safety net phase), as well as an mHealth intervention. The CCT was conditional on taking children under 5 to a health screening.	The <b>CCT during the emergency humanitarian phase led to improved measles vaccination coverage (39.2% to 77.5%) and complete pentavalent coverage (44.2% to 77.5%)</b> . Coverage increased from baseline at the end of the safety net phase. However, other indicators including <b>timely vaccination, mortality, acute malnutrition, diarrhea, and measles infection did not improve during the 9-month follow-up</b> .
Directly Observed Oral Polio Vaccination (DOPV)  Korir et al. (27)	Northern Nigeria	Nonfinancial (soap, milk sachets, sweets, noodles, sugar)	Children were vaccinated against polio, observed by an independent supervisor, and nonfinancial incentives were provided to caregivers or the children directly to encourage them to get vaccinated.	<b>Population immunity from polio increased in all LGAs where DOPV with incentive was implemented since 2013</b> . In 2013, seven states had 90% of children receiving more than four OPV doses, which increased to 11 states in 2016. Additionally, the <b>percentage of missed children decreased in the LGAs where DOPV was implemented</b> from 2014–2016. The <b>nonfinancial incentives were cited as one of the necessary elements for a successful DOPV intervention</b> .
GEVaP trial	Northern Ghana	Financial (mCCT)	Three intervention groups included: (1) voice call reminders; (2) community health	Intervention arm 1 (voice call reminders) was associated with a 10.5% increase in coverage of timely infant vaccination, <b>while</b>

Levine et al. (28)	(remote rural)		volunteer intervention with financial incentives; and (3) control. In the second intervention arm, the caregiver and community health volunteer were provided 1 Ghana cedis for timely polio and BCG vaccination via mobile money, with a maximum of 2 Ghana cedis, or about US\$0.50.	<b>intervention arm 2 (mobile financial incentives) was associated with 49.5% increased coverage.</b>
Cash transfer programs' effects on child well-being  Robertson et al. (29)	Zimbabwe  (Remote rural)	Financial (CCTs)	Three intervention arms included: (1) unconditional cash transfer; (2) conditional cash transfer; and (3) control. Group 1 consisted of cash transfers every two months. Group 2 consisted of the same cash transfer conditional on applying for birth certificates for children, FIC for children under 5, growth-monitoring visits twice a year for children under 5, 90% school attendance for children aged 6–17, and local parenting class attendance by caregivers.	The proportion of children between 0 and 4 years with birth certificates increased by 1.5% in group 1 and 16.4% in group 2 compared to control. The proportion of children aged 0–4 years with complete vaccine records increased by 3.1% in group 1 and 1.8% in group 2 compared to control. Finally, the proportion of children between 6 and 12 years with 80% school attendance was 7.2% higher in group 1 and 7.6% higher in group 2 compared to control. <b>The results indicate that cash transfers have positive effects on birth registration, vaccination uptake, and school attendance, but the difference in effectiveness between unconditional and conditional cash transfers is unclear.</b>
Mobile phone incentives for childhood immunization  Seth et al. (30)	Haryana, India  (Remote rural, low-income area with low literacy rates)	Financial (phone talk time)	Three intervention groups were implemented: (1) control; (2) automated mobile phone reminders; and (3) automated mobile phone reminders with conditional incentives (30 Indian rupees or about 0.50 US\$worth of mobile phone minutes). Biometric software was used for identification	Vaccination coverage was 33% across all groups at baseline and increased to 41.7% in the control group, 40.1% in the mobile phone reminder group, and <b>50.0% in the incentives group. Implementing conditional incentives was the only intervention independently linked with improved immunization coverage and timeliness</b> after adjusting for other factors, with a risk ratio of 1.09 compared to control.

			and record keeping among all three groups.	
<b>Bolsa Família Program</b> Shei et al. (31)	Brazil (Urban poor)	Financial (CCT)	A CCT program that provides monthly payments to women based on household income, dependent on health care and education utilization. This study focused on the program's impact in a large urban slum.	The program led to <b>increased odds of the following indicators among children under 7: growth monitoring visits, vaccinations, and checkups</b> . Additionally, older siblings of participating children experienced positive spillover effects on growth monitoring, checkups, and psychosocial health.
<b>Bolsa Família Program</b> Souza et al. (32)	Southeast Brazil (Araraquara, a medium-sized city in Sao Paulo)	Financial (CCT)	A CCT program that provides monthly payments to beneficiaries based on household income, dependent on conditions related to children's growth and development. This study evaluated the impact of the program on timely vaccination at ages 12 and 24 months.	<b>Coverage of up-to-date infant vaccination at 12 and 24 months was higher among program participants by 7.0% and 10.2%, respectively, compared to non-participants. However, timely infant vaccination coverage did not significantly differ</b> between beneficiaries and non-beneficiaries.
Maternal Health Voucher Scheme (MHVS) Sultana et al. (33)	Bangladesh (remote rural)	Financial (vouchers for health services, including cash incentives)	The MHVS provides vouchers and cash incentives to disadvantaged pregnant women for antenatal care visits, health facility delivery, post-natal visit, free medicine, transportation allowance, incentive for facility delivery, and care related to complications including c-section.	<b>FIC was higher among children whose mothers benefited from MHVS (93%) compared to children whose mothers were not MHVS members (84%)</b> . The adjusted odds ratio of FIC for children whose mothers benefited from MHVS compared to those who did not was 2.03.
Afya credits incentive Vanhuyse et al. (34)	Kenya (remote rural)	Financial (CCTs)	The study included an intervention arm, which involved a mCCT payment of KSH 450 (about US\$4.5) for each antenatal care, delivery, postnatal care, and childhood vaccination appointment attended at	<b>There was a higher proportion of appointments attended in the intervention arm compared to the control arm for antenatal care (67% compared to 60%) and childhood immunization (88% versus 85%), but no significant differences were found in terms of facility delivery nor postnatal care.</b>

			a facility, and a control arm, which involved KSH 50 (about US\$0.5) of airtime sent to women for each scheduled appointment.	Across all appointments, the odds ratio of attendance was 1.64.
Indira Gandhi Matritva Sahyog Yojana (IGMSY) and Pradhan Mantri Matritva Vandana Yojana (PMMVY) von Haaren et al. (35)	India	Financial (CCT)	The program provides CCTs in the amount of INR 4000 (or about US\$65) for the first two births for all women, delivered to women's bank accounts in three installments, as long as the following conditions were met: registration of pregnancy, antenatal checkup and tetanus immunization, receipt of iron and folic acid tablets, participation in a nutrition and health counseling session, registration of the child's birth, counseling sessions on child nutrition, record child's weight, and completion of the immunization schedule for BCG, polio, and DPT. The program was later renamed and changed to INR 5000 and only one birth.	The effects of the program on individual vaccines were insignificant; however, <b>FIC increased by 9%. Additionally, a long-term effect of the program was that utilization of public health facilities three to five years following delivery increased by 14%</b> and spacing between births increased by 17%.
The studies below show mixed or no effect of user incentives on immunization:				
<b>Bolsa Família Program</b> Andrade et al. (37)	Brazil (poor families nationally)	Financial (CCT)	Direct income transfers provided to families dependent on utilizing health care services and attendance at school	In 2005, <b>the program did not affect childhood vaccination coverage</b> , despite adherence to the immunization schedule being one of the conditionalities
Health services and additional microcredit	Bangladesh (remote rural)	Financial (microcredit)	Four intervention groups were implemented: (1) additional microcredit worker was assigned to villages; (2) monthly	Five main results were found: (1) food security increased significantly among households in all intervention groups; (2) microcredit participation did not increase in any

Becker et al. (38)			household visits from a health assistant; (3) both previous interventions together; and (4) control	group; (3) use of contraception increased in the control group but saw no significant changes in the other groups; (4) trained birth attendance increased in intervention 2 (visits from a health assistant) and (5) <b>measles immunization among children 12–23 months was not affected in any group</b> . The mostly negative results were likely due to poor implementation of the microcredit intervention.
Integration of immunization and hygiene interventions  Briere et al. (36)	Kenya  (rural and urban areas)	Nonfinancial (hygiene kits)	Water treatment and hygiene kits were distributed to caregivers when they brought their infants to be vaccinated.	The intervention's <b>effect on immunization coverage was mixed</b> — up-to-date vaccine coverage increased in urban areas but not rural areas of Homa Bay, and it increased in rural areas of Suba without the distribution of the nonfinancial incentive. It is possible that the intervention positively affected household water treatment, hygiene knowledge, and hygiene behavior.
“Apni Beti Apna Dhan” (our daughter, our wealth) and “Laadli” CCT schemes  Krishnan et al. (39)	Haryana, India  (Gender-related barriers)	Financial (CCT)	This study evaluated a CCT scheme in India that started in 1994 targeting all disadvantaged girls, and then shifted in 2005 to be restricted to second girl children among all groups. The amount of the CCT also increased from US\$500 to US\$2000 upon the following conditions: the girl reached 18 years old and was fully immunized, stayed in school until class 10, and remained unmarried.	The intervention <b>did not have a significant effect on the outcomes of interest</b> , including girl child discrimination, fetal sex determination, breastfeeding, full diets, education, and sex ratio at birth. FIC at 12 months increased for both boys and girls and educational levels and mean age at marriage increased, but these improvements were <b>likely the result of long-term trends and were present among boys as well</b> , not an impact of the intervention.

## Appendix C.

Table 3. Contextual barriers and facilitators by ERG setting

Some studies described how the success of user incentives was influenced by factors inherent to the immunization program context. This table lists circumstances in which user incentive interventions may be more successful or not successful. For example, small CCTs are unlikely to be effective among populations with high hesitancy to vaccines due to religious or cultural beliefs, or in areas with limited access to vaccines.

	<b>Facilitators</b>	<b>Barriers</b>
<b>Remote rural</b>	Limited health system infrastructure is required to implement this type of intervention (28)	<p>High transportation costs (36)</p> <p>Long distance to health facilities, especially compared to urban areas (28, 36, 41)</p> <p>High levels of migration (25)</p> <p>System-level bottlenecks such as infrequent vaccination outreach services, poor health worker training/supervision/performance (28, 41)</p> <p>Cultural beliefs and lack of knowledge (30)</p> <p>Limited access to health care services (limits participation of households) (31)</p> <p>Resistance or lack of approval from husband/father (41)</p>
<b>Urban poor</b>	<p>Close geographic proximity to health facilities compared to rural areas (31, 36)</p> <p>Cheaper and better transportation infrastructure than rural areas (36)</p> <p>Free immunization services (43)</p> <p>Awareness among caregivers regarding the benefits of vaccines (43)</p>	<p>High levels of migration/relocation (42)</p> <p>Poor weather conditions limit access and discourage care seeking (42, 43)</p> <p>High transportation costs (42, 43)</p> <p>Long lines at clinics (42, 43)</p> <p>Substance abuse among caregivers (42)</p> <p>Violence and gang-related activities (42)</p> <p>Poor road infrastructure (43)</p> <p>Long distances to health care services (43)</p> <p>Stockouts (43)</p> <p>Poor treatment toward caregivers from health care workers (43)</p> <p>Misinformation regarding vaccines (43)</p>
<b>Gender-related barriers</b>		Limited monitoring of the intervention (39)

<p><b>Remote rural AND urban poor</b></p>		<p>Poor quality of household survey data (21)</p> <p>Corruption within administration (21)</p> <p>Human resources shortages (21)</p> <p>Poor infrastructure quality (21)</p> <p>Limited cold chain capacity (21)</p> <p>Limited knowledge about safe vaccine administration and waste management (21)</p>
<p><b>Other/Not Reported</b></p>	<p>Limited or no vaccine hesitancy (47)</p>	<p>Strong negative views regarding vaccines (often related to side effects), particularly among hard-to-reach populations such as migrant workers and daily wagers (47)</p> <p>Religious reasons (47)</p> <p>Sterilization rumors regarding vaccines (47)</p>



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