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Incentives in immunisation campaigns in low- and middle-income countries: a scoping review mapping evidence on effectiveness and unintended consequences

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ABSTRACT

Introduction Various incentive programmes are being used to improve immunisation uptake, despite limited understanding of their effectiveness and potential unintended consequences. We conducted a scoping review to map and synthesise evidence on their use in low- and middle-income countries (LMIC), compare experiences across regions and incentive types, and identify unintended consequences and implementation challenges.

Methods We searched Ovid MEDLINE and grey literature for studies published between 2000 and 2024 investigating incentives in immunisation campaigns in LMIC. We included quantitative and qualitative studies investigating monetary or non-monetary incentives provided conditionally or unconditionally on immunisation uptake. Data were synthesised narratively to summarise evidence on effectiveness, perceptions and attitudes and unintended consequences.

Results We included 40 studies from 19 countries (20 from Africa, 13 from Asia and seven from Latin America). Of these, 31 evaluated effectiveness through randomised trials (n=17) or quasi-experimental designs (n=14). Most evaluated monetary incentives for childhood immunisations, particularly conditional cash transfers, while some examined non-monetary incentives including food, mobile phone credit and symbolic rewards. While effect sizes varied substantially across different interventions and contexts, most studies demonstrated modest positive short-term effects on immunisation uptake, and no studies showed decreased uptake. However, several revealed unintended consequences, including reduced intrinsic motivation manifesting as lower immunisation uptake when incentives were withdrawn, creation of payment expectations and implementation challenges affecting acceptability. Several studies highlighted how incentive programmes could undermine community volunteerism and trust in both immunisation and health services, particularly when poorly implemented or withdrawn.

Conclusions While incentives can improve short-term immunisation uptake in LMIC, their effects vary by context, and they can have negative unintended consequences which need to be taken into consideration in programme design. Future programmes should be co-designed with communities, consider locally acceptable non-monetary alternatives, incorporate strategies to maintain intrinsic motivation and ensure sustainable implementation within existing health systems.

WHAT IS ALREADY KNOWN ON THIS TOPIC?

⇒ While various incentive programmes are being implemented to increase immunisation uptake, including in low- and middle-income countries (LMICs), evidence on their use, effectiveness and potential unintended consequences is limited.

WHAT THIS STUDY ADDS?

⇒ Our scoping review identified 40 studies using a range of study designs from 19 countries in LMIC. While the available evidence suggests incentives generally improve short-term immunisation uptake, our review highlights how effects are likely to vary substantially in different contexts. Furthermore, we found evidence that incentives can reduce intrinsic motivation, create payment expectations and undermine community trust.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE, OR POLICY?

⇒ Future research is needed to systematically examine the long-term effects of incentives on immunisation uptake and attitudes and characterise context-specific factors affecting implementation. Meanwhile, incentive programmes should be carefully co-designed with communities and health systems aiming to build on, rather than potentially disrupt, existing community motivations for immunisation.

INTRODUCTION

Immunisation against common infectious diseases is a highly effective public health

intervention, especially for reducing child morbidity and mortality.[1] Indeed, since the WHO launched its Expanded Programme on Immunization (EPI) in 1974,[2] immunisation is estimated to have prevented 154 million deaths, including 101 million in infants younger than 1 year, making it the single most effective health intervention for mortality reduction.[3] However, major challenges and vast inequalities persist. While global coverage of the third dose of the diphtheria-tetanus-pertussis (DTP) vaccine, a widely used measure of immunisation programme performance, was estimated at 84% in 2023, coverage in low-income countries was 68%, and just 10 countries accounted for nearly 60% of completely unimmunised children.[4] Importantly, global immunisation coverage has declined since the COVID-19 pandemic and failed to recover.[4]

Uptake of immunisation may be limited by several factors including limited access to healthcare, socioeconomic barriers, a lack of awareness and education about vaccines, and vaccine hesitancy.[5 6] Because immunisation of individuals also contributes to community protection through herd immunity, the social benefits of immunisation exceed the private benefits to any individual. Various incentive programmes have therefore been implemented aiming to increase immunisation uptake and achieve coverage levels needed for effective community protection.[7] These include monetary incentives such as conditional cash transfers and non-monetary incentives such as food, mobile phone credit or symbolic rewards that signal immunisation uptake. Incentive programmes have been relatively well studied in high-income countries (HIC), particularly for COVID-19, with a recent systematic review concluding that monetary incentives are likely to increase immunisation uptake.[8] Evidence on their effectiveness in low- and middle-income countries (LMIC) is limited, with recent reviews showing mixed results and focussing purely on effectiveness, without discussing potential unintended consequences.[9–12] Arguments against the use of incentives have been widely made and include three key risks: (i) that the value of an incentive may be negated or even reversed if people infer that offering incentives indicates that the vaccine is of low quality; (ii) that offering incentives may 'crowd out' social and intrinsic motivations for immunisation, which could result in less healthy behaviours in the future when no incentives are offered; and (iii) that incentives prompt suspicion and may cause feelings of coercion, reducing trust in health services.[13 14]

In LMIC, both immunisation and incentive programmes face distinct planning and operational implementation challenges including a higher burden of vaccine-preventable diseases, weaker health systems and supply chains, limited resources, and complex socioeconomic and historical contexts.[15 16] Experience from Médecins Sans Frontières (MSF), which supports extensive immunisation campaigns in LMIC, has highlighted how these contextual factors may influence both the potential effectiveness of incentives and their unintended consequences. Given these complexities and the fact that incentives are being increasingly used in immunisation campaigns in LMIC,[17] we conducted a scoping review aiming to: (i) map and synthesise evidence on their use; (ii) compare experiences across different regions and incentive types; and (iii) identify unintended consequences and implementation challenges. In doing so, we aimed to inform future research and evidence-based practices and policies on their use.

METHODS

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines for conducting and reporting this scoping review.[18]

Search strategy

In October 2024, we searched Ovid MEDLINE (PubMed) for peer-reviewed studies investigating the use of incentives in immunisation campaigns in LMIC. The full database search strategy (online supplemental appendix) combined searching for free text words in titles and abstracts with Medical Subject Headings (MeSH). To supplement this database search, we sought additional studies and reports by searching the grey literature using Google and Google Scholar with simplified search terms (with results extracted from the first 100 hits); manually checking references of included articles, relevant commentaries and reviews; citation forward searching (checking for articles that cite included articles); and searching the websites of key non-governmental organisations (NGOs) and evaluation organisations operating in LMIC (eg, 3ie International Initiative for Impact Evaluation).

Selection criteria

For pragmatic reasons, all titles and abstracts returned by the search were screened for eligibility by one author using Rayyan (MJS), with relevant records then sought for a detailed full-text review. Studies were eligible to be included if they were quantitative (including randomised trials and quasi-experimental studies) or qualitative (including those that utilised interviews, focus groups and other methods) in design and published in English from the year 2000 onwards. Studies were classified as quasi-experimental if they used methods to approximate causal effects, including those using cross-sectional data with appropriate analytical approaches such as propensity score matching. Systematic and other types of reviews returned by the search were not included but were reviewed to identify references to original studies which may have been eligible. Studies exclusively investigating incentives for COVID-19 immunisation were excluded because of the specific contextual factors characterising this illness and vaccine which would limit generalisability to routine immunisation programmes, as were non-human studies and abstracts without accessible full texts.

Inclusion criteria were based on the Population, Intervention, Comparator, Outcome framework:

- *Population(s)*. Any individuals who received, or were asked about their perceptions of receiving, incentives for immunisation (and individuals in comparison groups) who were residing in LMIC, as determined by the World Bank at the time of the study.
- *Intervention(s)*. Any monetary or non-monetary incentive provided to recipients either conditionally or unconditionally on their or their dependent's immunisation uptake. Studies examining perceptions of hypothetical incentives were also included.
- *Comparator(s)*. The main comparator of interest was the receipt of no incentives, but studies were not excluded if they had no control group (eg, qualitative studies) or if they had a different standard of care (eg, mobile phone-based reminders).
- *Outcome(s)*. The primary quantitative outcome of interest was the difference in immunisation uptake between people who received incentives versus those who did not, which could be presented as relative risks (RR), odds ratios (OR) or risk differences, with 95% confidence intervals (95% CI). Both objective (eg, administration records) and subjective (eg, self-reported) measures of immunisation uptake were included. The other outcomes of interest included quantitative and qualitative data describing study participants' experiences, perceptions and attitudes towards immunisations and incentives and any reported unintended consequences.

Data extraction and synthesis

A standardised data extraction form was developed to capture relevant information from studies meeting the inclusion criteria. This included study characteristics (eg, author, year, design), population characteristics (eg, demographics, setting), intervention details (eg, type of immunisation campaign, type of incentive), sample size, and the main quantitative and qualitative results. While formal quality assessment is not typically conducted in scoping reviews, we noted study design and methodological features that could affect the interpretation of findings. A narrative synthesis was then undertaken to describe the main findings and themes from included studies. We organised findings into three broad domains and disaggregated available data by continent: (i) quantitative evidence on the effectiveness of incentives for improving immunisation uptake; (ii) quantitative and qualitative evidence on positive effects of incentives on perceptions and attitudes towards immunisation; and (iii) quantitative and qualitative evidence on risks and unintended consequences of incentives.

Patient and public involvement

The research question was informed by the experiences of MSF staff working with patients and the public in immunisation campaigns in LMIC. As this was a review of the literature, no patients were involved in the design or execution of the study.

RESULTS

Our Ovid MEDLINE search yielded 771 records, of which 87 were sought for full-text review and 28 studies were included. We also identified and included an additional 12 studies/reports from the additional searches described above; meaning a total of 40 studies/reports were included in this review (figure 1). Studies were undertaken across a variety of LMIC—20 were undertaken in Africa, 13 in Asia and seven in Latin America.

Of the 40 studies included in this review, 31 were explicitly designed to evaluate the effects of incentive programmes on immunisation uptake, summarised in tables 1–3. These included 17 randomised trials (13 cluster randomised and four individually randomised) and 14 quasi-experimental studies. Most studies evaluated monetary incentives, particularly conditional cash transfers for routine childhood immunisations, though some examined non-monetary incentives such as food, mobile phone credit and symbolic rewards. While effect sizes varied substantially by context, most studies demonstrated modest positive short-term effects of incentives on immunisation uptake, and, notably, no studies found that incentives decreased immunisation uptake. The remaining nine studies provided valuable quantitative and qualitative insights into effects on perceptions and attitudes towards immunisation, and potential unintended consequences and implementation challenges, summarised in table 4.

Quantitative evidence on the effectiveness of incentives for improving immunisation uptake

Africa (table 1)

We identified 13 studies undertaken in Africa, including several very large evaluations. Ten of these studies demonstrated positive effects on immunisation uptake of the various incentives under evaluation. Of note is the New Incentives-All Babies Are Equal Initiative (NI-ABAE) run in North-West Nigeria, which directly incentivises uptake of the main childhood immunisations with small conditional cash transfers provided to caregivers, with payments increasing across the immunisation schedule. In a cluster randomised trial including 167 clinics in three states, this programme demonstrated positive short-term effects of incentives on immunisation uptake—among children in incentive clinics compared with those in control clinics, uptake was 16 percentage points higher for BCG vaccine (95% CI 12 to 21), 21 percentage points higher for the penta one vaccine (95% CI 16 to 26), 14 percentage points higher for the measles vaccine (95% CI 10 to 18) and full immunisation was 27 percentage

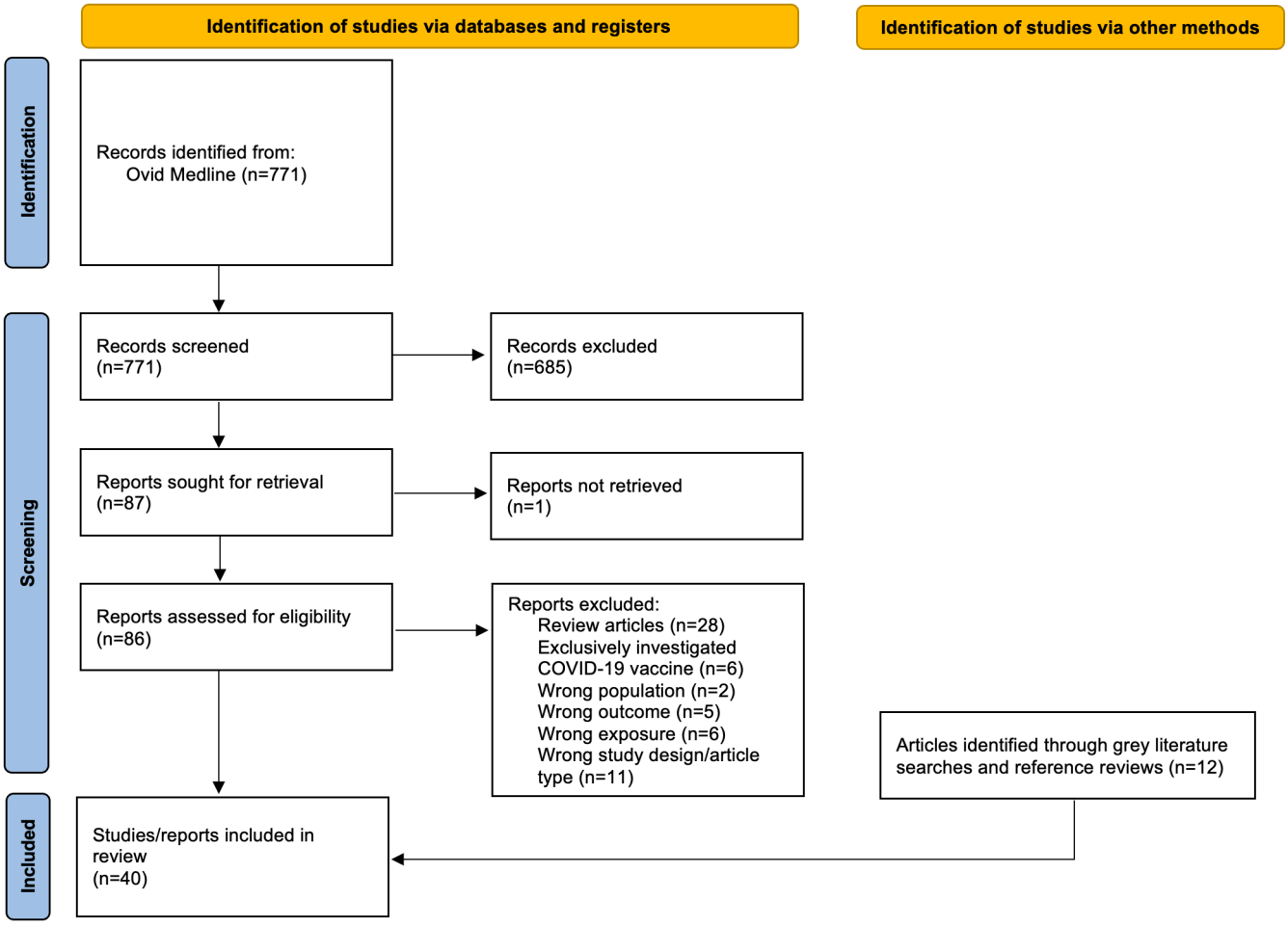

Figure 1 Study selection.

points higher among infants aged 12–16 months old (approximately a doubling).[19] This is consistent with another recent cluster randomised trial undertaken in camps for internally displaced people in Somalia, which evaluated adding a one-time health screening conditionality to a cash transfer intervention.[20] Overall, the conditionality improved uptake of measles immunisation from 39% to 78%, and completion of the pentavalent series from 44% to 78%. Interestingly, overall timely immunisation, mortality and measles incidence over 9 months follow-up did not improve. Other randomised trials evaluating monetary incentives have shown positive results to varying extents. For example, in Ghana, Levine *et al* found that mobile phone-based cash transfers were associated with a 50 percentage point (95% CI 26 to 73) higher coverage of at least one dose of oral polio vaccine within 14 days of life and BCG vaccine within 28 days of life,[21] while in Kenya, three trials of mobile phone-based cash transfers demonstrated only small positive effects on immunisation outcomes.[22–24] In Nigeria, two studies demonstrated positive effects of cash transfers on maternal tetanus immunisation during pregnancy,[25 26] but no effect on the number of infants receiving oral polio vaccine at birth in the one study in which it was evaluated.[26] For non-monetary incentives, Karing demonstrated that the provision of a bracelet as a symbolic reward and signal of immunisation status increased complete immunisation coverage by 13% in Sierra Leone,[27] and Goodson *et al* demonstrated that providing insecticide-treated bed nets concurrently with measles immunisation was associated with higher immunisation coverage in Madagascar.[28]

In contrast, we identified three studies that showed no detectable effects on immunisation uptake of the various incentives under evaluation. In a large cluster randomised trial in Zimbabwe, Robertson *et al* investigated the effects of unconditional and conditional cash transfers on a range of health and social outcomes, including immunisation uptake.[29] Their study included over 4000 households and found that compared with control clusters, there were no differences in the proportions of children aged 0–4 years with complete immunisation records in the unconditional cash transfer clusters or the conditional cash transfer clusters. For non-monetary incentives, Demilew *et al* found no effects of a symbolic tracking poster and stamp system, designed to act as a signal of immunisation status, on a range of immunisation outcomes in Ethiopia,[30] and Mathanga *et al* found

Table 1 Characteristics and results of quantitative studies evaluating the effectiveness of incentives for improving immunisation uptake in Africa

Study	Years of study	Type of study	Setting	Participants	Type of vaccine/ immunisation campaign	Type of incentive	Conditional on immunisation uptake	Summary of results
Africa								
Demilew *et al*[30]	2016–2019	Cluster randomised trial	Ethiopia	2700 households	Childhood immunisations	Tracking poster and stamp system as a visual reward	Yes	The intervention had no effect on a range of different immunisation outcomes.
Levine *et al*[21]	2018–2019	Cluster randomised trial	Ghana	690 mother-child pairs	Polio and BCG	Cash transfers	Yes	In adjusted intent-to-treat analysis, mobile phone-based incentives were associated with 49.5 percentage points (95% CI 26.4 to 72.5) higher coverage of at least one dose of polio vaccine within 14 days of life and BCG immunisation within 28 days of life compared with control.
Vanhuyse *et al*[22]	2017–2019	Cluster randomised trial	Kenya	5471 pregnant women	Childhood immunisations	Cash transfers	Yes	Compared with the control arm, in the intervention arm there was a small increase in the proportion of immunisation appointments attended in the post-natal period (88% vs 85%, aOR=1.74, 95% CI 1.10 to 2.77).
Kagucia *et al*[23]	2016–2017	Individually randomised trial	Kenya	537 caregivers of infants aged 6–8 months	Measles	Cash transfers	No	Timely coverage of measles immunisation was 68% among control arm infants compared with 78% in the incentive arm (aRR=1.16; 95% CI 1.01 to 1.32). But, this was a similar effect size to the third study arm (text message reminders alone).
Gibson *et al*[24]	2013–2014	Cluster randomised trial	Kenya	2018 caregiver pairs	Childhood immunisations	Cash transfers	Yes	In this four-arm trial testing text message reminders and two different amounts of incentives, full immunisation by 12 months was 82% in the control arm, 86% in the text message arm, 86% in the text message plus small incentive arm and 90% in the text message plus large incentive arm. Children in the text message plus large incentive arm were more likely to have full immunisation at 12 months compared with control (RR=1.09, 95% CI 1.02 to 1.16).
Goodson *et al*[28]	2009–2009	Quasi-experimental study	Madagascar	3158 children aged 9–59 months	Measles	Insecticide-treated bed net	No	Measles coverage was higher in intervention districts (70.8%) than non-intervention districts (59.1%) (RR=1.3, 95% CI 1.1 to 1.6). Among children in the poorest wealth quintile, measles coverage was higher in intervention than in non-intervention districts (RR=2.4, 95% CI 1.2 to 4.8), and equity was greater in intervention districts (equity ratio=1.0, 95% CI 0.8 to 1.3) than in non-intervention districts (equity ratio=0.4, 95% CI 0.2 to 0.8).
Mathanga *et al*[31]	2005–2007	Quasi-experimental study	Malawi	10 390 households including 1240 children aged 12–23 months	Childhood immunisations	Insecticide-treated bed net	No	The percentage of children fully immunised by 12 months increased in two intervention areas, but it also increased to a similar extent in the control area. Thus, it cannot be concluded that the intervention increased vaccination uptake.
IDinsight[19]	2017–2020	Cluster randomised trial	Nigeria	167 clinics	Childhood immunisations	Cash transfers	Yes	Among children in cash transfer catchment areas compared with those in control areas, self-reported immunisation coverage was 16 percentage points higher for the BCG vaccine (95% CI 12 to 21), 21 percentage points higher for the penta one vaccine (95% CI 16 to 26) and 14 percentage points higher for the measles vaccine (95% CI 10 to 18). Children in cash transfer catchment areas were 27 percentage points more likely to be fully immunised than children in control areas.
Okoli *et al*[26]	2013–2014	Quasi-experimental study	Nigeria	20 133 pregnant women	Maternal tetanus and polio at birth	Cash transfers	Yes	The conditional cash transfer scheme was associated with an increase in tetanus toxoid immunisations among women (the monthly average increased following the introduction of the scheme by 22/100 000 people per month, 95% CI 9.2 to 34). There was no effect on the uptake of the first polio dose to neonates.

Continued

Table 1 Continued

Study	Years of study	Type of study	Setting	Participants	Type of vaccine/ immunisation campaign	Type of incentive	Conditional on immunisation uptake	Summary of results
Sato *et al*[25]	2013–2013	Individually randomised trial	Nigeria	2482 women of childbearing age	Maternal tetanus	Cash transfers	Yes	This trial investigated cash incentives of different amounts. Immunisation uptake was 85.5% among people receiving the highest amount, 75.7% among people receiving the middle amount and 54.8% among people receiving the smallest amount. OR=7.6 (95% CI 4.5 to 11) for highest vs lowest and OR=3.4 (95% CI 2.6 to 4.4) for middle vs lowest.
Karing[27]	2016–2018	Cluster randomised trial	Sierra Leone	120 clinics	Childhood immunisations	Signalling reward bracelet	Yes	The signalling reward bracelet increased the share of children who completed all vaccines in time by 13.3%. There were positive effects on immunisation completion at 12 and 24 months, with the intervention increasing the proportion of fully immunised children by 9.4% and 5.1% respectively at these time points.
Grijalva-Eternod *et al*[20]	2019–2019	Cluster randomised trial	Somalia	1430 households and their children aged 0–59 months	Childhood immunisations	Cash transfers	No	Compared with unconditional cash transfers, adding a conditionality (one time point health screening for children) to the cash transfers significantly improved the coverage of measles immunisation from 39.2% to 77.5% (aOR=11.7, 95% CI 5.2 to 26.1) and pentavalent series completion from 44.2% to 77.5% (aOR=8.9, 95% CI 2.6 to 29.8) after 3 months. However, there was no evidence the conditionality improved timely immunisation coverage.
Robertson *et al*[29]	2009–2011	Cluster randomised trial	Zimbabwe	4043 households	Childhood immunisations	Cash transfers	Yes and no	This was a three-arm trial, control vs unconditional cash transfers vs conditional cash transfers. Compared with control clusters, the proportion of children aged 0–4 years with complete immunisation records was 3.1% (95% CI −3.8 to 9.9) greater in the unconditional cash transfer group and 1.8% greater (95% CI −5.0 to 8.7) in the conditional cash transfer group. Thus, there was no evidence for any effect of the cash transfers.

BCG, Bacillus Calmette Guérin; 95% CI, 95% confidence interval; OR, odds ratio; RR, relative risk.

Table 2 Characteristics and results of quantitative studies evaluating the effectiveness of incentives for improving immunisation uptake in Asia

Asia								
Sultana *et al*[32]	2016–2017	Quasi-experimental study	Bangladesh	1151 children aged 12–23 months of age	Childhood immunisations	Cash transfers and vouchers	No	93% of children whose mothers were enrolled in the Maternal Health Voucher Scheme were fully immunised vs 84% for the children of mothers not enrolled (aOR=2.03, 95% CI 1.11 to 3.71).
Banerjee *et al*[42]	2004–2007	Cluster randomised trial	India	1640 children aged 1–3 years	Childhood immunisations	Raw lentils and metal plates	Yes	Among children aged 1–3 years in the end point survey, rates of full immunisation were 39% (95% CI 30% to 47%) for villages randomised to reliable immunisation with incentives, 18% (95% CI 11% to 23%) for villages randomised to reliable immunisation without incentives and 6% (95% CI 3% to 9%) for control villages. The RR of complete immunisation for reliable immunisation with incentives vs control was 6.7 (95% CI 4.5 to 8.8) and for reliable immunisation with incentives vs reliable immunisation alone was 2.2 (95% CI 1.5 to 2.8).
Banerjee *et al*[41]	2016–2019	Cluster randomised trial	India	Approximately 295 000 children	Childhood immunisations	Mobile phone credit	Yes	This large study evaluated several interventions concurrently. Relative to the comparison group, the number of fully immunised children per village per month was higher in villages where people received high incentives that increased throughout the immunisation course (10.0 per village per month vs 7.32 per village per month in the comparison group). This was a statistically significant increase. In contrast, incentives that were flat across the immunisation schedule had no impact in any combination.
Seth *et al*[40]	2016–2017	Individually randomised trial	India	608 children aged <24 months	Childhood immunisations	Mobile phone credit	Yes	Median immunisation coverage at enrolment was 33% in each of the three trial arms (control, text message reminders, reminders plus incentives). It increased to 41.7%, 40.1% and 50.0% respectively by the end of the study. Incentives were independently associated with an improvement in immunisation coverage (aRR=1.09, 95% CI 1.0 to 1.2).
Chakrabarti *et al*[33]	1999–2016	Quasi-experimental study	India	208 895 mother-child pairs	Childhood immunisations	Cash transfers	Yes	Exposure to the Mamata cash transfer scheme was associated with increased odds of full immunisation (OR 1.69; 95% CI 1.37 to 2.08).
De *et al*[34]	2004–2012	Quasi-experimental study	India	Not specified	Childhood immunisations	Cash transfers	No	Belonging to a Janani Suraksha Yojana (JSY) district increased the probability of receiving the BCG vaccine by almost 4.4 percentage points; of initiating the DPT vaccine by nearly 4.8 percentage points; and of being immunised against measles by roughly 2.5 percentage points.
Carvalho *et al*[36]	2007–2008	Quasi-experimental study	India	720 320 households	Childhood immunisations	Cash transfers	No	Receipt of financial assistance from JSY led to an increase in immunisation rates ranging from 3.1 (95% CI 2.2 to 4.0) percentage points for one dose of polio vaccine to 9.1 (95% CI 7.5 to 10.7) percentage points in the proportion of fully immunised children.
Krishnan *et al*[35]	1992–2010	Quasi-experimental study	India	28 326 children	Childhood immunisations	Cash transfers, specifically targeted at parents of girls	Yes	Immunisation coverage at 12 months of age increased significantly for both boys (from 62% in 1992–1994 to 97% in 2005–2010) and girls (from 60% in 1992–1994 to 96% in 2005–10). As trends were also seen in boys, it suggests limited impact of the cash transfer scheme.
Chandir *et al*[37]	2017–2018	Individually randomised trial	Pakistan	11 197 caregiver pairs	Childhood immunisations	Cash transfers and mobile phone credit	Yes	Full immunisation coverage at 12 months was 62.3% for participants receiving any incentive, compared with 58.4% for participants receiving only text message reminders (OR=1.18, 95% CI 1.05 to 1.33). Similar effects were seen for individual immunisations, but there was no evidence for an effect on timeliness of individual immunisations. Mobile phone credit appeared more effective than cash transfers.
Chandir *et al*[38]	2006–2007	Quasi-experimental study	Pakistan	3059 infants	Childhood immunisations	Food and medicine vouchers	Yes	The DTP up-to-date immunisation coverage at 18 weeks of age increased two-fold (RR 2.20, 95% CI 1.95 to 2.48) in the incentive cohort compared with the no-incentive cohort.
Ali *et al*[39]	2012–2015	Quasi-experimental study	Pakistan	2552 women of childbearing age from the lowest two wealth quintiles	Childhood immunisations	Healthcare vouchers	No	There was no overall difference in the proportion of children who were ever immunised between areas receiving and not receiving the intervention. For individual vaccines, the intervention area coverage increased for BCG (84% to 91%), DPT (78% to 84%), HBV (52% to 82%) and measles (42% to 79%) vaccines between baseline and endline. The increases for HBV and measles vaccines were significant compared with the areas not receiving the intervention.

BCG, Bacillus Calmette Guérin; 95%CI, 95% confidence interval; DTP, diphtheria, tetanus and pertussis; HBV, hepatitis B virus; OR, odds ratio; RR, relative risk.

Table 3 Characteristics and results of quantitative studies evaluating the effectiveness of incentives for improving immunisation uptake in Latin America

Latin America								
Shei *et al*[44]	2010–2010	Quasi-experimental study	Brazil	567 households including 1266 children	Childhood immunisations	Cash transfers	Yes	In children aged under 7 years, the intervention was associated with increased odds of completing immunisations (OR=2.8, 95% CI 1.4 to 5.4).
Souza *et al*[43]	2014–2016	Quasi-experimental study	Brazil	7386 children	Childhood immunisations	Cash transfers	Yes	Overall, there was higher up-to-date immunisation coverage, at 12 (92.1%, 95% CI 90.6 to 93.5) and 24 months (83.8%, 95% CI 81.8 to 85.7), among the cash transfer beneficiaries compared with the non-beneficiaries (85.1%, 95% CI 83.2 to 86.9 at 12 months and 73.6%, 95% CI 71.2 to 75.8 at 24 months). The coverage of timely immunisation did not statistically differ between beneficiaries and non-beneficiaries.
Attanasio *et al*[48]	2001–2005	Quasi-experimental study	Colombia	100 municipalities, each with <100 000 individuals	Childhood immunisations	Cash transfers and nutritional subsidies	Yes	There was some evidence (p<0.1) that Familias en Acción increased the probability of adequate DTP immunisation for children under 24 months by 8.9%.
Morris *et al*[49]	2000–2002	Cluster randomised trial	Honduras	70 municipalities including around 5600 households	Childhood immunisations	Cash transfers	Yes	Results from this large trial were mixed. There was no impact on the uptake of tetanus or measles vaccine, but the intervention did increase the coverage of the first dose DTP vaccine by 6.9% (95% CI 1.0 to 12.8).
Barham[47]	1998–1999	Cluster randomised trial	Mexico	506 villages	Measles	Cash transfers	Yes	The programme had no detectable effect on BCG immunisation but a 3% increase in measles immunisation coverage among children aged 12–23 months.
Salinas-Rodriguez *et al*[45]	2007–2007	Quasi-experimental study	Mexico	12 146 people aged 65 years and over	Influenza, pneumococcal and tetanus	Cash transfers	Yes	People who were beneficiaries of the scheme had higher immunisation rates. For a complete schedule, proportions were 5.5% higher (95% CI 2.8 to 8.3); for influenza, they were 6.9% higher (95% CI 3.8 to 9.6); for pneumococcal, they were 7.2% higher (95% CI 4.3 to 10.2); and for tetanus, they were 6.6% higher (4.1–9.2).
Barham and Maluccio[46]	2000–2002	Cluster randomised trial	Nicaragua	42 communities including 2229 children aged 0–35 months participating in household surveys, and 9986 children aged <5 years participating in administrative surveys	Childhood immunisations	Cash transfers	Yes	Overall, the results show a statistically insignificant programme effect of 12 percentage points in 2002 compared with 2000. However, for some vaccines, there were larger effects, and importantly, effects were larger for children who are typically harder to reach.

BCG, Bacillus Calmette Guérin; 95% CI, 95% confidence interval; DTP, diphtheria, tetanus and pertussis; OR, odds ratio.

Table 4 Characteristics and results of quantitative and qualitative studies characterising perceptions and attitudes towards immunisation and incentives and risks and unintended consequences

Study	Years of study	Methods	Setting	Participants	Type of vaccine/ immunisation campaign	Type of incentive	Benefits of incentives	Risks of incentives
Africa								
Delea *et al*[54]	2021	Focus group discussions and key informant interviews	Chad	130 people; 20 stakeholders from central, district and local levels; and 110 community members	Guinea worm and polio-related eradication initiatives	Not specified	Community participants suggested that incentives positively influence communities' participation in activities.	The provision of compensation and incentives contributed to tension and suspicion with communities. Using incentives as a strategy for community engagement led to unexpected outcomes, such as an expectation for compensation. Using them was reported to have altered understanding of community engagement, and negative influences of incentives have shaped the community's attitudes towards participation in and engagement with various programmes and initiatives. The use of incentives attenuated the sense of volunteerism and commitment within communities, leading to a situation where incentives are seen as a requirement for participation.
Dickin *et al*[56]	2020	Focus group discussions and key informant interviews as part of a process evaluation embedded within a randomised trial	Kenya	15 healthcare workers and 15 participants in the intervention	Childhood immunisations	Cash transfers delivered through a card reader system	Acceptability of cash transfers was high for participants and was initially high for healthcare workers. Participants were enthusiastic to join the trial and were happy with the cash transfer when they received it. Healthcare workers perceived improvements in their facilities' services.	Healthcare workers had concerns related to cash transfers for maternal visits, seeing it as the personal responsibility of mothers. Some also noted the programme set a precedent that could affect future attendance. Among participants, acceptability was negatively affected by significant delays linked to the card reader system, with most participants describing a situation where cash transfers were not received automatically on attending appointments. Some participants' family members felt that no one should be paid to attend appointments and that it could create problems with future attendance.
Olaniyan *et al*[55]	Not specified	Focus group discussions and key informant interviews	Nigeria	44 mothers/caregivers, 24 community leaders and 19 healthcare workers	Childhood immunisations	Not specified	Non-monetary incentives were seen as facilitators, especially for those with lower socioeconomic status. Participants said approaches such as congratulatory cards that document immunisation completion confer a sense of pride and may cost less and be more sustainable than material incentives.	None specified
Abad *et al*[57]	2017	Focus group discussions and key informant interviews	Nigeria	193 people, including healthcare workers, caregivers and community influencers	Childhood immunisations	Not specified	Many participants shared their belief that monetary and non-monetary incentives could improve immunisation uptake, particularly non-monetary incentives like soap and milk.	Some participants expressed that while incentives might increase uptake, if stopped, uptake may drop to previous levels or worse. Caregivers reported that community members became suspicious of free vaccines given when other treatments cost money.
Eti *et al*[53]	2022	Focus group discussions	Nigeria	93 caregivers and 91 community influencers	Childhood immunisations	Not specified	Incentives, such as free mosquito nets, were found to be a motivation for immunisation uptake.	In some states, caregivers stopped vaccinating children when incentives were no longer provided. Without incentives, community influences reported difficulty in persuading mothers to immunise their children.

Continued

Table 4 Continued

Study	Years of study	Methods	Setting	Participants	Type of vaccine/ immunisation campaign	Type of incentive	Benefits of incentives	Risks of incentives
Karing *et al*[58]	2020–2021	Cross-sectional study	Sierra Leone	3040 children	Childhood immunisations	Non-monetary (bracelets)	See Karing[27]	This survey aimed to investigate the impact of incentive withdrawal. It found that 3 years after exposure to the bracelet incentive, eligibility for this incentive reduced parents' motivation to immunise their subsequent child on time. However, there were no effects by 15 months of age, suggesting that parents delay vaccination rather than abstaining altogether.
Ostermann *et al*[50]	2017	Cross-sectional study	Tanzania	406 pregnant women in their last trimester from two regions of Tanzania	Childhood immunisations	Not specified	In a contingent valuation questionnaire, women preferred non-monetary incentives (eg, birth certificate or maternal health check) over monetary incentives. All women expected to get their children vaccinated, even without incentives, and nearly all women (97%) were willing to pay for vaccinations.	None described
Asia								
Reda *et al*[52]	2022–2023	Focus group discussions and key informant interviews	Bangladesh	60 healthcare workers, seven government officials and five NGO workers	Childhood immunisations	Not specified	Incentives for caregivers were noted as a potential facilitator of childhood immunisation.	Collaboration between organisations was hindered by different organisations competing to demonstrate good performance, including through providing different incentives.
Sahitia *et al*[51]	2019	Key informant interviews	Pakistan	11 male community leaders representing a range of rural, urban and peri-urban areas	Childhood immunisations	Not specified	Community leaders advocated for government-supported, subsidised transportation mechanisms or incentivised programmes to reduce the financial burden on families.	None described

no evidence that providing insecticide-treated bed nets with timely completion of routine childhood immunisation increased uptake compared with a control group in Malawi.[31]

Asia (table 2)

We identified 11 studies undertaken in Asia, all of which were conducted in India, Pakistan, or Bangladesh. All but one of these studies demonstrated positive short-term effects on immunisation uptake of the various incentives under evaluation. In an evaluation of the Bangladesh Maternal Health Voucher Scheme, which provided unconditional healthcare vouchers and cash transfers to disadvantaged pregnant women, Sultana *et al* demonstrated that 93% of children whose mothers were enrolled in the scheme were fully immunised before 12 months of age, compared with 84% of children whose mothers were not enrolled.[32] Quasi-experimental studies from India have shown similar positive effects of state or national conditional cash transfer programmes (Mamata and Janani Suraksha Yojana), although an evaluation of a cash transfer programme specifically targeted at raising girl children's status had no detectable effect on immunisation coverage.[33–36]

In Pakistan, Chandir *et al* undertook a seven-arm randomised trial of a range of conditional mobile phone-based cash transfers and found that full immunisation coverage was higher among caregiver-child pairs receiving any cash transfers compared with mobile phone reminders alone (OR=1.18, 95% CI 1.05 to 1.33); that within the cash transfer arms coverage was higher for those receiving a high versus low amount (OR=1.16, 95% CI 1.04 to 1.29); and that mobile phone credit appeared more effective than mobile money (which could be redeemed and spent on anything) (OR=1.17, 95% CI 1.01 to 1.36).[37] An earlier quasi-experimental study also by Chandir *et al* evaluated conditional food and medicine vouchers and found that timely completion of DTP at 18 weeks of age doubled (RR=2.20; 95% CI 1.95 to 2.48).[38] Another evaluation of multipurpose vouchers to allow free access to healthcare also showed small increases in uptake of common childhood immunisations.[39]

In India, two studies also evaluated mobile phone credit as an incentive. Seth *et al* demonstrated in a small trial (n=608) that this was associated with a greater increase in childhood immunisation coverage than mobile phone reminders alone among families living in rural communities[40]; and Banerjee *et al* tested several combinations of mobile phone credit incentives in a very large evaluation across 140 health centres including approximately 295 000 children.[41] Overall, the incentives had positive effects on immunisation coverage when administered based on a sloped schedule (where the incentive amount was higher for the final two vaccines a child should receive in their first year). In an earlier study, Banerjee *et al* also evaluated the provision of raw lentils and metal plates conditional on completed immunisation in rural India (provided alongside establishment of a 'reliable' immunisation service).[42] Among children aged 1–3 years, rates of completed immunisation were 39% (95% CI 30 to 47) in villages receiving this intervention; 18% (95% CI 11 to 23) in villages receiving only the reliable immunisation service; and 6% (95% CI 3 to 9) for control villages.

Latin America (table 3)

Many governments in Latin America have established conditional cash transfer programmes aiming to alleviate poverty and improve health outcomes. We identified six studies evaluating these programmes (Bolsa Familia in Brazil, Progresa in Mexico, Familias en Accion in Colombia, and Red de Protección Social in Nicaragua), all of which showed broadly positive effects of conditional cash transfers on immunisation uptake.[43–48] We also identified a four-arm cluster randomised trial undertaken in Honduras, which evaluated monetary incentives; resources provided to local health teams with a nutrition intervention; both packages; or neither.[49] The results were mixed—no effect of incentives was demonstrated on uptake of tetanus or measles immunisation, but uptake of the first dose of DTP vaccine increased by 6.9% (95% CI 1.0 to 12.8).

Quantitative and qualitative evidence on positive effects of incentives on perceptions and attitudes towards immunisation

Few of the above quantitative evaluations reported on how incentives may have changed perceptions and attitudes towards immunisation. In the cluster randomised trial of the NI-ABAE programme in Nigeria, respondents in treatment areas had greater knowledge of vaccines and the immunisation schedule than those in control areas, but only 2% more said they thought that vaccines were more beneficial than harmful for children.[19] Banerjee *et al* in India also found that incentives improved knowledge of immunisations but had no effect on whether participants felt immunisations were beneficial or harmful.[41] We also identified a cross-sectional study undertaken among 406 pregnant women from two regions of Tanzania which investigated preferences around incentives for immunisation.[50] This study had three important findings: first, that women preferred non-monetary incentives such as a maternal health check or support with birth registration over monetary incentives; second, that all women expected to get their children immunised according to the recommended schedule irrespective of incentives; and third, that the great majority (97%) were actually willing to pay for immunisations.

We included seven qualitative studies in this review, most of which aimed to characterise barriers and facilitators of immunisation uptake.[51–57] All studies highlighted potential positive effects of incentives for potentially increasing immunisation uptake. For example, in a qualitative study in Cox's Bazar refugee camp, Bangladesh, health service providers, government officials and representatives from NGOs noted that provision of hygiene kits and medication to caregivers acted as facilitators of childhood immunisation.[52] Importantly, the study also noted that such programmes should be consistent

throughout the camp to ensure equality, and that collaboration and service provision had been hindered by organisations 'competing to demonstrate good performance', including through providing different incentives for caregivers. In another example from Nigeria, non-monetary incentives such as soap or diapers were seen as facilitators of immunisation among mothers.[55] Interestingly, participants felt that congratulatory cards documenting immunisation completion conferred a sense of pride and were potentially more sustainable than these material incentives.

Quantitative and qualitative evidence on risks and unintended consequences of incentives

None of the above quantitative evaluations reported directly on any unintended consequences of providing incentives for immunisation (including noting null results). However, our search did return a follow-up study by Karing *et al* in Sierra Leone, which was undertaken 3 years after exposure to the non-monetary signalling bracelet incentive intervention described above.[58] This study demonstrated that eligibility for the incentive led to crowding out of parents' intrinsic motivation after the incentive programme had ended—parents who had received the incentive were less likely to immunise their subsequent child on time by around 5%–11%. There were no effects on overall immunisation rates by 15 months, however, and the study concluded that incentives that signal being a caring parent do not lead to adverse effects. In contrast, in the cluster randomised trial in Kenya run by Gibson *et al*, all but one participant said they would retain their enthusiasm for immunisation for a future child, even if incentives were not given again.[24]

Negative unintended consequences were also highlighted in four other qualitative studies, all of which raise similar themes as those raised by Karing *et al* in Sierra Leone.[58] In Chad, a qualitative study investigating factors affecting community engagement with guinea worm and polio eradication activities noted that the provision of incentives contributed to tension and suspicion within communities and that using incentives attenuated the sense of volunteerism and commitment within communities and led to a situation where incentives were seen as a requirement for participation.[54] In Nigeria, two qualitative studies highlighted that while incentives may increase immunisation uptake in the short term, if incentives are withdrawn or interrupted because of inconsistent supply chains, caregivers may stop vaccinating their children and uptake may drop to previous levels or worse.[53 57] In one of these studies, caregivers were additionally noted as becoming suspicious of free vaccines when other health services cost money.[57] Finally, in a process evaluation of the Afya conditional cash transfer intervention in Kenya, participants were enthusiastic to join the programme and were happy with the intervention when they received it.[56] However, operational challenges with implementing an electronic card reader system were noted to negatively affect intervention acceptability; and some participants' family members felt that no one should be paid to attend appointments, that this system could create problems with future attendance and that it changed intra-household dynamics (eg, a spouse expecting a share of the money). Nurses participating in the programme also had objections to cash transfers, suggesting instead that the incentive should be material items which would directly benefit the child (eg, blankets). Some also believed the programme set a precedent that could create future problems with attendance and was not sustainable.

DISCUSSION

In this scoping review, we identified 40 studies from 19 countries investigating the use of incentives in immunisation campaigns in LMIC. These included a range of interventional studies, including multiple randomised trials evaluating effectiveness, and several qualitative studies adding important context on how incentives may be perceived and what their longer-term effects may be. While most studies demonstrated modest positive short-term effects of incentives on immunisation uptake, our review highlights how effectiveness is likely to vary substantially in different contexts and that these interventions may have important negative unintended consequences. We found that similar interventions often had very different effects in different contexts, which ranged from large increases in immunisation uptake (eg, in Nigeria and Somalia) to minimal or no effects (eg, in Kenya and Zimbabwe). These differences likely reflect variations in baseline immunisation coverage, perceptions and attitudes towards immunisation and incentives, health system capacity, implementation and broader socioeconomic and historical contexts.

Even if incentives do result in an initial positive change in behaviour and increase immunisation uptake in the short term, a key concern for donors, policy makers and implementers has been that they may create expectations and undermine intrinsic motivation. This may lead to lower immunisation uptake in the future when incentives are withdrawn or create a scenario where people expect a greater incentive to maintain the same level of motivation. Although a recent study of incentives for COVID-19 vaccination in Sweden and the USA found no evidence of negative unintended consequences on future vaccination uptake, morals, trust and perceived safety,[59] this phenomenon has been widely discussed in the behavioural science literature,[60] and we found several studies providing further empirical evidence from LMIC contexts. The clearest example came from Sierra Leone, where people who received incentives were less likely to immunise subsequent children on time when incentives were no longer offered.[58] Similar concerns emerged from qualitative studies in Chad, Kenya and Nigeria, where incentives appeared to create expectations of payment and reduce voluntary participation.[53 54 56 57] These studies also highlighted how incentive programmes could undermine community trust in health services, particularly when there are operational barriers to their effective implementation

(as in the Afya credits programme in Kenya),[22 56] when they are withdrawn or when their provision made communities suspicious of free vaccines. It is important to note that these themes were not universally raised in all studies, at least partly because most quantitative evaluations did not report on unintended consequences of the incentive under study.

These findings highlight the importance of carefully considering local context and ensuring incentive programmes are co-designed, piloted and evaluated in partnership with local communities and stakeholders, with involvement from global partners such as GAVI and WHO. The unintended consequences we identified may be particularly influenced by cultural, historical and social contexts in LMIC. Trust in health interventions can be deeply affected by historical experiences with colonialism and past health interventions, as demonstrated by Lowes and Montero,[61] who showed how forced medical interventions during the colonial era continue to negatively impact present-day immunisation rates in Central Africa. When incentives are provided by external organisations without adequate community involvement, they may be viewed with suspicion or as attempts to control rather than support. These contextual factors may help explain why similar incentive approaches had such variable effects across different settings—they likely reflect not just variation in programme design but also differences in community perceptions, historical experiences and social dynamics that shape how incentives are understood and responded to by communities.

Several studies highlighted how specific features of the incentive programme, such as the type and size of the incentive, influenced effectiveness. In some studies which evaluated different sizes of incentives, we found some evidence that larger incentives were more effective than smaller ones (although this was not universally true) and that incentives that increased in value through the immunisation schedule were more effective. Furthermore, while most studies evaluated monetary incentives in the form of conditional cash transfers, the available evidence also suggests merit in exploring non-monetary incentives that might be more acceptable and promote intrinsic motivation, particularly those that signal positive parenting or provide direct health benefits. This distinction between private and social benefits is particularly relevant for immunisation programmes. Non-monetary signalling incentives such as the bracelets evaluated by Karing in Sierra Leone[27] function not merely as private rewards but as visible social signals of parents' choice to immunise their children, potentially activating social image concerns and community norms. In contrast, more private incentives like mobile phone credit or cash transfers provide fewer opportunities for such social signalling, though they address individual cost barriers. This balance is especially important for immunisation, where community protection through reduced transmission might enhance the scope for social signalling incentives. Similarly, our findings also highlight the importance of integrating health promotion and education alongside the provision of incentives to reinforce intrinsic motivation by improving knowledge of the benefits of immunisations.

Another key consideration in programme design is equity. Several studies demonstrated larger effects among traditionally harder-to-reach populations, such as in Somalia's camps for internally displaced people and among the poorest households in Madagascar's bed net programme. However, implementation challenges could also exacerbate inequities. For example, mobile phone-based transfers may exclude those without phones, or electronic payment systems may create barriers for populations with lower access or literacy. Gender equity considerations also emerged as an important factor affecting incentive programmes in our review. The limited effect of the cash transfer programme specifically targeted at raising girl children's status in India[35] and the qualitative findings from Kenya's Afya programme, where spouses sometimes expected a share of mothers' incentives, highlight how these programmes operate within existing gender power structures. In many contexts, women may be responsible for taking children for immunisation, but men may control household finances and decision-making. Non-monetary incentives that directly benefit children or provide services valued by mothers may therefore be more appropriate in some settings, as they are less likely to be diverted and may face less resistance within household power dynamics. Future incentive programmes should consider both socioeconomic and gender-related inequities in their design, potentially incorporating strategies to engage men in newborn and child health, to maximise reach and impact.

Despite the relatively large number of studies included in this scoping review, there is a clear lack of data from the Pacific and Southeast Asia regions, and several important research gaps remain. Given the risks of motivation crowding out and reduced community engagement and trust highlighted in this review, and the fact that the emphasis of most included studies was on short-term immunisation uptake, future research is urgently needed to better understand the long-term effects of different types and sizes of incentives on a broader range of outcomes, including future immunisation uptake after incentives are withdrawn. Relatedly, it is notable that most of the incentive programmes under study were implemented by NGOs or research institutions in the context of a formal evaluation. If incentive programmes are to become a sustainable health service intervention, implementation research is needed to understand how they can be effectively integrated into existing health systems without undermining intrinsic motivation or trust (especially if other health services are associated with out-of-pocket costs) and what their effects are if implemented in these contexts. Finally, outcome evaluations should also be complemented by rigorous process evaluations to understand the mechanisms through which incentives affect behaviour in different contexts and characterise what societal and individual factors modify their effectiveness and acceptability. Economic evaluations to assess cost-effectiveness are also required to inform

resource prioritisation and health service planning. While this evidence is awaited, interim policy guidelines on the use of incentives in immunisation campaigns are urgently needed.

Our scoping review has several limitations. First, for pragmatic reasons, we limited our search to English language publications from the last 25 years, and screening was undertaken by a single reviewer. We may have therefore potentially missed relevant evidence, including from non-English speaking settings or older studies. Second, because this was a scoping review and not a systematic review and meta-analysis, our ability to synthesise results and draw conclusions was limited to a narrative synthesis, and we could not quantitatively assess the trade-off between the positive immediate effects of incentives against any potential unintended consequences. Third, we did not formally assess the quality of included studies or the risk of bias, including publication bias which may have led to underreporting of negative results.

In conclusion, in this scoping review, we have mapped and summarised the available evidence on the use of incentives in immunisation campaigns in LMIC. While the evidence suggests that incentives can improve short-term immunisation uptake in these settings, their effects vary substantially in different contexts, and they can also have important negative unintended consequences which need to be taken into consideration when using incentives in immunisation campaigns. Fundamentally, although incentive programmes are potentially valuable, policy-makers and implementers should prioritise the establishment of reliable and consistent immunisation services in LMIC before adding incentive components.

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