August 2016 – SUPPORT Summary of a systematic review

What are the effects of interventions to improve childhood vaccination coverage?

Routine vaccination during childhood is considered to be the single most effective way of controlling many infectious diseases, including measles, polio, diphtheria, pertussis and tetanus, and reducing child mortality and morbidity. However, not all children receive their recommended vaccinations. Different approaches that aim to increase childhood vaccination coverage include health education, monetary incentives for clients, provider oriented interventions, system interventions such as integration, home visits and reminders for parents.

Key messages

➔ **Community-based health education probably improves coverage of three doses of Diphtheria-Tetanus-Pertussis vaccine (DTP3). However, the impacts of facility-based health education on coverage of DPT3 may vary from little or no effect to potentially important benefits**

➔ **Health education combined with reminders may increase DTP3 coverage**

➔ **Training vaccination managers to provide supportive supervision for healthcare provider may have little or no effect on coverage of DTP, oral polio vaccine (OPV) and hepatitis B virus (HBV) vaccine**

➔ **Integrating vaccination with other healthcare services may increase DTP3 and measles vaccine coverage and may have little or no effect on BCG coverage**

➔ **Household monetary incentives may have little or no effect on achieving full vaccination coverage**

➔ **Home visits may improve OPV3 and measles coverage**

➔ **Reminders and recall strategies probably increase routine childhood vaccination uptake**

Who is this summary for?

People making decisions concerning how to improve the rates of routine childhood vaccinations

! This summary includes:

- **Key findings** from research based on a systematic review
- **Considerations about the relevance of this research** for low-income countries

X Not included:

- Recommendations
- Additional evidence not included in the systematic review
- Detailed descriptions of interventions or their implementation

This summary is based on the following systematic review:

Oyo-Ita A, Wiysonge C, Oringanje C, et al. Interventions for improving coverage of child immunization in low and middle-income countries. Cochrane Database of Systematic Reviews 2016. Issue 7

Jacobson Vann JC, Szilagyi P. Patient reminder and recall systems to improve immunization rates. Cochrane Database of Systematic Reviews 2005, Issue 3.

What is a systematic review?

A summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise the relevant research, and to collect and analyse data from the included studies

SUPPORT was an international project to support the use of policy relevant reviews and trials to inform decisions about maternal and child health in low- and middle-income countries, funded by the European Commission (FP6) and the Canadian Institutes of Health Research.

Glossary of terms used in this report: www.supportsummaries.org/glossary-of-terms

Background references on this topic: See back page

Background

Vaccination programmes are key components of child healthcare services in low- and middle- income countries, but coverage is often low, especially in South Asia and sub-Saharan Africa. Increasing the number of children who are vaccinated according to schedule could lower death and disease rates.

How this summary was prepared

After searching widely for systematic reviews that can help inform decisions about health systems, we have selected ones that provide information that is relevant to low-income countries. The methods used to assess the reliability of the review and to make judgements about its relevance are described here: www.supportsummaries.org/how-support-summaries-are-prepared/

Knowing what's not known is important

A reliable review might not find any studies from low-income countries or might not find any well-designed studies. Although that is disappointing, it is important to know what is not known as well as what is known.

A lack of evidence does not mean a lack of effects. It means the effects are uncertain. When there is a lack of evidence, consideration should be given to monitoring and evaluating the effects of the intervention, if it is used.

About the systematic review underlying this summary

Review objective: To assess the effectiveness of intervention strategies to improve immunisation coverage in LMICs

Types of	What the review authors searched for	What the review authors found
Study designs & Interventions	Randomized trials, non-randomized trials, controlled before-after studies (CBAs) and interrupted time series studies that evaluate patient oriented (health education or incentives), provider oriented (audit and feedback, reminders) or health system oriented (outreach programmes, interventions oriented to improve quality) interventions to increase immunization coverage	14 studies were included: 10 cluster randomized trials and 4 individually randomized trials. Interventions included health education (6 studies), monetary incentives (4), health education plus parent reminders (2), provider oriented interventions (1), home visits (1), integration of immunization services with intermittent preventive treatment of malaria in infants (1), regular immunization outreach sessions (1) and a combination of provider training and quality assurance (1). Several studies evaluated more than one intervention
Participants	Healthcare personnel who deliver immunization. Children under 5 years who receive immunization or their caregivers.	Children birth to 4 years (10 studies), primary healthcare workers (1), general adult population (1), and pregnant and postpartum women (2)
Settings	Low- and middle-income countries	Ambulatory care settings in: Georgia (1), Ghana (1), Honduras (1), India (2), Mali (1), Mexico (1), Nepal (1), Nicaragua (1), Pakistan (4) and Zimbabwe (1)
Outcomes	***Primary outcomes****:* proportion of children who received DTP3 by one year; proportion of children who received all recommended vaccinations by two years of age ***Secondary outcomes:*** occurrence of vaccine preventable diseases, number of under-fives immunized, costs, attitudes of caregivers and clients to vaccination, adverse events	DTPs coverage (6 studies), proportion of the target population that was fully immunized (11), percentage change in immunization coverage over time (2). Other outcomes reported were coverage for specific vaccines (3), costs (1), received at least one vaccine (1), completion of schedule (1). None of the studies provided data on the attitudes of caregivers and clients to vaccination
Date of most recent search: May 2016 for most databases		
Limitations: This is a well-conducted systematic review with only minor limitations		

Oyo-Ita A, Wiysonge C., Oringanje C, Nwachukwu CE, Oduwole O, Meremikwu MM. Interventions for improving coverage of child immunization in low and middle-income countries. Cochrane Database of Systematic Reviews 2016. Issue 7.

Summary of findings

The main review included 14 studies, all done in LMIC countries.

The additional review included 43 studies, mostly done in the USA; none were done in low or middle-income countries. However, the included studies were conducted in diverse settings, and some of the interventions were aimed at low-income groups in high-income countries. This summary considers only studies targeted to child vaccinations from this review.

1) Health Education

Six studies included health education interventions. Three assessed community-based interventions: evidence based discussions in the community on the prevalence of diseases and the importance of childhood vaccination; an information campaign that involved presentation of audiotape messages; and distribution of posters and leaflets. Three studies assessed facility-based health education on the importance of completion of the vaccination schedule.

➔ **Community-based health education probably improves coverage of DTP3. The certainty of this evidence is moderate.**

➔ **The impacts of facility-based health education on coverage of DPT3 may vary from little or no effect to potentially important benefits. The certainty of this evidence is low.**

About the certainty of the evidence (GRADE) *

⊕⊕⊕⊕
High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⊕⊕⊕◯
Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate.

⊕⊕◯◯
Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⊕◯◯◯
Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

* This is sometimes referred to as 'quality of evidence' or 'confidence in the estimate'.

† Substantially different = a large enough difference that it might affect a decision

See last page for more information.

Community-based health education compared to usual care

People: Children aged < 24 months
Settings: Community settings in LMICs
Intervention: Health education
Comparison: Usual care

Outcomes	Comparative risks*		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)
	Without health education	**With health education** (95% CI)			
DPT3§ coverage (Follow-up: 4-9 months)	**577 per 1000**	**969 per 1000** (629 to 1000)	RR 1.68 (1.09 to 2.59)	1692 (2 studies#)	⊕⊕⊕◯ Moderate

CI: Confidence interval; RR: Risk ratio. GRADE: GRADE Working Group grades of evidence (see above and last page)
* Illustrative comparative risks. The assumed risk WITHOUT the intervention is based on routine care. The corresponding risk WITH the intervention (and its 95% confidence interval) are based on the overall relative effect (and its 95% confidence interval).
§Three doses of Diphtheria Tetanus Pertussis containing vaccines #One study was not included in this analysis

Facility-based health education compared to usual care		
People	Children under 5 years	
Settings	Facility-based settings in LMICs	
Intervention	Health education	
Comparison	Usual care	
Outcomes	**Impact**	Certainty of the evidence (GRADE)
DTP3 uptake	Three studies assessed this outcome. The impacts of facility-based health education may vary from little or no effect to potentially important benefits	⊕⊕◯◯ Low
GRADE: GRADE Working Group grades of evidence (see above and last page) Certainty of evidence was assessed as low due to risk of bias in the included studies and significant heterogeneity.		

2) Health education with reminders

Two studies evaluated combining facility-based health education with a redesigned 'reminder-type' vaccination card.

➔ **Health education combined with reminders may increase DTP3 coverage. The certainty of this evidence is low.**

3) Healthcare provider training

One study evaluated an intervention in which immunization managers were trained to provide supportive supervision for healthcare providers.

➔ **Training immunization managers to provide supportive supervision for healthcare provider may have little or no effect on coverage for three doses of DTP, oral polio vaccine (OPV) and hepatitis B virus (HBV) vaccine. The certainty of this evidence is low.**

4) Integration of vaccination with other healthcare services

One study evaluated integrating vaccination servcices with intermittent prophylactic treatment of malaria in infants.

➔ **Integrating vaccination with other healthcare services may increase DTP3 and measles vaccine coverage and may have little or no effect on BCG coverage. The certainty of this evidence is low.**

Integration of vaccination with other healthcare services

People: Children aged 0–23 months
Settings: Mali
Intervention: Integration of vaccination services with intermittent prophylactic treatment of malaria
Comparison: Usual care

Outcomes	Comparative risks* / Impact		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)
	Without (routine care)	**With Incentives**			
DTP3 coverage (Follow-up: 12 months)	**602 per 1000**	**1000 per 1000** (854 to 1000)	RR **1.92** (1.42 to 2.59)	1481 (1 study)	⊕⊕◯◯ Low
Measles vaccine coverage	**May improve measles vaccine coverage**		**RR 1.13** (1.06 to 1.20)	1481 (1 study)	⊕⊕◯◯ Low
BCG coverage	**May have little or no effect on BFG coverage**		**RR 1.03** (0.89 to 1.19)	1481 (1 study)	⊕⊕◯◯ Low

CI: Confidence interval RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above and last page) BCG: Bacillus Calmette-Guérin vaccine against tuberculosis
*Illustrative comparative risks. The assumed risk WITHOUT the intervention is based on routine care. The corresponding risk WITH the intervention (and it's 95% confidence interval) are based on the overall relative effect (and its 95% confidence interval).

5) Monetary incentives

Two studies evaluated monetary incentives in the form of conditional and unconditional cash transfers to households. The conditional cash transfers were linked to children in the household being up-to-date with vaccination.

➔ **Household monetary incentives may have little or no effect on achieving full vaccination coverage. The certainty of this evidence is low.**

Monetary incentives

People: Children aged <5 years
Settings: Nicaragua, Zimbabwe
Intervention: Monetary incentives in the form of household cash transfers
Comparison: Usual care

Outcomes	Comparative risks*		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)
	Without (routine care)	**With Incentives**			
Fully immunised children (Follow-up: 13 months to 5 years)	**701 per 1000**	**736 per 1000** (631 to 862)	RR **1.05** (0.90 to 1.23)	1000 (2 studies)	⊕⊕◯◯ Low

CI: Confidence interval RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above and last page)
*Illustrative comparative risks. The assumed risk WITHOUT the intervention is based on routine care. The corresponding risk WITH the intervention (and it's 95% confidence interval) are based on the overall relative effect (and its 95% confidence interval).

6) Home visits

One study assessed the effects of home visits on improving coverage for OPV3 and measles.

➔ **Home visits may improve OPV3 and measles coverage. The certainty of this evidence is low.**

7) Reminders to parents or carers

In the additional review summarized, 16 of the 47 included studies used a variety of methods to remind parents about their child's routine vaccinations. Eight studies used a letter alone or in combination with other interventions. Other interventions included postcards, telephone calls and home visits.

➔ **Reminders and recall strategies probably increase routine childhood vaccination uptake. The certainty of this evidence is moderate.**

Reminders to parents or carers

People: Children up to 7 years
Settings: Diverse; some low income, in USA (11 studies) and Australia (1 study)
Intervention: Reminder and recall interventions to promote vaccination uptake
Comparison: Usual care, except one study which used a printed schedule of routine vaccinations

Outcomes	Comparative risks*		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)
	Without reminder/recall	**With reminder/recall** (95% CI)			
Children Immunized or up-to-date with vaccinations	**314 per 1000**	**402 per 1000** (369 to 434)	OR 1.47 (1.28 to 1.68)	15 704 (15 studies[#])	⊕⊕⊕◯ Moderate

CI: Confidence interval; OR: Odds ratio GRADE: GRADE Working Group grades of evidence (see above and last page)
* Illustrative comparative risks. The assumed risk WITHOUT the intervention is based on routine care. The corresponding risk WITH the intervention (and its 95% confidence interval) are based on the overall relative effect (and its 95% confidence interval).
[#] One study was excluded from the meta-analysis because of a potential error in its analysis.

Relevance of the review for low-income countries

➔ Findings	▷ Interpretation*
APPLICABILITY	
➔ **Apart from the studies evaluating reminder and recall strategies, all of the studies were conducted in LMICs** ➔ **Most of the studies of reminder and recall strategies were conducted in the USA. However, in some of these studies the interventions were aimed at low-income groups**	▷ *The effects reported here are based on evaluations conducted in experimental settings. Users should consider the extent to which their 'real world' settings are similar to those in the included studies* ▷ *For remind and recall strategies, applicability to low-income settings may depend on the availability in these settings of the technology or physical infrastructure to identify potential recipients and send reminders to them. Weak infrastructure or technology (e.g. poor postal services or internet access) may reduce the effectiveness of these strategies in low-income settings* ▷ *Selecting interventions to implement in specific settings should be guided by an understanding of local barriers to uptake of vaccination*
EQUITY	
➔ **The reviews did not discuss the impacts of the interventions on equity**	▷ *Some interventions relied on face-to-face contact with parents and carers (e.g., health education), reaching houses (home visits) or being able to contact parents or carers (e.g., reminders). These interventions may be more difficult to implement in low-income settings or with hard-to-reach groups.* ▷ *Inequalities may be exacerbated if interventions are implemented where geographical or financial access to vaccination services is uneven across population groups*
ECONOMIC CONSIDERATIONS	
➔ **The reviews found limited evidence on costs and the data available were of limited use**	▷ *Implementing some interventions to improve vaccination coverage, such as facility-based health education, may not require substantial additional resources. However, other interventions, such as home visits or reminders to parents, may require considerable resources in terms of technology and personnel. Such resources may not be readily available in many LIC settings* ▷ *Integrating vaccination with other healthcare services may create opportunities to share resources across different programmes and create efficiencies*
MONITORING & EVALUATION	
➔ **The reviews found limited evidence on the effects of improving supervision for healthcare providers, integrating vaccination with other services and home visits. Evidence on the effects of reminder and recall strategies in low-income countries is also very limited** ➔ **For a number of interventions, the certainty of the evidence is moderate or low** ➔ **There is litte evidence on the effects of the interventions on caregiver attitudes to vaccination or on costs and adverse or unintended effects**	▷ *Rigorous studies are needed on the effects of a range of interventions to improve vaccination coverage in LICs. These studies should assess adverse or unintended effects and also examine the costs and cost-effectiveness of the interventions, particularly for key target groups in low-income countries* ▷ *Evaluations of the effects of reminder and recall strategies in low-income countries, including of new technologies such as social media*

*Judgements made by the authors of this summary, not necessarily those of the review authors, based on the findings of the review and consultation with researchers and policymakers in low-income countries. For additional details about how these judgements were made see: www.supportsummaries.org/methods

Additional information

Related literature

This systematic review presents evidence on the effectiveness of lay health workers in improving childhood vaccination uptake:
Glenton C, Scheel I, Lewin S, Swingler G. Can lay health workers increase the uptake of childhood immunisation? A systematic review and typology. Tropical Medicine and International Health. 2011; 16(9):1044-1053.

This systematic review includes evidence on interventions to increase demand for childhood vaccination in LMICs:
Shea B, Andersson N, Henry D. Increasing the demand for childhood vaccination in developing countries: a systematic review. BMC international health and human rights. 2009;9 Suppl 1:S5.

These systematic reviews present evidence on the effects of interventions to inform and educate about childhood vaccination:
Kaufman J, Synnot A, Ryan R, Hill S, Horey D, Willis N, Lin V, Robinson P. Face to face interventions for informing or educating parents about early childhood vaccination. Cochrane Database of Systematic Reviews. 2013, Issue 5. Art. No.: CD010038.

Saeterdal I, Lewin S, Austvoll-Dahlgren A, Glenton C, Munabi-Babigumira S. Interventions aimed at communities to inform and/or educate about early childhood vaccination. Cochrane Database of Systematic Reviews. 2014, Issue 11. Art. No.: CD010232.

This systematic review synthesises evidence on on individuals' and communities' concerns about vaccination in low- and middle-income countries:
Cobos Muñoz D, Monzón Llamas L, Bosch-Capblanch X. Exposing concerns about vaccination in low- and middle-income countries: a systematic review. Int J Public Health. 2015;60(7):767-80.

This summary was prepared by

Simon Lewin, Norwegian Institute of Public Health, Norway; Sebastian García Martí and Agustin Ciapponi, Argentine Cochrane Centre IECS - Institute for Clinical Effectiveness and Health Policy - Iberoamerican Cochrane Network, Argentina; Shaun Treweek, University of Aberdeen, UK; and Andy Oxman, Norwegian Institute of Public Health, Norway.

Conflict of interest

None declared. For details, see: www.supportsummaries.org/coi

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Oyo-Ita A, Wiysonge C, Oringanje C, et al. Interventions for improving coverage of child immunization in low and middle-income countries. Cochrane Database of Systematic Reviews 2016. Issue 7

Jacobson Vann JC, Szilagyi P. Patient reminder and recall systems to improve immunization rates. Cochrane Database of Systematic Reviews 2005, Issue 3.

The summary should be cited as

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About certainty of the evidence (GRADE)

The "certainty of the evidence" is an assessment of how good an indication the research provides of the likely effect; i.e. the likelihood that the effect will be substantially different from what the research found. By "substantially different" we mean a large enough difference that it might affect a decision. These judgements are made using the GRADE system, and are provided for each outcome. The judgements are based on the study design (randomised trials versus observational studies), factors that reduce the certainty (risk of bias, inconsistency, indirectness, imprecision, and publication bias) and factors that increase the certainty (a large effect, a dose response relationship, and plausible confounding). For each outcome, the certainty of the evidence is rated as high, moderate, low or very low using the definitions on page 3.

For more information about GRADE:
www.supportsummaries.org/grade

SUPPORT collaborators:

The Cochrane Effective Practice and Organisation of Care Group (EPOC) is part of the Cochrane Collaboration. The Norwegian EPOC satellite supports the production of Cochrane reviews relevant to health systems in low- and middle-income countries .
www.epocoslo.cochrane.org

The Evidence-Informed Policy Network (EVIPNet) is an initiative to promote the use of health research in policymaking in low- and middle-income countries. www.evipnet.org

The Alliance for Health Policy and Systems Research (HPSR) is an international collaboration that promotes the generation and use of health policy and systems research in low- and middle-income countries.
www.who.int/alliance-hpsr

Norad, the Norwegian Agency for Development Cooperation, supports the Norwegian EPOC satellite and the production of SUPPORT Summaries.
www.norad.no

The Effective Health Care Research Consortium is an international partnership that prepares Cochrane reviews relevant to low-income countries. www.evidence4health.org

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