Innocenti Research Brief

2022-07

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Evidence and Gap Map Research Brief

UNICEF STRATEGIC PLAN 2018–2021 GOAL AREA 4: EVERY CHILD LIVES IN A SAFE AND CLEAN ENVIRONMENT

What this research brief is about

This research brief is one of a series of six briefs, which provide an overview of available evidence shown in the Campbell-UNICEF Mega-Map of the effectiveness of interventions to improve child well-being in low- and middle- income countries (LMICs). Five of the six briefs summarize evidence as mapped against the five Goal Areas of UNICEF's Strategic Plan 2018–2021, although it is anticipated that they will also be useful for others working in the child well-being space. The sixth brief maps the COVID-19-relevant studies.

This brief provides an overview of the available evidence related to interventions to ensure that every child lives in a safe and clean environment.

The purpose of the research brief is to:

- Make potential users aware of the map and its contents
- Identify areas in which there is ample evidence to guide policy and practice, and so encourage policymakers and practitioners to use the map as a way to access rigorous studies of effectiveness
- Identify gaps in the evidence base, and so encourage research commissioners to commission studies to fill these evidence gaps.

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This brief is an update of the 2020 version. Thanks to additional funding support from the Bill & Melinda Gates Foundation, this forms part of our commitment to make the Mega-Map and associated briefs a 'living product', updated annually and made openly available as relevant evidence evolves over the lifetime of UNICEF's Strategic Plan 2018–2021.

Box 1: What is the Campbell-UNICEF Child Well-being Mega-Map?

The Campbell-UNICEF Child Well-being Mega-Map maps evidence synthesis studies – evidence and gap maps and systematic reviews – here on in referenced simply as studies, which report studies of the effectiveness of interventions to improve child well-being. The evidence is structured by intervention categories, such as health and nutrition, and by outcome domains, such as morbidity.

Systematic reviews help establish which programmes are effective, for who, and in what circumstances. Evidence maps guide users to the evidence from systematic reviews and impact evaluations. The Mega-Map is an evidence and gap map (EGM) of 536 systematic reviews and 25 EGMs organized into six intervention categories and six outcome domains. This year's update has seen an increase of 52 systematic reviews on 2020.

The map shows only evidence syntheses that summarize evidence from around the world. It does not show the individual studies. The map shows what evidence syntheses are available, not what the evidence says.

https://www.campbellcollaboration.org/funding/global-funds/child-welfare-global-fund.html

What interventions are included for a safe and clean environment?

In the UNICEF Strategic Plan 2018–2021, strategic Goal Area 4, every child lives in a safe and clean environment, is touched on in four Sustainable Development Goals (SDGs):

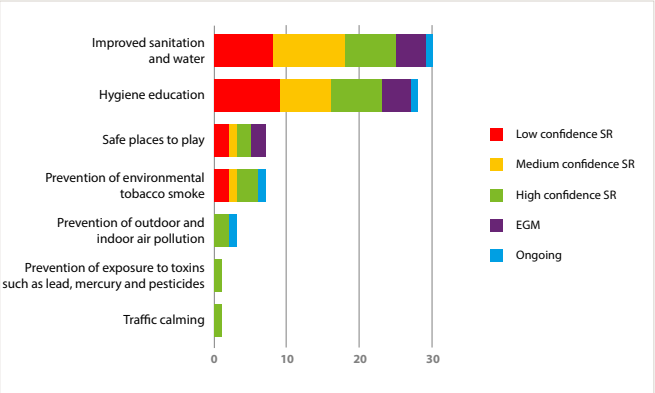
- SDG 3: Ensure healthy lives and promote well-being for all at all ages
- SDG 6: Ensure availability and sustainable management of water and sanitation for all
- SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- SDG 12: Ensure sustainable consumption and production patterns

Interventions to ensure that every child lives in a safe and clean environment are in the environmental health intervention category section of the Mega-Map, which has seven intervention subcategories:

- Improved sanitation and water (26 systematic reviews and 4 EGMs) – e.g., Waddington et al. (2009), Water, sanitation and hygiene interventions to combat childhood diarrhoea in developing countries; and Als et al. (2020), Delivering water, sanitation and hygiene interventions to women and children in conflict settings: A systematic review
- Hygiene education (24 systematic reviews and 4 EGMs) – e.g., De Buck (2017), Promoting handwashing and sanitation behaviour change in low- and middle-income countries: A mixed-method systematic review
- Prevention of outdoor and indoor air pollution (3 systematic reviews) – e.g., a smoking-related study, Behbod et al. (2018), Family and carer smoking control programmes for reducing children's exposure to environmental tobacco smoke; and Saleh et al. (2020), Air pollution interventions and respiratory health: A systematic review
- Prevention of environmental tobacco smoke (7 systematic reviews), which is often part of a larger study – e.g., Bhutta et al. (2005), Community- based interventions for improving perinatal and neonatal health outcomes in developing countries: A review of the evidence
- Prevention of exposure to toxins, such as lead, mercury and pesticides (1 systematic review) – Visser et al. (2020), Agricultural and nutritional education interventions for reducing aflatoxin exposure to improve infant and child growth in low-and middle-income countries
- Safe places to play (5 systematic reviews and 3 EGMs) – e.g., Leavy et al. (2016), A review of drowning prevention interventions for children and young people in high, low and middle income countries; and Bhatta et al. (2020), Environmental change interventions to prevent unintentional home injuries among children in low-and middle-income countries: A systematic review and meta-analysis
- Traffic calming (1 systematic review) – e.g., Vecino-Ortiz (2018), Regulatory and road engineering interventions for preventing road traffic injuries and fatalities among vulnerable (non-motorised and motorised two-wheel) road users in low- and middle-income countries.

The number of reviews and study confidence is shown in Figure 1. See the Endnote for an explanation of how study confidence is assessed.

Figure 1: Number of studies by intervention subcategory and systematic review (SR) confidence



Environmental health is one of the less heavily populated areas of the map. A moderate number of reviews address 'improved sanitation and water' and 'hygiene education' (around 25 for each), although there is a substantial overlap with reviews covering both subcategories. The other interventions have few reviews. In the Mega-Map, most environmental health studies are concentrated under 'improved sanitation and water' and 'hygiene education' for three health outcomes: morbidity, mortality, and child health and disability. These same three outcomes appear for the next most common intervention, preventing tobacco smoke. Study confidence is assessed using the widely used AMSTAR quality assessment tool (see Endnote). There is a lower percentage of high-confidence environmental health reviews (40 per cent) than overall (45 per cent), with a higher share of medium-confidence ones (44 versus 33 per cent).

The evidence and gap map shows what evidence exists but not what it says. However, to give a taste of the evidence contained in the studies, Box 2 summarizes the evidence of selected studies related to water and sanitation.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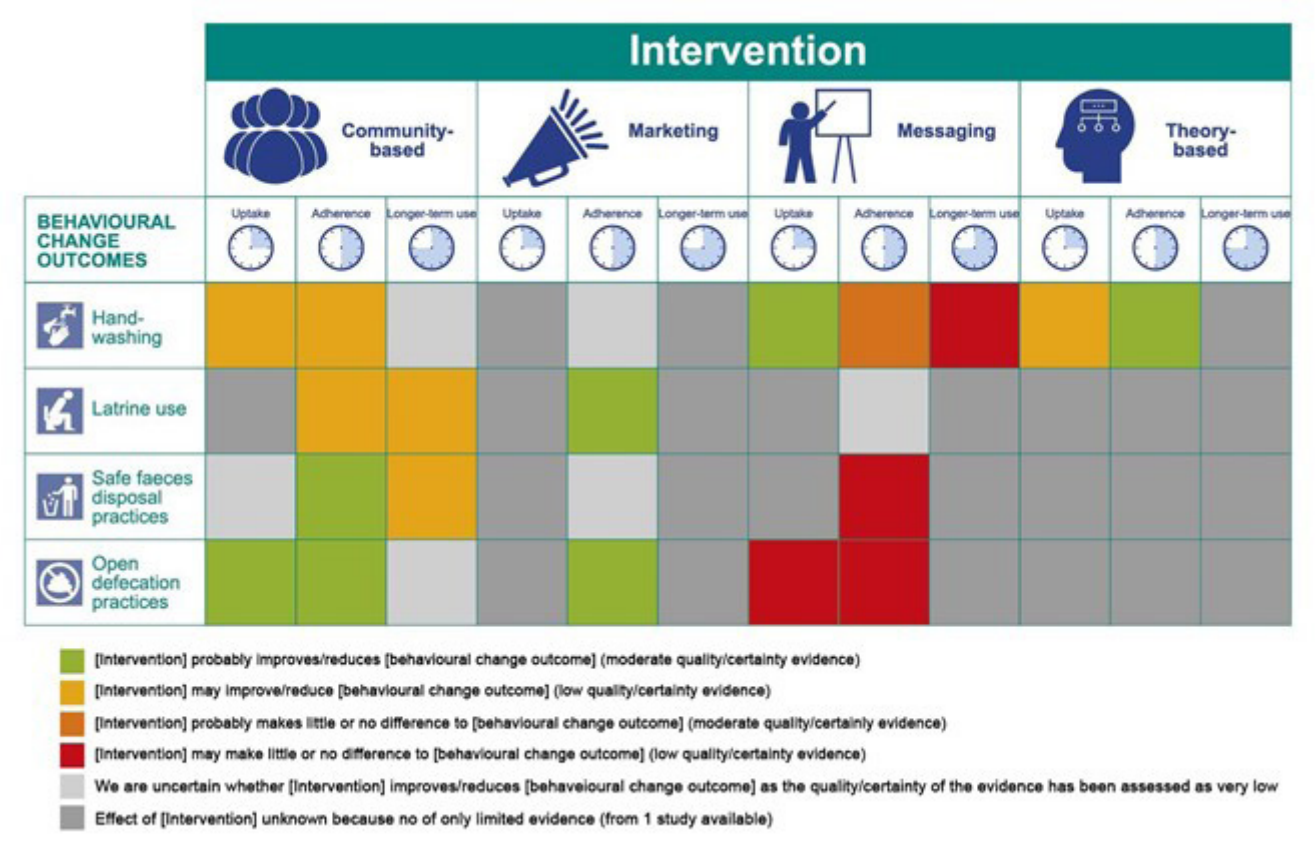
Box 2: Challenges in improving child health through WASH interventions. Findings from selected reviews

The evidence from several reviews is clear that water, sanitation and hygiene (WASH) interventions are effective in reducing child diarrhoea (which is the most common outcome indicator in WASH studies). Waddington et al. (2009) finds a 40–60 per cent reduction in child diarrhoea from interventions to improve water quality, and both sanitation and hygiene interventions. However, there is no impact from simply increasing the quantity of water, such as with community standpipes. Even when water from community sources is clean, it is often stored, so may be re-contaminated before use.

The review also points to problems of sustained compliance, which means that impact declines after the project finishes. The review gives the following examples: (1) in a study in Cambodia, only 31 per cent of the follow-up households were still using the filters that had been provided 36 months or even less after receiving them; (2) in Kenya, only 30 per cent continued to pasteurize their water (Iijima et al., 2001); and (3) in Guatemala, just 14 per cent reported using the flocculant-disinfectant promoted by the project, with only 5 per cent meeting the criteria for active repeat use, and only 1.5 per cent having detectable chlorine in their drinking water.

As such, the policy challenge is how to encourage sustained adoption of improved water and better hygiene practices. A review of this issue found that there is a lack of studies on long-run adoption. High-confidence primary studies are only available for messaging approaches, which are found to be ineffective in promoting handwashing (see figure below). Lower-confidence evidence suggests that community-based approaches may be effective in promoting latrine use and safe disposal of faeces.



Source: Bunk et al. (2017). Infographic design by Centre for Evidence Based Practice.

PANDEMICS AND EPIDEMICS

We identified four studies with an explicit focus on response measures to pandemics and epidemics (such as COVID-19, SARS, MERS, H1N1, HIV/AIDS) or financial crises and natural disasters (such as major earthquakes, the global financial crisis, severe recession and the Indian Ocean tsunami), that fall under the Goal Area of every child lives in a safe and clean environment (e.g., Blake and Temin (2020), Promoting adolescent girls' health and well-being in low-resource settings in the era of COVID-19; and Aledort et al. (2007), Non-pharmaceutical public health interventions for pandemic influenza: An evaluation of the evidence base.

What outcomes are reported?

The Mega-Map shows studies according to the outcomes they report. For the Goal Area of every child lives in a safe and clean in environment, the most relevant outcome domain is risk factor reduction. There are also relevant outcomes under health impacts.

Table 1 shows the number of studies for each outcome subdomain, classified by the relevant SDG. There are a substantial number of studies reporting outcomes related to SDG 3, but these outcomes are, of course, linked to a wide range of interventions. The number of studies across these three outcomes related to the safe and clean environment intervention subcategories is around 25. There are only a small number of evidence synthesis studies for most other outcomes, notably childhood injuries.

Table 1: Number of studies by outcome domain, classified by SDG

Goal Area 4: Every child lives in a safe and clean environment	Sustainable Development Goal			
	3: Good Health and Well-being	6: Clean Water and Sanitation	11: Sustainable Cities and Communities	12: Responsible Consumption and Production
Risk factor reduction		Hand washing (16) Clean environment (12)	Childhood injuries (6)	Maternal smoking (18) Alcohol abuse/ substance abuse (12)
Health impacts	Mortality (32) Morbidity (32) Disability and childhood illness (26)			

Where is the evidence from?

Systematic reviews are often global in scope. We included in the map all reviews for which studies from developing countries were eligible for inclusion, whether or not there were actually any studies from developing countries included. The screening process did not check whether the review actually included studies from developing countries.

An example of a global review is Leavy et al. (2016), A review of drowning prevention interventions for children and young people in high, low and middle income countries. However, given the nature of the topic, several reviews in this area have a focus on developing countries (e.g., Waddington et al. (2009), Water, sanitation, and hygiene interventions to combat childhood diarrhoea in developing countries; Arnold and Colford (2007), Treating water with chlorine at point-of-use to improve water quality and reduce child diarrhea in developing countries: A systematic review and meta-analysis; and De Buck (2017), Promoting handwashing and sanitation behaviour change in low- and middle-income countries: A mixed-method systematic review).

Where are the evidence gaps?

There are many evidence gaps for evidence synthesis of interventions to ensure that every child lives in a safe and clean environment. The available evidence is concentrated on the impact of WASH interventions on health outcomes. Moreover, even for WASH, a closer investigation of the evidence in Box 2 shows an evidence gap concerning successful approaches to promote sustained adoption. For the other intervention categories in the map – and their related outcomes – there are very few evidence synthesis studies. There are limited studies to help identify effective strategies to reduce: the exposure of children to indoor and outdoor air pollution; the risk of accidents, including road-related accidents; or the risk of exposure to toxic materials.

Implications of findings

There is a strong need for mapping, reviews and primary studies to develop an evidence-based programme to ensure that every child lives in a safe and clean environment. Even where there is evidence, as for WASH, important policy issues need to be addressed.

Since this is a map of evidence synthesis studies, the lack of evidence synthesis does not mean that there are not any primary studies. In areas in which there is a reasonable amount of evidence synthesis already – for example, WASH – evidence and gap maps need to be constructed to gain an idea of the extent of the developing country literature, and also to develop a taxonomy of approaches relevant in these contexts. Such a map already exists for WASH but needs to be regularly updated.

In areas where there are no or few evidence synthesis studies, a map will help provide an overview of the extent of primary studies, and so inform decisions about whether to commission a review or focus on primary studies as a priority.

How can the map be used by UNICEF?

The map will help UNICEF staff identify evidence-based programmes and practice to help achieve the agency's strategic goals.

Although the evidence base is weak, the existing reviews do yield relevant information. For example, the review of interventions to prevent drowning is clear that messaging alone is ineffective and that multi-strategy approaches need to be used (Leavy, 2016). However, the evidence base is thin. So, in this area, UNICEF and partners should be using their programmes as a means to strengthen the evidence by building studies into programmes.

Endnote: Assessing the confidence of systematic reviews

For systematic reviews, we score each study using the 16-item checklist called AMSTAR 2 (Assessing the Methodological Quality of Systematic Reviews). The 16 items cover: (1) PICOS in inclusion criteria; (2) ex ante protocol; (3) rationale for included study designs; (4) comprehensive literature search; (5) duplicate screening; (6) duplicate data extraction; (7) list of excluded studies with justification; (8) adequate description of included studies; (9) adequate risk of bias assessment; (10) report sources of funding; (11) appropriate use of meta-analysis; (12) risk of bias assessment for meta-analysis; (13) allowance for risk of bias in discussing findings; (14) analysis of heterogeneity; (15) analysis of publication bias; and (16) report conflicts of interest.

Items 2, 4, 7, 9, 11, 13 and 15 are termed 'critical'. Study confidence is rated high if there is no more than one non-critical weakness, and medium if there are no critical weaknesses but more than one non-critical weakness. Studies with one or more critical weakness are rated low confidence.

About this Innocenti research brief

This research brief was prepared by Howard White and Ashrita Saran with assistance from Yashika Kanojia, Campbell Collaboration. The production of the brief benefited from technical inputs provided by Kerry Albright, Laurence Chandy, Priscilla Idele and Alessandra Ipince, UNICEF.

Funding to support its production was provided by UNICEF Office of Research – Innocenti. Comments may be sent to info@ campbellcollaboration.org or research@unicef.org

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