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BEHAVIOURAL SCIENCE INTERVENTIONS WITHIN THE DEVELOPMENT AND ENVIRONMENTAL FIELDS IN DEVELOPING COUNTRIES: AN EVIDENCE GAP MAP

Samantha Booth, Romina Cavatassi, Benjamin Curtis, Deborah Sun Kim, Laurenz Langer, Caitlin Blaser Mapitsa, Promise Nduku, Martin Prowse, Jyotsna Puri, Jamie Robertsen

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About this IEU Learning Paper

This paper presents an evidence gap map on behavioural science interventions in the human development and environmental fields in developing countries. It describes topics for which high-quality evidence exists and highlights gaps in the available evidence.

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ABSTRACT

Climate change is expected to intensify over the next several decades, resulting in a myriad of impacts on natural and human systems. The impacts of climate change will not be uniformly distributed across the globe and, overall, many developing countries are more likely to experience greater variability and uncertainty from global warming.

This evidence gap map (EGM) presents a landscape of studies on the effectiveness of behavioural science interventions in non-Annex I settings, a group of mainly developing countries within the context of the Kyoto Protocol of the United Nations Framework Convention on Climate Change. The EGM summarizes causal evidence from development and environmental interventions. Understanding what is effective in changing behaviour in these countries is important for both adaptation and mitigation purposes.

The evidence review presents a systematic, multisectoral search of publications in the academic and grey literature. The searches were restricted to quantitative studies published between 2000 and 2022 that assessed the effectiveness of one or more behavioural science interventions using experimental and quasi-experimental designs. The evidence review defines behavioural science as the scientific study of behaviour informed by an array of disciplines including sociology, psychology, economics, anthropology, and political science. The evidence review team systematically searched and reviewed the existing empirical evidence base and identified 84 studies that met the inclusion/exclusion criteria, which we used to develop an EGM.

The EGM followed a consistent intervention–outcome framework to highlight the distribution of the evidence base on the impacts of various behavioural science interventions on knowledge, uptake and use, as well as behavioural outcomes, human development results, and impacts (mitigation and adaptation). The evidence base is brought together on an interactive platform that provides a visual overview of the evidence and provides access to the individual studies. The EGM can be used to inform the design and implementation of new interventions to support behavioural science interventions and to allocate funding and resources for further research.

Although the evidence base is thin, the EGM reveals that the most commonly evaluated interventions are reminders, feedback, micro-incentives, salience of communication, commitment devices, salience of experience design (how individuals interact with their physical or digital environment), goal setting, rules of thumb, social norms and social benchmarking. There is limited evidence on wider interventions including planning prompts, group incentives, public commitments, framing devices, checklists, lotteries, defaults, interventions to reduce hassles, identity priming, anchoring, active choice and cognitive behavioural therapy interventions.

The EGM highlights regional patterns in evaluating these interventions. The impact evaluations are relatively skewed towards sub-Saharan Africa and East Asia and the Pacific. A limited number of impact evaluations have been conducted in Europe and Central Asia, the Middle East and North Africa. A majority of the studies included in the EGM emanate from the water, sanitation and hygiene sector, the financial sector, the energy and extractives sector and the agricultural sector. In terms of outcomes, studies report on adaptation much more frequently than on mitigation. In addition, studies report on knowledge, uptake and use more frequently than on development results and impacts.

I. BACKGROUND

A. DESCRIPTION OF THE PROBLEM

Climate change is projected to intensify over the coming decades, resulting in dramatic impacts on natural and human systems. Human behaviour is a key driver of climate change yet rigorous empirical guidance is lacking in terms of how to change behaviour most effectively to support adaptation and emissions reductions. In particular, research evidence from developing countries is thin and scattered. This is a pressing problem given that the impacts of climate change will not be uniformly distributed across the globe. Developing countries are likely to be disproportionately affected due to not only their exposure to shocks and stresses but also their limited capacity to withstand and respond to damaging variability (see Global Commission on Adaptation, 2019; Intergovernmental Panel on Climate Change, 2007b; Intergovernmental Panel on Climate Change, 2014; United Nations Environment Programme, 2017; Wade and Jennings, 2015; Binet and others, 2021).

In addition, greenhouse gas emissions from human behaviour, such as from transportation, energy consumption and food production, present some of the most significant opportunities to change human behaviour to reduce carbon emissions (Williamson and others, 2018). Yet, human behaviour is the least-understood aspect of the climate change system (Intergovernmental Panel on Climate Change, 2007a). Literature from environmental psychology, behavioural economics and behavioural science (Schmuck and Schultz, 2012) highlights a complex set of interrelated psychological factors that hamper action against the effects of climate change (Gifford and others, 2011; Stoknes, 2014; Van der Linden and others, 2015), such as perceived distance, framing and cognitive dissonance (Stoknes, 2014).

In recent decades, theories and evidence from behavioural science – defined by Balmford and others (2021) as the scientific study of behaviour informed by an array of disciplines including sociology, psychology, economics, anthropology and political science – have provided insights into the social, motivational, cognitive, cultural and contextual factors underlying human behaviour. Stern (2020) describes behavioural interventions as involving neither command and control regulations nor solely financial incentives. Examples include information provisions, appeals to values and norms, or engagement and restructuring choice options (commonly referred to as nudges). These insights have informed interventions that have helped to encourage societally valued behaviour change, including reductions in smoking, addiction and obesity, as well as improvements in tax compliance, development assistance and climate change mitigation (Duflo and others, 2011; Datta and Mullainathan, 2014; Hallsworth and others, 2017; Bollinger and others, 2020). Research has informed behaviour change interventions relevant to a variety of environmental issues including, but not limited to, energy efficiency, water conservation, recycling and transport (Osbaldiston and Schott, 2012; Byerly and others, 2018; Nisa and others, 2019).

We have an opportunity and a responsibility to reduce climate change through a better understanding of the factors underlying the anthropogenic causes of climate change and ways that mitigation and adaptation behaviours may be effectively encouraged (Gifford and others, 2011). Insights from behavioural science have frequently been applied to enhance public policy effectiveness (Organisation for Economic Co-operation and Development, 2017). For example, nudges as a category of psychology-based interventions can be a cost-effective tool to support individual decision-making and have been applied to foster pro-environmental behaviours (Cinner, 2018; Schubert, 2017). Nudges can involve simple alterations to the physical micro-environments in

which choices are made (choice architecture). Such small changes can have significant effects on behaviour, helping people to make decisions that are more beneficial to themselves and the broader society (Szaszi and others, 2018; Thaler and Sunstein, 2009; Hollands and others, 2017). Aiming to fill the "last mile" gap in climate action, behavioural science tools such as nudges and boosts are a promising effort to increase the effectiveness and impact of climate investments (Krüger and Puri, 2020).

Balmford and others (2021) argue that integrating evidence from behavioural science into the design of biodiversity conservation interventions that are currently based on education, regulation and material incentives has great potential to enhance these interventions' effectiveness (Balmford and others, 2021). Traditional interventions in conservation campaigns try to persuade consumers, farmers or politicians to change their behaviours by highlighting the environmental impacts of their actions. But these broad attempts to increase knowledge are often not sufficient to shift behaviour (Kollmuss and Agyeman, 2002). Effective communication campaigns for global issues, like climate change or pandemics, have been proven to be two-way processes that involve clear messages tailored for diverse audiences, shared by trusted people, and where actions by individuals give a clear contribution to addressing the problem (Hyland-Wood and others, 2021). Behavioural science also shows that information campaigns can be more effective when they target discrete audience segments and account for their values as well as social and physical realities (Cheng and others, 2011; Kahan and others, 2012; Kusmanoff and others, 2020). For instance, switching from pro-social to self-interest messages has been seen to increase the adoption of solar panels in the United States (Bollinger and others, 2020). Arranging default settings for pre-selected inclusion and participation in such a way that participants must take action to opt-out of (rather than into) commonly selected choices (at the individual or societal level) has proven effective at increasing household subscriptions to renewable energy programmes (Ebeling and Lotz, 2015; Liebe and others, 2021). This report presents the tools used to create an evidence gap map (including the theory of change, inclusion/exclusion criteria, the search strategy, screening, data extraction and management). It then outlines the evidence base, gaps and implications for policy and research.

B. WHY IS IT IMPORTANT TO UNDERTAKE THIS EVIDENCE GAP MAP

Evidence gap maps (EGMs) are tools for decision makers, project implementers, funders and researchers working in a sector or thematic area, to help them make evidence-informed decisions. EGMs make evidence in a field more accessible and facilitate the prioritization of future research by mapping studies onto a framework of interventions and outcomes. This EGM gathers evidence about behavioural science interventions aimed at promoting environmental and development outcomes by individuals, households, communities and firms in developing countries.

As far as we are aware, there appears to be an absence of systematically collected evidence that carefully explores the nature of behavioural science interventions on environmental and development outcomes in these settings. In brief, there is extensive evidence both about what is ineffective and about what works in promoting behaviour change broadly (Flanagan and Tanner, 2016), but evidence has not been rigorously mapped or synthesized for climate-relevant sectors in developing countries. Moreover, within this evidence it is also hard to distinguish between studies that focus on behaviour change and studies that focus on evaluating behavioral science interventions. This review will reduce this gap within the literature to inform governments, donors and other decision makers of the available evidence on a broad set of behavioural science interventions and their outcomes and impacts across different sectors in developing country contexts, thereby contributing to climate adaptation and mitigation efforts.

C. STUDY OBJECTIVES AND RESEARCH QUESTIONS

The aim of this EGM is to identify and describe the available evidence on the effects of behavioural science interventions targeted at individuals, households, communities and firms in developing countries for development and environmental outcomes, including those related to climate mitigation and adaptation. Mapping the evidence that assesses the effectiveness of these interventions identifies gaps in the literature where the number of evaluations or syntheses is low. It also facilitates the use of such evidence to inform decisions by making this evidence easily accessible. The specific objectives of this EGM are as follows:

- Identify and describe the available evidence base (extent and quality), evaluating the effectiveness of behavioural science interventions on climate, environmental and development outcomes in developing countries through an interactive EGM.
- Improve access to this evidence for decision makers, project implementers, funders and researchers.
- Identify evidence gaps and synthesis evidence gaps in the existing evidence base.

To achieve these objectives, we address the following research questions:

1) What is the extent of experimental and quasi-experimental evidence on the effectiveness of behavioural science interventions conducted in developing countries on environmental, climate and development outcomes?
2) What are the characteristics of the evidence base?
3) What are the major gaps in the primary evidence base?

II. METHODS

A. THE OVERALL METHODOLOGICAL APPROACH

The production of this EGM has followed the standards and methods for EGMs developed by the International Initiative for Impact Evaluations (3ie) (Snilstveit and others, 2016; Snilstveit and others, 2017). The Green Climate Fund's Independent Evaluation Unit, the International Fund for Agricultural Development, and the Africa Centre for Evidence (ACE) team developed this EGM using systematic methods to identify, screen and describe all completed impact evaluations (IEs) and systematic reviews (SRs) relevant to the research questions listed above. The EGM is produced on an intervention–outcome matrix to structure the identified evidence base and, by doing so, highlights the size and nature of the evidence for different configurations of interventions and environmental, climate and development outcomes.

The EGM is visualized on an interactive online interface using the EPPI-Reviewer 4® mapping software,[1] similar to the software used to visualize 3ie's EGMs. The web-based visual display of the map shows the volume of evidence for each intervention–outcome combination and distinguishes the type of evidence (IEs or SRs). This mapping software also allows for multiple visualization options as well as integrated user feedback, in addition to a range of other minor advantages above other software solutions. Using the type of study as a segmenting attribute, assigning different colours to different types of evidence makes it easy to visually distinguish between IEs and SRs.

The software's interactive platform provides additional filters so users (who will be able to access the map once it is made available to interested stakeholders) can explore the evidence – for example, by focusing on certain regions, income levels or other defining characteristics. Stakeholders will be able to use the interface to create customized maps by filtering the evidence base according to any attributes of interest. The EGM as a product in its own right supports stakeholder engagement with the evidence base and also supports decision-making about the most effective synthesis approach and scope. The evidence base included in the map will help in identifying the interventions and outcomes that are of most interest to stakeholders and policymakers. It will be applied instrumentally to guide discussions about which areas of the evidence base to synthesize, as well as which synthesis method would be the most effective to implement in a subsequent systematic review.

We adopted a co-production approach in the development of the theory of change, inclusion criteria and the intervention–outcome framework of the EGM. The key objective of the co-production process was to jointly design the most appropriate outputs to support the relevance, legitimacy and use of the EGM. The main stakeholders involved in the co-production exercise included the Independent Evaluation Unit, the International Fund for Agricultural Development and ACE, which, as the contracted entity, provided the core project team of methods and content experts.

The co-production and engagement entailed regular meetings each week, for a period of three weeks, to consecutively develop the theory of change, inclusion criteria and the intervention–outcome framework of this EGM. Furthermore, upon the finalization of the abovementioned outputs, all stakeholders were involved in regular (coding) sessions to extract data from a total of nine selected studies. The key objectives of these meetings were, firstly, to ensure the adequacy of the intervention–outcome framework in capturing relevant interventions and outcomes of interest

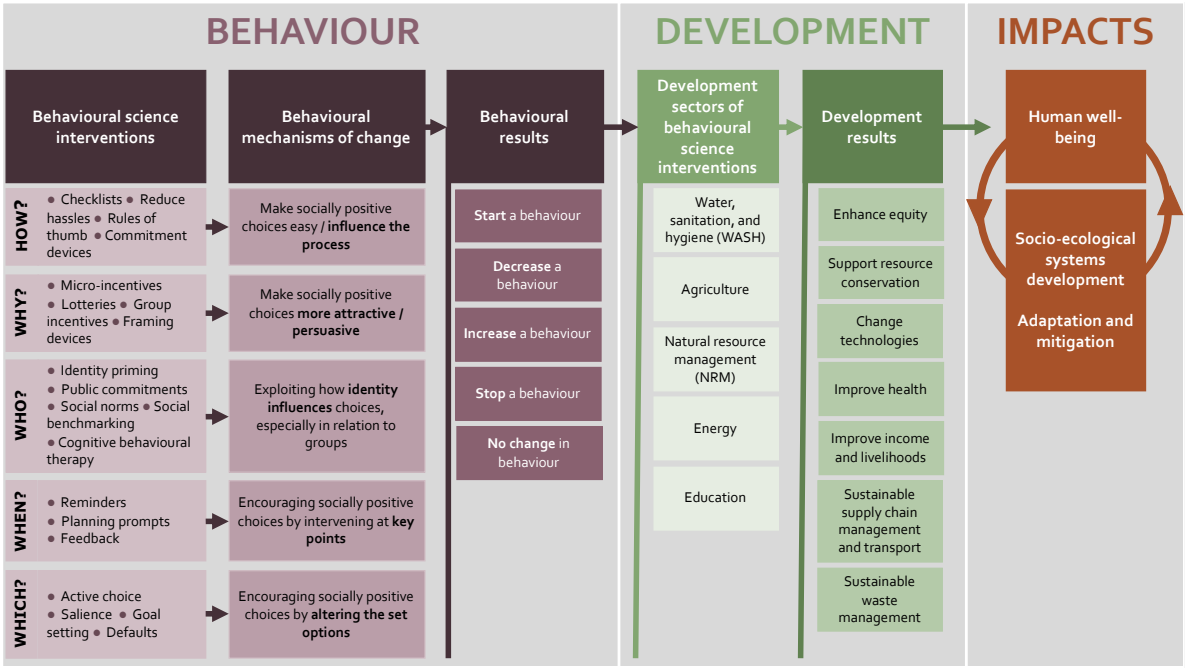
[1] EPPI-Reviewer 4® is software for all types of literature review, including SRs, meta-analyses, "narrative" reviews and meta-ethnographies. For more information visit: *https://eppi.ioe.ac.uk/CMS/Default.aspx?alias=eppi.ioe.ac.uk/cms/er4&.*

and, secondly, to ensure a shared understanding and consistency in the data extraction process across the interventions and outcomes.

B. THEORY OF CHANGE FOR EVIDENCE REVIEW ON BEHAVIOURAL SCIENCE INTERVENTIONS

A theory of change is essentially "a set of statements that describe the process and the mechanisms (i.e. the how and why)" through which an intervention is thought to work and the results it aims to affect (Frey, 2019). In the context of the evidence review on behavioural science interventions, the purpose of the theory of change is to inform the types of interventions included in the EGM. The theory of change directly informed the Population, Intervention, Comparison, Outcome and Study (PICOS) design framework that was used to develop inclusion and exclusion criteria. It also illustrates the role that behavioural science interventions play in human and environment and development outcomes. The theory of change is shown in Figure 1[2].

Figure 1. Theory of change of behavioural science interventions



Source: Authors

The theory of change is divided into three distinct parts: behaviour, development and impact. The theory of change conceptualizes three levels showing how behavioural science interventions lead to behavioural results, through five behavioural mechanisms of change. Definitions of the behavioural interventions are provided in Table 1 below. The first level is a categorization of different behavioural interventions (i.e. checklists, social norms or defaults). These interventions are most

[2] The theory of change is also expected to evolve based on the outcomes of this review. The categories presented may therefore be further developed to reflect the analytical requirements of the study. In using the theory of change to inform the evidence review, it is possible that certain additional categories will emerge based on the results of the review. This could include the addition or division of the sectoral component of the theory of change. Furthermore, traditional development programming around behaviour often includes components of knowledge and attitude. These have been included in the matrix to support the search process and better understand the relationships between newer behavioural science strategies and traditional development models. However, they have not been included in the theory of change because they do not reflect our current understanding of mechanisms of change.

commonly applied in the field and are drawn from the list compiled by the Behavioural Evidence Hub, a leading knowledge clearinghouse for policy-relevant behavioural science. The second level specifies the mechanisms of change – for example, how these interventions actually influence behaviour such as through changing sets of options or "nudging" at key decision points. These mechanisms are informed by two prominent conceptualizations of behaviour change: the EAST framework produced by the Behavioural Insights Team (Service and others, 2014) and the 4Ps Framework for Behaviour Change from Yale University (Dhar, 2014). The third level outlines concrete behavioural results (e.g. starting a behaviour, stopping a behaviour).

This theory of change is unique in that the outcome of the behavioural intervention leads to activities that provide inputs for the development component of the theory of change. There are therefore two intervention levels before results are attained in human and environmental development. These development results, which are grouped by indicative sectors, then have their own intermediate and wider outcomes. The development results are purposefully categorized more broadly than the behavioural change interventions and results. This is to ensure that (1) the theory of change is not so complex as to lose utility and (2) the theory of change does not limit the development results in the evidence gap mapping process. The transition from narrowly defined interventions to broad development results also means that the causal pathways are less well-articulated. Two examples that outline potential causal pathways are provided below:

- If the desired development result was the adoption of new farming practices (to improve income and livelihoods) through an agriculture intervention, the potential causal pathway would be using planning prompts (behavioural interventions) to encourage socially positive choices by intervening at key decision points (behavioural mechanism of change). This would then result in starting a behaviour (behavioural result), which in this example would be adopting new farming practices.
- If the desired development result was to use more energy-efficient lighting (to change technologies), through an energy-related intervention, the potential causal pathway would be using micro-incentives (behavioural interventions) to make positive choices more attractive/persuasive (behavioural mechanism of change). This would then result in starting a behaviour (behavioural result), which in this example would be using energy-efficient lighting.

The development sectors were selected based on their potential for behavioural interventions with outcomes that have results impacting socioecological systems. Similarly, the development results were selected as part of an iterative process of refinement. They are not necessarily mutually exclusive, and one intervention could target more than one result area. The outcomes are described in Table 2 of the intervention–outcome framework in section II.D.3 below.

The impact level denotes the desired state of socioecological systems through human well-being and climate change adaptation and mitigation. These two impacts are intrinsically linked. For the purposes of this study, we considered the intention of the research when determining contribution towards impact. Using the causal pathway examples provided above, examples of the impact level could include the following:

- Adjusting farming practices to new climate conditions contributes to climate change adaptation and improves human well-being through sustaining or improving incomes and livelihoods. This in turn contributes to developing and sustaining more stable socioecological systems.
- Changing technologies by using energy-efficient lighting contributes directly to mitigating the effects of climate change by reducing energy consumption. This in turn contributes to sustainable socioecological systems.

C. Intervention–outcome framework for the EGM

The EGM intervention–outcome framework is the primary tool to structure and visualize the evidence base, and its design is directly influenced by the theory of change discussed above. Appendix 1 illustrates the structure of the intervention–outcome framework for this EGM in detail. The dimensions of the map are placed in a matrix format of row and column headings that are used to structure the evidence base. The primary dimensions of the EGM are intervention categories (row attributes) and the outcome domains (column attributes), which are divided into subcategories and subdomains respectively. The structure of our intervention–outcome framework maps the key behavioural science interventions onto outcomes, broadly divided into knowledge, uptake and use outcomes; behavioural outcomes; development results; and impact (socioecological systems development through human well-being and climate adaptation and mitigation). Definitions of the behavioural interventions and outcomes are provided in Table 1 and Table 2 respectively, developed through the co-production exercise discussed above.

D. Criteria for inclusion and exclusion of studies in the EGM

To systematically characterize a large, disparate literature base on the effectiveness of behavioural science interventions, an underlying focus on environment and human development outcomes guided the scope of this EGM. Formally, we adopted the PICOS framework to develop our inclusion criteria. A summary of the inclusion criteria for the EGM is provided in Appendix 2. The inclusion criteria defined the precise characteristics of the studies that were included in the EGM. All evidence not meeting these criteria were excluded from this EGM. The EGM includes IEs and SRs.

1. Population

We followed the country-level categorization as found in the Kyoto Protocol of the United Nations Framework Convention on Climate Change and included studies assessing the effectiveness of a behavioural science intervention in (1) non-Annex 1 countries,[3] and (2) non-Annex 1 and Annex 1 countries jointly if the associated analysis distinguished effects and reported results separately across the two samples.

Any primary study that presented combined analysis on both Annex 1 and non-Annex 1 countries without reporting separate results across the two samples was excluded. SRs were included in the EGM either if data were aggregated for non-Annex 1 countries relative to Annex 1 countries or if there was at least a single primary study included from non-Annex 1 countries. The EGM includes studies conducted at any unit of observation, including individuals, households, communities and companies. We included studies published only from the year 2000 onwards.

2. Interventions

We included only behavioural science interventions, which are all informed by empirical research principally from behavioural psychology and/or behavioural economics. Relevant research seeks to identify characteristic human cognitive patterns, which are often unconscious or not "rationally maximizing" in a classical economic sense. Building on these patterns, interventions can alter the choice architecture of decision-making, build in "nudges" to overcome biases or process barriers, and optimize communications, all with the typical goal of encouraging pro-social behaviours. The

[3] See *https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states.*

type of interventions we included are informed by the theory of change described in section II.B. Interventions fall into 22 main domains as illustrated in Table 1.

Interventions can be delivered at any administrative level and administered to any type of beneficiary (e.g. individual, household) and by any type of actor (e.g. government, non-governmental organization). Additionally, we did not apply any restrictions related to intervention-level characteristics such as modality, intensity, duration or complexity of intervention delivery. Specifically, we excluded studies based on restrictions related to sample size, ensuring that pilot-scale interventions that often focus on newer, more innovative approaches were captured in our evidence review.

3. Comparison

The EGM considered evaluation studies that clearly identified at least two experimental groups: (1) a treatment group exposed to the intervention, and (2) a control group that did not receive the intervention for the purpose of establishing the impact of the intervention. The nature of the control group depends largely on the specific methods deployed in the study (e.g. the control group in a randomized controlled trial) and can refer to the population receiving no treatment, treatment as usual, placebo treatment or pipeline treatment. We will consider synthetic control groups for inclusion (for example, studies using instrumental variables, a regression discontinuity design or forms of matching).

We excluded any study that did not describe a clearly articulated control group – for instance, descriptive/predictive analyses highlighting drivers and determinants of selecting into behavioural science interventions. Studies with quantitative methods for which the use of comparison/control groups is not relevant, such as life-cycle assessments, were excluded.

Table 1. Behavioural intervention definitions

BEHAVIOURAL INTERVENTION		DEFINITION
HOW is the choice made? This category of intervention influences the decision-making process to make positive choices easier.	Checklists	This type of intervention creates a series of procedural steps to guide decisions or behaviour. The steps are designed to be used consciously and systematically, and thereby reduce the complexity of decisions/behaviour.
	Reduced hassles	This type of intervention removes procedural or processual barriers standing in the way of positive behaviours. Reducing hassle and barriers means there is less friction in the process.
	Rules of thumb	This type of intervention simplifies decision-making by creating a relatively straightforward heuristic device. In distinction to checklists and reduced hassles, rules of thumb are more cognitive, relating to how people think about decisions rather than how they carry them out.
	Commitment devices	In this type of intervention, people consciously commit to following a certain course of action or behaviour. The specific "device" itself can take a variety of forms, but typically devices will seek to influence an individual's future behaviour by encouraging positive decisions in the present.
WHY is the choice made? This category of intervention makes positive choices more attractive or persuasive.	Micro-incentives	This type of intervention typically involves small rewards given out to encourage specific behaviours. The incentives are often but not exclusively cash, can be frequent and are tied to the completion of tasks.
	Group incentives	This type of intervention rewards based on a group's performance. For example, when a certain percentage of group members all complete a designated behaviour, then the entire group receives the reward.
	Lotteries	A lottery encourages a positive decision by holding out the promise of some reward in the future. Even if the probability of winning the reward is small, it can incentivize behaviour.
	Anchoring	This type of intervention influences behaviour by introducing a reference point (such as a high or low number) that influences subsequent decisions in the direction of that reference point or "anchor". For example, the first price mentioned in a negotiation skews the final negotiated amount towards the initial price – a high anchor will lead to a higher negotiated price and a low anchor will lead to a lower negotiated price.
	Framing devices	A framing device influences decisions via often subtle changes in how the options are presented. Certain options are made to seem either more or less attractive through highlighting potential loss, gain or risk, which are three common, potential "frames".
WHO is making the choice? This category of interventions exploits how identity influences decision-making,	Identity priming	This type of intervention influences behaviour by referring to an individual's self-conception, particularly in relation to group memberships. "Priming" involves exposing an individual to a mental, associative stimulus that influences subsequent behaviour. In practice, personal, civic, kinship-based, ethnolinguistic, national or other collective identities can be primed prior to relevant decisions to encourage the individual to take actions consistent with ostensible group values.
	Public commitments	This type of intervention is a commitment device in which people promise to others that they will take a certain course of action or behaviour. Other individuals or the group thereby hold the individual accountable for their behaviour.

Behavioural intervention		Definition
especially in relation to groups, to encourage environmentally positive choices.	Social norms	This type of intervention leverages an individual's inclination to conform with the majority. It influences behaviour by providing information about what "most people" do in each situation and/or communicates unwritten rules (such as "approved" or "disapproved" norms) to encourage or discourage actions.
	Social benchmarking	This type of intervention directly compares an individual's own behaviour with a peer group. It typically involves using measurable data (such as energy consumption) to benchmark an individual's behaviour against a group's behaviour.
	Cognitive behavioural therapy	This is a therapeutic intervention that influences behaviour by getting people to think about their thinking. It typically provides a structure to alter thought patterns that give rise to certain behaviours.
WHEN is the choice made? This category of interventions encourages positive choices by influencing key decisions.	Reminders	This type of intervention involves messaging people (via email, text message, etc.) in a timely way to call their attention to something and/or to encourage them to take certain actions.
	Planning prompts	This type of intervention involves prompting people to plan for when, where and how they will undertake certain actions. The prompt typically helps them think through a process before deciding to act, then carrying out those actions or behaviours, and then framing future benefits of the behaviour in a more short-term time frame.
	Feedback	This type of intervention provides information, often tracked over time, about behaviours. The information might report how the tracked behaviours compare to targets and/or outline consequences of the behaviour trajectories.
WHICH choices are available? This category of interventions encourages positive choices by altering the set of options available.	Active choice	This type of intervention makes clear which of a series of options will lead to a better outcome. It forces a choice because there is no default and highlights potential losses from choosing the less-desirable option(s).
	Salience (communication)	This type of intervention improves the ease and accessibility of adopting behaviours by making information/choices more prominent and relevant. Personalizing communication and highlighting follow-on instructions are typical strategies to increase salience. Because this intervention focuses on messaging content rather than timely delivery, it is distinct from a reminder.
	Salience (experience design)	This type of intervention targets how individuals interact with their physical and/or digital environment. It involves arranging facilities or options so that they are either (1) more prominent, accessible and easy, to prompt a particular behaviour, or (2) less prominent, accessible or easy, to discourage a particular behaviour.
	Goal setting	This type of intervention helps individuals consider what their priorities are and then specify a series of goals that they would like to achieve. It often goes along with a planning process.
	Defaults	This type of intervention involves setting a default option that people must actively choose to change. The default is typically set as the socially optimal choice, encouraging people to stick with that option.

Table 2. Outcome definitions

OUTCOME		DEFINITION
Knowledge, uptake and use	Know the intervention	Awareness of the intervention and its objectives
	Take part in the intervention	Adoption of intervention activities
	Acquire knowledge	Increased understanding of environmental and development-related issues
	Change attitudes	Perceptions on the environment and developmental matters
Behavioural outcomes	Start behaviour	Resumption of actions/activities following the intervention
	Increase behaviour	Evidence of more actions/activities due to the intervention
	Decrease behaviour	Reducing actions/activities
	End behaviour	Halting actions/activities
	No change in behaviour	No evidence of noticeable variations from the status quo regarding conduct
Development results	Enhanced equity	Unsustainable systems of production and consumption drive cycles of inequality, and many interventions aim to share resources in a community more equitably.
	Natural resource conservation and preservation	This result could include outcomes such as reduced water use, reduced fossil fuel consumption, a reduction in the harvesting of wild plants, limiting encroachment on protected areas, or the improvement of soil quality.
	Changed technologies	This result includes an evolution in technology used, such as more drought-resistant seeds, improved cooking stoves or water-efficient toilets.
	Improved health	While health is not a core sector included in the review, many interventions in sectors such as agriculture, transport, and water, sanitation and hygiene have aims of improving health; this is a key component of well-being. Results could include improved nutrition or a reduction in illnesses linked to air pollution or water quality.
	Improved income or livelihoods	The interlinkages between income and ecological outcomes are complex, but many human development interventions have an increase in income as a key result.
	Sustainable transport or supply chain management	This result will include transport options that reduce fossil fuel consumption, reduce private vehicle ownership, increase uptake in public transport, strengthen transport management systems or support local suppliers.
	Sustainable waste management	This result will reflect interventions promoting separation at source, reduced packaging, composting and other waste related practices.
	Mitigation	Shift to low-emission sustainable development pathways (human well-being).

Outcome		Definition
Socioecological systems development (includes human well-being)		Examples: • Increased low-emission energy access and power generation • Use of low-emission transport • Reforestation, sustainable forest management, afforestation, agroforestry practices • Low or zero carbon livestock • Zero or minimum tillage, sustainable rice intensification • Reduced emissions from buildings, cities, industries and appliances • Strengthened institutional and regulatory systems for low-emission planning and development
	Adaptation	Increased climate-resilient sustainable development (human well-being). Examples: • Increased resilience of infrastructure and the built environment to climate change threats • Increased generation and use of climate information in decision-making • Strengthened adaptive capacity and reduced exposure to climate risks • Strengthened institutional and regulatory systems for climate-responsive planning and development • Adoption of adaptation options promoted by the intervention (use of climate-resistant varieties, conservation agriculture, sustainable rice intensification, rotational plans for pasture and fishery, etc.)

4. Outcomes

The EGM considered the following outcomes: knowledge outcomes, uptake and use outcomes, behavioural outcomes, and development results and impacts as shown in the theory of change. Studies that covered at least one intervention of the framework and measured at least one of the outcomes were included in the map. Table 2 lists the outcomes in more detail.

We assessed the range of outcomes measured at any unit of analysis (e.g. individual, household, community and organizational levels). Moreover, in line with our broad criteria related to study-level characteristics, we considered studies that measure outcomes at any reasonable point following the administration of the relevant behavioural science intervention. We also recorded information on intervention costs or cost-effectiveness where these were reported.

5. Study design

We included IEs and SRs in the EGM with the following definitions and designs specifying both study types.

- **SRs eligible for inclusion:** We included any form of literature review or evidence synthesis, regardless of whether the review self-identified as a systematic review. As long as the review described its search for evidence, data collection and methods for synthesis, it was included.[4]
- **Impact evaluation designs eligible for inclusion:** We included studies that assess the effects of interventions using experimental or quasi-experimental designs, with non-random assignment that allow for causal inference in line with Lwamba and others (2020). Specifically, we included the following:
  - Randomized controlled trials (RCTs) with assignment at individual, household, community or other cluster level, and quasi-RCTs using prospective methods of assignment such as alternation.
  - Non-randomized studies with selection on unobservables:
    + Regression discontinuity designs, where assignment is done on a threshold measured at pre-test, and the study uses prospective or retrospective approaches of analysis to control for unobservable confounding.
    + Studies using design or methods to control for unobservable confounding, such as natural experiments with clearly defined intervention and comparison groups that exploit natural randomness in implementation assignment by decision makers (e.g. public lottery) or random errors in implementation, and instrumental variables estimation.
  - Non-randomized studies with pre-intervention and post-intervention outcomes data in intervention and comparison groups, where data are individual-level panel or pseudo-panels (repeated cross-sections) that use the following methods to control for confounding:
    + Studies controlling for time-invariant unobservable confounding, including difference-in-differences, or fixed- or random-effects models with an interaction term between time and intervention for pre-intervention and post-intervention observations.
    + Studies assessing changes in trends in outcomes over a series of time points (interrupted time series), with or without contemporaneous comparison (controlled

[4] This follows Snilstveit and others (2016) and overlaps with 3ie's inclusion criteria for systematic reviews in its Development Evidence Portal.

interrupted time series), with sufficient observations to establish a trend and control for effects on outcomes due to factors other than the intervention (e.g. seasonality).

- Non-randomized studies with control for observable confounding, including non-parametric approaches (e.g. statistical matching, covariate matching, coarsened-exact matching, propensity score matching) and parametric approaches (e.g. propensity-weighted multiple regression analysis).

We excluded all studies that did not fall under any of the criteria defined above. Examples of excluded study types are simulation studies that aim to predict the effect of a certain intervention, observational studies with no control for selection bias, life-cycle analyses, process evaluations, acceptability studies and non-systematic literature reviews.

6. Exclusion criteria

We excluded any studies that did not meet the criteria outlined in points (1) to (5) above. That is, we excluded studies with interventions that did not meet our definition of "behavioural science interventions" as well as interventions that were not focused on the human development and environmental sectors. We excluded all studies that did not clearly articulate a comparison/control group – for example, process evaluations. As indicated above, we also excluded studies that did not focus on populations in non-Annex I countries or that did not report separate results for Annex I and non-Annex I countries. Studies published before the year 2000 were also excluded.

E. Searching for evidence

1. Search steps

A comprehensive search strategy was developed to search research literature for qualifying studies to identify all available evidence relevant to the review question (Appendix 3). The key objective of the strategy was to be sensitive rather than specific by deliberately formulating search strings and search sources that were over-inclusive. This strategy may have increased the number of citations to be screened, but it reduced the risk of missing any relevant studies. The search strategy aimed to find both academic and grey literature. To that end, a three-pronged search strategy was employed in this review: (1) formal search of academic databases using predefined and explicit search strings and Boolean operators; (2) a formal search of grey literature in key organizational websites using keywords but applying full search strings in cases where institutional databases allowed the application of Boolean operators; and (3) backward and forward citation searches of included and seminal studies.

2. Search databases and repositories

We searched a range of sources in academic and grey literature, including bibliographic databases (general social science and environment-focused databases), repositories of IEs and SRs, specialist organizational databases, and websites of bilateral and multilateral agencies. The database choice was guided by relevance and comprehensiveness in covering sectoral literature. This strategy was then translated according to the requirements and functionalities of different databases. The full list of academic and grey literature sources covered in the search can be found in Appendix 4, together with the results obtained from each source.

3. FORWARD AND BACKWARD CITATION SEARCHES

We conducted backward citation searches by searching the reference lists of included studies, especially SRs and seminal papers. We also carried out forward citation searches using Google Scholar to find papers cited in included studies.

4. SEARCH TERMS

Our search terms provided broad but manageable coverage related to the EGM and systematic review objective. We designed a series of sets of search terms with individual terms including wild card symbols (*) where appropriate, separated by the Boolean operator "OR". The sets were then combined using "AND". The search terms (Appendix 3) are organized into the following categories.

- **Developing country terminology:** This subcategory includes terms often used interchangeably with or closely related to the phrase "developing countries" or "low-middle-income countries" including "underdeveloped countries" and specification of developing country names.
- **Methods terminology:** This category includes terminology related to the measurement and tracking of impacts such as "impact evaluation*" and "impact assessment" and "impact analysis"; articulation of comparison groups including "control group" or "treatment". Terms related to the specific empirical methods such as "instrumental variable" are also included in the search strings as these do not always refer to explicit comparison groups but generate comparative estimates of causal impacts.
- **Intervention terminology:** Intervention terms included in the search strings were related to the behavioural science interventions of interest highlighted in the theory of change above and drawn from the Behavioural Hub's behavioural tools. These were "nudge", "choice architecture", "active choice", "incentive*" and "priming". The development of the intervention terms was intended to be broad and to encapsulate numerous synonyms without limiting the concepts to their technical definitions in behavioural science. This broad approach was taken to ensure a wide enough search that would not miss relevant studies.
- **General restrictions:** This category of search terms is a combination of language- and time-specific restrictions that enable us to restrict (on academic databases) the search results to English-language articles and SRs published in peer-reviewed academic journals in or after the year 2000.

5. COMBINATION OF SEARCH TERMS

The first substring of search terms is focused on the region of this review, which is developing countries or the "Population" of the PICOS framework for the research question. Identified synonyms for developing countries were combined using the "OR" Boolean operator. The second substring of search terms focused on the methodology of studies of interest to the review, the "Study design" part of the PICOS framework. It combines systematic and impact evaluation synonyms using the "OR" Boolean operator. The third group of substrings is the intervention terms divided into five search substrings shown in Appendix 3, the "Intervention" component of the PICOS framework. These behavioural science synonyms were also combined using "OR" with the use of truncations to improve the search. The overall combination of search concepts will follow the below syntax:

(1) Developing country "P" terms AND (2) Methods "S" terms AND (3) Intervention "I" terms

F. DATA COLLECTION AND ANALYSIS

1. SCREENING OF STUDIES

Once we obtained the search results, they were imported into the SR software EPPI-Reviewer 4.[5] This platform is used to manage references, identify and remove duplicate studies, and screen records for inclusion using the procedures outlined below. This review management software (EPPI-Reviewer 4) was used to manage the entire review process. Search results from organizational websites and the citation searches were captured in MS Word, and only studies deemed to be relevant for the EGM were transferred to EPPI-Reviewer 4. Studies that were not already on EPPI-Reviewer were captured manually on the software. Before proceeding with screening, all duplicate titles were excluded from the review using the duplicate control function on EPPI-Reviewer 4.

At the title and abstract screening level, we conducted a manual double-screening exercise to assess the eligibility of studies using the inclusion criteria highlighted above, and decisions made about each citation were recorded on the same platform. To ensure quality and consistency in the screening process, 5,000 studies were double screened at title and abstract level. Two reviewers screened this common sample of 15 per cent of all study abstracts. During the training, the results given by the researchers were compared, and any discrepancy in coding decisions were discussed as needed, including clarification of the inclusion criteria. The individual screening was only permissible once a similarity index of the screening exercise reached 90 per cent.

We conducted full-text screening of each study that met all title and abstract screening inclusion criteria. Two reviewers from the core team independently examined the full text of each study in detail against the protocol and independently decided whether to include or exclude the study. Any disagreements between reviewers were reconciled through the supervision of a senior review team member. The output of this stage is a set of studies deemed suitable for inclusion in the EGM.

2. DATA EXTRACTION AND MANAGEMENT

We used a predefined data extraction tool to extract data systematically and transparently from the included primary studies and SRs. The data extraction tool highlighted in Appendix 5 and the accompanying 3ie equity coding protocol and guidance in Appendix 6 were translated into EPPI-Reviewer 4 to extract the information required for the EGM. The data were entered directly into the EPPI-Reviewer database; full-text reports were examined and studies coded on variables related to the following:

- Descriptive data, including authors, publication date and status, country, type of intervention, outcome, population and context.
- Information on intervention design, and how the intervention considers equity and programme mechanisms, including implementation and funding agencies.

To ensure consistency of coding quality, two reviewers piloted the data extraction tool. They worked independently on a random sample of 17 (20 per cent) eligible studies selected to test the tool on the complete range of codes highlighted in the data extraction tool. The process was repeated until a high level of consistency (95 per cent similarity) was attained in the reviewer's application of codes; only after this point was the tool deemed final. Following the double-screening stage, the remaining studies were coded by individual reviewers. During the individual coding exercise, a senior review team member conducted random checks of all coding by junior members. Any uncertainties or disagreements were resolved via discussions by further reviewing the study reports.

[5] EPPI-Reviewer 4 is software for all types of literature review, including SRs, meta-analyses, "narrative" reviews and meta-ethnographies. For more information, see: *https://eppi.ioe.ac.uk/CMS/Default.aspx?alias=eppi.ioe.ac.uk/cms/er4&*.

The behavioural science experts acted as third-party arbitrators, providing resolution to any outstanding disagreements or uncertainties, especially regarding the interventions.

3. VISUALIZATION OF THE EVIDENCE GAP MAP

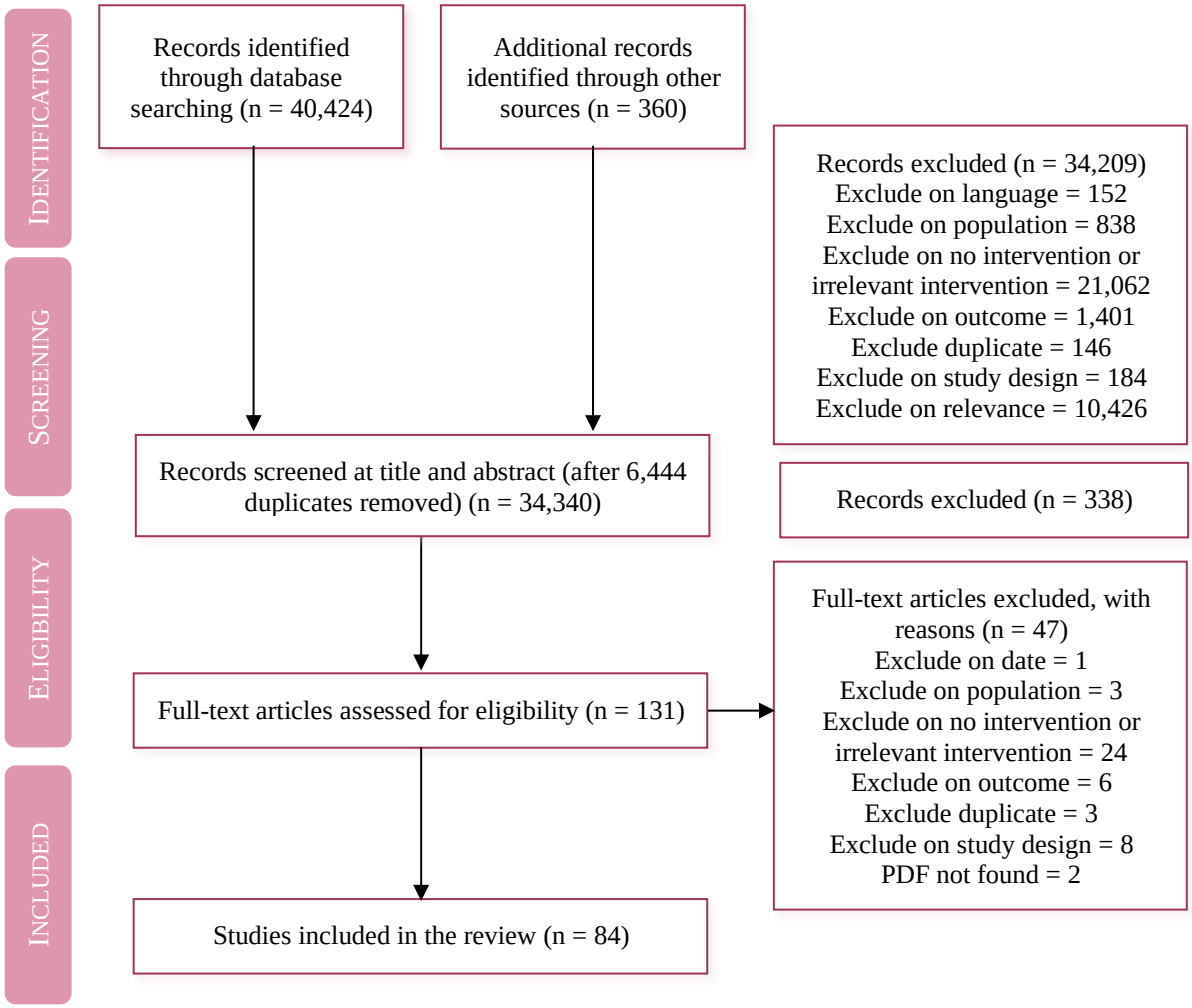
We utilized ACE's interactive mapping software to visualize and host the EGM. Appendix 1B shows the respective visualization based on the intervention–outcome matrix structure found in Appendix 1A. The identified evidence base consists of different behaviour intervention categories mapped across the knowledge uptake and use, development results and impact (mitigation and adaptation) outcomes. Following the data extraction process in EPPI-Reviewer 4, we generated and exported a JavaScript Object Notation (JSON) formatted file to ACE's mapping wizard to create the EGM. The "design" function of the mapping software provides an opportunity to select colour codes that will enable the visualization of included studies to be separated by predefined characteristics. For example, studies were separated by study type, with IEs appearing as green-coloured bubbles and SRs appearing as yellow-coloured bubbles. As indicated earlier, the software options also enable users to tailor the evidence base to their own contexts using filters (e.g. sector, region, study design).

III. SEARCH RESULTS AND DESCRIPTIVE STATISTICS

A. SEARCH AND SCREENING

We conducted our search in January and February 2022. As the PRISMA diagram[6] (Moher and others, 2009) below shows, the search strategy returned 40,424 records (Figure 2). After removing duplicates, 34,340 records were left for screening at the title and abstract level. As noted above, to enable ex-post validation of screening consistency, approximately 15 per cent (5,000) of the 34,340 studies were retained for double screening at title and abstract. Around 90 per cent of these studies were screened consistently by all screeners. Consistency checks during closer reviews of the text and coding yielded similar consistency rates. Screening these records, we identified 131 studies to review at the full-text level. Of them, 24 were excluded because the interventions were not relevant to the scope of the EGM. A total of eight studies were excluded due to their study design; six were excluded due to irrelevant outcomes; three studies were excluded on population, and three studies were identified as duplicates. One study was excluded based on its publishing date and two full texts were not found. The final set comprised 84 studies, of which 82 were IEs and two were SRs.

Figure 2. PRISMA diagram



Source: Authors

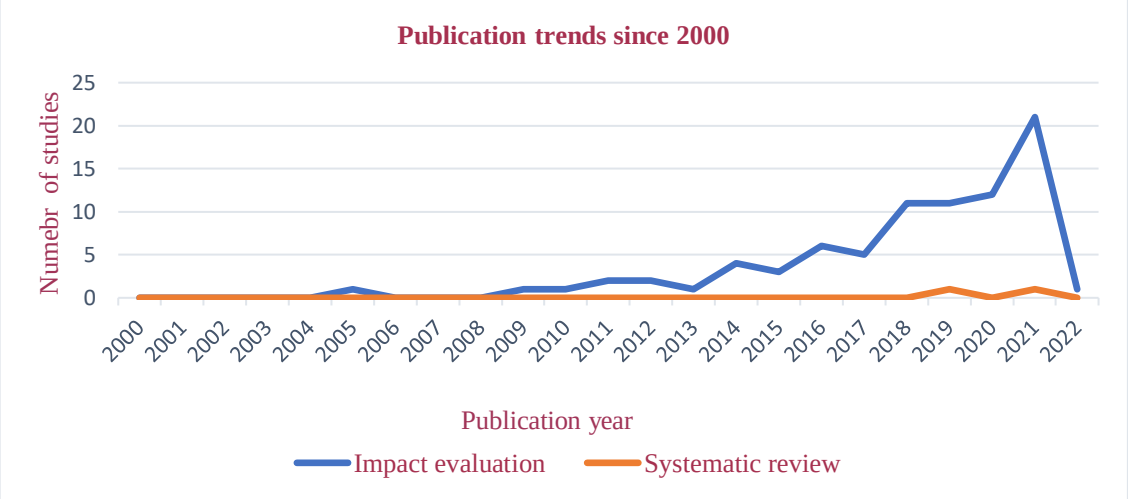
[6] PRISMA stands for preferred reporting items for SRs and meta-analyses. For more information, see: *http://prisma-statement.org/PRISMAStatement/PRISMAStatement.aspx*.

B. CHARACTERISTICS OF THE EVIDENCE BASE

1. PUBLICATION TREND OVER TIME

Figure 3 reports the publication trend of the IEs included in the EGM over time. The number of studies published increased substantially in the past decade in particular – from two published in 2002 to 21 published in 2021.[7] We found a small number (two) of published SRs that were published in 2019 and 2021, thereby displaying no particular trend.

Figure 3. Publication trend by number of studies



Source: Authors

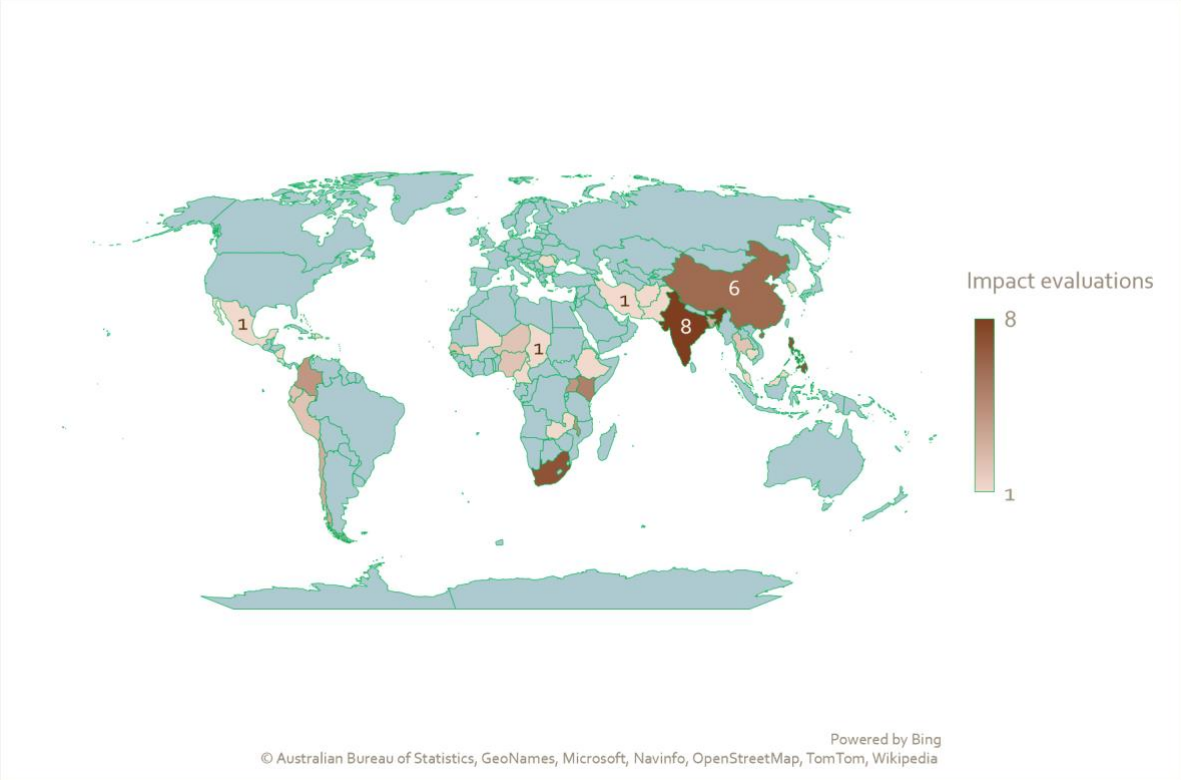
2. GEOGRAPHIC DISTRIBUTION

Figure 4 shows the geographic distribution of IEs in the EGM. The IEs were conducted across 36 countries. Figure 5 presents the distribution of studies by region and includes single-country studies and multi-country studies restricted to a single region, as well as multi-region/global studies. Thirty-five per cent (30) of the studies were conducted in sub-Saharan Africa and 23 per cent (20) were conducted in East Asia and the Pacific. South Asia as well as Latin America and the Caribbean each constituted 18 per cent (16) of the IEs included in the EGM. A limited number of IEs were conducted in Europe and Central Asia (2 per cent) and the Middle East and North Africa (1 per cent). As shown in Figure 6, most of these interventions were carried out in lower-middle-income countries (36; 45 per cent) and upper-middle-income countries (23; 27 per cent). The rest of the interventions were conducted in lower-income countries (12; 14 per cent) and high-income countries (12; 14 per cent).

In one of the two SRs included in the map, the evidence included studies from East Asia and the Pacific, sub-Saharan Africa, Europe and Central Asia, and Latin America and the Caribbean. The other systematic review only indicated the country income classification from which the evidence was derived and covered high-income, upper-middle-income and lower-middle-income countries.

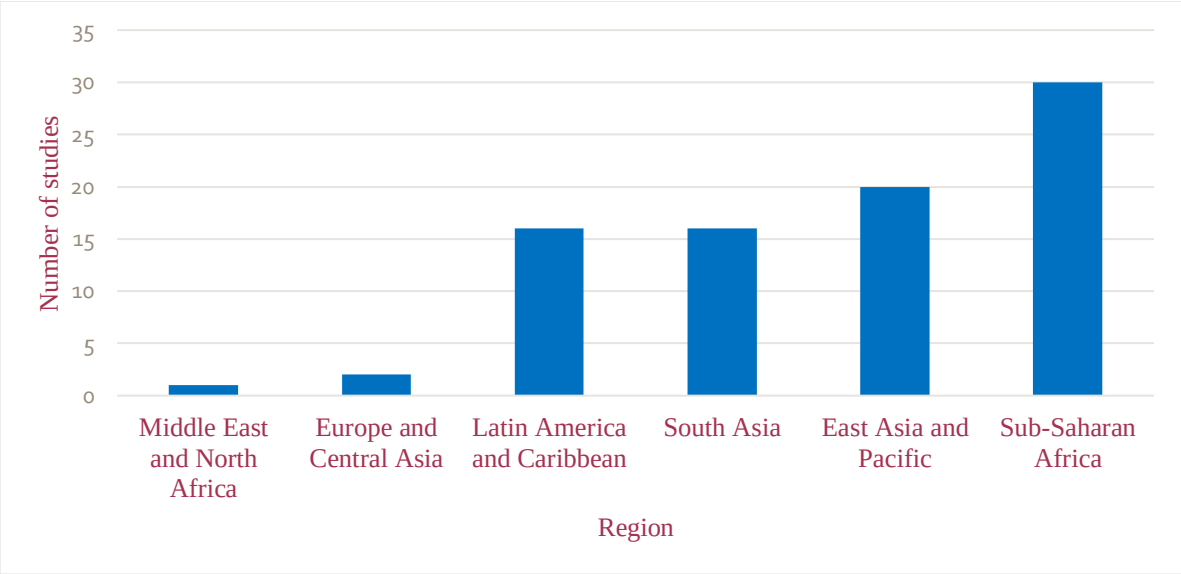
[7] Two studies were included from January and February 2022. Please note that these studies influence the trend line in Figure 3.

Figure 4. Geographic spread of IEs



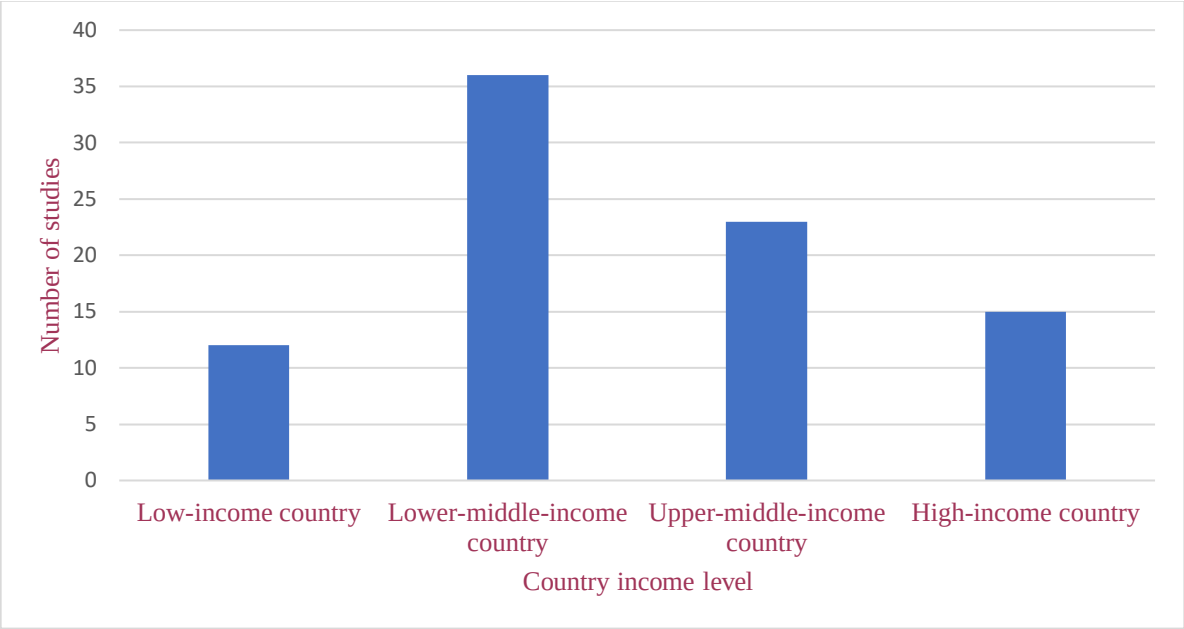
Source: Authors

Figure 5. Distribution of IEs by region



Source: Authors

Figure 6. Distribution of IEs by country income level



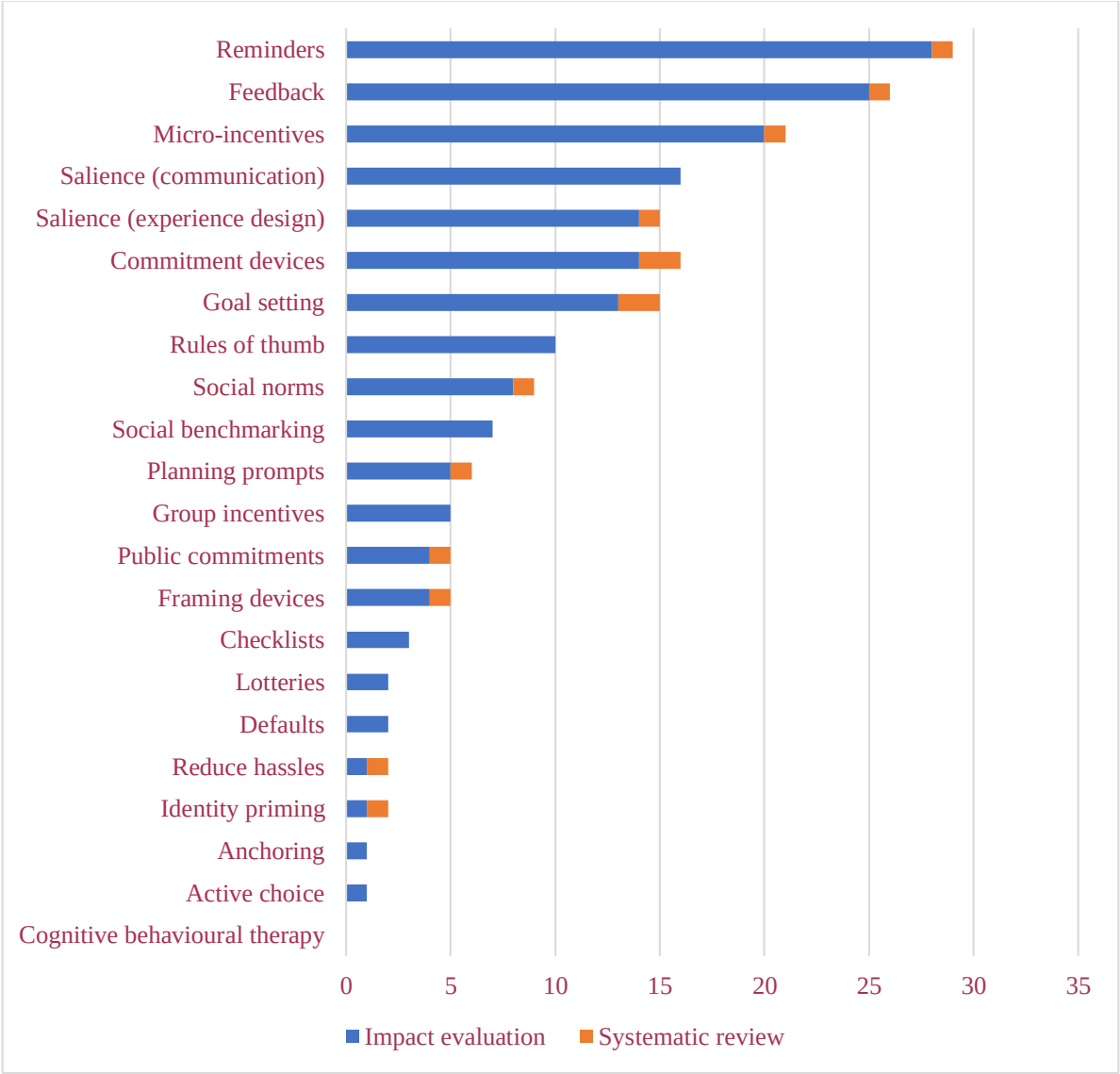
Source: Authors

3. INTERVENTIONS

Figure 7 shows the number of studies across the 22 behavioural science intervention categories covered in this EGM. The IEs focus on interventions such as reminders (28), feedback (25), micro-incentives (20), salience in communication (16), commitment devices (14), salience of experience design (14), goal setting (13), rules of thumb (10), social norms (8) and social benchmarking (7). There is limited evidence on the remaining intervention categories, with an absence of evidence focusing on cognitive behavioural therapy.

The intervention categories for the two SRs identified have a different distribution compared to the IEs. Both SRs focused on commitment devices (2) and goal setting (2). Either one or the other of the two focused on reminders, feedback, micro-incentives, salience of experience design, social norms, planning prompts, public commitments, reducing hassles and identity priming. Neither of the two SRs focused on any of the other interventions.

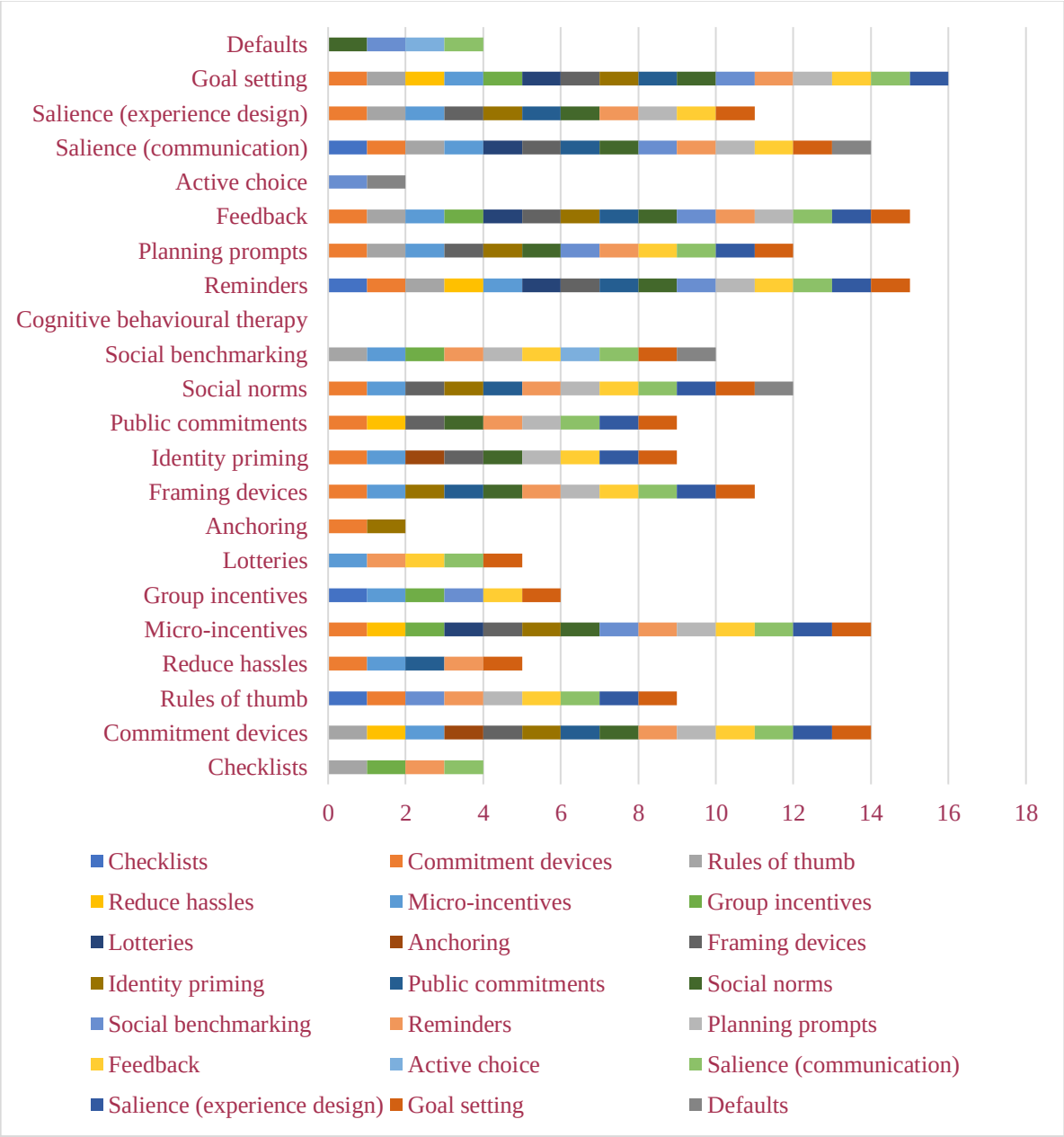
Figure 7. Frequency of intervention category by study type (IEs and SRs)



Source: Authors

In all the 82 impact evaluations where at least one intervention was identified, the intervention was combined with one or more additional components (Figure 8). These interventions have been categorized according to the main intervention framework. The interventions that have been combined with other interventions most frequently are goal setting (16 times), reminders (15), feedback (15), micro-incentives (14), salience of communication (14), commitment devices (14) and social norms (12). The interventions with the least number of second or more intervention components are defaults (4), checklists (4) and active choice (2) and anchoring (2).

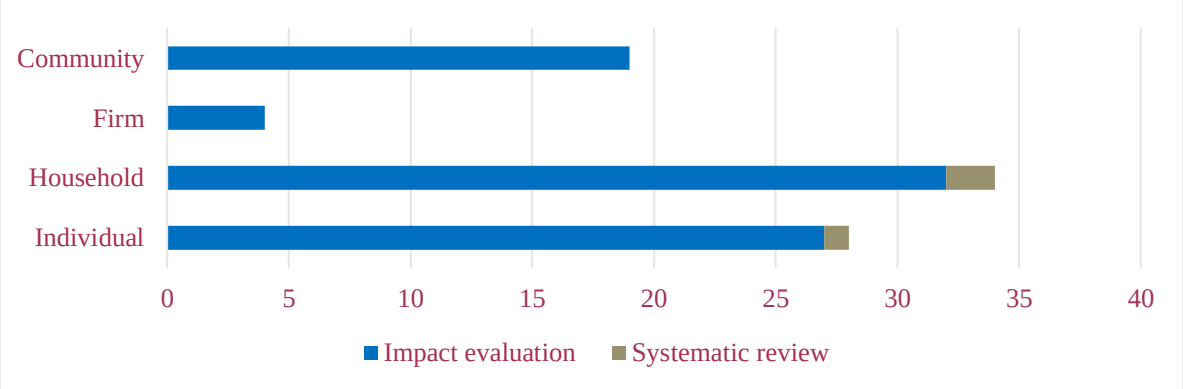
Figure 8. Frequency of intervention in multi-component intervention studies



Source: Authors

Figure 9 presents the number of studies broken down by the scale of implementation and study type. Overall, 39 per cent of IEs (32) targeted households, whereas 33 per cent (27) and 23 per cent (19) of the studies targeted individuals and communities respectively. At the household level, an example of the kind of intervention examined includes salience communication interventions in which households received a recycling bin with a sticker with information about recyclables to prompt recycling behaviour. At the individual level (including schools), example interventions include feedback and reminders that encouraged individuals to reconsider their original savings goals, while at the community level, social norm-based handwashing interventions in communal housing compounds were used to encourage hygienic behaviours. Among the two SRs included, both focused on households and only one included evidence that targeted individuals.

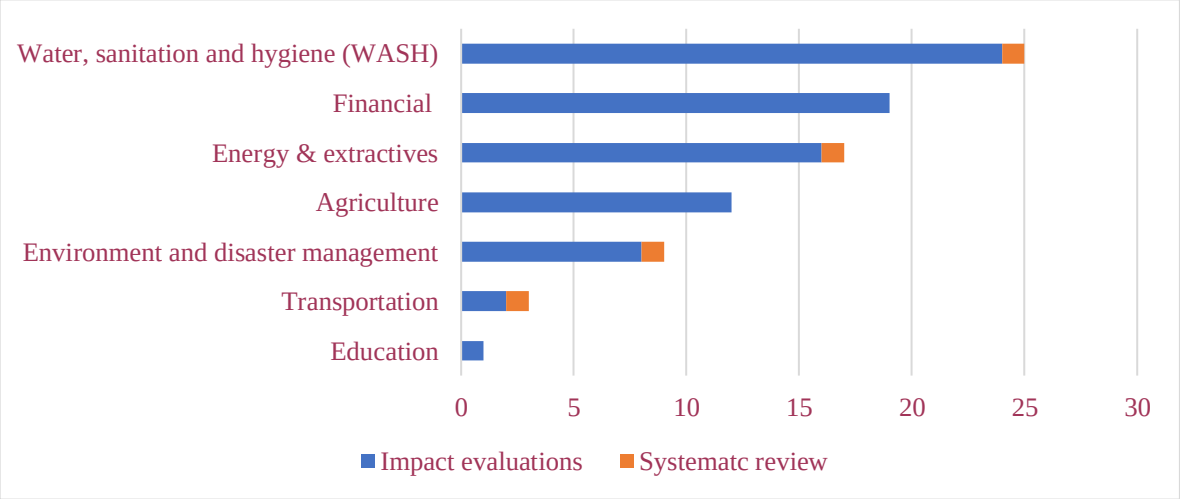
Figure 9. Distribution of studies by scale of implementation and study type



Source: Authors

Figure 10 presents the frequency of sectoral focus within the evidence base. The water, sanitation and hygiene sector dominated the sectoral focus of the included studies (25), followed by the financial (19), energy and extractives (16), agriculture (12), and environment and disaster management sectors (9). This distribution of sectoral focus reveals the expected patterns within the development and environment fields. However, one concern is the limited amount of evidence on behavioural science interventions focusing on the transport sector – a key area of interest for climate change mitigation (as well as a Green Climate Fund results area that has received a limited amount of approved funding to date).

Figure 10. Distribution of studies by sector and study type



Source: Authors
Note: Studies were found that evaluated interventions from the rest of the sectors – namely, forestry, industry & trade/services, information & communication and public administration.

4. Outcomes

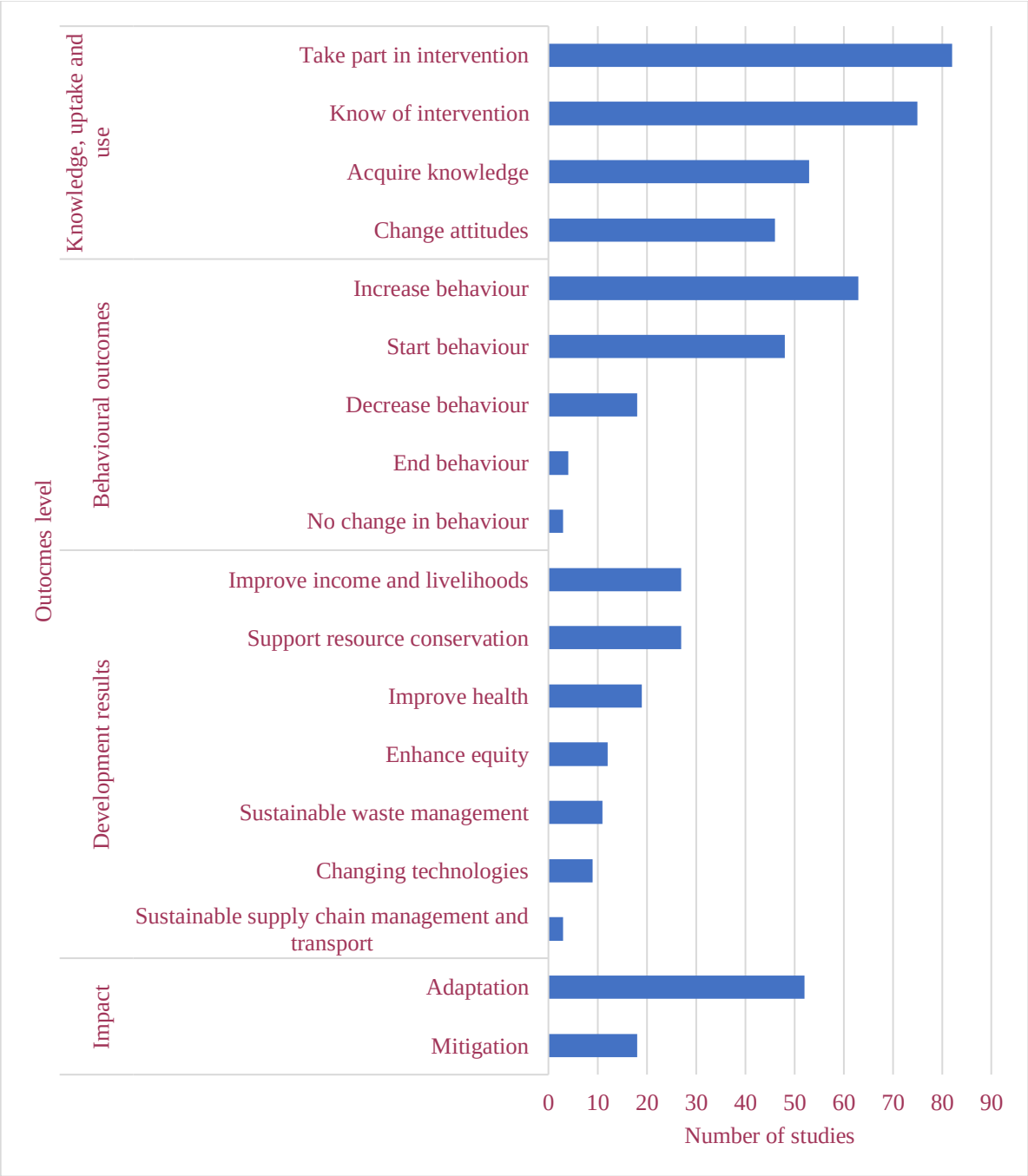
Figure 11 shows the number of studies that report[8] each outcome, broken down by study type. Overall, most reported outcomes fall in the knowledge, uptake and use level – namely, taking part in the intervention (82), knowledge of the intervention (75), acquiring knowledge (53) and change in

[8] The behavioural and knowledge, uptake and use outcomes were coded for if they were either reported or implied.

attitudes (46). The second most reported outcomes are at the behavioural outcomes level: increase in behaviour (63) and starting behaviour (48). However, very few studies identify with ending behaviour (4) and no change in behaviour outcomes (3) in this outcome domain. The impact level is the third most reported outcome domain, with adaptation being reported in 52 IEs, although only 18 studies report mitigation outcomes. The development results level of outcomes are the least reported outcomes. Within this level of outcomes, the outcomes with highest frequency are improved income and livelihoods (27) and supporting resource conservation (27), followed by improve health outcomes (19). Few studies report on enhanced equity (12), sustainable waste management (11) and change technologies (9), and even fewer report on sustainable supply chain management (3). Hence, the most reported outcomes fall within the behavioural outcome level, compared to development results and impact level.

The two SRs both report and synthesize two outcomes: start behaviour and increase behaviour outcomes, which both fall within the behavioural outcome domain. One SR reports sustainable waste management (development results), support to resource conservation (development results domain) and mitigation outcomes (impact domain).

Figure 11. Frequency of each outcome by level of outcomes



Source: Authors

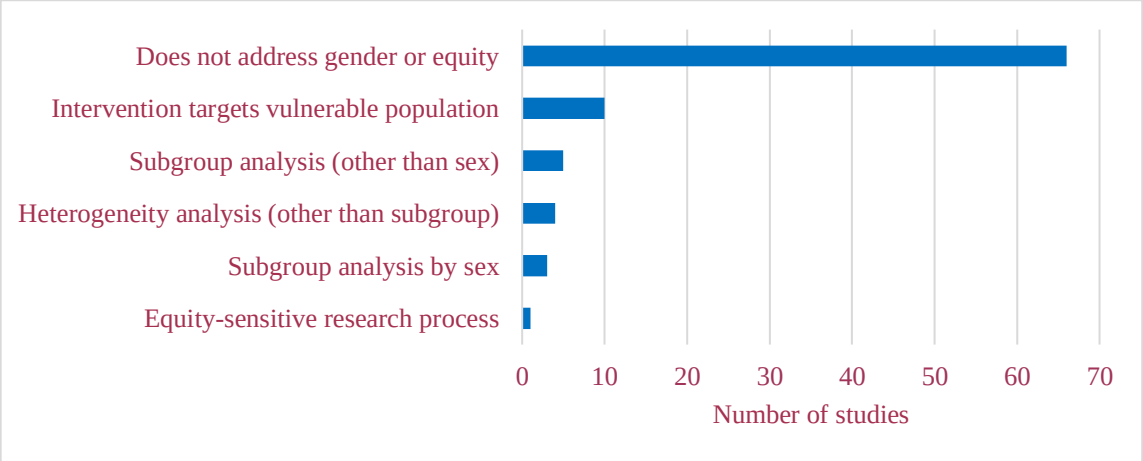
5. EQUITY DIMENSIONS AND FOCUS

Most studies (65) included in the EGM do not consider equity in any form. We identified only 23 studies that considered equity through various methodologies (Figure 12). Of these studies, the most common approach to considering equity was the assessment of interventions targeting vulnerable populations (10). This category typically corresponds to low-income households. In these settings, the aim of interventions was often to help participants improve their income and livelihoods as well as their health outcomes – for instance, commitment devices such as monetary lockboxes to promote saving behaviours and micro-incentives in the form of monetary receipts matching the number of deposits individuals make into their bank account. Additionally, other forms of interventions aimed

at improving livelihoods included rules of thumb for financial decision-making that encouraged participants to separate business and personal accounts. The second most adopted approach to considering equity was subgroup analysis (8), including subgroup analysis by sex (3) and subgroup analysis using variables other than sex (5). The latter variables included studies that assessed the effects of the interventions on people of different socioeconomic status and education levels, among others. Five studies used heterogeneity analysis[9] to study the effects of the intervention on different groups, mainly using socioeconomic status and sex as differentiating attributes regarding the impact of interventions. Finally, only one study used an equity-sensitive research process.[10]

Figure 13 shows the breakdown of the dimensions of equity considered by the studies that addressed equity in some way. As the figure shows, most studies focused on socioeconomic status (9), although some also considered participants' education level (5), sex (4) and HIV/AIDS status (3). A few other studies took into account age (2), food security (1), social capital (1) and place of residence (1). Five studies considered other moderating variables. For instance, Goette and others (2019) evaluated a multi-component intervention combining lotteries, micro-incentives, feedback and salience (communication) to promote water conservation. The study addressed equity by considering the moderator variable litres per capita per day, by dividing the treated groups into two subgroups: low and high baseline households.

Figure 12. IE equity focus

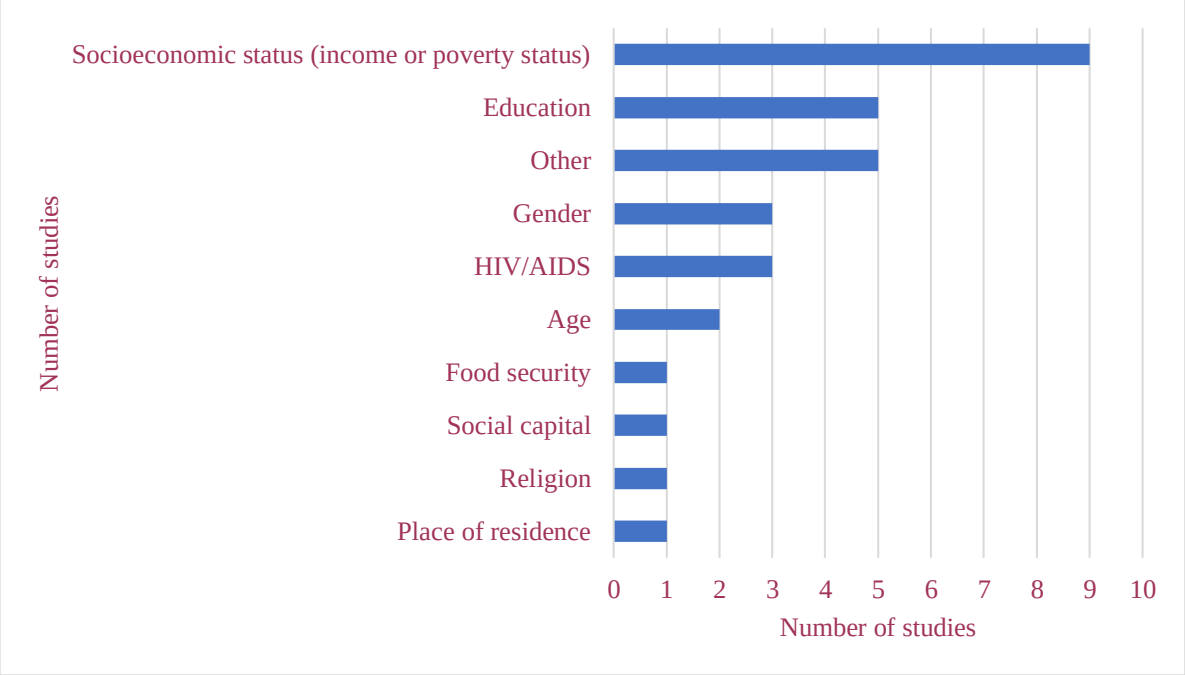


Source: Authors

[9] Heterogeneity analysis (other than subgroup) definition: Does the IE go beyond calculating average treatment effects using a subgroup analysis? This can be done in a variety of ways – for example, combining the treatment with different characteristics or a quantile regression, which examines the effects across the range of the outcome variable. Source: 3ie Equity Coding Protocol Guidance (Appendix 6). Available at *https://www.3ieimpact.org/sites/default/files/2021-11/DEP_Gender_Equity_Protocol-DEP.pdf*.

[10] Is the research informed by gender or equity considerations (e.g. who are the respondents; who collects and analyses data; when, where and who is present)?

Figure 13. Breakdown of studies that addressed equity

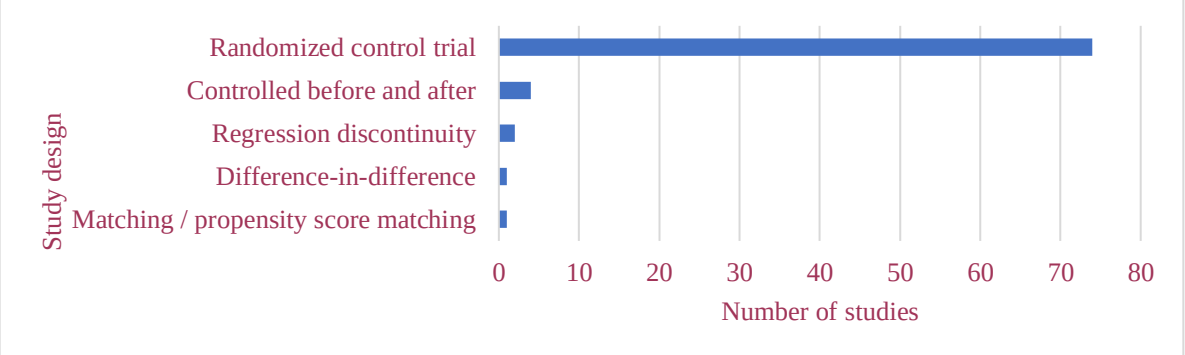


Source: Authors

6. IE STUDY DESIGN AND COST DATA

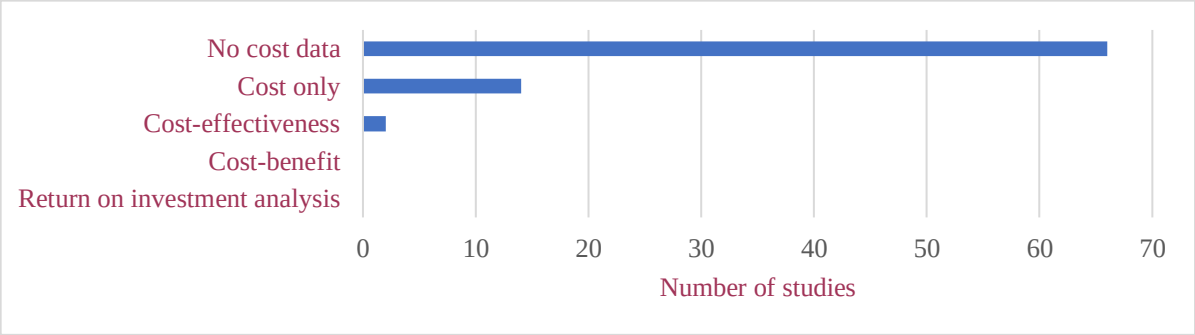
A majority of the included IEs (74; 90 per cent) used an experimental design in the form of RCTs, while the remaining 10 per cent applied different quasi-experimental designs as shown in Figure 14 below. Four IEs used the controlled before-and-after design, two studies utilized regression discontinuity, and of the remaining two studies, one adopted propensity score matching and the other a difference-in-difference design. No studies evaluated utilized the remaining study designs – namely, instrumental variable / two-stage least squares, interrupted time series analysis, Heckman, fixed effects or random effects estimation or via a natural experiment. Of the 82 IEs, only 20 per cent (16) reported cost data (Figure 15). Of these 16, 88 per cent (14) reported cost data only; 12 per cent performed a cost-effectiveness analysis. No IE reported return on investment analysis or cost–benefit analysis.

Figure 14. IEs by study design



Source: Authors
Note: No studies included in the evidence base adopted the following study designs: instrumental variable / two-stage least squares; interrupted time series analysis; Heckman; fixed effects or random effects estimation; and natural experiment.

Figure 15. IE cost data



Source: Authors

C. GAP ANALYSIS

Although the annual number of IEs for behavioural science interventions has steadily increased, the EGM identified numerous evidence gaps, as shown in Appendix 1B. Aside from the relatively low number of studies included in the map (attributable to the fact that in developing countries the field is relatively new and has received little attention to date), two key reasons can explain these evidence gaps.

- Behavioural science evaluations are complex and costly to undertake, especially in developing countries. As a result, fewer studies have been conducted in non-Annex 1 countries (mostly developing countries) than in high-income Annex 1 countries, which are outside the scope of this review.
- Some experts from the advisory group suggested that in some cases evaluations may not be publicly available. Limited public access to evaluations can hamper learning about the effectiveness of behavioural science interventions in relation to climate change adaptation and mitigation. The gaps in the EGM are categorized into evidence gaps, where we identified few or no studies, and "synthesis" gaps, where we identified a cluster of primary studies but no up-to-date or high-quality SRs (Snilstveit and others, 2017).

Finally, we highlight some "methodological" gaps that should be considered in future IEs.

1. EVIDENCE GAPS

The evidence base about the effects of behavioural science interventions in developing countries is fractured and unevenly distributed, with gaps in numerous interventions. Studies (IEs) focus on only close to half of the intervention categories: reminders, feedback, micro-incentives, salience in communication, goal setting, commitment devices, the salience of experience design, rules of thumb, social norms and social benchmarking. We observe evidence gaps characterized by few or no IEs within the remaining 12 intervention categories: planning prompts, group incentives, public commitments, framing devices, checklists, lotteries, defaults, reduce hassles, identity priming, anchoring, active choice and cognitive behavioural therapy.

While all outcomes are covered in the included evidence base, most included studies report on knowledge, uptake and use and behavioural outcomes, rather than development results and impact outcomes. The most identified knowledge, uptake and use outcomes are taking part in the intervention, knowledge of intervention and acquisition of knowledge. Starting behaviour, increasing behaviour and decreasing behaviour are the most reported outcomes in the behavioural

outcome domain. In the development results domain, the most reported outcomes are improved income and livelihood, supporting resource conservation and improved health outcomes. In terms of outcomes, gaps are identified in the following outcomes: change in technologies (9), sustainable supply chain management (3) and ending behaviour outcomes. Importantly, many more studies report on climate change adaptation rather than mitigation.

2. SYNTHESIS GAPS

We have identified several synthesis gaps – namely, the absence of SRs assessing intervention categories and/or clusters of IEs with no effectiveness SRs available. The two SRs included in the EGM did not cover the following interventions: salience (communication), rules of thumb, social benchmarking, group incentives, checklists, lotteries, defaults, anchoring, active choice or cognitive behavioural therapy. In order to formulate clear conclusions and generalizable findings, an SR is usually based on one or more clusters of studies with comparable interventions and outcomes. We find some clusters of IEs where there are no effectiveness SRs. The intervention categories covered by clusters of IEs with no effectiveness SRs include reminders (27), feedback (24), micro-incentives (20), salience in communication (16), commitment devices (14), goal setting (13) and salience of experience design (13).

3. METHODOLOGICAL GAPS

There is a lack of systematic reporting of cost data in the evidence base, including cost-effectiveness and cost–benefit analysis. Only 16 of the 82 included studies report cost data in some form, and 14 provide these data without any further cost–benefit, cost-effectiveness or return-on-investment analysis. The inclusion of data on the cost of an intervention is crucial to ensure that the evidence base is useful for decision makers who may need to consider costs and relative cost-effectiveness when deciding on intervention strategies. In any future studies, this gap in the characteristics of the existing evidence base should be addressed.

IV. CONCLUSIONS AND IMPLICATIONS

This EGM presents evidence on behavioural science interventions in the human and environmental fields in developing countries based on a systematic mapping strategy. Decision makers can use the results of this map to identify the key characteristics of available evidence and take this evidence into consideration when designing and commissioning interventions. Researchers and funders can consider filling in the evidence gaps by funding and conducting research on priority areas.

We found a total of 84 studies, constituting 82 completed IEs and 2 SRs. Despite the increasing number of IEs published each year, we found a number of evidence gaps within the interventions and outcome framework. Impact evaluations are relatively skewed towards sub-Saharan Africa and East Asia and the Pacific in lower-middle-income and upper-middle-income country contexts (relative to lower-income countries). A limited number of IEs were conducted in Europe and Central Asia, the Middle East and North Africa. In addition, one of the included SRs covered studies from East Asia and the Pacific, sub-Saharan Africa, Europe and Central Asia, and Latin America and the Caribbean.

Out of the 22 categories, the most commonly evaluated interventions were reminders (28), feedback (25), micro-incentives (20), salience in communication (16), commitment devices (14), salience of experience design (14), goal setting (13), rules of thumb (10), social norms (8) and social benchmarking (7). There are 12 intervention categories with no or few studies, which represent gaps – namely, planning prompts, group incentives, public commitments, framing devices, checklists, lotteries, defaults, reduce hassles, identity priming, anchoring, active choice and cognitive behavioural therapy.

While all the 18 outcomes are covered in the included evidence base, most included studies report on knowledge, uptake and use and behavioural outcomes rather than relative to development results and impact outcomes. Most studies are seen to measure or identify with the knowledge, uptake and use level of outcomes: taking part in intervention (82), knowledge of intervention (75), acquisition of knowledge (53) and changing attitudes (46), followed by increasing behaviour (63) and starting behaviour (48). The impact-level outcome is the third most reported, with 53 studies reporting adaptation outcome but only 18 studies reporting mitigation outcomes. Development results are the least reported outcomes level, with 27 studies reporting improved income and livelihoods, a further 27 reporting supporting resource conservation and 19 studies reporting improved health outcomes. Gaps are identified in the following outcomes and outcomes levels: change technologies (development results), sustainable supply chain management (development results), ending behaviour outcomes (behaviour outcomes) and no change in behaviour outcomes (behaviour outcomes).

One of the major reasons for the relative thinness of evidence in behavioural science interventions in developing countries is that behavioural science intervention evaluations are complex and costly to undertake. Another reason is that interventions are not specifically focused on studying behaviour and its evidence, which gets somewhat hidden in the intervention and is not always reported in studies and evidence. Most studies have been conducted in Annex 1 (high-income) countries because more resources are available to implement these interventions, but these countries are outside the scope of this review and are not included in the EGM.

A. SUGGESTIONS FOR POLICY AND PROGRAMMING

Decision makers and programme implementers can use this EGM when designing or implementing an intervention by considering the existing rigorous evidence. The map can help decision makers

learn lessons from completed research and avoid duplication of efforts. Hence, we suggest the following:

- When a new behavioural science intervention is commissioned and the map shows no existing evidence for that intervention, or evidence is lacking in that geographic area, consider including an impact evaluation when implementing the intervention, following the research implications presented in the following section.
- If no SRs are available, the findings from primary studies can be useful for programme design. However, because the results of one or several studies could not be generalized, they should be treated with caution. In using evidence from a single case evaluation, both IE experts and specialists in the sector should be consulted to assess the transferability of results to different contexts.
- If there is a cluster of evidence on the intervention of interest shown in the EGM and there is no high-confidence systematic review, consider commissioning a systematic review, ideally following guidelines that ensure the high confidence level of the results, as presented in the next section.

B. Suggestions for future research

Given challenges in conducting evaluations of the interventions and contexts discussed above, we found relatively few RCTs and quasi-experimental studies. As discussed above, numerous evidence gaps exist. When a new evaluation is being commissioned or designed, we suggest researchers and funders consider the following:

- Conducting an IE for one of the following intervention categories: planning prompts, group incentives, public commitments, framing devices, checklists, lotteries, defaults, reducing hassles, identity priming, anchoring, active choice and cognitive behavioural therapy.
- Applying the most rigorous experimental and quasi-experimental methods that suit the available data, intervention type and context.
- Evaluating more behavioural science interventions in developing countries across different regions.
- Measuring both mitigation and adaptation outcomes.
- Including cost data, a cost-effectiveness analysis, a cost–benefit analysis or a return-on-investment analysis in the evaluation.
- Making use of mixed-methods approaches to combine qualitative and quantitative evaluations for more holistic overviews of what affects intervention effectiveness.
- Making new evaluations publicly available so everyone can learn more about the effectiveness of these interventions.
- Recognizing the necessity of a “living map” or an update of this map in the near future, because the effectiveness evidence on behavioural science may change rapidly.

REFERENCES

Balmford, Andrew, and others (2021). Making more effective use of human behavioural science in conservation interventions. *Biological Conservation*, 261, 109256. Available at https://doi.org/10.1016/j.biocon.2021.109256.

Binet, Silvia, and others (2021). Independent evaluation of the adaptation portfolio and approach of the Green Climate Fund. Evaluation Report No. 9 (February). Songdo, South Korea: Independent Evaluation Unit, Green Climate Fund.

Bollinger, Bryan, Kenneth T. Gillingham and Marten Ovaere (2020). Field experimental evidence shows that self-interest attracts more sunlight. *Proceedings of the National Academy of Sciences*, 117(34), pp. 20503–20510.

Byerly, Hilary, and others (2018). Nudging pro-environmental behavior: evidence and opportunities. *Frontiers in Ecology and the Environment*, 16(3), pp. 159–168.

Cheng, Tania, Danielle Kathryn Woon and Jennifer K. Lynes (2011). The use of message framing in the promotion of environmentally sustainable behaviors. *Social Marketing Quarterly*, 17(2), pp. 48–62. Available at https://doi.org/10.1080%2F15245004.2011.570859.

Cinner, Joshua (2018). How behavioural science can help conservation. *Science*, 362(6417), pp. 889–890. Available at https://www.science.org/doi/10.1126/science.aau6028.

Collaboration for Environmental Evidence (2013). Guidelines for Systematic Review and Evidence Synthesis in Environmental Management. Version 4.2. Environmental Evidence. Available at https://environmentalevidence.org/wp-content/uploads/2014/06/Review-guidelines-version-4.2-final.pdf.

Datta, Saugato, and Sendhil Mullainathan (2014). Behavioural design: A new approach to development policy. *Review of Income and Wealth*, 60(1), pp. 7–35.

Duflo, Esther, Michael Kremer and Jonathan Robinson (2011). Nudging farmers to use fertilizer: Theory and experimental evidence from Kenya. *American Economic Review*, 101(6), pp. 2350–2390.

Ebeling, Felix, and Sebastian Lotz (2015). Domestic uptake of green energy promoted by opt-out tariffs. *Nature Climate Change*, 5(9), pp. 868–871.

Flanagan, Ann Elizabeth, and Jeffery Clark Tanner (2016). Evaluating behaviour change in international development operations: A new framework. IEG Working Papers. Washington, D.C.: World Bank.

Frey, Carl Benedikt (2019). *The technology trap: Capital, labor and power in the age of automation*. Princeton, NJ: Princeton University Press.

Gifford, Robert, Christine Kormos and Amanda McIntyre (2011). Behavioural dimensions of climate change: Drivers, responses, barriers, and interventions. *Wiley Interdisciplinary Reviews: Climate Change*, 2(6), pp. 801–827.

Global Commission on Adaptation (2019). *Adapt now: A global call for leadership on climate resilience. Global Commission on Adaptation.* Washington, DC: Global Center on Adaptation and World Resources Institute. Available at https://gca.org/reports/adapt-now-a-global-call-for-leadership-on-climate-resilience/.

Goette, Lorenz, Ching Leong and Neng Qian (2019). Motivating household water conservation: A field experiment in Singapore. *PLoS One*, 14(3), e0211891.

Hallsworth, Michael, and others (2017). The behaviouralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148, pp. 14–31.

Hollands, Gareth J., and others (2017). The TIPPME intervention typology for changing environments to change behaviour. *Nature Human Behaviour*, 1(8), pp. 1–9.

Hyland-Wood, Bernadette, and others (2021). Toward effective government communication strategies in the era of COVID-19. *Humanities and Social Sciences Communications*, 8(1), pp. 1–11.

Intergovernmental Panel on Climate Change (2007a). *Climate change 2007: Synthesis report. Contribution of working groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Core Writing Team, Pachauri, R.K and Reisinger, A., eds. Geneva. Available at https://www.ipcc.ch/report/ar4/syr/.

_____ (2007b). *Climate change 2007: The physical science basis: Working Group I contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (vol. 4)*, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller, eds. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. Available at https://www.ipcc.ch/report/ar4/wg1/.

_____ (2014). Summary for policymakers. In *Climate change 2014: Mitigation of climate change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx, eds. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_summary-for-policymakers.pdf.

Kahan, Dan M., and others (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change*, 2(10), pp. 732–735.

Kollmuss, Anja, and Julian Agyeman (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), pp. 239–260. Available at https://doi.org/10.1080/13504620220145401.

Krüger, Cornelius, and Jyotsna Puri (2020). Going the last mile: Behavioural science and investments in climate change mitigation and adaptation. Learning Paper No. 3 (November). Songdo, South Korea: Independent Evaluation Unit, Green Climate Fund.

Kusmanoff, Alexander M., and others (2020). Five lessons to guide more effective biodiversity conservation message framing. *Conservation Biology*, 34(5), pp. 1131–1141.

Liebe, Ulf, Jennifer Gewinner and Andreas Diekmann (2021). Large and persistent effects of green energy defaults in the household and business sectors. *Nature Human Behaviour*, 5(5), pp. 576–585. Available at https://doi.org/10.1038/s41562-021-01070-3.

Moher, David, Alessandro Liberati and others (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, 151 (4), pp. 64-269.

Nisa, Claudia F., and others (2019). Meta-analysis of randomised controlled trials testing behavioural interventions to promote household action on climate change. *Nature Communications*, 10(1), pp. 1–13.

Organisation for Economic Co-operation and Development (2017). Behavioural insights and public policy: Lessons from around the world. Paris: OECD Publishing. Available at https://www.oecd.org/gov/regulatory-policy/behavioural-insights-and-public-policy-9789264270480-en.htm.

Osbaldiston, Richard, and John Paul Schott (2012). Environmental sustainability and behavioural science: Meta-analysis of pro-environmental behavior experiments. *Environment and Behavior*, 44(2), pp. 257–299. Available at https://doi.org/10.1177%2F0013916511402673.

Schmuck, Peter, and Wesley P. Schultz (2012). *Psychology of Sustainable Development*. Berlin: Springer Science and Business Media.

Schot, Johan, Laur Kanger and Geert Verbong (2016). The roles of users in shaping transitions to new energy systems. *Nature Energy*, 1(5), pp. 1–7.

Schubert, Christian (2017). Green nudges: Do they work? Are they ethical? *Ecological Economics*, 132, pp. 329–342. Available at https://doi.org/10.1016/j.ecolecon.2016.11.009.

Schultz, Wesley P. (2011). Conservation means behavior. *Conservation Biology*, 25(6), pp. 1080–1083.

Service, Owain, and others (2014). EAST: Four simple ways to apply behavioural insights. The Behavioural Insights Team. Available at *https://www.bi.team/publications/east-four-simple-ways-to-apply-behavioural-insights/*.

Snilstveit, Birte, and others (2016). Evidence and gap maps: a tool for promoting evidence informed policy and strategic research agendas. *Journal of Clinical Epidemiology*, 79, pp.120–129. Available at *https://doi.org/10.1016/j.jclinepi.2016.05.015*.

Snilstveit, Birte, and others (2017). 3ie evidence gap maps: A starting point for strategic evidence production and use. Working Paper No. 38. New Delhi: International Initiative for Impact Evaluation (3ie).

Stern, Paul C. (2020). A re-examination on how behavioural interventions can promote household action to limit climate change. *Nature Communications*, 11(1), 1–3.

Stoknes, Per Espen (2014). Rethinking climate communications and the "psychological climate paradox". *Energy Research & Social Science*, 1, pp. 161–170. Available at *https://doi.org/10.1016/j.erss.2014.03.007*.

Szaszi, Barnabas, and others (2018). A systematic scoping review of the choice architecture movement: Toward understanding when and why nudges work. *Journal of Behavioural Decision Making*, 31(3), pp. 355–366.

Thaler, Richard H., and Cass R. Sunstein (2009). *Nudge: Improving decisions about health, wealth, and happiness.* New York, NY: Penguin Random House.

United Nations Environment Programme (2017). *The emissions gap report 2017. Synthesis report.* Nairobi: United Nations Environment Programme. Available at *https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR_2017.pdf*.

Van der Linden, Sander, Edward Maibach and Anthony Leiserowitz (2015). Improving public engagement with climate change: Five "best practice" insights from psychological science. *Perspectives on Psychological Science*, 10(6), pp. 758–763.

Wade, Keith, and Marcus Jennings (2015). Climate change and the global economy: Regional effects. Available at *https://www.schroders.com/en/ch/asset-management/insights/economics/climate-change-and-the-global-economy-regional-effects/*.

Williamson, Katie, and others (2018). Climate change needs behavior change: Making the case for behavioural solutions to reduce global warming. Arlington, VA: Rare. Available at *https://rare.org/report/climate-change-needs-behavior-change/.*

Studies included in the EGM

Agarwal, Shilpa, Valentina Brailovskaya and Jonathan Robinson (2020). Saving for multiple financial needs: Evidence from lockboxes and mobile money in Malawi. *The Review of Economics and Statistics*, pp. 1–45.

Agarwal, Sumit, and others (2017). Nudges from school children and electricity conservation: Evidence from the "Project Carbon Zero" campaign in Singapore. *Energy Economics*, 61, pp. 29–41.

Agarwal, Sumit, and others (2017). *The role of goals and real-time feedback in resource conservation: Evidence from a large-scale field experiment.* Singapore: National University of Singapore.

Aguinaga, Paulina, and others (2019). Raising achievement among microentrepreneurs: An experimental test of goals, incentives, and support groups in Medellin, Colombia. *Journal of Economic Behavior and Organization*, 161, pp. 79–97.

Aker, Jenny C., and others (2020). Just a bit of cushion: The role of a simple savings device in meeting planned and unplanned expenses in rural Niger. *World Development*, 128, 104772.

Amon-Tanoh, Maud A., and others (2021). Effects of a social norm-based handwashing intervention including handwashing stations, and a handwashing station-only intervention on handwashing with soap in urban Côte d'Ivoire: a cluster randomised controlled trial. *The Lancet Global Health*, 9(12), pp. e1707– e1718.

Andres, Luis, and others (2020). A multiple-arm, cluster-randomized impact evaluation of the Clean India (Swachh Bharat) Mission program in rural Punjab, India. Policy Research Working Paper (9249). Washington, D.C.: World Bank.

Apisarnthanarak, Anucha, Thanee Eiamsitrakoon and Linda M. Mundy (2015). Behavior-based interventions to improve hand hygiene adherence among intensive care unit healthcare workers in Thailand. *Infection Control and Hospital Epidemiology*, 36(5), pp. 517–521.

Ashraf, Nava, Dean Karlan and Wesley Yin (2005). Tying Odysseus to the mast: Evidence from a commitment savings product in the Philippines. *The Quarterly Journal of Economics*, 121(2), pp. 635–672.

_____(2010). Female empowerment: Impact of a commitment savings product in the Philippines. *World Development*, 38(3), pp. 333–344.

Aulady, Mohamad F.N., and Toshio Fujimi (2021). Reminders for learning about flood risk preparedness in Indonesian poor villages: Parallel group in situ randomized controlled trial. *Natural Hazards Review*, 22(3), 04021020.

Avdeenko, Alexandra, Albrecht Bohne and Markus Frölich (2019). Linking savings behavior, confidence and individual feedback: A field experiment in Ethiopia. *Journal of Economic Behavior and Organization*, 167, pp. 122–151.

Bahinipati, Chandra S., and P.K. Viswanathan (2019). Incentivizing resource efficient technologies in India: Evidence from diffusion of micro-irrigation in the dark zone regions of Gujarat. *Land use policy*, 86, pp. 253–260.

Blumenstock, Joshua Evan, Michael Callen and Tarek Ghani (2016). *Mobile-izing savings with automatic contributions: Experimental evidence on present bias and default effects in Afghanistan.* Discussion Paper. London: London Centre for Economic Policy Research.

Brick, Kerri, Samantha De Martino and Martine Visser (2017). Behavioural nudges for water conservation: Experimental evidence from Cape Town. Preprint.

Brune Lasse, and others (2011). Commitments to save: A field experiment in rural Malawi. Policy Research Working Paper (5748). Washington, DC: World Bank.

Brune, Lasse, and others (2017). Savings defaults and payment delays for cash transfers: Field experimental evidence from Malawi. *Journal of Development Economics*, 129, pp. 1–13.

Burns, Justine, Brendan Maughan Brown, and Âurea Mouzinho (2018). Washing with hope: Evidence of improved handwashing among children in South Africa from a pilot study of a novel soap technology. *BMC Public Health*, 18(1), pp. 1–13.

Carrión-Yaguana, Vanessa D., Jeffrey Alwang and Victor H. Barrera (2020). Promoting behavioural change using text messages: A case study of blackberry farmers in Ecuador. *Journal of Agricultural and Applied Economics*, 52(3), pp. 398–419.

Casaburi, Lorenzo, and others (2014). *Harnessing ICT to increase agricultural production: Evidence from Kenya.* Working Paper. Cambridge, MA: Harvard University.

Chong, Aalberto, and others (2015). (Ineffective) messages to encourage recycling: Evidence from a randomized evaluation in Peru. *The World Bank Economic Review*, 29(1), pp. 180–206. Washington, DC: World Bank.

Cole, Shawn Allen, Mukta Joshi and Antoinette Schoar (2021). Heuristics on call: The impact of mobile phone-based business management advice. Available at *https://ssrn.com/abstract=3971013*.

Coville, Aidan, and others (2019). The Nollywood nudge: An entertaining approach to saving. Policy Research Working Paper (8920). Washington, DC: World Bank.

Dalla Pellegrina, Lucia, and others (2021). Fostering savings by commitment: Evidence from a quasi-natural experiment at The Small Enterprise Foundation in South Africa. *World Development*, 148, 105660.

Datta, Saugato, and others (2015). A behavioural approach to water conservation: Evidence from Costa Rica. Policy Research Working Paper No. 7283. Washington, DC: World Bank.

de Leon Barido, Diego Ponce, and others (2018). Opportunities for behavioural energy efficiency and flexible demand in data-limited low-carbon resource constrained environments. *Applied Energy*, 228, pp. 512–523.

Drexler, Alejandro, Greg Fischer and Antoinette Schoar (2014). Keeping it simple: Financial literacy and rules of thumb. *American Economic Journal: Applied Economics*, 6(2), pp. 1–31.

Duflo, Esther, Michael Kremer and Jonathan Robinson (2009). Nudging farmers to utilize fertilizer: Theory and experimental evidence from Kenya. *American Economic Review*, 101(6), pp. 2350–2390.

Dzanku, Fred Mawunyo, Robert Osei and Isaac Osei-Akoto (2021). The impact of mobile phone voice message reminders on agricultural outcomes in Mali. *Agricultural Economics*, 52(5), pp. 789–806.

Eisenbarth, Sabrina, Louis Graham and Anouk S. Rigterink (2021). Can reminders of rules induce compliance? Experimental evidence from a common pool resource setting. *Environmental and Resource Economics*, 79(4), pp. 653–681.

Figueroa, Aurelia, and others (2019). Show me (more than) the money! Assessing the social and psychological dimensions to energy efficient lighting in Kenya. *Energy Research and Social Science*, 47, pp. 224–232.

Fiorillo, Alexandra, and others (2014). Applying behavioural economics to improve micro-savings outcomes. Washington, DC: ideas42; Grameen Foundation.

Freeman, Matthew C., and others (2020). Impact of a demand-side integrated WASH and nutrition community-based care group intervention on behavioural change: a randomised controlled trial in western Kenya. *BMJ Global Health*, 5(11), e002806.

Goette, Lorenz, Ching Leong and Neng Qian (2019). Motivating household water conservation: A field experiment in Singapore. *PLoS One*, 14(3), e0211891.

Grohmann, Antonia, Tabea Lakemann and Helke Seitz (2020). Savings goal calendars as soft commitment devices: Evidence from small business owners in Uganda. Discussion Paper No. 1919. Berlin: DIW Berlin.

Grover, Elise, and others (2018). Comparing the behavioural impact of a nudge-based handwashing intervention to high-intensity hygiene education: a cluster-randomised trial in rural Bangladesh. *Tropical Medicine and International Health*, 23(1), pp. 10–25.

Huang, Haijing Crystal, and others (2021). Nudging handwashing among primary school students in the Philippines: Evidence from a cluster randomized trial. *The American Journal of Tropical Medicine and Hygiene*, 105(6), pp. 1806–1815.

Islam, Mahnaz, and Sabrin Beg (2021). Rule-of-thumb instructions to improve fertilizer management: Experimental evidence from Bangladesh. *Economic Development and Cultural Change*, 70(1), pp. 237–281.

Jung, Miyeon, Daegon Cho and Euncheol Shin (2021). Repairing a cracked mirror: The heterogeneous effect of personalized digital nudges driven by misperception. *Production and Operations Management*, 30(8), pp. 2586–2607.

Karlan, Dean, and others (2016). Getting to the top of mind: How reminders increase saving. *Management Science*, 62(12), pp. 3393–3411.

Kast, Felipe, Stephan Meier and Dina Pomeranz (2012). Under-savers anonymous: Evidence on self-help groups and peer pressure as a savings commitment device. Working Paper No. 18417. Cambridge, MA: National Bureau of Economic Research.

Kast, Felipe, Stephan Meier and Dina Pomeranz (2018). Saving more in groups: Field experimental evidence from Chile. *Journal of Development Economics*, 133, pp. 275–294.

Kim, Jin Han, and Michaell Kaemingk (2021). Persisting effects of social norm feedback letters in reducing household electricity usage in post-Soviet Eastern Europe: A randomized controlled trial. *Journal of Economic Behavior and Organization*, 191, pp. 153–161.

Kimmich, Christian (2013). Incentives for energy-efficient irrigation: Empirical evidence of technology adoption in Andhra Pradesh, India. *Energy for Sustainable Development*, 17(3), pp. 261–269.

Klege, Rebecca A., and others (2018). Behavioural nudges, a non-residential case of energy conservation: Evidence from the 4th Dorp Street building in the Western Cape. Research Paper. Cape Town, South Africa: University of Cape Town School of Economics.

Klege, Rebecca, and others (2022). The power of nudging: Using feedback, competition, and responsibility assignment to save electricity in a non-residential setting. *Environmental and Resource Economics*, 81, pp. 573–589.

Kua, H.W., and S.E. Wong (2012). Lessons for integrated household energy conservation policies from an intervention study in Singapore. *Energy Policy*, 47, pp. 49–56.

Kumar, Ramesh, Ratana Somrongthong and Jamil Ahmed (2016). Impact of waste management training intervention on knowledge, attitude and practices of teaching hospital workers in Pakistan. *Pakistan Journal of Medical Sciences*, 32(3), 705.

Larochelle, Catherine, and others (2019). Did you really get the message? Using text reminders to stimulate adoption of agricultural technologies. *The Journal of Development Studies*, 55(4), pp. 548–564.

Li, Zhaungai, and Xia Cao (2021). Analysis of information feedback on residential energy conservation and the implications: The case of China. *Frontiers in Environmental Science*, 9.

Lilje, Jonathan, and Hans-Joachin Mosler (2018). Effects of a behavior change campaign on household drinking water disinfection in the Lake Chad basin using the RANAS approach. *Science of the Total Environment*, 619, pp. 1599–1607.

Ling, Maoliang, and Lin Xu (2021). How and when financial incentives crowd out pro-environmental motivation: A longitudinal quasi-experimental study. *Journal of Environmental Psychology*, 78, 101715.

Ling, Maoliang, and Lin Xu (2021). Incentivizing household recycling crowds out public support for other waste management policies: A long-term quasi-experimental study. *Journal of Environmental Management*, 299, 113675.

Lipscomb, Molly, and Laura Schechter (2018). Subsidies versus mental accounting nudges: Harnessing mobile payment systems to improve sanitation. *Journal of Development Economics*, 135, pp. 235–254.

Liu, X., and others (2019). A multimodal intervention to improve hand hygiene compliance via social cognitive influences among kindergarten teachers in China. *PLoS One,* 14(5), e0215824.

Liu, Y., H.W. Kua and Y. Lu (2021). Spillover effects from energy conservation goal-setting: A field intervention study. *Resources, Conservation and Recycling*, 170, 105570.

Luoto, Jill, and others (2014). Nudging to use: Achieving safe water behaviors in Kenya and Bangladesh. *Journal of Development Economics,* 110, pp. 13–21.

Manaseki-Holland, Semira, and others (2021). Effects on childhood infections of promoting safe and hygienic complementary-food handling practices through a community-based programme: A cluster randomised controlled trial in a rural area of The Gambia. *PLoS Medicine*, 18(1), e1003260.

Mi, Lingyun, and others (2019). Using goal and contrast feedback to motivate Chinese urban families to save electricity actively – A randomized controlled field trial. *Journal of Cleaner Production*, 226, pp. 443–453.

Miranda, Juan J., Saugato Datta and Laura Zoratto (2020). Saving water with a nudge (or two): evidence from Costa Rica on the effectiveness and limits of low-cost behavioural interventions on water use. *The World Bank Economic Review*, 34(2), pp. 444–463.

Morgan, Tessa., Lisa A. Williams, and Merryn Gott (2016). A feminist quality appraisal tool: Exposing gender bias and gender inequities in health research. *Critical Public Health*, 27(2), pp.263-274.

Naluonde, Tabonga, and others (2018). A disruptive cue improves handwashing in school children in Zambia. *Health Promotion International*, 34(6), pp. e119–e128.

Newman, Carol, and others (2019). Group incentives for the public good: A field experiment on improving the urban environment. Policy Research Working Paper (9087). Washington, DC: World Bank.

Nisa, Claudia F., and others (2019). Meta-analysis of randomised controlled trials testing behavioural interventions to promote household action on climate change. *Nature Communications*, 10(1), pp. 1–13.

Nourmoradi, Heshmatollah, and others (2021). The influence of an education program on students' environmental responsibility in developing countries: Evidence from Iran. *Journal of Human Behavior in the Social Environment*, pp. 1–11.

Pandur, Vlad, and Patricia Albulescu (2016). How to promote pro-environmental behaviour in organizations: The message matters. *Psihologia Resurselor Umane*, 14(1), 69–82.

Ritter, Michael, and others (2020). Impact evaluation of an SMS campaign to promote household chlorination in rural Haiti. *Water*, 12(11), 3095.

Ruiz-Tagle, J.C., and Alejandra Schueftan (2021). Nudging for cleaner air: Experimental evidence from an RCT on wood stove usage. *Environmental and Resource Economics*, 79(4), pp. 713–743.

Shah, Avni, and others (2020). Can making family salient increase retirement savings? Evidence from a large-scale field experiment. Available at *https://ssrn.com/abstract=3460722*.

Sharma, Upasna, and others (2021). Do phone-based short message services improve the uptake of agri-met advice by farmers? A case study in Haryana, India. *Climate Risk Management*, 33, 100321.

Soman, Dilip, and Amar Cheema (2011). Earmarking and partitioning: Increasing saving by low–income households. *Journal of Marketing Research*, 48(SPL), S14–S22.

Sudarshan, Anant (2017). Nudges in the marketplace: The response of household electricity consumption to information and monetary incentives. *Journal of Economic Behavior and Organization*, 134, pp. 320–335.

Sukor, Nur S.A., Nur K. Basri and Sitti A. Hassan (2015). Travel behaviour modification technique – A framework for awareness on carbon footprint towards adolescents in developing country. *Jurnal Teknologi*, 76(14).

Thondhlana, G., and H.W. Kua (2016). Promoting household energy conservation in low-income households through tailored interventions in Grahamstown, South Africa. *Journal of Cleaner Production*,131, pp. 327–340.

Tidwell, James B., and others. (2020). Impact of a teacher-led school handwashing program on children's handwashing with soap at school and home in Bihar, India. *PLoS One*, 15(2), e0229655.

Torres, Mónica M.J., and Fredrik Carlsson (2016). Social norms and information diffusion in water-saving programs: Evidence from a randomized field experiment in Colombia. Environment for Development Initiative.

Torres, Mónica M.J., and Fredrik Carlsson (2018). Direct and spillover effects of a social information campaign on residential water-savings. *Journal of Environmental Economics and Management*, 92, pp. 222–243.

Usmani, Faraz, Jason Steele and Marc Jeuland (2017). Can economic incentives enhance adoption and use of a household energy technology? Evidence from a pilot study in Cambodia. *Environmental Research Letters*, 12(3), 035009.

Visser, Martine and others (2021). Saving water at Cape Town schools by using smart metering and behavioural change. *Water Resources and Economics*, 34, 100175.

Wang, Julia S.H., and others (2018). Effects of financial incentives on saving outcomes and material well-being: evidence from a randomized controlled trial in Uganda. *Journal of Policy Analysis and Management*, 37(3), pp. 602–629.

Wang, Julia S.H., and others (2021). A multifaceted intervention with savings incentives to reduce multidimensional child poverty: Evidence from the Bridges Study (2012–2018) in rural Uganda. *Social Indicators Research*, 158(3), pp. 947–990.

Wang, Meng, and others (2021). Promoting support for carbon capture and storage with social norms: Evidence from a randomized controlled trial in China. *Energy Research and Social Science*, 74, 101979. Available at *https://doi.org/10.1016/j.erss.2021.101979*.

Watson, Julie, and others (2021). Effectiveness of behaviour change techniques used in hand hygiene interventions targeting older children–A systematic review. *Social Science and Medicine*, 281, 114090. Available at *https://doi.org/10.1016/j.socscimed.2021.114090*.

Welch, Vivian, and others (2017). Reporting of sex and gender in randomized controlled trials in Canada: a cross-sectional methods study. *Research integrity and peer review*, 2(1), pp.1-11.

Wichaidit, Wit, and others (2020). Installation of pedal-operated alcohol gel dispensers with behavioural nudges and changes in hand hygiene behaviors during the COVID-19 pandemic: A hospital-based quasi-experimental study. *Journal of Public Health Research*, 9(4), 1863. Available at *https://doi.org/10.4081/jphr.2020.1863*.

Yamin, Paulius, and others (2020). Local determinants of driving behaviours: Installation Theory interventions to reduce fuel consumption among truck drivers in Colombia. *Transport*, 35(6), pp. 616–634. Available at *https://doi.org/10.3846/transport.2020.14195*.

Young, Carrie E. (2017). The impact of narrative and participatory drama on social interactions, attitudes, and efficacy around health and environmental issues in Malawi. PhD diss. Ithaca, NY: Cornell University.

APPENDICES

Appendix 1. INTERVENTION–OUTCOME FRAMEWORK

A. INTERVENTION–OUTCOME FRAMEWORK MATRIX

			Outcomes																	
			Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
			Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
Interventions	**How?**	Checklists																		
		Reduce hassles																		
		Rules of thumb																		
		Commitment devices																		

		OUTCOMES																
		Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
		Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
Why?	Micro-incentives																		
	Group incentives																		
	Lotteries																		
	Anchoring																		
	Framing devices																		

			Outcomes																	
			Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
			Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
Who?		Identity priming																		
		Public commitments																		
		Social norms																		
		Social benchmarking																		

			Outcomes																	
			Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
			Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
When?		Cognitive behavioural therapy																		
		Reminders																		
		Planning prompts																		
		Feedback																		

			Outcomes																	
			Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
			Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
Which?	Active choice																			
	Salience (communication)																			
	Salience (experience design)																			

			Outcomes																
			Intermediate outcomes (knowledge, uptake and use)				**Behavioural outcomes**					**Development results**							**Socioecological systems development (includes human well-being)**	
			Know of intervention	Take part in intervention	Acquire knowledge	Change attitudes	Start behaviour	Increase behaviour	Decrease behaviour	End behaviour	No change in behaviour	Enhance equity	Support resource conservation	Changing technologies	Improve health	Improve income and livelihoods	Sustainable supply chain management and transport	Sustainable waste management	Mitigation	Adaptation
		Goal setting																		
		Defaults																		

B. EVIDENCE GAP MAP VISUALIZATION

Appendix 2. SUMMARY OF INCLUSION AND EXCLUSION CRITERIA ORGANIZED USING THE PICOS (POPULATION, INTERVENTION, OUTCOME, COMPARISON, STUDY DESIGN) MODEL

The below tables present a summary of our inclusion criteria for the EGM. They are intended for illustration and do not present an exhaustive outline of the inclusion criteria.

INCLUDED	INCLUSION DESCRIPTION	EXCLUDED
Population	1) Studies that focus on behavioural science interventions in: a) Non-Annex 1 countries b) For primary studies non-Annex Annex 1, and Annex 1 countries (jointly) if analyses distinguish effects across the two samples c) SRs are included in the EGM either if data is aggregated for non-Annex 1 countries relative to Annex 1 or if there is at least a single primary study included that is from non-Annex 1 countries 2) English-language literature 3) Publication date: 2000 onwards	1) Studies that focus on behavioural science interventions in: a) Annex 1 countries only for both primary studies and SRs b) Primary studies with a combination of both non-Annex 1 and Annex 1 countries if analysis does not distinguish the two samples 2) Non-English-language literature 3) Studies published before the year 2000
Interventions	Bisectoral focus on the environmental sector and human development sector. a) Delivered at any administrative level b) Administered to any type of beneficiary (e.g. individual, household) c) By any type of actor (e.g. government, non-governmental organization) These interventions include the following behavioural tools: checklists, reduce hassles, rules of thumb, commitment devices, micro-incentives, group incentives, lotteries, framing devices, identity priming, public commitments, social norms, social benchmarking, cognitive behavioural therapy, reminders, planning prompts, feedback, active choice, salience (communication), salience (experience design), goal setting and defaults. Studies looking at behavioural science interventions with different a) modes of delivery; doses; durations; intensities; co-interventions b) degree of complexity; sample sizes	1) Interventions not in the environmental or human development sectors 2) Interventions focusing on trainings, capacity-building initiatives or farmer field schools
Comparator	Studies that identify a comparison/control group	1) Descriptive/predictive analyses without a clear comparison/control group

INCLUDED	INCLUSION DESCRIPTION	EXCLUDED
		2) Methods that do not utilize comparison/control groups (e.g. life-cycle assessment)
Outcomes	Outcomes measured at a reasonable time after the onset of intervention following the behavioural science intervention leading to changes in intermediate outcomes (change in attitudes), final outcomes (behaviour change), development-related outcomes or socioecological systems development outcomes. A range of outcomes measured at the individual, household, community and company level. Outcomes are organized into the following categories and subcategories: 1) Intermediate outcomes Know of intervention, take part in intervention, acquire knowledge, change in attitudes 2) Final outcomes Start behaviour, increase behaviour, decrease behaviour, end behaviour, no change in behaviour 3) Development results Enhance equity, support resource conservation, changing technologies, improve health, improve income and livelihoods, sustainable waste management, sustainable supply chain management and transport 4) Impact a) Socioecological systems development b) Mitigation, adaptation	1) Any outcomes not meeting the stated criteria
Study design	1) Impact evaluations (experimental, quasi-experimental). For example: a) Randomized controlled trials b) Difference-in-differences design c) Regression discontinuity design d) Instrumental variable design e) Propensity score matching designs 2) Systematic reviews	1) Non-counterfactual impact evaluation designs 2) Non-systematic literature review

Appendix 3. SEARCH TERMS

A. COUNTRY

Africa OR Asia OR Caribbean OR "West Indies" OR "South America" OR "Latin America" OR "Central America" OR Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Azerbaijan OR Bahamas OR Bahrain OR Bangladesh OR Barbados OR Benin OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Darussalam OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cabo Verde" OR "Cape Verde" OR "Central African Republic" OR CAR OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR "Cook Islands" OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus OR Czechoslovakia OR "Czech Republic" OR Slovakia OR "Slovak Republic" OR Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Eswatini OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Georgia OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Haiti OR Honduras OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Israel OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Latvia OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Maldives OR Malawi OR Nyasaland OR Mali OR Mauritania OR Mauritius OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Mocambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nauru OR Nepal Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Niue OR Oman OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico" OR Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Sao Tome" OR Principe OR "Saudi Arabia" OR Senegal OR Serbia OR Montenegro OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Singapore OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria* OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Tuvalu OR Uganda OR Ukraine OR "United Arab Emirates" OR UAE OR Uruguay OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe OR "developing country" OR "developing countries" OR "developing nation" OR "developing nations" OR "developing world" OR "less-developed countr*" OR "less developed countr*" OR "less-developed world" OR "less-developed world" OR "lesser-developed countr*" OR "lesser developed countr*" OR "lesser-developed nation" OR "lesser developed nation*" OR "lesser developed world" OR "lesser-developed world" OR "under-developed countr*" OR "under developed countr*" OR "under-developed nation*" OR "under developed nation*" OR "under-developed world" OR "underdeveloped world" OR "under developed world" OR "underdeveloped countr*" OR "under-developed countr*" OR "Under developed countr*" OR

"under developed nation*" OR "under-developed nation*" OR "underdeveloped nation*" OR "lower middle income countr*" OR "lower middle-income countr*" OR "lower middle income nation*" OR "lower middle-income nation*" OR "upper middle-income countr*" OR "upper middle income countr*" OR "upper middle-income nation*" OR "upper middle income nation*" OR "low-income countr*" OR "low income countr*" OR "low-income nation*" OR "low income nation*" OR "lower income countr*" OR "lower-income countr*" OR "lower income nation*" OR "lower-income nation*" OR "Low- and Middle- Income countr*" OR "Low and Middle Income Countr*" OR "underserved country" OR "underserved countries" OR "underserved nation" OR "underserved nations" OR "underserved world" OR "under served country" OR "under served countries" OR "under served nation" OR "under served nations" OR "under served world" OR "deprived country" OR "deprived countries" OR "deprived nation" OR "deprived nations" OR "deprived world" OR "poor country" OR "poor countries" OR "poor nation" OR "poor nations" OR "poor world" OR "poorer country" OR "poorer countries" OR "poorer nation" OR "poorer nations" OR "poorer world" OR "developing economy" OR "developing economies" OR "less developed economy" OR "less developed economies" OR "lesser developed economy" OR "lesser developed economies" OR "under developed economy" OR "under developed economies" OR "underdeveloped economy" OR "underdeveloped economies" OR "middle income economy" OR "middle income economies" OR "low income economy" OR "low income economies" OR "lower income economy" OR "lower income economies" OR lmic OR lmics OR "third world" OR "lami country" OR "lami countries" OR "transitional country" OR "transitional countries" LMIC OR LMICs OR LIC OR LICs OR UMICs OR UMIC OR ("khmer" AND "republic") OR ("cape" AND "verde") OR ("central" AND "african" AND "republic")

B. Methodology

"Systematic review*" OR "longitudinal stud*" OR "impact stud*" OR "Impact evaluation*" OR "comparison stud*" OR "Longitudinal Analysis*" OR "impact analysis" OR "random* control* trial*" OR "random* trial*" OR "comparison group*" OR "control group*" OR "control* treatment" OR RCT OR "program* evaluation*" OR "experimental control*" OR "comparative analysis" OR Quasi-experiment* OR "project apprais*" OR "cluster random* trial*" OR "propensity score matching" OR PSM OR "propensity weight*" OR "regression discontinuity design" OR "difference* in difference*" OR "diff in diff" OR "diff-in-diff" OR "meta-analy*" OR "meta analy*" OR "control* random* trial*" OR "interrupted time series" OR "random* allocation*" OR "instrumental variable*" OR "research synthesis" OR "rapid evidence assessment*" OR "systematic literature review*" OR QED OR "intervention group*" OR "controlled stud*" OR "comparative stud*" "Quasi-experiment*" OR "quasi experiment" OR "experimental group*" OR "control community" OR "intervention commun*" OR "control communities" OR "intervention condition*" OR "control* condition*" OR "control participant*" OR "experimental condition*" OR counterfactual OR "discontinu* design" OR "fixed effect*" OR "double differenc*" OR "panel data" OR "double robust" OR "pipeline approach" OR "pipeline method" OR "pipeline comparison" OR "impact assessment" OR "econometric analys*" OR "cross-sectional data" OR "fixed effect*" OR "rapid evidence assessment*" OR "heckman*" OR "counterfactual" OR "counter factual" OR "counter-factual" OR "control* evaluation" OR "randomized field" OR "randomised field"

C. Interventions

1. Active choice, commitments and goal setting

"choice architecture" OR "active choice" OR "default bias" "status quo bias" OR "pre-set option" OR "opt-out" OR "proxy measure" OR "advance directive*" OR "implementation intention*" OR "checklist" OR "check-list" OR "goal setting" OR "cue*" OR "anchor*" OR "earmarking" OR "reference point*" OR "framing" OR "commitment"

2. Incentives and lotteries

"incentive*" OR "reward" OR "award" OR "gift" OR "coupon" OR "discount" OR "disincentive" OR "lotter*" OR "penal*" OR "reinforc*" OR "token" OR "voucher" OR "payment" OR "forfeit"

3. Priming, feedback, reminders and salience

"priming" OR "nudge*" OR "nudging" OR "advice*" OR "guidance" OR "caution*" OR "urging answer" OR "solution pointer" OR "label*" OR "feedback" OR "prompt*" OR "remind*" OR "salience" OR "confirmation bias" OR "peak-end effect" OR "timing effect" OR "attention effect" OR messenger

4. Social norms and benchmarking, rule of thumb

"norm*" OR "social proof" OR "herd mentality" OR "network effect*" OR "social benchmarking" OR "goal-framing" OR "goal framing" OR "neighbourhood effect*" OR "peer effect*" OR "social comparison" OR "heuristic" OR "rule of thumb" OR "group feedback"

5. Cognitive behavioural therapy and reducing hassles

"cognitive behavioural therapy" OR "psychotherapy" OR "self-control" OR "emotional intelligence" OR "meta-cognition" OR "check-in" OR "check in" OR "retrospective activity" OR "introspective activity" OR "administrative burden" OR "compliance" OR "intention-action gap" OR "procedural barrier" OR "processual barrier" OR "hassle*"

6. Behavioural science concepts

"behaviour* science" OR "behaviour* economic*" OR "behaviour* lever*" OR "behaviour* insight*" OR "behavior* science" OR "behavior* economic*" OR "behavior* lever*" OR "behaviour* insight*" OR "action bias" OR "affect heuristic" OR "altruism" OR "ambiguity aversion" OR "bounded rationality" OR "certainty effect*" OR "possibility effect*" OR "choice overload" OR "Chunking" OR "cognitive dissonance" OR "cognitive bias" OR "control premium" OR "decision fatigue" OR "decision staging" OR "decoy effect" OR "disposition effect" OR "diversification bias" OR "Hedonic adaptation" OR "Herd behaviour" OR "Herd behavior" OR "Homo economicus"

Appendix 4. SEARCH SOURCES

DATABASE TYPE	NAME OF DATABASE	RESULTS
Academic	Centre for Agricultural Bioscience International Abstracts	3,291
	PubMed	459
	Scopus	9
	Web of Science (Social Science Citation Index, Science Citation Index Expanded, Emerging Sources Citation Index)	27,568
	via EBSCO	
	Biological and Agricultural Index	299
	Business Source Ultimate	2,733
	EconLit	2,287
	GreenFILE	508
	Political science complete	607
	PsychInfo	2,838
	Urban studies abstracts	77
	Waters and Oceans Worldwide	129
	Supplementary searches[11]	
	AGRIS	0
	Behavioural Public Policy	19
	Decision-A Journal for Research about Judgment and Decision Making	0
Total		40,424

[11] We will carry out supplementary independent hand searches in two academic journals that are known to be two hotspots of behavioural science. The journals are not covered by the bibliometric databases above but are identified as being particularly relevant.

DATABASE TYPE	NAME OF DATABASE	RESULTS
Grey literature	African Development Bank: *https://www.afdb.org/en*	2
	Asian Development Bank: *https://www.adb.org/*	2
	Behaviour and Health Research Unit, University of Cambridge, UK: *www.bhru.iph.cam.ac.uk/*	1
	Behavioural Economics in Action at Rotman School of Management University of Toronto, CA: *www.rotman.utoronto.ca/FacultyAndResearch/ResearchCentres/BEAR*	6
	Behaviour Economics Team of the Australian Government: *www.behaviouraleconomics.pmc.gov.au/*	0
	Behavior Evidence Hub: *https://www.bhub.org/*	96
	Behavioural Insights Team: *https://www.bi.team/*	4
	Behavioural Science and Policy Association: *www.behaviouralpolicy.org/*	2
	Bill & Melinda Gates Foundation: *https://www.gatesfoundation.org/*	0
	Campbell Collaboration*: https://campbellcollaboration.org/*	2
	CEEDER: *https://environmentalevidence.shinyapps.io/CEEDER/*	4
	Center for Effective Global Action Research Publications: *https://vcresearch.berkeley.edu/research-unit/center-effective-global-action*	0
	Deloitte Insights: *www2.deloitte.com/insights/us/en.html*	0
	Department for Environment, Food and Rural Affairs, UK: *https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs*	0
	Environment Agency, UK: *www.gov.uk/government/organisations/environment-agency*	5
	Environmental Protection Agency, USA: *www.epa.gov/*	0
	Environmental Evidence Library: *http://www.environmentalevidence.org/completed-reviews*	0
	European Commission Joint Research Centre: *https://joint-research-centre.ec.europa.eu/index_en*	0
	European Environment Agency: *www.eea.europa.eu/*	3
	European Nudge Network: *www.tenudge.eu/*	0
	Federal Environment Agency, GER: *www.umweltbundesamt.de/*	0

Database type	Name of database	Results
	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, GER: *www.bmu.de/*	1
	Federal Ministry of Food and Agriculture, GER: *www.bmel.de/*	0
	Foreign, Commonwealth and Development Office, UK: *https://www.gov.uk/government/organisations/foreign-commonwealth-development-office*	4
	Green Climate Fund: *https://www.greenclimate.fund/publications*	0
	Green Finance Platform: *https://www.greenfinanceplatform.org/*	4
	Harvard Kennedy School Centre for Public Leadership, Behavioural Insights Group: *https://cpl.hks.harvard.edu/behavioral-insights-group*	0
	Ideas42: *https://www.ideas42.org/*	3
	Innovations for Poverty Action Publications: *https://www.poverty-action.org/publications*	2
	Inter-American Development Bank: *https://www.iadb.org/en/topics-effectiveness-improving-lives/impact-evaluations-repository*	0
	International Fund for Agricultural Development: *https://www.ifad.org/en/*	0
	International Initiative for Impact Evaluation: 3ie Development Evidence Portal*: https://developmentevidence.3ieimpact.org/*	22
	International Institute for Environment and Development: *www.iied.org/*	8
	J-PAL: *https://www.povertyactionlab.org/evaluations*	1
	London School of Economics and Political Sciences (LSE), Centre for Analysis of Risk and Regulation: *www.lse.ac.uk/accounting/CARR*	0
	Millennium Challenge Corporation: *https://www.mcc.gov/*	0
	National Bureau of Economic Research, USA: *https://www.nber.org/*	1
	NSW Government Behavioural Insights Unit, AUS: *www.nsw.gov.au/behavioural-insights-unit*	0
	Nudge Lebanon: *https://nudgelebanon.org/*	0
	Observatory for Public Sector Innovation: *https://oecd-opsi.org/bi-projects/*	0
	Organisation for Economic Co-operation and Development: *http://www.oecd.org/*	0
	PBL Netherlands Environmental Assessment Agency: *https://www.pbl.nl/en*	0

Database type	Name of database	Results
	Rare: *www.rare.org*	4
	Thünen-Institute, GER: *www.thuenen.de/*	0
	United Nations Development Programme: *www.undp.org/*	1
	United Nations Environment Programme (REDD+): *https://www.unenvironment.org/explore-topics/climate-change/what-we-do/mitigation*	7
	United Nations Framework Convention on Climate Change: *https://unfccc.int/*	0
	United Nations Food and Agriculture Organization: *https://www.fao.org/home/en*	2
	United States Department of Agriculture: *www.usda.gov/*	0
	USAID Evaluations Clearinghouse: *http://dec.usaid.gov/*	0
	World Bank: *www.worldbank.org/*	9
	World Bank eLibrary: *https://elibrary.worldbank.org/*	22
Total		218

Appendix 5. DATA EXTRACTION TOOL

<table>
<tr><th colspan="3">1. ADMINISTRATIVE INFORMATION</th></tr>
<tr><td colspan="2">1.1 Study title</td><td></td></tr>
<tr><td colspan="2">1.2 Publication year</td><td></td></tr>
<tr><td colspan="2">1.3 Author(s)</td><td>Last name, initial</td></tr>
<tr><td colspan="2">1.4 Type of research publication</td><td>☐ Academic journal article
☐ Research report
☐ Government report
☐ Dissertation/thesis
☐ Online book chapter</td></tr>
<tr><th colspan="3">2. FILTERS</th></tr>
<tr><td rowspan="3">2.1 Geographic information</td><td>☐ Country(s)</td><td>☐ State/province name</td></tr>
<tr><td>☐ District name</td><td>☐ City/town name</td></tr>
<tr><td>Geographical
☐ East Asia and the Pacific
☐ Middle East and North Africa
☐ Sub-Saharan Africa
☐ Europe and Central Asia
☐ Latin America and Caribbean
☐ South Asia</td><td>Income classifications
☐ LIC
☐ MIC
☐ UMIC
☐ HIC</td></tr>
<tr><td></td><td colspan="2">Location name</td></tr>
<tr><td>2.2 Target population living environment (location)</td><td colspan="2">State the target population living environment between
☐ Rural
☐ Urban
☐ Both</td></tr>
<tr><td>2.3 Study design</td><td colspan="2">☐ Randomized control trial (RCT)
☐ Quasi-experimental
☐ Regression discontinuity
☐ Matching / Propensity score matching
☐ Instrumental variable / two-stage least squares
☐ Difference in difference
☐ Interrupted time series analysis
☐ Controlled before and after
☐ Heckman
☐ Fixed effects or random effects estimation
☐ Natural experiment</td></tr>
<tr><td>2.4 Sector</td><td colspan="2">☐ Agriculture
☐ Education</td></tr>
</table>

	☐ Energy & extractives ☐ Forestry ☐ Financial ☐ Industry & trade/services ☐ Information & communication ☐ Public administration ☐ Transportation ☐ Water, sanitation and hygiene ☐ Environmental and disaster management
2.5 Scale of implementation	☐ Individual ☐ Household ☐ Firm ☐ Community ☐ District/region
2.6 Target population gender	State here the gender-targeted population whether ☐ Female ☐ Male ☐ Female and male ☐ Unspecified
2.7 Target population age	Indicate the population either ☐ Children <18 ☐ Young adults (18–35) ☐ Adults (36–65) ☐ Elderly (65+) ☐ Mixed ☐ Not specified
2.8 Implementation agency name	Name of implementing agency
2.9 Implementation agency type	Implementation agency category ☐ Academic institution ☐ Charitable or private foundation ☐ For-profit firm ☐ Government agency ☐ International aid agency ☐ International financial institution ☐ Non-profit organization ☐ Not specified
2.10 Intervention funding agency name	Name of intervention funding agency
2.11 Intervention funding agency type	Intervention funding agency category ☐ Academic institution ☐ Charitable or private foundation ☐ For-profit firm

	☐ Government agency ☐ International aid agency ☐ International financial institution ☐ Non-profit organization ☐ Not specified
2.12 Research funding agency name	Name of research funding agency
2.13 Research funding agency type	Research funding agency category ☐ Academic institution ☐ Charitable or private foundation ☐ For-profit firm ☐ Government agency ☐ International aid agency ☐ International financial institution ☐ Non-profit organization ☐ Not specified
2.14 Type of costs and cost analysis (IE)	Type of costs and cost analysis presented in impact evaluations ☐ Return on investment analysis ☐ Cost-effectiveness ☐ Cost–benefit ☐ Cost only ☐ No cost data
2.15 Equity dimensions and focus (Refer to Appendix 6 for comprehensive guidance and selectable options)	a) IE equity focus EQUITY FOCUS 1. How does this study consider gender or equity? EQUITY DIMENSION 2. Which dimension(s) of gender and/or equity does this study address?

3. INTERVENTIONS	4. OUTCOMES
<u>3.1 How?</u>	<u>4.1 Knowledge, uptake and use</u>
☐ Checklists	☐ Know of intervention
☐ Reduce hassles	☐ Take part in the intervention
☐ Rules of thumb	☐ Acquire knowledge
☐ Commitment devices	☐ Change attitudes
<u>3.2 Why?</u>	<u>4.2 Behavioural outcomes</u>
☐ Micro-incentives	☐ Start behaviour
☐ Group incentives	☐ Increase behaviour
☐ Lotteries	☐ Decrease behaviour
☐ Anchoring	☐ End behaviour
☐ Framing devices	☐ No change in behaviour
<u>3.3 Who?</u>	<u>4.3 Development results</u>
☐ Identity priming	☐ Enhance equity
☐ Public commitments	☐ Support resource conservation
☐ Social norms	☐ Changing technologies

☐ Social benchmarking ☐ Cognitive behavioural therapy 3.4 When? ☐ Reminders ☐ Planning prompts ☐ Feedback 3.5 When? ☐ Active choice ☐ Salience (communication) ☐ Salience (experience design) ☐ Goal setting ☐ Defaults	☐ Improve health ☐ Improve income and livelihoods ☐ Sustainable supply chain management and transport ☐ Sustainable waste management 4.4 Development results (Socioecological systems development) ☐ Mitigation ☐ Adaptation

Appendix 6. 3IE EQUITY CODING PROTOCOL AND GUIDANCE

A. INTRODUCTION

This coding guide has been designed to help us identify and extract information about how IEs and SRs address equity considerations.[12]

The coding includes answering three questions, summarized in the table below and described in more detail in the text. The first two questions have fixed options for answers, and coders may select more than one answer as applicable. The final question has an open answer, designed to provide more detailed descriptions to corroborate the answers to questions 1 and 2. For further background on what we consulted for this guide, please see Morgan and colleagues (2016) and Welch and colleagues (2017).

B. DEFINITIONS

Equity

Equity is the absence of avoidable and unfair conditions between or among people that hinder or prevent them from attaining their full potential. It is inherently a moral judgment of fairness, as the judge is almost always determined by a dominant power paradigm that considers one group of society unequal to another.

Sex and gender

Sex is commonly used to refer to genetic, biological and physiological processes.

Gender refers to the roles, relationships, behaviours, relative power and other traits that societies ascribe to women, men and people of diverse gender identities (Welch and others, 2017, page 2).

Sex and gender interact with each other and other characteristics to influence outcomes. For example, research indicates there are significant physiological differences in cardiac function between males and females, as well as gender differences in how men and women with heart disease are diagnosed and treated. Failure to take these differences into account – not just between men and women, but also across other characteristics such as sexual identity, age, income, education, ethnicity, religion, caste and location – can have serious, even life-threatening, consequences for individual patients.

Gender analysis

Gender analysis is a socioeconomic analytical framework for identifying and assessing inequality due to (1) different gender norms, roles and relations; (2) unequal power relations between and among women and men or girls and boys; and (3) the interaction of contextual factors with gender such as age, sexual orientation, ethnicity, education, employment status, caste and income. Such an analysis is systematically applied to all stages of the research process, starting with the formulation of the initial research question, followed by methodology development, analysis, interpretation of results and reflection on their implications.

[12] The coding guide is available at *https://www.3ieimpact.org/sites/default/files/2021-11/DEP_Gender_Equity_Protocol-DEP.pdf*.

Gender and equity coding questions

CODING QUESTIONS	ANSWERS/CODING GUIDE
EQUITY FOCUS 1. How does this study consider gender or equity? If unsure, mark both what you think you are finding and for a senior staff member to review that article.	Tick "does not address gender or equity" or choose one or more equity focus codes from below: ☐ *Intervention targets vulnerable population* ☐ *Subgroup analysis by sex* ☐ *Subgroup analysis (other than sex)* ☐ *Heterogeneity analysis (other than subgroup)* ☐ *Equity-sensitive analytical framework* ☐ *Equity-sensitive methodology* ☐ *Equity-sensitive research process* ☐ *Measures effects on an inequality outcome* ☐ *Research ethics informed by equity*
EQUITY DIMENSION 2. Which dimension(s) of gender and/or equity does this study address? Please select only those vulnerable groups (dimensions) that are considered using the "equity focus" types listed in point 1. For example, a sex-disaggregated impact analysis of an antiretroviral take-up programme would be an *intervention targeting a vulnerable population* (dimension: HIV/AIDS) that conducts a *subgroup analysis by sex* (dimension: sex)	If "does not address gender or equity" was selected in the equity focus column, code "not applicable". Otherwise, choose one or more of the following dimensions: ☐ *Age (e.g. old or young, but only if the choice of that group is driven by equity considerations)* ☐ *Conflict-affected (only if that was a component of intervention targeting; not every study taking place in a fragile or conflict-affected area should be coded as such)* ☐ *Culture (includes language)* ☐ *Disability (medical, physical, neurological, mental disorders)* ☐ *Displaced populations (including refugees)* ☐ *Education* ☐ *Ethnicity* ☐ *Head of household (female-headed)* ☐ *HIV/AIDS (people with or at risk of HIV)* ☐ *Land size* ☐ *Land ownership* ☐ *Place of residence (rural, urban, peri-urban, informal dwellings)* ☐ *Religion* ☐ *Socioeconomic status (income or poverty status)* ☐ *Social capital* ☐ *Sex (meaning the biological sex of a person; includes gender)* ☐ *Sexual orientation* ☐ *Sexual identity* ☐ *Other (vulnerable group not typified by any of the above – e.g. orphans, sex workers, survivors of sexual violence)*
EQUITY DESCRIPTION 3. Open answer	Provide a description of how the study considers gender and equity, and for which population to corroborate answers above (page numbers).

Below please find a description and tips for coding.

How does this study consider equity? (EQUITY FOCUS)

Please select one or more answers as applicable.

Does not address gender or equity	The IE does not explicitly address equity. If the analysis determines only average effects, the results are not likely to take equity into account.
Intervention targets vulnerable population	Does the IE look at the impact of an intervention that targets specific, at-risk populations? For example, an impact evaluation on the effect of a cash transfer programme that targets a population in the context of any of the equity dimensions reported in Table A1 (e.g. HIV/AIDS, socioeconomic status).
Subgroup analysis by gender	Does the study only focus on a particular vulnerable group from a wider population of people who received the intervention? This is typically done through a subgroup analysis. Find a table reporting the findings of the study. If the term "gender", "sex", "female", etc., is used as the label for sex-disaggregation of findings, then the study reports "subgroup analysis by gender". **Caution!** Make sure you do not confuse the findings table with the table reporting the demographic composition of study participants. Reporting gender differences in baseline characteristics between the intervention and control group does not count as "subgroup analysis by sex". Also, this needs to be disaggregated data rather than an interaction term in a regression or adjusting for sex/gender as a covariate.
Subgroup analysis (other than gender)	Does the study only focus on a particular vulnerable group from a wider population of people who received the intervention? This is typically done through a subgroup analysis. Find a table reporting the findings of the study. Does the IE present outcomes disaggregated by an equity dimension (e.g. income, education, age, ethnicity, disability)? **Caution!** Make sure you do not confuse the findings table with the table reporting the demographic composition of study participants. Reporting differences in baseline characteristics between the intervention and control group does not count as a subgroup analysis. Also, this needs to be disaggregated data rather than an interaction term in a regression or adjusting for "equity dimension" (caste, poverty status) as a covariate.
Heterogeneity analysis (other than subgroup)	Does the IE go beyond calculating average treatment effects using a subgroup analysis? This can be done in a variety of ways – for example, interacting the treatment with different characteristics or a quantile regression, which examines the effects across the range of the outcome variable.
Equity-sensitive analytical framework	Does the IE discuss the role of any drivers of equity considerations around the intervention and context in their analytical framework and/or theory of change? For example, an IE that presents a gender framework that considers theoretically how gendered social relations and institutions determining and reinforcing gendered relations relate to the intervention and considered outcomes.

	Look at the methods section. Ideally there will be a gender analysis framework mentioned that has a reference. If not, see if there is any mention of gender analysis or any other theoretical framework that is sensitive to equity considerations (e.g. social analysis, empowerment theory, sociological theories of intimate partner violence). In either case, code "yes" for equity-sensitive theoretical frameworks and/or theory of change being explicitly mentioned in methods. **Caution!** Even if the intervention was designed to be equity-sensitive, we would only consider this code to apply if an equity-sensitive theoretical framework is used in the analysis.
Equity-sensitive methodology	Does the study include any study components to assess the how and why (including mixed and qualitative methods) of differential impacts based on social and structural inequality (e.g. in-depth interviews, focus groups or life histories with women only or with a certain caste)? This information will normally be contained in the methods section.
Equity-sensitive research process	Is the research informed by gender or equity considerations (e.g. who are the respondents; who collects and analyses data; when, where and who is present)? Do the authors of the IE consider the equity implications of data collection, including how sampling was undertaken, who was present during interviews and who collected the data? For example, did the researchers consider the different work burdens of men and women and ensure that they chose times that were convenient for both to undertake data collection? Did they consider that if both males and females are present, this may change the quality and accuracy of the data collected, as each may be reluctant to share information about their lives and work? Did they consider the sex, age, race, ethnicity, gender norms or occupation of the person collecting data and how this may affect the data collected? Have they eliminated risks to safety of women and girls in fragile and conflict-affected settings? Did they provide confidential reporting of sexual harassment or gender-based threats of violence? Have data collectors received adequate training and supervision to help them become aware of their gender biases and to try to minimize these biases within the research process?
Measures effects on an inequality outcome	Does the IE assess the impact of the intervention on a measure of inequality (e.g. a study on the impact of cash transfers on income inequality or if the dependent variable is the gender identity of the household decision maker)? This information will normally be included in the objectives, research questions and/or methods section.
Ethics informed by equity	Does the IE consider the ethics of conducting research with vulnerable populations beyond ethics approval from the internal review board? This information will normally be included in the data collection or methods section.

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