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Science, technology, innovation and partnerships for development

An evidence gap map

March 2017

Evidence Gap Map Report 6

Multi-sector

3ie International Initiative for Impact Evaluation

About 3ie

The International Initiative for Impact Evaluation (3ie) is an international grant-making NGO promoting evidence-informed development policies and programmes. We are the global leader in funding, producing and synthesising high-quality evidence of what works, for whom, why and at what cost. We believe that high-quality and policy-relevant evidence will make development more effective and improve people's lives.

3ie evidence gap maps

3ie evidence gap maps (EGMs) are thematic collections of information about impact evaluations or systematic reviews that measure the effects of international development policies and programmes. The maps present a visual overview of existing and ongoing studies in a sector or sub-sector in terms of the types of programmes evaluated and the outcomes measured. EGM reports provide all the supporting documentation for the maps themselves, including the background information for the theme of the map, the methods and results, including the protocols and the analysis of the results. 3ie EGMs are available through an online interactive platform on the 3ie website that allows users to explore the studies and reviews that are included.

About this evidence gap map report

This report summarises the methods and findings of an EGM on how science, technology, innovation and partnerships enhance development programming. A companion paper, *Assessing the evidence on science, technology, innovation, and partnership for accelerating development outcomes*, additionally assesses the demand for new and higher quality evidence and provides recommendations for future investment for research and synthesis

3ie developed it as part of a project funded by the support of the American People through the United States Agency for International Development (USAID)'s US Global Development Lab. The contents of this report are the sole responsibility of the authors and does not represent the opinions of 3ie, its donors or its Board of Commissioners, or reflect the views of USAID or the United States government. Any errors and omissions are also the sole responsibility of the authors. Any comments or queries should be directed to the corresponding author, Shayda Sabet ssabet@3ieimpact.org.

Suggested citation: Sabet, SM, Heard, AC, and Brown, AN, 2017. *Science, technology, innovation and partnerships for development: an evidence gap map*. 3ie Evidence Gap Map Report 6. New Delhi: International Initiative for Impact Evaluation (3ie).

3ie Evidence Gap Map Reports executive editors: Edoardo Masset and Beryl Leach
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Science, technology, innovation and partnerships for development: an evidence gap map

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Acknowledgements

We gratefully acknowledge funding of this paper from the American people through USAID's Global Development Lab.

3ie relied on the guidance and feedback from an advisory group for this scoping work; the members, to whom we are thankful:
Ashley Bear (National Academy of Sciences)
Samuel Bickel (UNICEF)
David de Ferranti (Results for Development)
Naoto Kanehira (World Bank)
Kyriacos Koupparis (USAID)
Saharah Moon Chapotin (USAID)

The authors wish to thank Shannon Griswold, Joshua Kaufman and Jessica Lucas for their constant guidance and support; Scott Neilitz, Kristen Rankin and Ben Wood for their valuable input and advice; and the work of consultants Mark Engelbert, Amy Holter, Leah Leavitt, Julie Perng, Nadine Pfeifer, Aryamala Prasad and Ingrid Rojas, who helped with the search and screening process to identify studies for the gap map. We also thank Tasmia Rahman, who was an intern for this project and provided indispensable input and research assistance.

Additionally, 3ie would like to thank the wide range of stakeholders who participated in the consultative workshop and roundtable events in Washington, DC.

Summary

Background

Many organisations incorporate science, technology and innovation into their development agendas. For example, the United Nations has established a forum on science, technology and innovation for achieving the Sustainable Development Goals, the Organisation for Economic Co-operation and Development has a directorate for science, technology and innovation and the World Bank's 2016 *World Development Report* focuses on 'digital dividends'. Most recently, the US Global Development Lab at the United States Agency for International Development (USAID) has made a strong push for incorporating science, technology, innovation and new partnerships (STIP) into its development efforts.

With more and more organisations turning to STIP to enhance their development programming, high-quality evidence is needed to inform such decisions and designs. This 3ie evidence gap map (EGM) therefore examines the evidence base of the impact of STIP in development programming on individual, community and institutional outcomes, providing a cross-sectoral visualisation of the supply of evidence in low- and middle-income countries.

Methodology

Working with a large number of stakeholders, we developed a STIP framework to serve as the foundation of the map. The framework is a matrix with 25 intervention categories as the rows and 16 outcome categories as the columns. We used a systematic search strategy, employing STIP-related search terms to search 12 databases, 32 websites and 3 impact evaluation registries. We screened the results using a pre-specified screening protocol at the title, abstract and full-text levels. We coded the metadata for each included study, including bibliographic details and information about the interventions evaluated and outcomes measured. We then populated the EGM, placing the studies in the cells for which they evaluated a category of intervention in the specified sector and at the level where outcomes were reported.

Main findings

There is large body of evidence around STIP-related interventions, with clusters of related studies in several areas. The matrix of 25 intervention categories and 16 outcome categories contains 320 completed impact evaluations, 77 ongoing impact evaluations and 7 completed systematic reviews. 'Mobile health' is the intervention category with the largest number of studies. The large majority of studies report outcomes at individual and household levels rather than firm or community levels. The largest proportion of studies report outcomes related to global health. Most studies in the map were conducted in Sub-Saharan Africa.

There are still several gaps in the evidence base. There is very little evidence on how macro-level policies and regulation affect the production of scientific research, access to digital technology and the innovative behaviour of private firms. We found essentially no evidence on how two-entity partnerships and multi-stakeholder initiatives implement development assistance. We also find clusters of evidence that have not yet been synthesised. These include evidence around digital information services not related to finance or health and evidence on the impacts of results- or performance-based financing programmes on global health outcomes.

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List of figures and tables

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Abbreviations and acronyms

3ie	International Initiative for Impact Evaluation
ART	antiretroviral therapy
e-governance	electronic governance
EGM	evidence gap map
FONTAR	Argentinian Technological Fund
L&MICs	low- and middle-income countries
m-health	mobile health
OECD	Organisation for Economic Co-operation and Development
PBF	performance-based financing
PDA	personal digital assistant
R&D	research and development
RBF	results-based financing
RCT	randomised control trial
SMS	short message service
STEM	science, technology, engineering and mathematics
STIP	science, technology, innovation and partnerships
USAID	United States Agency for International Development

1. Introduction

Many organisations incorporate science, technology and innovation into their development agendas. For example, the United Nations has established a forum on science, technology, and innovation for achieving the Sustainable Development Goals, the Organisation for Economic Co-operation and Development (OECD) has a directorate for science, technology, and innovation, and the World Bank's 2016 *World Development Report* focuses on 'digital dividends'. Most recently, the US Global Development Lap at the United States Agency for International Development (USAID) has made a strong push for incorporating science, technology, innovation and new partnerships (STIP) into its development efforts.

With more and more organisations turning to STIP to enhance their development programming, high-quality evidence is needed to inform such decisions and designs. In 2015, USAID requested that 3ie conduct research on the evidence base of STIP in improving development programming and outcomes. This project is largely inspired by the ideas that using STIP to enhance development outcomes is not merely the responsibility of donor countries and organisations and that scientific and technological innovation is no longer the duty or privilege of higher-income countries (UN System Task Team 2013a). Low- and middle-income countries (L&MICs) must also build their capacities to 'develop their own solutions to their specific problems and to play their part in the international scientific and technological arena' (UNESCO n.d.) – capacities that are necessary for achieving sustainable and scalable solutions to development problems (World Bank Group 2015).

Developing these capacities requires an enabling environment in which researchers, entrepreneurs and innovators can thrive. Such an environment includes favourable policies and regulatory frameworks, improved scientific educational curricula, increased access to funding for scientists and entrepreneurs and enhanced collaboration between these various actors (UN System Task Team 2013a; World Bank Group 2015). Likewise, as new technology permeates the lives of the poor – almost 70 per cent of the world's poorest quintile own a mobile phone (World Bank Group 2016) – mere access to technology such as mobile phones and the internet is not enough. A strong enabling environment also requires a digitally literate population that can effectively use and innovate new technologies (World Bank Group 2016).

As L&MIC governments, nongovernmental organisations, public aid agencies and philanthropic foundations seek to create an enabling environment for science, technology and innovation to thrive, they look increasingly towards innovative partnerships. Partnerships have the potential to leverage the diverse resources, skills and knowledge of different stakeholders to produce effective and sustainable development outcomes (Gray and Stites 2013). Organisations may also utilise innovative financing models, such as development impact bonds and results-based financing, to improve the level and quality of financing available to programmes and projects (World Bank Group 2015) and to enhance the development of science, technology and innovation in L&MICs.

This 3ie evidence gap map (EGM) examines the evidence base of the impact of STIP in development programming on individual, organisational and community-level outcomes, providing a cross-sectoral visualisation of the supply of evidence in L&MICs.

1.1 Evidence gap maps

3ie EGMs are thematic collections of evidence on the effects of policies and programmes (Snilstveit *et al.* 2013). They provide an innovative approach for rapid knowledge transfer and capture, combining methods from other review and mapping approaches with data visualisation and using an interactive platform. A key feature of an EGM is the use of a framework of interventions and outcomes, based on a review of the policy literature and consultation with stakeholders.

The rows of the framework represent a list of the key interventions from the sector or thematic area of focus, and the columns cover the most relevant outcomes. The framework is designed to capture the universe of important interventions and outcomes in the sector or subsector covered by the map.

This EGM is based on systematic and comprehensive methods to identify impact evaluations and systematic reviews corresponding to the concepts included in the framework. Appendix A details the methods used in this study. Impact evaluations use counterfactual analysis to measure the net impact of an intervention (3ie 2012). Systematic reviews of effects use transparent and systematic methods to identify, appraise and synthesise findings from studies addressing a specific issue (Waddington *et al.* 2012). When we use the term ‘evidence’ in this report, we are speaking primarily of these types of primary studies and syntheses of effects.

1.2 Study objectives

This EGM is part of a scoping project funded by USAID’s US Global Development Lab to understand how L&MICs can be supported to develop their own scientific and innovative capabilities, how technology can be used in development programming to enhance outcomes and how new partnerships can be leveraged to improve the delivery of development programming. The overall aim of this EGM is to identify and map the existing evidence base and gaps of the above topics. In doing so, it addresses two main objectives:

- identify, appraise and summarise existing evidence from systematic reviews of the effect of interventions in STIP-related fields for development programming; and
- identify existing evidence gaps where new primary studies and systematic reviews are needed to better inform future investments in research.

1.3 Methodology

The process for developing an EGM begins with determining the scope of the map. We held several brainstorming sessions at a consultation event held at USAID. Through these sessions we developed the framework – a matrix of 25 intervention

categories and 16 outcome categories. To test the framework, we conducted a cursory search and screening of existing studies in 3ie's Impact Evaluation Repository, identified 46 relevant studies and plotted them in what we call a 'teaser map'. This map allowed us to identify missing categories in the framework and to assess its usability. We shared several iterations of the framework and teaser map with staff at USAID and our advisory group, and received valuable feedback. We present the framework in the next section of this report.

The next step for developing an EGM is to search a chosen set of resources and screen the results to determine which studies to include. These processes are guided by a pre-specified search strategy and screening protocol, presented in appendix A. We searched 12 databases, 32 websites and three impact evaluation registries in June and July 2016. We searched for general terms such as 'STIP', 'impact evaluation' and 'L&MIC' and key terms such as 'mobile money', 'results-based financing', 'randomised control trial' and 'least developed country'. We limited our search to studies dated 1990 and later, broadly corresponding with the period when impact evaluations in the sector started to emerge. We conducted our search in English; however, studies in Spanish, French and Portuguese that were captured were also screened for inclusion.

Our search strategy included three types of searches: publication database searches, targeted searches of specialist websites and databases, and backwards and forwards snowballing, which is checking references of included studies and the online curricula vitae and websites of authors with at least one included study.

After we cleaned the search results for duplicates, we used the screening protocol (Table A-3) to screen results by title, abstract and full-text levels. To be included, studies must be impact evaluations or systematic reviews, they must evaluate a STIP-related intervention and the intervention must be conducted in an L&MIC. To avoid bias, at least two reviewers screened each study. Next, we assessed each systematic review according to a pre-specified 3ie rating tool (see appendix A) to determine our confidence in its findings and assess the review's risk of bias. We included reviews for which we have medium or high confidence in the findings. Finally, we coded the included studies and populated the map. A second researcher verified the coding for each study. We present the coding instructions and template in appendix A (Table A-4).

1.4 Report structure

In section 2 of this report we present the scope of the STIP EGM. In section 3 we present the findings, including the search and screening results and an analysis of the features of the evidence base. Section 4 discusses limitations, and section 5 concludes. Appendix A includes the detailed methodological information, and appendices B and C present the full bibliography of included studies.

2. Scope of the evidence gap map

The scope of this EGM is defined by the 25 intervention and 16 outcome categories included in the framework and the type of studies included. We define these concepts below.

2.1 Study types

We include impact evaluations and systematic reviews of effectiveness studies in our EGM. Impact evaluations measure the change that is causally attributable to a programme or an intervention. They use experimental or quasi-experimental study designs to conduct a counterfactual analysis (3ie 2012). Specifically, we include the following types of studies:

- randomised control trials (RCT);
- regression discontinuity design;
- before and after study, using appropriate methods to control for selection bias and confounding variables (propensity score matching or other matching methods, instrumental variable estimation or other methods using an instrumental variable such as Heckman's two-step approach, difference-in-differences or a fixed- or random-effects model with an interaction term between time and intervention for baseline and follow-up observations);
- Cross-sectional or panel studies with an intervention and comparison group using methods to control for selection bias and confounding, as described above; and
- Studies explicitly described as systematic reviews and reviews that describe methods used for search, data collection and synthesis, as per the protocol for the 3ie database of systematic reviews (Snilstveit *et al.* 2013).

2.2 Interventions

The scope of this EGM is defined by the intervention categories included and the types of studies selected. We chose to group our interventions by each STIP component (science, technology, innovation and partnerships). We developed the definitions of each component in consultation with USAID and other relevant stakeholders. For the purposes of this map, our team defines *science interventions* as those that build the capacities of L&MICs to produce their own scientific and technological research; *technology interventions* as those that use mobile devices and the internet to enhance development programming in L&MICs; and *innovation interventions* as those that build the innovation 'ecosystem'. In other words, these are interventions that foster the necessary enabling environments to encourage and spur innovation in L&MICs. Finally, for the purposes of this map, *partnerships* include the implementation of development programmes through innovative partnerships and financing mechanisms.

Table 1 presents the intervention categories for each group, along with a brief description and an example.

Table 1: Intervention categories

Intervention	Definition	Example
Science		
Fellowships and research grants	Monetary assistance for postgraduate-level researchers to conduct existing or new research.	Publicly funded grants to professors
Material resources for scientific research	Material resources provided to research institutions for the purposes of conducting research.	Lab equipment, other in-kind donations
Technical assistance for scientific research	Assistance or training for researchers, often provided by an international nongovernmental organisation or university from a high-income country.	Training on the use of technology or research equipment
Research exchanges and collaborations	Collaboration between researchers, educational institutions or other research-based entities for the purposes of scientific research or capacity building.	Joint research grants
Policy and regulation for scientific research	Laws and regulations that facilitate research in science and technology.	Patent laws
Education programmes to promote science, technology, engineering and mathematics (STEM)	Educational programmes, scholarships, training and in-kind donations at all nontertiary educational levels intended to promote the STEM fields.	Pedagogical strategies used to enhance learning in the sciences in secondary schools
Technology		
Digital infrastructure development	Facilitating access to digital technology or improved digital infrastructure.	Rollout of cell phone towers
Policy and regulation for digital services	Laws and regulations that facilitate access to or use of digital technologies.	Reduction of taxes on mobile technologies
Digital literacy	Aims to improve a person's ability to use the internet or mobile devices.	Training on how to use a mobile phone to make financial transactions
Digital inclusion	Facilitating access to digital and data technologies, particularly – though not exclusively – for marginalised groups.	Mobile phone credit to new mothers
Digital finance	Promoting the use of mobile technologies for finance.	Mobile money payment applications
e-Governance	Facilitating the provision of government services and communication between the public and government agencies using digital technology.	Digitising the process for renewing national ID cards
Digitising identity	Digitising identification systems.	Fingerprinting and biometrics
Data systems development	Using digital technology to improve data collection, management and use.	Use of personal digital assistants (PDAs) for data collection by health workers
Digital information services	Digital technology for information dissemination and the provision of individual services to smooth	Short Message Service (SMS) messages to farmers containing

Intervention	Definition	Example
	information asymmetry or to change or 'nudge' behaviour. Services related to finance or health are excluded from this category.	information about weather conditions
Technology-assisted learning	Use of the internet or mobile devices to improve learning outcomes.	Web-based computer simulation for teaching science
Mobile health	Use of mobile and wireless devices to provide medical care.	SMS messages to patients encouraging medication adherence
Innovation ecosystems		
Access to capital	Facilitating access to capital for small firms and entrepreneurs, intended to spur innovation and improve technology.	Venture capital and seed money. Accelerators and incubator programmes
Grants and subsidies	Non-debt instruments provided to firms intended to spur innovation and improve technology.	Grants, subsidies, prizes and other awards
Policies and regulation that affect innovation	Laws and regulations that affect innovation (positively or negatively).	Regional zones; reductions in trade barriers
Networks and collaboration for innovation	Facilitating the development of networks, partnerships and relationships between individuals or organisations for the purposes of information sharing, technology diffusion, network development or creating credible and recognisable associations.	Managerial associations for production innovation
Capacity building for innovation	Interventions that promote institutional and human capacity building. These interventions foster a culture of innovation or innovation systems, particularly related to promoting science and technology.	Programmes that provide technical assistance, training, mentorship, and capacity building to firms intended to spur innovation; accelerator and incubator programmes
Partnerships		
Two-entity partnerships	Interventions that are created or implemented by a partnership between a public aid agency and a philanthropic or private sector entity. Partners share a vision and values and may often jointly finance a project.	USAID - Rockefeller Foundation Global Resilience Partnership
Global multi-stakeholder initiatives	Collaborations among three or more entities from the private, public and civil society sectors intended to address complex development challenges in a nontraditional or innovative way.	Child Protection Knowledge and Information Network: an initiative between UNICEF, police, governments and universities in Sierra Leone
Innovative financing	Use of nontraditional, innovative financing instruments to complement traditional development assistance.	Results- or performance-based financing

2.3 Outcomes

Given the broad, cross-sectoral nature of this topic, we chose outcome categories for level of analysis for the measured effects and for the full range of development sectors. The map thus presents the same results in two different ways. On the left side of the map (see figure 2 in section 3), we see the intervention categories plotted against levels of analysis, and in the middle section we see the same information organised by sector. For example, a study that measures the impact of SMS reminders on individual health outcomes is counted in both the individual outcomes column and in the health sector column. A study can also be counted under two or more different outcome types or sectors. Table 2 presents the outcome categories for each group, along with a brief description and an example.

Table 2: Outcome categories

Outcome	Example
Levels of analysis	
Individual and household outcomes	Patient adherence to medication, researcher's academic output, household consumption
Organisational outcomes	Firm-level profits, health facility's productivity, school-wide average test scores
Community and societal outcomes	Changes in regulation, commodity prices, village-wide disease prevalence
Sectors	
Education and academia	Test scores, numeracy levels, school attendance
Global health	Adherence to treatment, risk of disease, health knowledge, sexual health
Democracy, human rights, and governance	Electoral participation, election fairness, government accountability, human rights, and civic engagement
Agriculture and good security	Agricultural production, crop prices, food security
Crises and conflict	Disaster relief, post-conflict reconstruction
Economic growth, finance and trade	Firm profits, employment levels, research and development (R&D) expenditures
Environment and global climate change	Changes in land regulation, recycling behaviour
Water and sanitation	Access to village water and sanitation resources
Energy	Household energy expenditures, energy/lighting usage

2.4 Crosscutting themes

On the right side of the map, we coded information for crosscutting themes:

- long-term impact;
- cost and cost-analysis;
- sex-disaggregated or sex-specific analysis;
- and vulnerable or marginalised populations.

We include these columns so readers can easily understand the size of the evidence base related to these areas. The first column comprises studies that include a measurement of long-term outcomes, which are those that provide effect sizes for one or more time periods after the first endline measurement. The cost and cost-analysis column reveals how many studies provide information on costs of the programme or compare implementation costs to measured outcomes. Understanding of costs is especially critical for decision making in resource-limited settings. To be included, a study must have some information about programme cost that can be compared to one or more of the measured net impacts.

The sex-disaggregated or sex-specific analysis includes studies that report effect sizes separately for women and men. These include evaluations of interventions that target only a single sex. Finally, in response to some interest among the stakeholders involved in developing the framework, we include a crosscutting theme for vulnerable or marginalised populations, studies that report effect sizes for conflict-afflicted populations, the disabled, rural populations, orphans and vulnerable children, and sexual minorities.

3. Findings

The search and screening resulted in 320 completed impact evaluations,[1] 77 ongoing impact evaluations,[2] and 7 completed systematic reviews.[3] We found no protocols for upcoming systematic reviews related to STIP interventions. Appendix B presents the bibliography of all the included impact evaluations and all the ongoing and announced impact evaluations, and appendix C includes the bibliographies for all the completed systematic reviews. Figure 1 presents the detailed results of the search and screening. Of the 320 completed impact evaluations, 212 are published journal articles and 64 are working papers published on institutional websites. We found 26 draft papers, 14 doctoral or master's dissertations, 3 project reports, and 1 book chapter.

We present a picture of the completed EGM as figure 2, which illustrates the number of studies that provide evidence for each cell. The darker cells represent those with more evidence. It is important to note that the map shows only where there is evidence, not what the evidence says. Therefore, it is incorrect to interpret a dark cell as meaning that there is a lot of evidence supporting a positive impact of the intervention on the outcome. The evidence may actually show negative effects or null effects, or be inconclusive. A dark cell means only that there is a deeper base of evidence for the effect of that intervention on that outcome.

[1] A study is considered complete if it has a published report or is in draft form.

[2] Ongoing impact evaluations were available as pre-registrations, published protocols or pre-analysis plans. Announcements were noted on primary authors' personal websites or curricula vitae.

[3] We plotted only systematic reviews with a medium- or high-confidence rating on our map. A full list of all systematic reviews, including those with a low-confidence rating, is available in appendix C.

When populated on the left side of the map, the completed impact evaluation studies produce 387 occurrences of evidence. Within the map reporting outcomes by sector, there are 377 occurrences of evidence. An occurrence of evidence is each cell in which a study appears. Therefore, if a study looks at a mobile health programme and it estimates effects for individuals and for health facilities, then it is plotted in two columns on the map. An example is Cole and Fernando (2016), which evaluates the impact of a mobile advisory service to farmers on both farmers' agricultural knowledge and the farms' productivity. Alternatively, a study may evaluate an intervention with multiple components that fall under two or more intervention categories. In this case, it would also be plotted more than once on the map. We can think of this as meaning that it reports two different types of evidence. An example is López, Reynoso and Rossi (2010), which evaluates the impact of a public fund in Argentina that provides both credit and matching grants to private firms to improve innovation.

Figure 1: Search and screening results

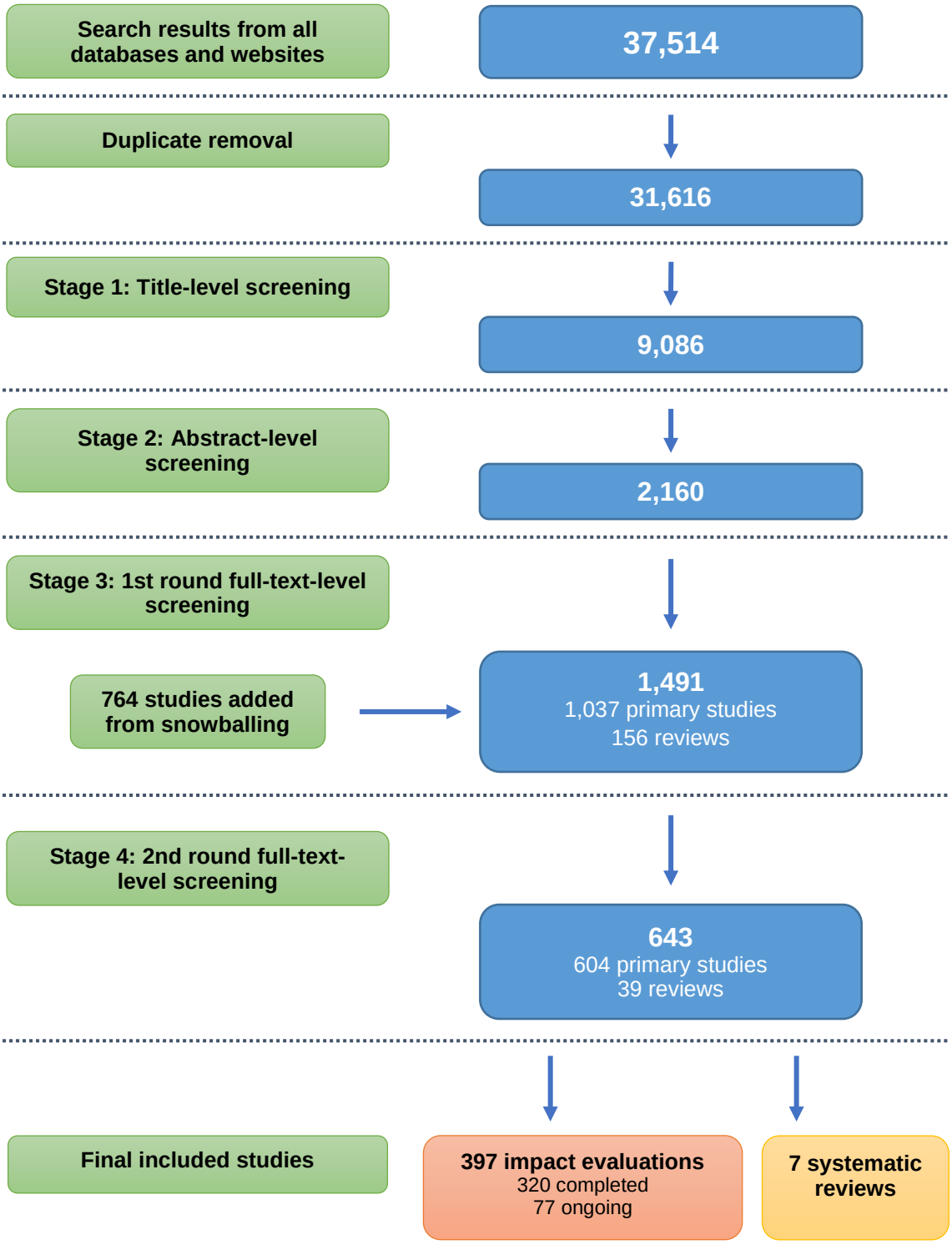


Figure 2: Evidence gap map of completed STIP impact evaluations

	Intervention categories	Levels of analysis			Sectors									Cross-cutting themes			
		Individual & household outcomes	Organisational outcomes	Community & societal outcomes	Education & academia	Global health	Democracy, human rights & governance	Agriculture & food security	Crises & conflict	Economic growth, finance & trade	Environment & global climate change	Water & sanitation	Energy	Long-term impact	Cost-analysis	Sex-disaggregated or sex-specific	Vulnerable or marginalised populations
Science	Fellowships & research grants	8			8									3		1	
	Material resources for scientific research																
	Technical assistance for scientific research																
	Research exchanges & collaborations		2							2							
	Policy & regulation for scientific research	1				1											
	Educational programmes to promote STEM	37			37									1	3	11	1
Technology	Digital infrastructure development	2		3	1			3									
	Policy & regulation for digital services			1						1				1	1		
	Digital literacy	5			2	1	1	1							1	2	
	Digital inclusion	4	1			1	1	2								2	
	Digital finance	16	1					3		13				1	3		3
	e-Governance	6	3				6	1		1					2	1	1
	Digitising identity	6	2			3	1	1		1					2		1
	Data systems development	5	4			8				1				1	5	2	2
	Digital information services	23	3	2	4	6	4	10		3	1			1	9	3	3
	Technology assisted learning	18	2		16	2				1				1	1	3	
	Mobile health	128	6	2		134						1		7	15	50	15
Innovation ecosystems	Access to capital		16							16				3			
	Grants & subsidies		29							29				6	2	1	
	Policies & regulation that affect innovation		7							7				2			
	Networks & collaboration for innovation	1	4	1				1		5	1	1		2			
	Capacity building for innovation		7							7				1	2	1	
Partnerships	Two entity partnerships																
	Global multi-stakeholder initiatives																
	Innovative financing	20	9	2	2	24				1					6	9	2

3.1 Features of the impact evaluation evidence base

This section lays out the key findings of the gap map of completed and ongoing impact evaluation studies by intervention and outcome category, region, publication year and programme.

3.1.1 Impact evaluations by intervention

Figure 3 displays the number of completed impact evaluations by intervention group. The group with the overwhelming majority of studies is technology. Figure 4 presents the number of completed impact evaluation studies by each intervention category.

The science intervention category with the most studies is 'educational programs that promote STEM'. These interventions include all programmes at the primary, secondary and tertiary level that encourage students to improve their science skills. Different pedagogical methods, such as mastery learning and concept mapping intended specifically to encourage learning in the sciences, are included here (e.g. Wambugu and Changeiywo 2008; Keraro, Wachanga and Orora 2007). The other prevalent science intervention category is 'fellowships and grants to scientists'. These are publicly funded programmes intended to encourage researchers to produce scientific or technological knowledge. We see many gaps in the other science categories. In particular, there is little or no evidence on the impacts of material resources and technical assistance for scientific research, exchanges and collaborations amongst researchers, and policies and regulations intended to promote research.

The reason for the large proportion of studies under the technology group becomes apparent once the group is disaggregated. Of the 220 studies that fall within the technology group, 134 (61 per cent) of them relate to mobile health (m-health). Most of these studies measure the impacts of a mobile-phone messages on individual health outcomes. Of these m-health studies, 24 target people living with HIV or are related to HIV prevention. For example, Mbuagbaw *et al.* (2012) evaluate the impact of SMS medication reminders to HIV-positive patients in Cameroon on their adherence to antiretroviral therapy. Other SMS-based studies simply provide health-related information and educational materials to recipients (e.g. Jamison, Karlan and Raffler 2013). Still other m-health studies evaluate the use of mobile devices for improving the quality and efficiency of health facilities. For example, Yu *et al.* (2009) measure the impact of using PDAs to collect patients' health data on data entry error and processing times.

The technology intervention category with the second largest concentration is 'digital information services'. The majority of studies coded under this intervention category evaluate SMS interventions intended to improve information asymmetry or nudge behaviour. Common examples include regular SMS messages to farmers with information about weather conditions or regional crop prices (e.g. Cole and Fernando 2016).

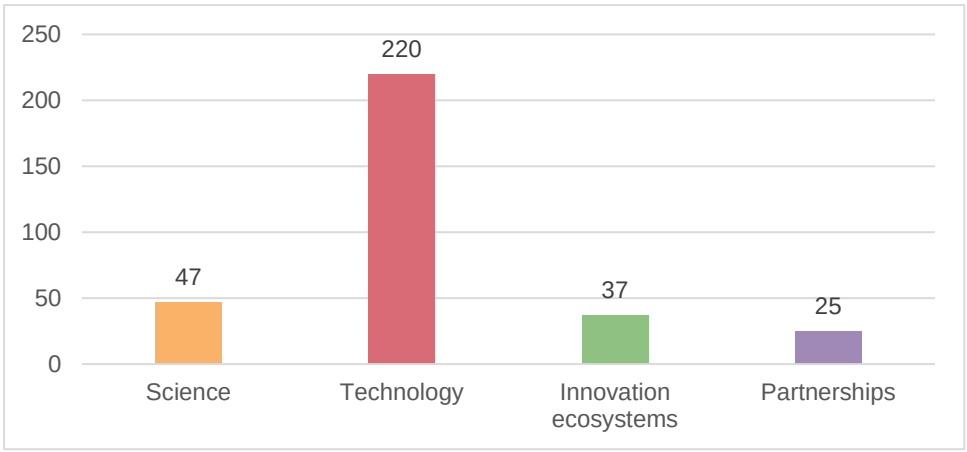
Other common technology interventions include financial services delivered via mobile phones. These frequently include SMS messages to individuals encouraging them to repay their loans or reminding them to save (e.g. Karlan, Morten and Zinman 2012) or mobile money applications that facilitate cash transfers and e-payments (e.g. Munyegera and Matsumoto 2016).

Each intervention category under innovation ecosystems includes at least five studies. These are interventions intended to create the enabling environments in which innovation can thrive. A large number of studies (n=29) evaluate the impacts of publicly funded grants or subsidies to private firms on innovative outputs, profitability or productivity (e.g. Castillo *et al.* 2014). Other studies examine the effects of policies and regulation, such as tax incentives, on private sector innovation (e.g. Avellar and Alves 2008).

Stakeholders' interest in the effectiveness of business incubators and accelerators motivated us to search specifically for impact evaluations on such interventions. A number of studies evaluate the impacts of seed money (access to capital, grants and subsidies), business networks and business training for new firms, or a combination of these. Three different studies (Lopez-Acevedo and Tinajero 2010; Pires *et al.* 2014; McKenzie 2015) evaluate programmes that fit the description of an incubator, though they are not explicitly described as such.

The most discernible gaps appear under the partnerships group. Two-entity partnerships and multi-stakeholder initiatives are not programmes or interventions, but forms of implementing development programming, which were more difficult to capture in our search and screening process. This can potentially explain why our map shows no completed impact evaluations in these two categories. Moreover, where partnerships were used to implement a programme, it is possible that the programme, not the partnership, was evaluated, and thus would not have been included as a partnership intervention in our map.[4]

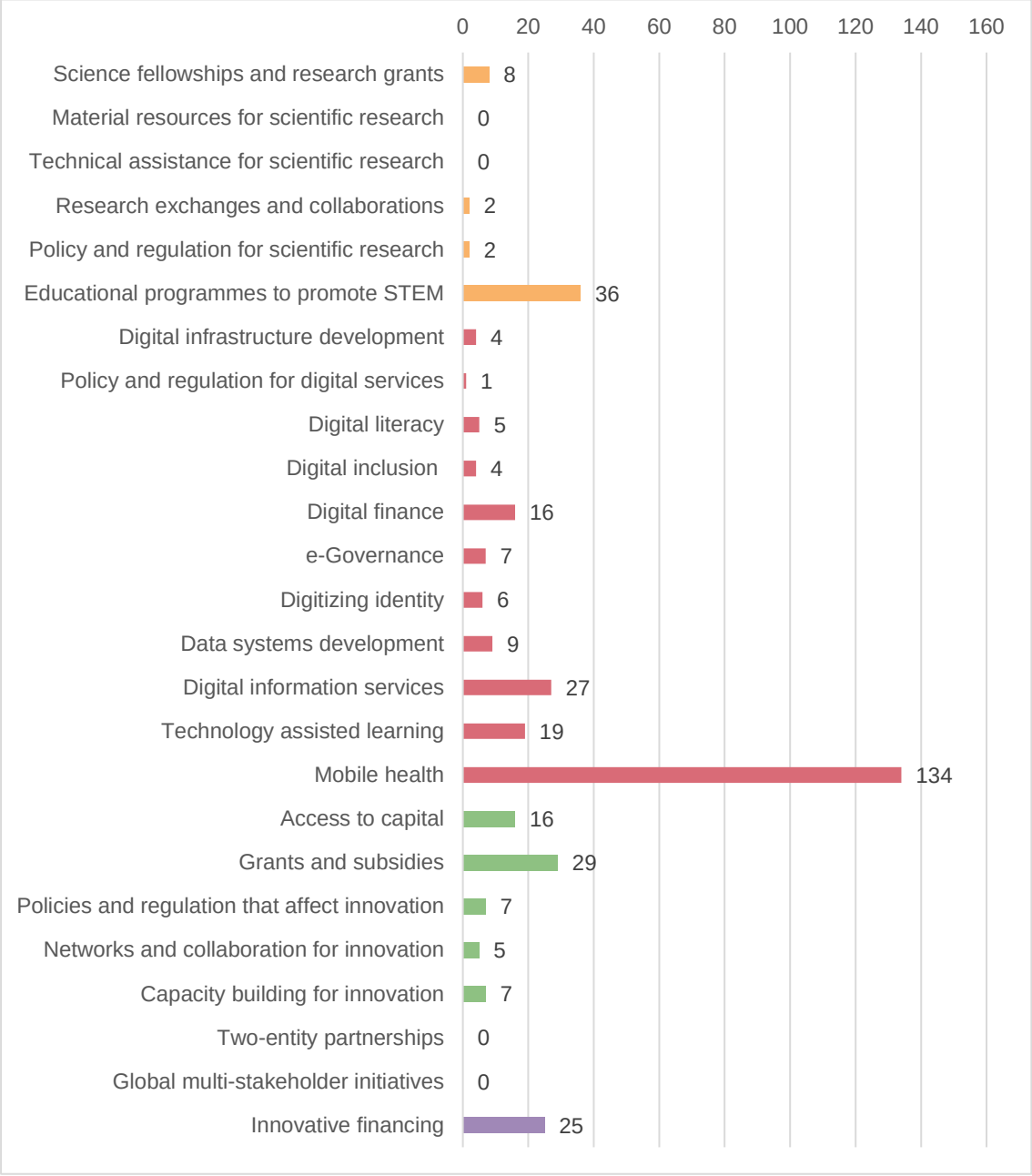
Figure 3: Completed impact evaluations by intervention group



[4] As described in section 3.1.2, we find one ongoing impact evaluation on the effects of multi-stakeholder initiatives.

All 25 studies plotted under ‘innovative financing for development assistance’ evaluate the effectiveness of results-based financing (RBF), performance-based financing (PBF) and pay-for-performance financing mechanisms. These include schemes in which, for example, a health facility receives blocks of payments based on the health of its patients or the quality of its service (e.g. de Walque *et al.* 2015). Other PBF interventions provide bonus payments to teachers based on students’ test scores (Muralidharan and Sundararaman 2011) or money to the governing body of an entire village based on aggregate educational and nutritional indicators of the village’s children (Olken, Onishi and Wong 2014).

Figure 4: Completed impact evaluations by intervention category



3.1.2 *Impact evaluations by outcome*

As described earlier, each study appears at least once under the levels of analysis group and at least once under a sector. Figure 5 presents the number of completed impact evaluations by levels of analysis.

The majority of studies measure individual or household level outcomes (n=262). These results are not surprising, as most interventions can be easily randomised at the individual level and many researchers rely on household or individual survey data to conduct research. Examples of such outcome types may include individual-level health indicators, student test scores or a researcher's academic output.

Most organisational outcomes pertain to private firms (e.g. profits, productivity, and R&D input), while some pertain to school-level indicators (e.g. dropout rates) or facility-level indicators (e.g. quality of care). The community and societal outcomes represented in this map include indicators such as agricultural commodity price dispersion and market prices (e.g. Aker and Fafchamps 2014) and village-wide vaccination coverage or prevalence of childhood illness (Priedeman Skiles *et al.* 2013).

Figure 5: Completed impact evaluations by levels of analysis

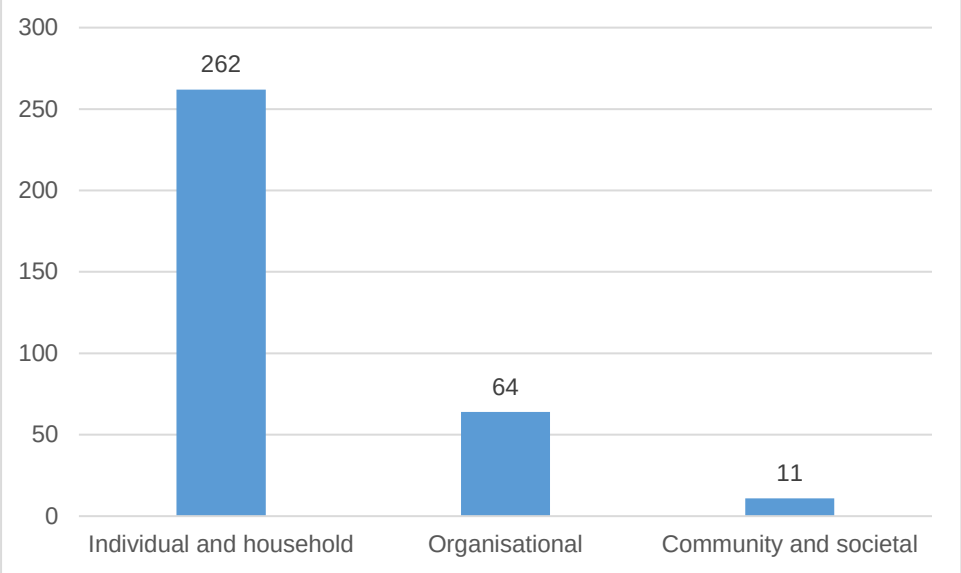
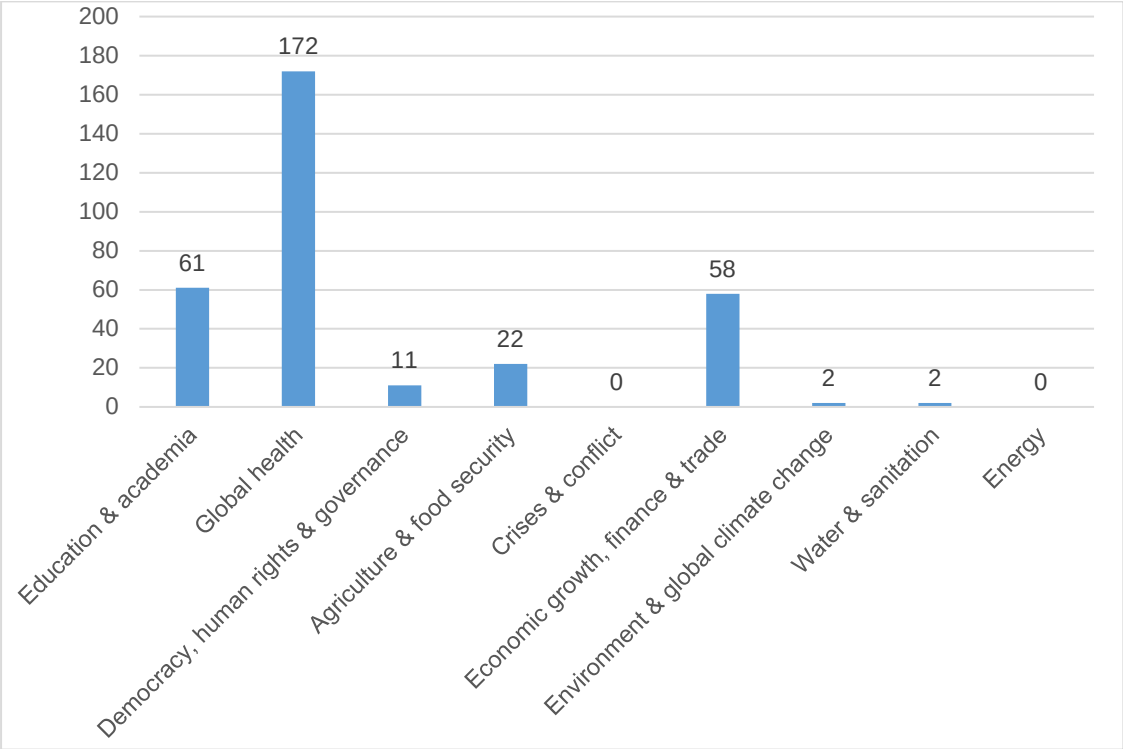


Figure 6 presents the number of completed and ongoing impact evaluations by sector. Most studies (n=172) are coded under 'global health'. This is consistent with our m-health findings and with findings from a recent analysis of 3ie's database of more than 4,000 published impact evaluations (the Impact Evaluation Repository), which finds that a large proportion of published impact evaluations are health-related (Miranda, Sabet and Brown 2016). A large number of studies also fall under 'education and academia' and 'economic growth, finance and trade'. We found no impact evaluations coded under 'crises and conflict' and 'energy'. It is unclear whether these are sectors with little STIP-related programming or whether programming exists but the evidence remains scarce.

Figure 6: Completed impact evaluations by sector



3.1.3 Impact evaluations by crosscutting themes

As figure 7 illustrates, 79 completed studies report sex-disaggregated or sex-specific effect sizes, though this number is largely driven by the former. Twenty-two studies – most of which fall under the innovation ecosystems group – report the long-term impact of an intervention, and 45 studies discuss costs or conduct some form of cost analysis. Only 27 studies report effect sizes for vulnerable or marginalised populations. We code studies under this column if they report effect sizes for conflict-afflicted populations, the disabled, rural populations, orphans and vulnerable children, and ethnic or sexual minorities. As figure 8 indicates, rural populations make up the majority of this group.

Figure 7: Completed impact evaluations by crosscutting themes

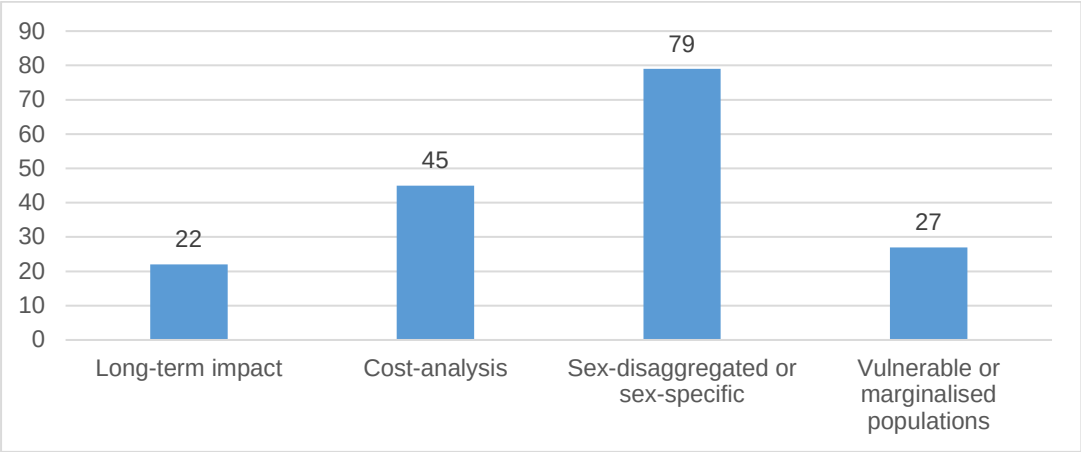
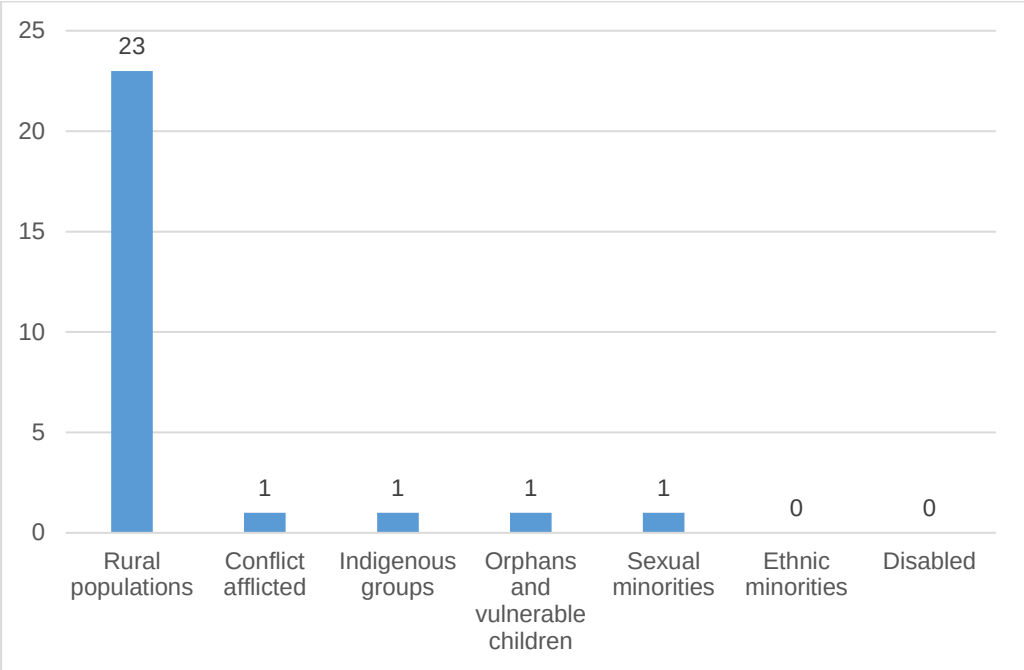


Figure 8: Completed impact evaluations by marginalised populations



3.1.4 Impact evaluations by geography

As figures 9 and 10 indicate, the majority of studies (n=128) are conducted in Sub-Saharan Africa. Seventy-six are conducted in Latin America and the Caribbean, while 48 are conducted in East Asia, Southeast Asia and the Pacific. The countries with the most evidence are Kenya and India, followed by China and South Africa.

Figure 9: Completed impact evaluations by region

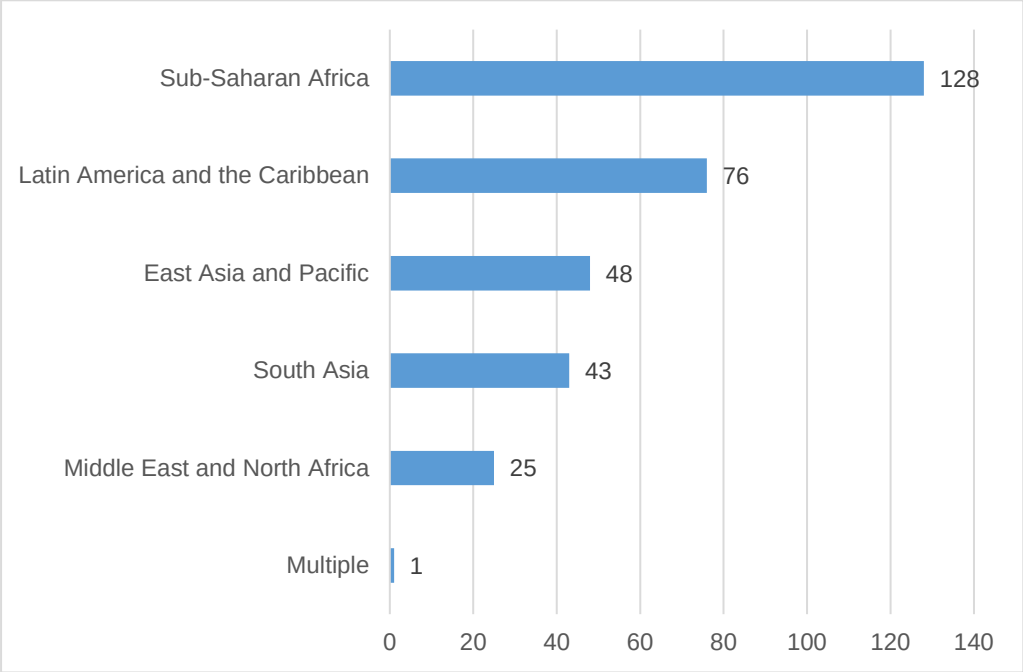


Figure 10: Completed impact evaluations by country

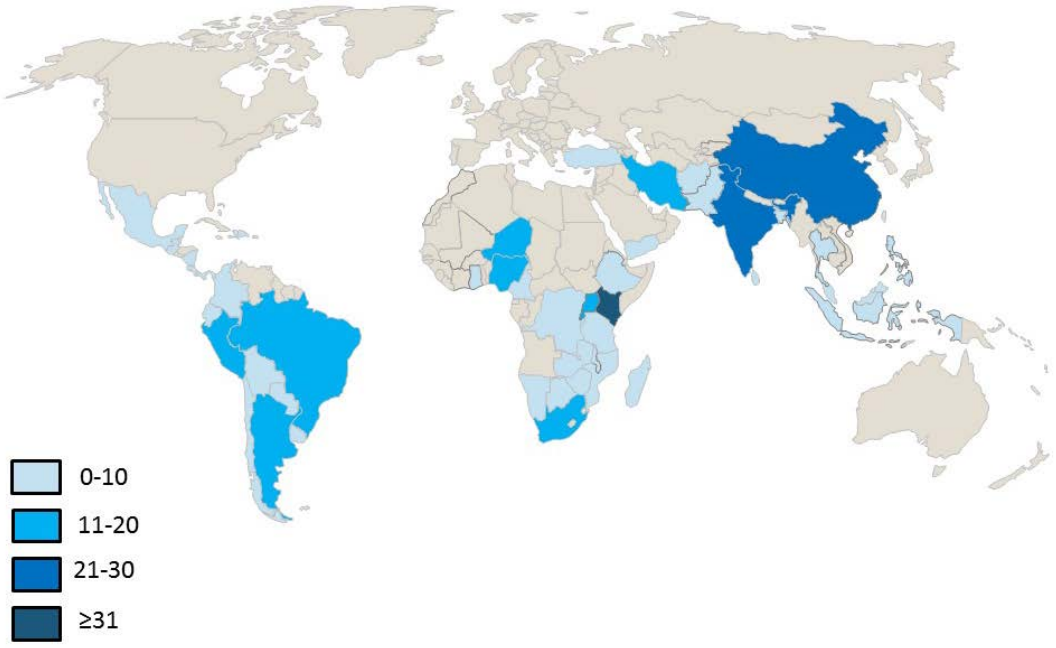
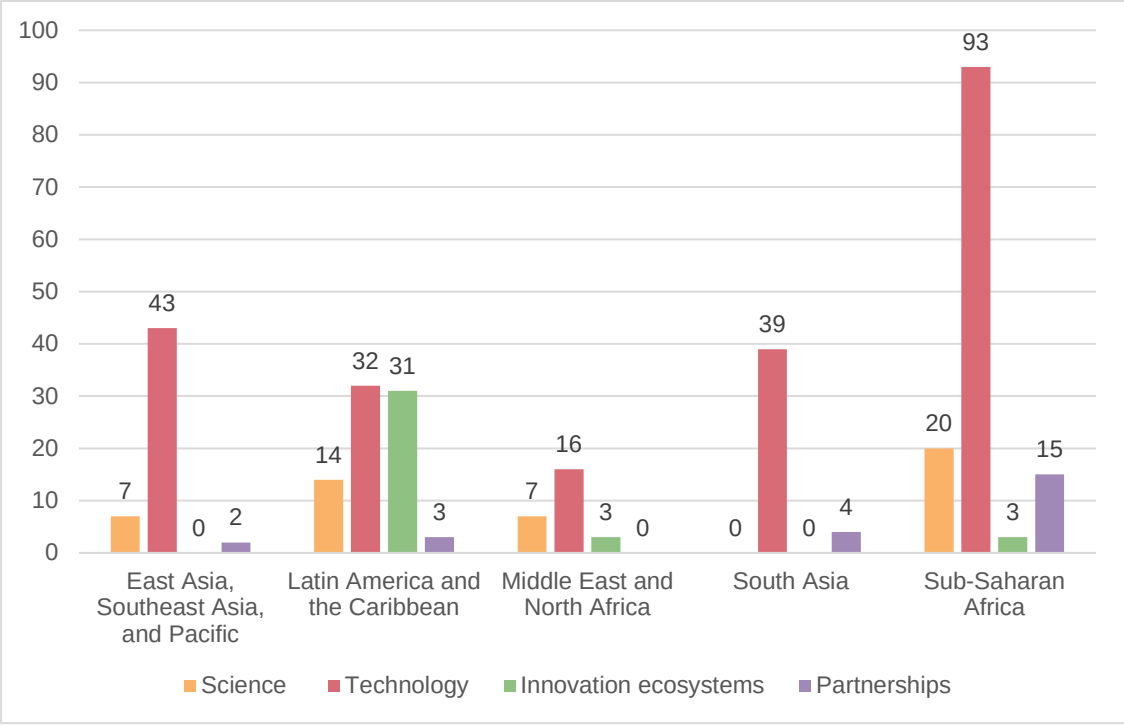


Figure 11 disaggregates regions by each STIP group. A large number of innovation ecosystems studies are conducted in Latin America and the Caribbean, while the majority of the partnerships and technology studies are conducted in Sub-Saharan Africa.

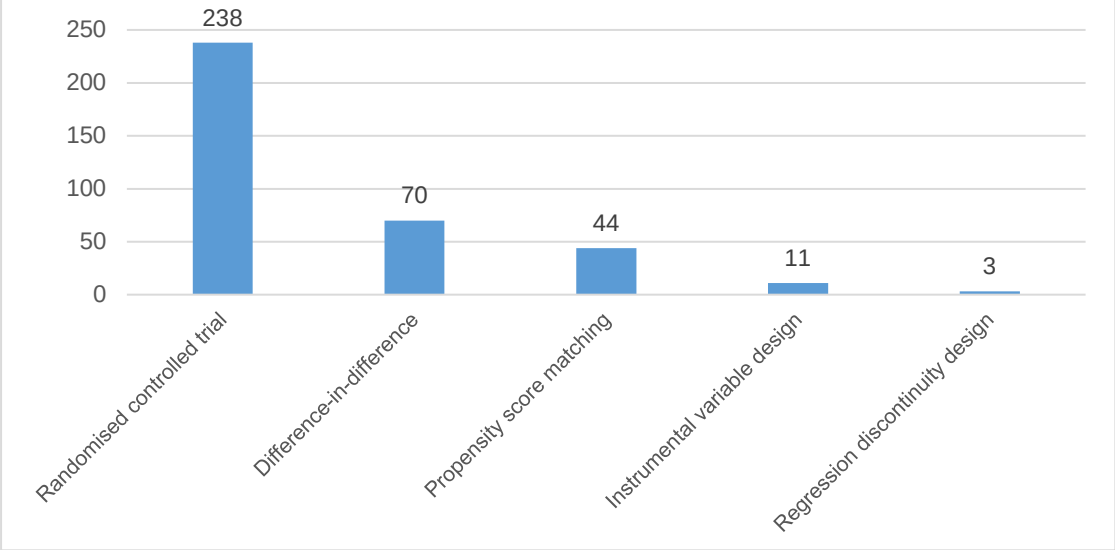
Figure 11: Completed impact evaluations by region and STIP group



3.1.5 *Impact evaluations by methodology*

Also consistent with data from the Impact Evaluation Repository, the majority of studies (n=238) use an experimental design (RCT), either alone or in combination with a quasi-experimental design. Of the 130 studies that do not use an experimental design, 30 use a combination of quasi-experimental designs.

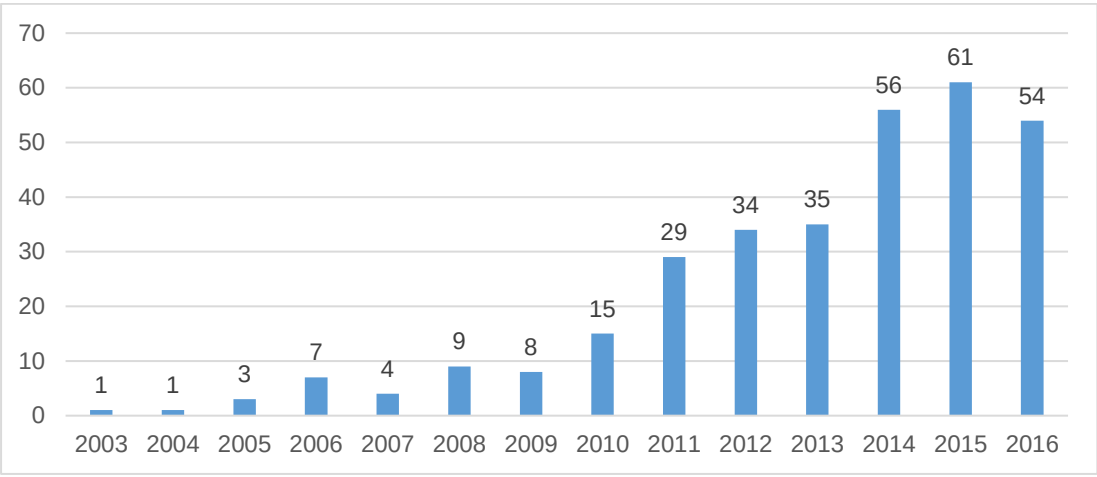
Figure 12: Completed impact evaluations by methodology



3.1.6 *Impact evaluations by publication year*

When reviewing the results by publication year, we find that impact evaluations in this field are steadily on the rise (figure 13). All completed impact evaluations are published in 2003 or later. The dip in 2016 is not indicative of a trend, since we conducted our search in June and July of 2016 and thus missed studies published in the latter half of 2016. The analysis of our ongoing impact evaluation map will provide a more complete picture of the evidence base in 2016. The trend over time is not different between specific STIP groups. For each group, publication of impact evaluations begins in the mid- to late-2000s and is on the rise.

Figure 13: Completed impact evaluations by publication year



3.1.7 Impact evaluations by programme

When coding the studies included in the map, we also noted when there were multiple evaluations of the same programme, whether by different authors, at different time frames or reporting on different outcomes. If we found more than one version of the same evaluation was with the same reported results (e.g. if a study had a working paper and a journal article), we included only one of them. Two programmes – *Fondo Tecnológico Argentino* (FONTAR) and Project ABC in Niger – are each evaluated in five different studies. FONTAR is a national Argentinian fund for private sector 'projects oriented to research and development, pilot scale technologies, applied knowledge generation, innovative products, and process development' (López, Reynoso and Rossi 2010). Project ABC uses mobile phones as a tool to promote adult literacy and numeracy in Niger (Project ABC n.d.). The five studies that evaluate Project ABC are all by one author, Jenny Aker, who works frequently in Niger and analyses the same data in several different ways (Aker, Clemens and Ksoll 2011; Aker, Ksoll and Lybbert 2012; Aker and Ksoll 2012; Aker and Ksoll 2015; Aker and Ksoll 2016)

One programme – the Chilean National Fund for Technological and Productive Development – is evaluated in four different studies (Benavente and Maffioli 2007; Tan 2009; Alvarez, Crespi and Cuevas 2012; Alvarez, Bravo and Zahler 2013). Several programmes have been evaluated three times or twice in different studies. Other programmes will have multiple analyses, as they also appear in our EGM of ongoing impact evaluation studies.

3.1.8 Ongoing impact evaluation studies

We identified 77 ongoing impact evaluation studies. More than half of these (n=49) are registered as trials on an institutional website, such as the American Economic Association or 3ie's Registry for International Development Impact Evaluations, and the remainder are published as protocols in journals. A map in appendix B provides a glimpse, though not complete picture, of the direction of future impact evaluation studies.

The pattern by STIP intervention group remains more or less unchanged in comparison with the completed impact evaluation map, with the exception of a slightly lower representation of science studies (3 per cent versus 15 per cent) and innovation ecosystems studies (1 per cent versus 19 per cent). Of the six ongoing impact evaluations in the partnerships group, five fall under innovative financing (all of which are PBF) and the sixth (Sheely) is a forthcoming evaluation of a multi-stakeholder consortium that leverages mobile-driven solutions to promote children's welfare.

The pattern by outcome types is also similar to that of the completed impact evaluations. The majority of ongoing impact evaluations measure outcomes at the individual or household level and fall under the global health sector. The pattern of crosscutting themes is not substantially different on the ongoing map either. Marginalised populations continue to remain underrepresented, and analyses of long-term impacts and cost are scarce. Although a smaller proportion of study

proposals specifically state that they will disaggregate outcomes by sex than do completed studies, this may not be an accurate representation of what they will actually report. Among the studies that provide effect sizes for marginalised populations, majority (n=5) do so for rural populations, while the others provide effect sizes for conflict-afflicted populations, orphans and vulnerable children, and ethnic minorities.

Ongoing impact evaluations continue to be conducted in the same regions. The majority of studies are conducted in Sub-Saharan Africa (n=43), followed by studies conducted in South Asia (n=15). One notable finding is that there are fewer studies being conducted in Latin America and the Caribbean. This is possibly due to the transition of many South American countries to high-income status, though a deeper analysis of the demand for evidence is required to draw definitive conclusions.

3.1.9 Completed systematic reviews

Only seven completed systematic reviews meet our inclusion criteria. This is a small number, given the density of completed impact evaluations that are included. We do not include 14 reviews on our map due to low confidence in their findings.

Eleven of them are on m-health, and one each are on RBF for healthcare, strengthening research capacity, and using mobile phones for agricultural and rural development. The main reason for rating these systematic reviews as low confidence is that they did not use two screeners to reduce risk of bias in their reviews, they did not include any grey literature or they did little or no risk of bias assessment of the included studies. Most of these systematic reviews are rated as low confidence for more than one reason.

Although the purpose of the EGM is to examine the size and scope of the evidence base, where we have systematic reviews with a medium or high confidence in the findings, we feel sufficiently confident to report what the evidence says. Therefore, we summarise those systematic reviews here.

3.2 Features of the systematic review evidence base

The seven completed systematic reviews in our EGM are all health-related (table 4). Six are under m-health. One of the six also includes studies that evaluate the impact of the use of mobile devices to gather health-related data, which falls under data systems development (Lee *et al*. 2016). The seventh study falls under innovative financing.

Table 4: High- and medium-confidence systematic reviews

Short citation	Intervention category	Intervention details	Sector	Meta-analysis
Lee *et al.* (2016) m-health interventions for maternal, newborn and child health	Data systems development	Mobile device use to gather data about pregnancies, birth weights and diagnosis	Global health	Yes
	Mobile health	SMS reminders and education for maternal and neonatal health		
Sondaal *et al.* (2016) m-health interventions for improving maternal and neonatal care	Mobile health	SMS for improving maternal and neonatal health	Global health	No
van Velthoven *et al.* (2013) Mobile phone messaging interventions for HIV/AIDS care	Mobile health	SMS for HIV infection prevention, treatment and care	Global health	No
Arambepola *et al.* (2016) Automated brief messaging interventions to promote lifestyle changes	Mobile health	SMS to encourage lifestyle changes for diabetics	Global health	Yes
Horvath *et al.* (2012) Text messaging interventions for promoting adherence to ART	Mobile health	SMS for antiretroviral therapy (ART) adherence	Global health	Yes
Beratarrechea *et al.* (2014 Mobile health interventions for treating chronic diseases	Mobile health	All mobile health interventions targeting chronic diseases	Global health	No
Lagarde and Palmer (2009)	Innovative financing	Contracting out health services	Global health	No

One systematic review assesses the evidence for contracting out health services to nongovernmental organisations. Lagarde and Palmer published the review in 2009 when these types of programmes were relatively new in L&MICs. They found only three studies that fit their inclusion criteria: one RCT (Bloom *et al.* 2006), one controlled before and after study (Lavadenz *et al.* 2001), and one interrupted time series with no control (Ali 2005). The RCT had a small sample size, due to the level of analysis (health facility). The controlled before and after study was confounded by an insurance scheme's concurrent extension, and the interrupted time series study

indicated initial improvements followed by declining utilisation. All studies were aid-supported initiatives that contracted out the provision of traditionally government-run basic primary health services. Contracts specified targets, but there was little implementation of payment based on those targets. Results were highly mixed. The authors find it difficult to draw conclusions and point out that the complexity of the intervention (contracting out the services) and even the definition makes generalisation difficult. None of the studies are included in the EGM.

Another systematic review assesses the evidence for promoting adherence to antiretroviral therapy for people living with HIV (Horvath *et al.* 2012). The authors are only able to include two RCTs, both from Kenya. One compares short weekly messages against the standard of care and the other compares a variety of messages (short daily, long daily, short weekly and long weekly) against the standard of care. In the first, text messages are associated with reduced risk of non-adherence at 12 months and with non-occurrence of virologic failure at 12 months. In the second, receiving weekly text messages of any length reduces patients' risk of non-adherence compared with the standard of care. A meta-analysis of the two studies suggests that any weekly text messages or just short weekly text messages is associated with lower risk of non-adherence at 48–52 weeks.

The third systematic review (van Velthoven *et al.* 2013) assesses the effectiveness, acceptability and feasibility of using text messaging for HIV prevention, treatment and care. The review includes 3 RCTs, 11 'interventional' studies and 7 qualitative or cross-sectional studies. The authors find that while text messaging is an acceptable way to receive information and communicate with health workers, few studies show a clear benefit. The authors report weak study designs and inadequate reporting resulting in an inability to make conclusions but caution against using their review as evidence of no effect.

The fourth systematic review (Sondaal *et al.* 2016) assesses the effectiveness of m-health interventions on improving maternal and neonatal care. The review focuses on L&MICs. The authors include 12 intervention studies and 15 descriptive studies that assess antenatal care attendance rates, facility services utilisation, skilled attendance at birth and vaccination rates. They find few studies reporting effects on maternal or neonatal health outcomes such as morbidity and mortality, and the few studies that do report on mortality, anaemia or gestational age at delivery and mode of delivery found no effect for text messages. They do find that m-health interventions may be effective solutions in improving maternal and neonatal service utilisation such as clinic attendance, use of skilled birth attendants or number of facility deliveries.

The fifth systematic review (Lee *et al.* 2016) assesses the effectiveness of m-health interventions for maternal, newborn and child health in L&MICs. The authors include 15 research articles and 2 conference abstracts, of which 12 are intervention studies, 3 are observation studies and only 2 are graded low risk of bias. They report that only one study shows improvements in morbidity or mortality – decreased risk of perinatal death with SMS support, compared with routine care. They perform a meta-analysis of three studies assessing effects on infant feeding and find significant

improvements in rates of breastfeeding within 1 hour after birth, and for exclusive breastfeeding for 3 or 4 months and for 6 months.

The sixth review (Arambepola *et al.* 2016) assesses the use of automated messages promoting lifestyle changes for type 2 diabetes outcomes. The authors include 15 studies, some of unidirectional messages (9 studies) and some bi-directional messages (6 studies). They perform a meta-analysis on 13 studies that report the impact on HbA1c levels and find a significant effect. They do not find a significant impact on body mass index.

The seventh study (Beratarrechea *et al.* 2014) assesses the effect of m-health interventions on chronic disease outcomes in developing countries. The authors find nine studies that meet their inclusion criteria. They conclude that SMS and mobile phone reminders improve clinic attendance rates. They report on one study that finds a significant effect on asthma management but not on diabetes. The authors also report that three studies looked at cost-effectiveness and conclude that interventions providing SMS appointment reminders are more cost-effective than telephone interviews, and just as efficacious, and that the study on asthma shows that the additional cost was minimal.

Of the six m-health interventions, we note that two are related to HIV, two to maternal and neonatal/child health and two to chronic diseases. We also note that there is very little overlap with the impact evaluations; very few of the impact evaluations in the EGM are included studies in the systematic reviews.

3.3 Major gaps and clusters in the evidence

3.3.1 Gaps in the evidence

Despite the impressive number of completed and ongoing impact evaluations in this EGM, there remain some gaps in the evidence base. An analysis of the EGM – the supply of evidence – alone is not sufficient for making decisions about priorities for investments in future research. A deeper analysis, including an examination of the demand for evidence, is available in a forthcoming scoping paper (Sabet *et al.* 2017). In this report, we identify areas with noticeably large gaps in the supply when combining the completed and ongoing impact evaluation maps (figure 14). Overall, the ongoing studies do not appear to be filling gaps in the evidence base. The exceptions are two ongoing or planned studies on digital literacy, one on digital inclusion and one on global multi-stakeholder initiatives.

Across every intervention group, there are gaps in the evidence on how macro-level policies and regulation affect the production of scientific research, access to digital technology and the innovative behaviour of private firms. Moreover, none of the completed or ongoing impact evaluations measure effects on crisis- and conflict-related outcomes or energy-related outcomes. Other sectors – democracy, human rights and governance, environment and climate change, and water and sanitation – are also underrepresented on the map. Although these types of interventions and outcomes may be more difficult to evaluate rigorously, it is not impossible. Using innovative evaluation methods or including an evaluation in the project planning

phase can improve the ability to rigorously evaluate the effects of these types of programmes and outcomes. On the left side of the map, we find few studies that report community-level and societal outcomes. Although in some cases outcomes at these levels are less relevant, in others they are important. For example, we can feasibly expect to fill gaps in the intersections of intervention categories such as e-governance, digital finance or policies and regulations that affect innovation and these outcome levels.

Figure 14: Evidence gap map of completed and ongoing STIP impact evaluations

Intervention categories		Levels of analysis			Sectors								
		Individual & household outcomes	Organisational outcomes	Community & societal outcomes	Education & academia	Global health	Democracy, human rights & governance	Agriculture & food security	Crises & conflict	Economic growth, finance & trade	Environment & global climate change	Water & sanitation	Energy
Science	Fellowships & research grants	8			8								
	Material resources for scientific research												
	Technical assistance for scientific research												
	Research exchanges & collaborations		2							2			
	Policy & regulation for scientific research	1				1							
	Educational programmes to promote STEM	39			39								
Technology	Digital infrastructure development	2		3	1			3					
	Policy & regulation for digital services			1						1			
	Digital literacy	7	1		2	1	1	1		2			
	Digital inclusion	6	1			1	2	2		1			
	Digital finance	27	3		2		1	3		23			
	e-Governance	6	4	1			8	1		1			
	Digitising identity	7	2			3	1	1		2			
	Data systems development	10	4			10	2	2		1			
	Digital information services	32	4	6	4	6	8	13		4	2	1	
	Technology assisted learning	21	2		17	2				4	1		
	Mobile health	164	8	3	2	172						1	
Innovation ecosystems	Access to capital		16							16			
	Grants & subsidies		29							29			
	Policies & regulation that affect innovation		7							7			
	Networks & collaboration for innovation	1	5	1				1		6	1	1	
	Capacity building for innovation		7							7			
Partnerships	Two entity partnerships												
	Global multi-stakeholder initiatives	1	1	1			1						
	Innovative financing	23	11	6	2	29				1			

In discussing gaps in the EGM, we want to ensure that what we see on the map represents intersections for which there are clear theories of change. For example, it is unlikely that researchers would measure the effects of STEM education programmes on water and sanitation outcomes. Therefore, since we would not expect to see studies in that intersection on the map, the blank space does not reflect a gap in the evidence base that necessarily needs to be filled. In the sections below, we note only those gaps that we believe need to be filled based on a clear link to a relevant theory of change.

Science

In general, gaps that cut across all science intervention categories exist on the effects of science programmes on organisational, community-level and societal outcomes. More specifically, gaps exist in the evidence base on the effectiveness of material resources and technical assistance for scientific research and of research collaborations and exchanges. Though we see a large number of impact evaluations on the effectiveness of STEM educational programmes (n=39), these fall uniquely under the 'education and academia' sector. An important gap to fill may be on the impact of STEM education interventions on other sectoral outcomes, such as economic growth.

Technology

A clear gap in the technology group is in the digital infrastructure development intervention category, across all levels of analysis and sectors. Other gaps exist on the impacts of various technology intervention categories on organisational, community-level and societal outcomes. Moreover, we expected to see more studies evaluating digital identity interventions, particularly their impacts on democracy, human rights and governance-related outcomes. However, one ongoing study is assessing the effects of fingerprinting at different stages in the loan cycle and agricultural season (Gine, Goldberg and Yang, forthcoming). Despite the large concentration of studies on the impacts of m-health interventions, all but 11 of the 164 studies measure individual or household-level outcomes. This presents an opportunity to invest more in studies that measure the impacts of m-health interventions at the health facility, village, or community levels, such as m-health technology for providers, m-health for community benefits such as immunisation coverage or m-health to affect community norms or beliefs, where evidence is less prevalent.

Innovation ecosystems

Like technology, the innovation ecosystems group is well-represented, such that each intervention category contains at least one study. Nevertheless, there are areas where we expected to see more evidence. Given the rising interest of development organisations in private sector innovation and the large number of publicly funded innovation programmes in L&MICs, we expected to see more evidence on how different macro-level policies affect the innovative behaviour of firms. Although these types of interventions may be more difficult to evaluate rigorously, we believe that it is possible with quasi-experimental methods and/or early planning and knowledge of upcoming policies. The obvious lack of evidence on the impact of innovation

ecosystems interventions on individual or household-level outcomes is likely because the programming in this group specifically targets firms and organisations.

Partnerships

There are clear gaps in the evidence base on the impacts of two-entity partnerships and multi-stakeholder initiatives on all levels of analysis. Interventions implemented through these mechanisms could cut across any sector, but we see only one ongoing study on the impact of a multi-stakeholder consortium that leverages mobile-driven solutions to promote children's welfare. Most innovative financing interventions are concentrated under global health. These financing mechanisms are likely relevant to other sectors, such as education and academia, democracy, human rights and governance, and water and sanitation, and we view these as gaps.

3.3.2 *Clusters of evidence*

Cells in which there are large concentrations of impact evaluations and no or few systematic reviews present promising areas for research synthesis.[5] While there are apparent clusters in the gap map, more analysis of the heterogeneity of the studies within each cell is necessary to identify promising areas for research synthesis. We present that detailed cluster analysis in the scoping paper (Sabet *et al.* 2017).

A number of clusters in the EGM stand out as having many impact evaluations and few or no systematic reviews. There are 39 impact evaluations on the effects of educational programmes for STEM on individual-level, education-related outcomes, but no systematic reviews. Many of these studies evaluate the impacts of different pedagogical strategies for instructing math or science.

There are 36 impact evaluations that measure interventions in the 'digital information services'[6] category. We did find one systematic review but rated it as low-confidence and did not plot it. With a more in-depth analysis of homogeneity in this category, it may be a promising area for evidence synthesis.

Twenty-two studies evaluate the effects of technology assisted learning programmes that make use of mobile devices or the internet on educational outcomes. A majority of these are evaluations of computer-assisted learning programmes with an internet component. Though there are a number of systematic reviews on the effectiveness of computer-assisted learning, we did not find any (with a medium or high confidence rating) that also included the effectiveness of using an internet component.

The innovation ecosystems intervention categories that evaluate the impact of monetary investments in innovation (I1 and I2) on economic growth outcomes also present a promising opportunity for evidence synthesis. Combined, there are 32 impact evaluations in this area and no systematic reviews.

[5] Appendix C presents an EGM of systematic reviews.

[6] This category does not include digital services for finance or health.

There are 172 studies coded as m-health. Although we include two high-quality systematic reviews on the use of mobile phones in HIV medication adherence and HIV care, there is surprisingly little overlap between these systematic reviews and the studies included in the map. The low-confidence systematic reviews did not include many more, or did not synthesise the information in a way that made it clear which studies they found. In addition, there are clusters of studies assessing the use of m-health to promote lifestyle changes (e.g. for diabetes, hypertension and weight loss), again with little overlap with our EGM, and the two low-confidence systematic reviews did not include any of the studies in our EGM. There is also a cluster of studies around appointment reminders, as well as of m-health targeting providers, to provide information on disease diagnosis and management and best practices, both with little synthesis.

There are 29 impact evaluations that measure the impacts of RBF or PBF programmes on global health outcomes. Although we identified a few systematic reviews in this area, they were rated as having low confidence in findings and do not appear on our map. In addition, these reviews do not include any of the studies included in our EGM. This presents a need for high-quality synthesis of the evidence in this area.

4. Limitations

The primary challenge associated with designing the STIP search strategy is the existence of four relatively distinct topics, each of which cut across a variety of sectors. To capture the breadth of each topic, we chose to focus the search terms on intervention categories only. As such, our search strategies and screening protocol are largely shaped by the intervention categories. Each term was tested on various platforms and only those that yielded relevant results were included in the strategies. For instance, the ‘partnerships’ search contains the names of certain pubic aid agencies, but not others, and the acronyms of some are included, while for others, the full titles are present in the search.

Due to time constraints, we conducted our search only in English and in primarily English-based databases and websites. Some foreign-language studies that were captured by the search were screened (if in Spanish, French or Portuguese). We invariably missed studies in other languages.

Lastly, due to the broad scope of this gap map, we were not able to identify a narrow set of outcome categories along a causal chain and were limited to plotting studies according to levels of analysis and sectors. A more specific gap map that focuses on one STIP group or one intervention category within a group would provide a more nuanced assessment of the evidence base.

5. Conclusion

This report summarises the impact evaluation findings of an EGM on STIP-related programming in L&MICs, developed by 3ie as part of a project funded by USAID's US Global Development Lab. The main objective of this EGM was to catalogue the current evidence base around how STIP is used to enhance development programming in L&MICs. The clearest finding from this study is that although a large number of studies are included in the map, they are generally clustered in a few key areas, leaving gaps in large portions of the map.

We identify a number of patterns in the evidence:

- The evidence base includes a large number of impact evaluations that evaluate m-health interventions.
- Outcomes are most commonly measured at the individual or household levels of analysis.
- The region of the world with the most evidence is Sub-Saharan Africa. The countries with the most evidence are Kenya and China, followed by India and South Africa.

Examining the amount of evidence in each cell of the map, we find several clusters of evidence and several gaps in the evidence:

- gaps in the evidence on policies and regulation that affect scientific research, access to digital technology, and innovation ecosystems;
- gaps in the evidence on a number of science intervention categories, including material and technical assistance for scientific research;
- gaps in the evidence on how two-entity partnerships and multi-stakeholder initiatives are implementing development assistance;
- an unsynthesised cluster of evidence around educational programmes to promote STEM;
- an unsynthesised cluster of evidence around digital information services such as SMS services, not related to finance or health; and
- an unsynthesised cluster of evidence on RBF or PBF programmes' impact on global health outcomes.

Appendix A: Methodological details

Using the search strategy delineated in table A-2, we searched 12 databases, 32 websites and 3 impact evaluation registries, all of which are listed in Table A-1. We searched for general terms connected to science, technology, innovation and partnerships. In each database, we searched the indexed terms and used thesauri, when available, to capture other articles related to our search terms.

Title and abstract screening was conducted in EndNote, using keywords to facilitate the search. The coded information includes bibliographic details for the study, the interventions from the framework that the study evaluates and the outcomes areas from the framework for which the study measures effects.

Table A-1: List of databases and websites searched

From database providers	
Academic search complete	EBSCO Host (http://search.ebscohost.com/)
Africa-wide information	
EconLit	
International Bibliography of Social Sciences (IBSS)	ProQuest (http://search.proquest.com/)
PAIS Index	
Library and information science collection	
Embase	Ovid (http://ovidsp.ovid.com/)
CAB abstracts	
Global Health	
ERIC	
Popline	Knowledge for Health (http://www.popline.org/)
Scopus	Elsevier BV (https://www.scopus.com/)
Other academic databases	
IDEAS	RePEc (https://ideas.repec.org/)
Social Science Research Network (SSRN)	https://www.ssrn.com/en/
Websites	
Impact Evaluation Repository	3ie (http://www.3ieimpact.org/evidence-hub/impact-evaluation-repository)
Center for Development Informatics	University of Manchester (http://www.cdi.manchester.ac.uk/)
Digital Development Network (DDN)	http://www.comminit.com/ict-4-development/search/apachesolr_search/?filters=tid:307%20tid:11
Consultative Group to Assist the Poor (CGAP)	https://www.cgap.org/publications
Institute of Development Studies (IDS)	http://www.ids.ac.uk/publications
Global Development Network (GDN)	http://www.gdn.int/html/workingpapers.php
International Food Policy Research Institute (IFPRI)	http://ebrary.ifpri.org/
AgEcon Search	University of Minnesota (http://ageconsearch.umn.edu/)

Innovations for Poverty Action (IPA)	http://www.poverty-action.org/publications
Poverty Action Lab (J-PAL)	https://www.povertyactionlab.org/publications
Center for Global Development (CGD)	http://www.cgdev.org/section/publications
UC Center for Effective Global Action (CEGA)	University of California, Berkley (http://cega.berkeley.edu/evidence/working-papers/)
Bureau of Research and Economics Analysis of Development (BREAD)	http://ibread.org/bread/papers
Rural Education Action Program (REAP)	Stanford University (http://reap.fsi.stanford.edu/docs/publications)
Multilateral organisations	
UK Department for International Development R4D	UK AID (https://www.gov.uk/dfid-research-outputs)
Technology and Innovation Report Series	UN Conference on Trade and Development (http://unctad.org/en/pages/publications/Technology-Innovation-Report.aspx)
UNDP Evaluation publications	http://www.undp.org/content/undp/en/home/library.html
UNU-World Institute for Development Economics Research	https://www.wider.unu.edu/publications
USAID Evaluations – Development Experience Clearinghouse	USAID (https://dec.usaid.gov/dec/content/search.aspx)
Development Impact Evaluation Initiative (DIME)	World Bank (http://www.worldbank.org/en/research/dime/research)
EnGender Impact	World Bank (website no longer available)
Open Knowledge Repository	World Bank (https://openknowledge.worldbank.org/)
WIE2	World Bank (website no longer available)
AGRIS (International information system for the agricultural science and technology)	UN Food and Agriculture Organization (http://agris.fao.org/agris-search/index.do)
Inter-American Development Bank (IDB)	https://publications.iadb.org/discover?locale-attribute=en
Registries	
American Economic Association (AEA) RCT Registry	https://www.socialscienceregistry.org/
Registry of International Development Impact Evaluations (RIDIE)	3ie (http://www.3ieimpact.org/evidence-hub/ridie)
Evidence in Governance and Politics (EGAP)	http://egap.org/
Systematic review databases	
EPPI-Centre	http://eppi.ioe.ac.uk/cms/Publications/tabid/56/Default.aspx
Campbell collaboration	https://campbellcollaboration.org/library.html
3ie systematic review database	www.3ieimpact.org/evidence-hub/systematic-review-repository
Dissertations and theses	
Bielefeld Academic Search Engine (BASE)	National Digital Library of Theses and Dissertations (https://www.base-search.net/)
British Library Electronic Theses online Service (EtHOS)	http://ethos.bl.uk/Home.do

We adapted the search strategy in Table A-2 to each of the indexes listed in Table A-1.

Table A-2: Search strategy

	Search syntax	Search fields
Topical terms		
1	(scien*) or (fellowship*) or (scholar*) or (research* N2 (grant or grants or project or projects or fund*)) or ((grant or grants) N2 (project or project or universit*)) or ("STEM" and educat*) or (((educat* or train*) N3 (program* or project or project)) N6 ("STEM" or technolog* or math* or engineer*)) or (((equip* or resourc*) AND ("STEM" or research*)) N3 (educat* or universit*)) or (research* N3 (collaborat* or cooperat* or partnership* or network*))	ti or ab or su or kw
2	(digital infrastructure) OR (digital N2 (service* or system*)) or (digital literacy) or (digital inclusion) or (digital finance) or (digital W2 information) or (broadband N2 (expan* or access)) or (wireless N2 access) or (internet N2 access) or (web N2 access) or (text* messag*) or (short* messag*) or ("SMS") or (cell* phone*) or (mobile phone*) or (telecommunication N2 access) or (electronic payment*) or (e-govern*) or (mhealth or "mobile health" or m-health or m#health) or (biometric* ident*) or (digital ident*) or (technolog* N2 access) or (digital technolog*) or (e-bank* or m-bank* or e-commerce) or (technolog* N3 (participat* AND (TX(digit*)))) or (technolog* N3 (banking AND (TX(digit*)))) or (technolog* N3 (promot* AND (TX(digit*))))	ti or ab or su or kw
3	(innovation) or (innovat* N2 process*) or (innovat* AND ((venture capital) or grant or grants or ("private sector") or fund* or ("SME") or support or promote or spur* or policy or policies or regulation* or (capacity building) or entrepreneur*)) or ((small business*) AND (award or grant or grants or ("venture capital") or financing)) or ((small enterprise*) AND (partnership* or network*)) or (technolog* N2 innovat*) or (incubator* AND (enterprise* or business*)) or ((R&D or "research and development") N2 (fund* or invest* or grant or grants or award*))	ti or ab or su or kw
4	(partnership* AND ((development N2 assistance) or (philanthrop*) or ("aid") or ("civil societ*") or (usaid) or ("australian agency for international development") or ("canadian international development agency") or ("department of foreign affairs trade and development") or (europeaid) or ("directorate-general for international cooperation and development") or ("agence francaise de developpement") or (giz) or ("deutsche gesellschaft für internationale") or ("japan international cooperation agency") or (jica) or (jbic) OR ("japan bank for international cooperation") or ("korean international cooperation agency") or (koica) or (nzaid) or ("new zealand agency for international development") or ("millennium challenge corporation") or (ukaid) or (dfid) or ("department for international development") or ("swedish international development cooperation agency") or (aid agenc*) or (public N3 agenc*))	ti or ab or su or kw or tx
5	(collaborat* AND ((philanthrop*) or ("civil society") or (aid agenc*) or (public N3 agenc*))	ti or ab or su or kw or tx
6	(assistance AND ((development) or philanthrop* or "aid" or ("civil society") or (usaid) or ("australian agency for international development") or ("canadian international development agency") or ("department of foreign affairs trade and development") or (europeaid) or ("directorate-general for international cooperation and development") or ("agence francaise de developpement") or (giz) or ("deutsche gesellschaft für internationale") or ("japan international cooperation agency") or (jica) or (jbic) OR ("japan bank for international cooperation") or ("korean international cooperation agency") or (koica) or (nzaid) or ("new zealand agency for international development") or ("millennium challenge corporation") or (ukaid) or (dfid) or ("department for international development") or ("swedish international development cooperation agency") or (aid agenc*) or (public N3 agenc*))	ti or ab or su or kw
7	("multi-stakeholder initiative")	ti or ab or su or kw
8	(innovat* W3 financ*)	ti or ab or su or kw
9	4 OR 5 OR 6 OR 7 OR 8	

	Search syntax	Search fields
10	ZW(science or "science & technology" or fellowship" or "fellowship & scholarships" or scholarship or "government aids action programme" or "government aid to small business - south africa" or "government aid" or "research grant" or "research grants" or "research project" or "research funding" or "research funds" or "research funding environment" or "university grants" or "education programme" or "education programmes" or "education programs" or "education projects" or "research equipment or "research resources" or "research collaboration" or "research collaborations" or "research cooperation" or "research partnerships" or "research network" or "research networks")	ZW
11	ZW("digital technology" or "digital infrastructure" or "digital services" or "digital system" or "digital systems" or "digital literacy" or "digital information" or "digital inclusion" or "digital fingerprint systems" or "broadband access" or "wireless access" or "internet access" or "test messaging" or "text messages" or "text messaging services" or "short message service" or "short message service (sms)" or "cell phone" or "cell phone access" or "mobile phone" or "telecommunication - developing countries" or "electronic payment" or "e-governance" or "e-government" or mhealth or "mobile health" or "biometric identification" or "digital identity" or "technology access" or e-banking or e-commerce or m-banking or m-commerce or "technology promotion")	ZW
12	ZW(innovation or "innovation adoption" or "innovation process" or "innovation processes" or "innovation programmes" or "innovation research and development" or "ventura capital" or "sme [small and medium enterprises]" or "small business" or "small enterprise" or "innovation partnerships" or "incubator for technological entrepreneurship" or R&D or "research and development")	ZW
13	ZW("public and private partnerships" or "public and private organisation" or "public private initiatives" or "public private partnership projects" or "public private partnership(ppp)" or "public private partnerships" or "public private partnerships [ppps]" or "public private sector partnerships" or "innovative funding mechanisms")	ZW
14	10 OR 11 OR 12 OR 13	
15	**1 OR 2 OR 3 OR 9 OR 14**	
Impact evaluation terms		
16	((match* N2 (propensity or coarsened or covariate)) or ("propensity score") or ("difference in difference*" or "difference-in-difference*" or "differences in difference*" or "differences-in-difference*" or "double difference*") or ("quasi-experimental" or "quasi experimental" or "quasi-experiment" or "quasi experiment") or ((estimator or counterfactual) and evaluation*) or (("instrumental variable*") or (IV W2 (estimation or approach))) or ("regression discontinuity"))	ti or ab or su or kw
17	((experiment or experimental) N2 (design or study or research or evaluation or evidence)) or ((random or randomi#ed) N2 (trial or assignment or treatment or control))) or AB(((experiment or experimental) N2 (design or study or research or evaluation or evidence)) or ((random or randomi#ed) N2 (trial or assignment or treatment or control))) or SU(((experiment or experimental) N2 (design or study or research or evaluation or evidence)) or ((random or randomi?ed) N2 (trial or assignment or treatment or control))	ti or ab or su or kw
18	((((((DE "RANDOMIZATION (Statistics)" OR DE "RANDOMIZED controlled trials") OR (DE "GROUP-randomized trials")) AND (DE "EXPERIMENTAL design" OR DE "BLIND experiment" OR DE "BLOCK designs" OR DE "CONTROL groups (Research)" OR DE "FACTORIAL experiment designs" OR DE "MANIPULATION checks (Research)" OR DE "OPTIMAL designs (Statistics)" OR DE "REGRESSION discontinuity design" OR DE "REPEATED measures design" OR DE "REPLICATION (Experimental design)" OR DE "RESPONSE surfaces (Statistics)" OR DE "SUBGROUP analysis (Experimental design)" OR DE "WEIGHING designs" OR DE "EXPERIMENTAL methods in education") OR (DE "FIXED effects model")) OR (DE "INSTRUMENTAL variables (Statistics)")) OR (DE "REGRESSION discontinuity design")) OR (DE "STATISTICAL matching")	DE
19	**16 OR 17 OR 18**	

	Search syntax	Search fields
Program evaluation terms		
20	(impact N2 (evaluation or evaluating or assess or assessing or assessment or analyze or analyse or analyzing or analysing or analysis or estimating or estimation)) or (effectiveness N2 (evaluate or evaluating or evaluation or assess or assessing or assessment or analyze or estimate or estimating or estimation))	ti or ab or su or kw
21	("program* evaluation" OR "project evaluation" OR "evaluation research" OR ("natural experiment*"))	ti or ab or su or kw
22	(DE "PROJECT evaluation") OR (DE "EVALUATION methodology" OR (DE "EVALUATION -- Research" OR DE "EVALUATION research (Social action programs)")	DE
23	**20 OR 21 OR 22**	
24	("program* evaluation" or "project evaluation" or "evaluation research" or "natural experiment*" or "program effectiveness" or "outcome assessment" or "evaluation study")	ti or ab or su or kw
25	**23 AND 24**	
Systematic review terms		
26	"meta analysis" or "systematic review"	ti or ab or su or kw
27	((systematic* N2 review*) or "meta-analy*" or "meta analy*" or metaanalytic*)	ti or ab or su or kw
28	DE("META-analysis")	DE
29	**26 OR 27 OR 28**	
30	**19 OR 25 OR 29**	
L&MIC terms		
31	(Africa or "Sub-Saharan Africa" or "North Africa" or "West Africa" or "East Africa" or Algeria or Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroon or "Cape Verde" or "Central African Republic" or Chad or "Democratic Republic of the Congo" or "Republic of the Congo" or Congo or "Cote d'Ivoire" or "Ivory Coast" or Djibouti or Egypt or "Equatorial Guinea" or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Guinea-Bissau or Kenya or Lesotho or Liberia or Libya or Madagascar or Malawi or Mali or Mauritania or Morocco or Mozambique or Namibia or Niger or Nigeria or Rwanda or "Sao Tome" or Principe or Senegal or "Sierra Leone" or Somalia or Somaliland or "South Africa" or "South Sudan" or Sudan or Swaziland or Tanzania or Togo or Tunisia or Uganda or Zambia or Zimbabwe)	ti or ab or su or kw or ge
32	("South America" or "Latin America" or "Central America" or Mexico or Argentina or Bolivia or Brazil or Chile or Colombia or Ecuador or Guyana or Paraguay or Peru or Suriname or Uruguay or Venezuela or Belize or "Costa Rica" or "El Salvador" or Guatemala or Honduras or Nicaragua or Panama)	ti or ab or su or kw or ge
33	(Caribbean or "Antigua and Barbuda" or Aruba or Barbados or Cuba or Dominica or "Dominican Republic" or Grenada or Haiti or Jamaica or "Puerto Rico" or "St. Kitts and Nevis" or "Saint Kitts and Nevis" or "St. Lucia" or "Saint Lucia" or "St. Vincent and the Grenadines" or "Saint Vincent and the Grenadines" or "St. Vincent" or "Saint Vincent" or "Trinidad and Tobago")	ti or ab or su or kw or ge
34	("Eastern Europe" or Balkans or Albania or Armenia or Belarus or Bosnia or Herzegovina or Bulgaria or Croatia or Cyprus or "Czech Republic" or Estonia or Greece or Hungary or "Isle of Man" or Kosovo or Latvia or Lithuania or Macedonia or Malta or Moldova or Montenegro or Poland or Portugal or Romania or Serbia or "Slovak Republic" or Slovakia or Slovenia or Ukraine)	ti or ab or su or kw or ge
35	("Middle East" or "Southeast Asia" or "Indian Ocean Island*" or "South Asia" or "Central Asia" or Caucasus or Afghanistan or Azerbaijan or Bangladesh or Bhutan or Burma or Cambodia or China or Georgia or India or Iran or Iraq or Jordan or Kazakhstan or Korea or "Kyrgyz Republic" or Kyrgyzstan or Lao or Laos or Lebanon or Macao or Mongolia or Myanmar or Nepal or Oman or Pakistan or Russia or "Russian Federation" or "Saudi Arabia" or Bahrain or Indonesia or Malaysia or Philippines or Sri Lanka or Syria or "Syrian Arab Republic" or Tajikistan or Thailand or Timor-Leste or Timor or Turkey or Turkmenistan or	ti or ab or su or kw or ge

	Search syntax	Search fields
	Uzbekistan or Vietnam or "West Bank" or Gaza or Yemen or Comoros or Maldives or Mauritius or Seychelles)	
36	("Pacific Islands" or "American Samoa" or Fiji or Guam or Kiribati or "Marshall Islands" or Micronesia or New Caledonia or "Northern Mariana Islands" or Palau or "Papua New Guinea" or Samoa or "Solomon Islands" or Tonga or Tuvalu or Vanuatu)	ti or ab or su or kw or ge
37	((developing or less-developed or less* developed or "under developed" or underdeveloped or under-developed or middle-income or "middle income" or "low income" or low-income or underserved or "under served" or deprived or poor*) N3 (countr* or nation or population or world or state or economy or economies))	ti or ab or su or kw or ge
38	("third world" or LMIC or L&MIC or LAMIC or LDC or LIC or lami countr* or transitional countr*)	ti or ab or su or kw or ge
39	**31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38**	
40	((ZG "africa") or (ZG "africa, central") or (ZG "africa, east") or (ZG "africa, eastern") or (ZG "africa, north") or (ZG "africa, northeast") or (ZG "africa, northwest") or (ZG "africa, southern") or (ZG "africa, sub-saharan") or (ZG "africa, west")) or ((ZG "algeria") or (ZG "algiers (algeria)") or (ZG "algiers (la.)"))) or ((ZG "benin"))) or ((ZG "angola"))) or ((ZG "botswana"))) or ((ZG "burkina faso"))) or ((ZG "burundi"))) or ((ZG "cameroon"))) or ((ZG "cabo verde"))) or ((ZG "central african republic"))) or ((ZG "chad"))) or ((ZG "congo (brazzaville)") or (ZG "congo (democratic republic)"))) or ((ZG "cote d'ivoire"))) or ((ZG "djibouti") or (ZG "djibouti (djibouti)"))) or ((ZG "egypt"))) or ((ZG "equatorial guinea"))) or ((ZG "eritrea"))) or ((ZG "ethiopia"))) or ((ZG "gabon"))) or ((ZG "gambia"))) or ((ZG "ghana"))) or ((ZG "guinea") or (ZG "guinea-bissau"))) or ((ZG "kenya") or (ZG "kenya, mount (kenya)"))) or ((ZG "lesotho"))) or ((ZG "liberia"))) or ((ZG "libya"))) or ((ZG "madagascar"))) or ((ZG "malawi"))) or ((ZG "mali"))) or ((ZG "mayotte"))) or ((ZG "mauritania"))) or ((ZG "morocco"))) or ((ZG "mozambique"))) or ((ZG "namibia"))) or ((ZG "niger") or (ZG "nigeria") or (ZG "nigeria, eastern") or (ZG "nigeria, northern") or (ZG "nigeria, southern") or (ZG "nigeria, southwest") or (ZG "nigeria, western"))) or ((ZG "rwanda"))) or ((ZG "sao tome & principe"))) or ((ZG "senegal"))) or ((ZG "sierra leone"))) or ((ZG "somalia"))) or ((ZG "south africa"))) or ((ZG "sudan"))) or ((ZG "south sudan"))) or ((ZG "swaziland"))) or ((ZG "tanzania"))) or ((ZG "togo"))) or ((ZG "tunisia"))) or ((ZG "uganda"))) or ((ZG "zambia"))) or ((ZG "zimbabwe"))	ZG
41	((ZG "south america")) or ((ZG "central america"))) or ((ZG "latin america"))) or ((ZG "mexico") or (ZG "mexico (mexico : state"))) or ((ZG "argentina") or (ZG "argentina, northeast") or (ZG "argentina, northwest"))) or ((ZG "bolivia"))) or ((ZG "brazil") or (ZG "brazil, central west") or (ZG "brazil, north") or (ZG "brazil, northeast") or (ZG "brazil, south") or (ZG "brazil, southeast"))) or ((ZG "chile"))) or ((ZG "colombia"))) or ((ZG "ecuador"))) or ((ZG "guyana"))) or ((ZG "paraguay"))) or ((ZG "peru"))) or ((ZG "suriname"))) or ((ZG "uruguay"))) or ((ZG "venezuela") or (ZG "venezuela, central west"))) or ((ZG "belize"))) or ((ZG "costa rica"))) or ((ZG "el salvador"))) or ((ZG "guatemala") or (ZG "guatemala (guatemala)"))) or ((ZG "honduras"))) or ((ZG "nicaragua"))) or ((ZG "panama") or (ZG "panama (panama)"))) or ((ZG "caribbean area"))) or ((ZG "antigua") or (ZG "antigua & barbuda"))) or ((ZG "barbuda"))) or ((ZG "aruba"))) or ((ZG "barbados"))) or ((ZG "cuba"))) or ((ZG "dominica") or (ZG "dominican republic"))) or ((ZG "grenada"))) or ((ZG "haiti"))) or ((ZG "jamaica"))) or ((ZG "netherlands antilles"))) or ((ZG "puerto rico"))) or ((ZG "saint kitts") or (ZG "saint kitts & nevis"))) or ((ZG "nevis"))) or ((ZG "saint lucia"))) or ((ZG "saint vincent") or (ZG "saint vincent & the grenadines"))) or ((ZG "trinidad") or (ZG "trinidad & tobago"))	ZG
42	((((((((((((((((((((((((((((((ZG "europe") or (ZG "europe, central") or (ZG "europe, eastern") or (ZG "europe, northern") or (ZG "europe, southern")) or ((ZG "balkan peninsula"))) or ((ZG "albania"))) or ((ZG "armenia") or (ZG "armenia (republic)"))) or ((ZG "belarus") or (ZG "belarus, western"))) or ((ZG "bosnia & hercegovina"))) or ((ZG "bulgaria"))) or ((ZG "croatia"))) or ((ZG "cyprus") or (ZG "cyprus, northern"))) or ((ZG "czech republic") or (ZG "czechoslovakia"))) or ((ZG "estonia"))) or ((ZG "greece"))) or ((ZG "gibraltar"))) or ((ZG "hungary"))) or ((ZG "isle of man"))) or ((ZG "kosovo (republic)"))) or ((ZG "latvia"))) or ((ZG "lithuania"))) or ((ZG "macedonia") or (ZG "macedonia (republic)"))) or ((ZG "malta"))) or ((ZG "moldova"))) or ((ZG "montenegro"))) or ((ZG "poland"))) or ((ZG	ZG

	Search syntax	Search fields
	"portugal"))) or ((ZG "romania"))) or ((ZG "serbia") or (ZG "serbia & montenegro"))) or ((ZG "slovakia"))) or ((ZG "slovenia"))) or ((ZG "ukraine") or (ZG "ukraine, southern") or (ZG "ukraine, western"))) or ((ZG "yugoslavia"))	
43	((ZG "asia")) or ((ZG "southeast asia"))) or ((ZG "south asia"))) or ((ZG "middle east"))) or ((ZG "caucasus, northern (russia")))) or ((ZG "afghanistan"))) or ((ZG "azerbaijan"))) or ((ZG "bangladesh"))) or ((ZG "bhutan"))) or ((ZG "cambodia"))) or ((ZG "china") or (ZG "china, northwest") or (ZG "china, southeast") or (ZG "china, southwest"))) or ((ZG "georgia") or (ZG "georgia (republic)"))) or ((ZG "india") or (ZG "india, north") or (ZG "india, northeastern") or (ZG "india, northwestern") or (ZG "india, south"))) or ((ZG "iran"))) or ((ZG "iraq"))) or ((ZG "jordan"))) or ((ZG "kazakhstan"))) or ((ZG "korea") or (ZG "korea (north)") or ((ZG "kyrgyzstan"))) or ((ZG "laos"))) or ((ZG "lebanon"))) or ((ZG "mongolia"))) or ((ZG "burma"))) or ((ZG "nepal"))) or ((ZG "oman"))) or ((ZG "pakistan"))) or ((ZG "russia") or (ZG "russia (federation)") or (ZG "russia, northern") or (ZG "russia, northwestern") or (ZG "russia, southern") or (ZG "russia, western"))) or ((ZG "soviet union") or (ZG "soviet union, western"))) or ((ZG "saudi arabia"))) or ((ZG "bahrain"))) or ((ZG "indonesia"))) or ((ZG "malaysia") or (ZG "malaysia, east"))) or ((ZG "philippines"))) or ((ZG "sri lanka"))) or ((ZG "syria"))) or ((ZG "tajikistan"))) or ((ZG "thailand") or (ZG "thailand, central") or (ZG "thailand, eastern") or (ZG "thailand, northeastern") or (ZG "thailand, northern") or (ZG "thailand, southern"))) or ((ZG "timor-leste"))) or ((ZG "timor island"))) or ((ZG "turkey"))) or ((ZG "turkmenistan"))) or ((ZG "uzbekistan"))) or ((ZG "vietnam") or (ZG "vietnam (democratic republic)") or (ZG "vietnam (republic)") or (ZG "vietnam, central") or (ZG "vietnam, northern") or (ZG "vietnam, northwestern") or (ZG "vietnam, southern"))) or ((ZG "gaza"))) or ((ZG "palestine"))) or ((ZG "yemen (people's democratic republic)") or (ZG "yemen (republic)") or (ZG "yemen, north") or (ZG "yemen, south"))) or ((ZG "comoros"))) or ((ZG "maldives"))) or ((ZG "mauritius"))) or ((ZG "seychelles"))	ZG
44	((((((((((((((((ZG "pacific ocean")) or ((ZG "american samoa"))) or ((ZG "fiji"))) or ((ZG "guam"))) or ((ZG "kiribati"))) or ((ZG "marshall islands"))) or ((ZG "micronesia") or (ZG "micronesia (federated states)"))) or ((ZG "new caledonia"))) or ((ZG "northern mariana islands"))) or ((ZG "palau"))) or ((ZG "papua new guinea"))) or ((ZG "samoa"))) or ((ZG "solomon islands"))) or ((ZG "tonga"))) or ((ZG "tuvalu"))) or ((ZG "vanuatu"))	ZG
45	(((ZW "developing countries")) or ((ZW "low income countries"))) or ((ZW "third world"))	ZG
46	**40 OR 41 OR 42 OR 43 OR 44 OR 45**	
47	**39 OR 46**	
Combined total		
48	**15 AND 30 AND 47**	
Additional search on 07/07/16		
1	result* based* financ*	ti or ab or su or kw
2	outcome* based financ*	
3	performance based financ*	
4	impact bond*	
5	crowd fund*	

We adapted the following website search strategy (Table A-3) to the websites listed in Table A-1, using keywords from Table A-2.

Table A-3: Website search methods

Website/Database:
Link:
Searcher:
Total number screened
Date Completed:
Method:
Keywords Searched/Filters:
Notes:

Table A-4: Screening protocol

Instructions:				
Proceed through the questions in order. Note that an 'unclear' answer never excludes a study. The questions are designed to be as objective as possible. The questions are meant to start with those easier to ascertain and progress to those that will be harder to answer based on a quick read. The screener should feel confident of any 'yes' or 'no' answer used to exclude a study. **If you cannot conclusively say 'yes' or 'no', please mark the study as unclear and it will move on to the next level of screening. At the title and abstract levels, if a study seems like a systematic review and meets the topical criteria, do not exclude it.**				
Screening questions		**No**	**Yes**	**Unclear**
Title level				
1	Is the publication date 1990 or after?			
	IF NO, THEN EXCLUDE			
2	Does the study concern a population within a country or countries classified as low- or middle-income?			
	IF NO, THEN EXCLUDE			
3	Are data being analysed using quantitative methods?			
	IF NO, THEN EXCLUDE			
4	Does the study concern a policy, program, or intervention?			
	IF NO, THEN EXCLUDE			
5	Is the study a biomedical (efficacy) trial of a product, medication, or procedure? These include medical technologies.			
	IF YES, THEN EXCLUDE			
6	Does the study concern a policy, program, or intervention that is CLEARLY NOT concerned with STIP as per the framework?			
	IF YES, THEN EXCLUDE			
Title and abstract level				
Repeat questions 1-6				
		No	**Yes**	**Unclear**
7	Are the methods clearly identified and clearly NOT among the included impact evaluation methodologies? [randomized controlled trials (including stratified), difference-in-differences, instrumental variable approaches, propensity score matching (and other matching techniques), regression discontinuity design, synthetic controls. At this level, include all systematic reviews that meet other inclusion criteria.]			
	IF YES, THEN EXCLUDE			

8	Does the study measure outcomes for many observations of a relevant unit of analysis? (e.g. individuals, households, firms, communities)?			
	IF NO, THEN EXCLUDE			
9	Studies are categorized as 'science' if they evaluate programs, policies or interventions that are intended to promote and/or facilitate research in science and technology. Examples include grants or in-kind donations to researchers or research institutions, partnerships between researchers or educational institutions, regulation to encourage scientific research, and educational programs that promote STEM. Does the study evaluate a policy, program or intervention that promotes or facilitates scientific and technological research?			
10	The framework defines 'technology' as the use of digital and data technologies. These include all policies, programs, and interventions that promote the use of or access to the internet or mobile phones. Data, in this context, broadly refers to the access to and efficient use of information that allows the public and private sectors to make better decisions for policies and programming. Does the study evaluate the use of or access to a digital or data technology?			
11	The 'innovation ecosystem' includes intervention categories intended to spur innovation or enable an innovative environment. The framework defines innovation as a new idea, device, method, or process that either improves upon a previous one, or creates a new solution to a problem. Examples include capacity building and training programs or access to funding intended to spur innovation (particularly in the private sector), or policies and regulations that affect innovation. Does the study evaluate an intervention that is intended to spur innovation or enable an innovative environment?			
12	The framework classifies studies under 'partnerships' if they are created, implemented or funded in a non-traditional, innovative way. Partnerships include collaborations between a public aid agency and one or more private or public entity, as well as innovative forms of financing development assistance (such as crowd funding or outcome-based financing). Does the study evaluate a program, policy, or intervention that is designed or implemented by a partnership between a public aid agency and one or more private or public entity, or one that is financed in an innovative way?			
13	**IF YOU ANSWERED NO TO ALL QUESTIONS 9-12, THEN EXCLUDE**	-	-	-
	-			-
***Full text level* [INCLUSIONARY QUESTIONS]**				
		No	**Yes**	
14	Does the study use one of the following impact evaluation methodologies: a) Randomized controlled trials (RCT). b) Regression discontinuity design (RDD). c) Propensity score matching (PSM) or other matching methods (as well as synthetic controls). d) Instrumental variable (IV) estimation (or other methods using an instrumental variable such as the Heckman Two Step approach). e) Difference-in-differences (DD), or a fixed or random effects model with an interaction term between time and intervention for baseline and follow-up observations.			

	Note: The study may also use methods in addition to those listed here (such as regression with controls), or may use a primary evaluation methodology not listed (such as in a natural experiment), but must do so in addition to one of the above methods (a-e).				
	IF YES, PROCEED TO QUESTION 15 IF NO AND NOT A REVIEW, EXCLUDE IF STUDY IS A REVIEW, PROCEED TO QUESTION 16				
15	Does the study have a sample size of at least 50 at baseline (control and treatment combined)? If it is a cluster RCT, are there at least four clusters?				
	IF NO, THEN EXCLUDE				
16	Is the study described as a systematic review, synthetic review, and/or meta-analysis? To be a review, the study must meet all four criteria below: a) Have a research question or focus on STIP b) Include effectiveness studies[7] undertaken in L&MIC countries c) Describe methods used for search, screening, data collection and synthesis d) Concern questions other than those related to treatment efficacy (trials undertaken in closed clinical or laboratory settings)				
	IF STUDY IS A REVIEW, BUT DOES NOT MEET CRITERIA ABOVE, THEN EXCLUDE				
Questions 17a-17d are intended to identify studies in the science category only.					
			No	**Yes**	**N/A**
17	Studies are categorized as 'science' if they evaluate programs, policies or interventions that are intended to promote and/or facilitate research in science and technology. Examples include grants or in-kind donations to researchers or research institutions, partnerships between researchers or educational institutions, regulation to encourage scientific research, and educational programs that promote STEM. Does the study appear to fall under the 'science' category. In other words, does it evaluate a policy, program or intervention that promotes or facilitates scientific and technological research?				
	IF NO, THEN EXCLUDE FROM SCIENCE AND PROCEED TO QUESTION 18. IF YES, THEN PROCEED TO QUESTIONS 17a, 17b, AND 17c.				
	17a	If the study evaluates fellowships, scholarships, subsidies, or grants for researchers, they must be CLEARLY earmarked for a project related to science or technology. Does the study meet this criterion?			
	17b	If the study evaluates an intervention that facilitates the creation of partnerships and collaboration between researchers, educational institutions, or other research-based entities, the partnership or collaboration must be for the explicit purposes of scientific research or capacity building for scientific research. Does the study meet this criterion?			
	17c	We are interested in interventions and programs that promote STEM at the primary, secondary, and tertiary levels (for example, new math-related curriculum, a scholarship to pursue STEM			

[8] Typically, efficacy studies examine treatment outcomes under highly controlled conditions. Effectiveness studies go beyond laboratory trials and examine interventions in real-world settings.

		studies, or the donation of lab equipment or school materials intended to teach or improve STEM skills). We are not interested in studies that report science and math outcomes (such as test scores) but that do not include a program or intervention that is STEM-related. Does the study concern an educational or extra-curricular policy or program that explicitly promotes STEM?			
	IF YOU ANSWERED YES to **AT LEAST ONE** of 17a, 17b, or 17c, THEN INCLUDE FOR SCIENCE AND PROCEED TO QUESTION 18. IF YOU ANSWER NO OR N/A TO ALL OF 17a, 17b, and 17c, THEN PROCEED TO QUESTION 17d.				
	17d	Does the study fall under any of the following science intervention categories, as per the framework: a) Material resources b) Technical assistance c) Policy and regulation for scientific research			
	IF YES FOR **AT LEAST ONE** OF THE THREE CATEGORIES, THEN INCLUDE FOR SCIENCE AND PROCEED TO QUESTION 18. IF NO, THEN EXCLUDE FOR SCIENCE AND PROCEED TO QUESTION 18.				
Questions 18a-18d are intended to identify studies in the technology category only.					
			No	**Yes**	**N/A**
18	The framework defines 'technology' as the use of digital and data technologies. These include all policies, programs, and interventions that promote the use of or access to the internet or mobile phones. Data, in this context, broadly refers to the access to and efficient use of information that allows the public and private sectors to make better decisions for policies and programming. Common examples of non-digital and non-data technologies include agricultural technologies (like improved seeds), cookstoves, and green energy. Does the study evaluate the use of or access to a digital or data technology?				
	IF YES, THEN ANSWER THE FOLLOWING QUESTION (18a). IF NO, PROCEED TO QUESTIONS 18b AND 18c.				
	18a	If the study evaluates the use of or access to computer or ICT-related technology, does it also include the use of the internet or mobile phones?			
	18b	Does the study evaluate the use of biometrics (such as fingerprinting) in order to digitize identity?			
	18c	Does the study evaluate the impact of a policy or regulation intended to promote technology?			
	IF YOU ANSWERED YES TO **AT LEAST ONE** OF 18a, 18b, or 18c, THEN INCLUDE FOR TECHNOLOGY AND PROCEED TO QUESTION 19. IF YOU ANSWERED NO OR N/A TO 18a, 18b, AND 18c, THEN EXCLUDE FROM TECHNOLOGY AND PROCEED TO QUESTION 19.				
Questions 19a-19d are intended to identify studies in the innovation ecosystems category only.					
			No	**Yes**	**N/A**
19	The 'innovation ecosystem' includes intervention categories intended to spur innovation or enable an innovative environment. The framework defines innovation as a new idea, device, method, or process that either improves upon a previous one, or creates a new solution for a problem. Examples include capacity building and training programs or access to funding intended to spur innovation (particularly in the private sector), or policies and regulations that affect innovation.				

	Does the study evaluate an intervention that is intended to spur innovation or enable an innovative environment?				
	IF NO, THEN EXCLUDE FROM INNOVATION ECOSYSTEMS AND PROCEED TO QUESTION 20. IF YES, THEN ANSWER QUESTIONS 19a, 19b, AND 19c.				
	19a	We are interested in funds (such as grants, loans, and subsidies) intended to spur innovation (i.e. promote or introduce a new idea, technology, device, method or process, or improve upon previous ones). If the study concerns a microfinance intervention to support business growth and expansion, is it explicitly intended to spur innovation?			
	19b	If the study evaluates an intervention that facilitates the formation of business or industry networks, groups, associations, or consortiums, it MUST be for purposes of sharing ideas, diffusing technology, and spurring innovation. Does the study meet this criterion?			
	19c	If the study concerns a capacity building, technical assistance, or training intervention to businesses, does it explicitly involve the introduction of a new technology or the improvement of production processes?			
	IF YOU ANSWERED YES TO **AT LEAST ONE** OF 19a, 19b, or 19c, THEN INCLUDE FOR INNOVATION ECOSYSTEMS AND PROCEED TO QUESTION 20. IF YOU ANSWERED NO OR N/A TO ALL OF 19a, 19b, AND 19c, THEN PROCEED TO QUESTION 19d.				
	19d	Does the study evaluate the impact of a policy or regulation on innovation?			
	IF YES, THEN INCLUDE FOR INNOVATION ECOSYSTEMS AND PROCEED TO QUESTION 20. IF NO, THEN EXCLUDE FROM INNOVATION ECOSYSTEMS AND PROCEED TO QUESTION 20.				
Questions 20a-20c are intended to identify studies in the partnerships category only.					
			No	**Yes**	**N/A**
20	The framework classifies studies under 'partnerships' if they are created, implemented or funded in a non-traditional, innovative way. Partnerships include collaborations between a public aid agency and one or more private or public entity, as well as innovative forms of financing development assistance (such as crowd funding or outcome-based financing). Does the study evaluate a program, policy, or intervention that is designed or implemented by a partnership between a public aid agency and one or more private or public entity, or one that is financed in an innovative way?				
	IF NO, THEN EXCLUDE FROM PARTNERSHIPS. IF YES, THEN ANSWER QUESTIONS 20a AND 20b.				
	20a	If the study concerns a joint venture between a public aid agency and at least one other public or private entity, does it include the active participation of all parties in the decision-making, design, or implementation of the program?			
	20b	Does the study evaluate an intervention that employs a new and creative form of financing development assistance? For example, contributions from small donors (crowd funding), outcome- or results-based financing, and development impact bonds			
	IF YOU ANSWERED YES TO **AT LEAST ONE** OF 20a or 20b, THEN INCLUDE FOR PARTNERSHIPS. IF YOU ANSWER NO OR N/A TO ALL OF 20a AND 20b, THEN PROCEED TO QUESTION 20c.				

	20c	Does the study evaluate a development program that is implemented by a multi-stakeholder initiative?			
	IF YES, THEN INCLUDE FOR PARTNERSHIPS. IF NO, THEN EXCLUDE FROM PARTNERSHIP.				
21	IF EXCLUDED FROM ALL FOUR CATEGORIES (SCIENCE, TECHNOLOGY, INNOVATION ECOSYSTEMS, AND PARTNERSHIPS), THEN EXCLUDE				

Systematic review confidence rating tool[8]

This tool should only be used to determine the confidence rating for systematic reviews for the purpose of inclusion in an EGM. For describing the quality in the systematic reviews database, the full checklist will need to be completed.

Overview of the tool

The purpose of this tool is to provide a screener with a consecutive set of yes or no questions that allow a rating to be determined at the first possible instance. The questions presume that possible answers are 'yes', 'partially', 'unsure' or 'no'. If the decision rule is 'if the answer is clearly no to any of these', then the screener need only determine whether the answer is clearly no. If unsure, the screener knows the answer is not clearly no and can move on to the next question. She does not need to determine yes, partially or unsure at this point in the tool.

Later in the tool, there are decision rules that say, 'if the answer is unsure or partially'. If the screener has reached this point, she has already decided that the answer is not clearly no, so the distinction she is making is between yes on the one hand and unsure or partially on the other hand. If the decision rule is 'if the answer is clearly yes' again, then the screener does not need to decide between unsure, partially, or no, only to determine whether the answer is clearly yes.

The first eight questions are used to determine whether the quality is low. The screener may stop screening at any point where she can confidently assign low quality based on the decision rule in the question. If the screener makes it to question 9, the study is either medium or high quality, and the screener is now determining whether the study is medium or not. Many of the questions are repeated from earlier, but the decision rule is now different. Again, she may stop screening at any point where she can confidently assign medium based on the decision rule in the question. Questions 9 through 22 are used to determine if the quality is medium. If the screener gets to the end, then the quality is high, as explained at the end of the tool.

[8] Adapted from appendix 2 of Snilstveit *et al.* (2013), available at: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2013/12/13/000158349_20131213135609/Rendered/PDF/WPS6725.pdf

Screening questions

1. Were the criteria used for deciding which studies to include in the review reported? Did the authors specify:

- Types of studies
- Participants/settings/population
- Intervention(s)
- Outcome(s)

If the answer is clearly no to any of these, the quality is low and the screening is completed. If not, keep going.

2. Was the search for evidence reasonably comprehensive?

- Relevant databases searched (minimum criteria: all reviews should search at least one source of grey literature, such as Google; for health, Medline/Pubmed + Cochrane Library; for social sciences, IDEAS + at least one database of general social science literature and one subject specific database)
- Reference lists in included articles checked

If the answer is clearly no to either of these, the quality is low and the screening is completed. If not, keep going.

3. Was bias in the selection of articles avoided? Did the authors specify:

- Independent screening of full text by at least two reviewers
- List of included studies provided

If the answer to either of these is clearly no, the quality is low and the screening is completed. If not, keep going.

4. Did the authors use appropriate criteria to assess the quality and risk of bias in analysing the studies to be included?

- The criteria used for assessing the quality/risk of bias were reported
- Sensible criteria were used that focus on the quality/risk of bias (and not other qualities of the studies, such as precision or applicability/external validity). 'Sensible' is defined as a recognised quality appraisal tool/checklist, or similar tool which assesses bias in included studies. Please see below for details of the main types of bias such a tool should assess.

If the answer to either of these is clearly no, the quality is low and the screening is completed. If not, keep going.

Bias is a systematic error or deviation from the truth in results or inferences. In studies of the effects of social, economic and healthcare interventions, the main types of bias arise from systematic differences in the groups that are compared (selection bias), the intervention that is provided, or exposure to other factors apart from the intervention of interest (performance bias/contamination), withdrawals or

exclusions of people entered into a study (attrition bias) or how outcomes are assessed (detection bias) and reported (reporting bias). Reviews of social science studies may be particularly affected by reporting bias, where a biased subset of all the relevant data and analyses is presented. Assessments of the risk of bias are sometimes also referred to as assessments of the validity or quality of a study. Validity is the extent to which a result (of a measurement or study) is likely to be true. Quality is a vague notion of the strength or validity of a study, often indicating the extent of control over bias.

If there are no included studies, skip questions 5 through 8 and start again with 9.

5. Were the characteristics and results of the included studies reliably reported? Was there:

- independent data extraction by at least two reviewers
- a table or summary of the results of all the included studies

If the answer to either of these is clearly no, then the quality is low and the screening is completed. If not, keep going. Skip if there are no included studies.

6. Did the review describe the extent of heterogeneity? Did the review ensure that included studies were similar enough that it made sense to combine them, sensibly divide the included studies into homogeneous groups or sensibly conclude that it did not make sense to combine or group the included studies?

If the answer is clearly no, then the quality is low and the screening is completed. If not, keep going. Skip if there are no included studies.

7. Were the findings of the relevant studies combined (or not combined) appropriately relative to the primary question the review addresses and the available data?

- Specifically, is the data analysis limited to narrative or vote counting where quantitative analyses would have been possible?

If the answer is clearly yes to the bulleted question, then the quality is low and the screening is completed. If not, keep going. Skip if there are no included studies.

If the coder does not feel qualified to assess this question, note the question number as not assessed and keep going.

8. Does the review report evidence appropriately?

- The review makes clear which evidence is subject to low risk of bias in assessing causality (attribution of outcomes to intervention), and which is likely to be biased, and does so appropriately.
- Where studies of differing risk of bias are included, results are reported and analysed separately by risk of bias status.

If the answer to either of these is clearly no, then the quality is low and the screening is completed. If not, keep going. Skip if there are no included studies.

Note on reporting evidence and risk of bias: For reviews of effects of 'large n' interventions, experimental and quasi-experimental designs should be included (if available). For reviews of effects of 'small n' interventions, designs appropriate to attribute changes to the intervention should be included (e.g. pre-post with assessment of confounders).

9. Were the criteria used for deciding which studies to include in the review reported? Did the authors specify:

- Types of studies
- Participants/settings/population
- Intervention(s)
- Outcome(s)

If the answer to any of these is partially or unsure, then the quality is medium and the screening is completed. If not, keep going.

10. Was the search for evidence reasonably comprehensive? Were the following done:

- Language bias avoided (no restriction of inclusion based on language)
- No restriction of inclusion based on publication status
- Relevant databases searched (Minimum criteria: All reviews should search at least one source of grey literature such as Google; for health, Medline/Pubmed + Cochrane Library; for social sciences, IDEAS + at least one database of general social science literature and one subject specific database)
- Reference lists in included articles checked
- Authors/experts contacted

If the answer to any of these is no or partially or unsure, the quality is medium and the screening is completed. If not, keep going.

11. Does the review cover an appropriate time period? Is the search period comprehensive enough that relevant literature is unlikely to be omitted?

Generally yes means searching the literature at least back to 1990, unless there are good reasons for a more limited search.

If the answer is no or cannot tell or unsure, the quality is medium and screening is completed. If not, keep going.

12. Was bias in the selection of articles avoided? Did the authors specify:

- Independent screening of full text by at least two reviewers
- List of included studies provided

If the answer is partially for either of these, the quality is medium and the screening is completed. If not, keep going.

13. Did the authors use appropriate criteria to assess the quality and risk of bias in analysing the studies that are included?

- The criteria used for assessing the quality/risk of bias were reported.
- A table or summary of the assessment of each included study for each criterion was reported.
- Sensible criteria were used that focus on the quality/risk of bias (and not other qualities of the studies, such as precision or applicability/external validity). 'Sensible' is defined as a recognised quality appraisal tool/checklist, or similar tool which assesses bias in included studies. Please see question 4, above, for details of the main types of bias such a tool should assess.

If the answer to any of these is no or partially, then the quality is medium and screening is completed. If not, keep going.

If the coder does not feel qualified to assess, note the question number as not assessed and keep going.

If there are no included studies, skip questions 14 through 20 and start again with 21.

14. Were the characteristics and results of the included studies reliably reported? Was there:

- Independent data extraction by at least 2 reviewers
- A table or summary of the characteristics of the participants, interventions and outcomes for the included studies
- A table or summary of the results of all the included studies

If the answer to any of these is no or partially, the quality is medium and the screening is completed. If not, keep going. Skip if there are no included studies.

15. Are the methods used by the review authors to analyse the findings of the included studies clear, including methods for calculating effect sizes if applicable?

If the answer is no or partially (some reporting on methods but lack of clarity) the quality is medium and the screening is completed. If not, keep going. Skip if there are no included studies.

16. Did the review describe the extent of heterogeneity?

- Did the review ensure that included studies were similar enough that it made sense to combine them, sensibly divide the included studies into homogeneous groups or sensibly conclude that it did not make sense to combine or group the included studies?
- Did the review discuss the extent to which there were important differences in the results of the included studies?

If the answer to either of these is no or partially, the quality is medium and the screening is completed. If not, keep going. Skip if there are no included studies.

If the coder does not feel qualified to assess, note the question number as not assessed and keep going.

17. If a meta-analysis was done, was the I2, chi-squared test for heterogeneity or other appropriate statistic reported? If no statistical test was reported, is a qualitative justification made for the use of random effects?

If the answer to this is no or partially, the quality is medium and screening is completed. If not, keep going. Skip if there are no included studies.

If the coder does not feel qualified to assess, note the question number as not assessed and keep going.

18. Were the findings of the relevant studies combined (or not combined) appropriately relative to the primary question the review addresses and the available data?

- Is an appropriate table, graph or meta-analysis included?
- Are the studies weighted appropriately?
- Does the review address unit of analysis errors – i.e. does the review take clustering into account if clustered trials or studies are included?

If the answer to any of these is no or partially, the quality is medium and the screening is completed. If not, keep going. Skip if there are no included studies.

If the coder does not feel qualified to assess, note the question number as not assessed and keep going.

19. Does the review report evidence appropriately?

- The review makes clear which evidence is subject to low risk of bias in assessing causality (attribution of outcomes to intervention), and which is likely to be biased, and does so appropriately.
- Where studies of differing risk of bias are included, results are reported and analysed separately by risk of bias status.

If the answer to either of these is partially, the quality is medium and the screening is completed. If not, keep going. Skip if there are no included studies.

Note on reporting evidence and risk of bias: For reviews of effects of ‘large n’ interventions, experimental and quasi-experimental designs should be included (if available). For reviews of effects of ‘small n’ interventions, designs appropriate to attribute changes to the intervention should be included (e.g. pre-post with assessment of confounders).

20. Did the review examine the extent to which specific factors might explain differences in the results of the included studies?

- Were factors that the review authors considered as likely explanatory factors clearly described?
- Was a sensible method used to explore the extent to which key factors explained heterogeneity?
    - Descriptive/textual
    - Graphical
    - Meta-analysis by sub-groups
    - Meta-regression
    - Other

If the answer to either of these is no or partially, the quality is medium and the screening is completed. If not, keep going. Skip if there are too few included studies, no important differences among results of included studies, or included studies are too dissimilar to explore heterogeneity of results.

If the coder does not feel qualified to assess, note the question number as not assessed and keep going.

21. Are there any other aspects of the review not mentioned before which lead you to question the results? For example, i) Additional methodological concerns – one person reviewing, ii) Robustness, iii) Interpretation, iv) Conflicts of interest (of the review authors or for included studies), v) Other.

If the answer is yes, the quality is medium and the screening is completed. If the answer is strongly yes, consider downgrading the quality to low.

22. Are there any mitigating factors which should be taken into account in determining the review's reliability? For example, i) Limitations acknowledged, ii) No strong policy conclusions drawn (including in abstract/summary), iii) Any other factors

If the answer is yes, the quality is medium. If the answer is strongly yes, consider downgrading the quality to low.

If the quality thus far is not low or medium, and no questions are marked as not assessed, the quality is high.

If the quality thus far is not low or medium, and one or more questions is marked not assessed, refer the study to the 3ie's Synthesis and Review Office.

Table A-5: Coding instructions and template for included studies

Instructions
For each impact evaluation study included at the end of the screening protocol, please read the full text to extract the following information. Remember, the interventions and outcomes code are only those for which the evidence in the study is counterfactual-based. The study may report other components of the programme or report data on a wide variety of outcomes. For the purpose of the gap map, we only code the interventions for which there is a counterfactual-based outcome analysis and the outcomes that are measured as part of that counterfactual-based analysis.

For studies identified as systematic reviews according to the screening protocol, complete the checklist for making judgments about how much confidence to place in a systematic review of effects from Appendix 2 of Snilstveit, B, Vojtkova, M, Bhavsar, A and Gaarder, M (2013) 'Evidence gap maps: a tool for promoting evidence-informed policy and prioritizing future research', Policy Research Working Paper 6725, Independent Evaluation Group, World Bank. The checklist should be completed before coding. Only code those systematic reviews that are deemed to have medium or high confidence according to the checklist.

Note: any study for which an intervention or outcome category cannot be identified from the list should be set aside for re-screening.

Basic Study Information	
Data to be extracted	***Additional instructions to coder***
Study authors	
Study title	
Year of publication/date on document	
Country(ies) where intervention implemented	
Region(s) where intervention implemented	
Author email address	Email address by corresponding author; if not indicated use first author.
URL (IER URL if available)	Look up if not indicated in report.
Study publication status	
Program Information	
Data to be extracted	***Additional instructions to coder***
Program name (if applicable)	
Methods used (from screening protocol)	If multiple methods were used, please separate with semicolon and space. Remember to consistently use British spelling.
Interventions	
Data to be extracted	***Additional instructions to coder***
Category code(s) of intervention from intervention list	
Name of intervention	
Description of intervention	
Outcomes	
Category code(s) for outcome from outcome list	
Name and description of outcome	
Observational level of measurement	
Cross-cutting themes	
Long-term impact	
Cost-analysis	It does not need to be a formal CEA – any information on cost is sufficient.
Gender	
Marginalised populations	Select: conflict-afflicted, differently-abled, elderly, ethnic minorities, indigenous groups, orphans and vulnerable groups, refugees, sexual minorities.

Appendix B: EGMs and bibliography of impact evaluations

Figure B-1: Evidence gap map of completed STIP impact evaluations

Intervention categories		Levels of analysis			Sectors									Cross-cutting themes			
		Individual & household outcomes	Organisational outcomes	Community & societal outcomes	Education & academia	Global health	Democracy, human rights & governance	Agriculture & food security	Crises & conflict	Economic growth, finance & trade	Environment & global climate change	Water & sanitation	Energy	Long-term impact	Cost-analysis	Sex-disaggregated or sex-specific	Vulnerable or marginalised populations
Science	Fellowships & research grants	8			8									3		1	
	Material resources for scientific research																
	Technical assistance for scientific research																
	Research exchanges & collaborations		2							2							
	Policy & regulation for scientific research	1				1											
	Educational programmes to promote STEM	37			37									1	3	11	1
Technology	Digital infrastructure development	2		3	1			3									
	Policy & regulation for digital services			1						1				1	1		
	Digital literacy	5			2	1	1	1							1	2	
	Digital inclusion	4	1			1	1	2								2	
	Digital finance	16	1					3		13				1	3		3
	e-Governance	6	3				6	1		1					2	1	1
	Digitising identity	6	2			3	1	1		1					2		1
	Data systems development	5	4			8				1				1	5	2	2
	Digital information services	23	3	2	4	6	4	10		3	1			1	9	3	3
	Technology assisted learning	18	2		16	2				1				1	1	3	
	Mobile health	128	6	2		134						1		7	15	50	15
Innovation ecosystems	Access to capital		16							16				3			
	Grants & subsidies		29							29				6	2	1	
	Policies & regulation that affect innovation		7							7				2			
	Networks & collaboration for innovation	1	4	1				1		5	1	1		2			
	Capacity building for innovation		7							7				1	2	1	
Partnerships	Two entity partnerships																
	Global multi-stakeholder initiatives																
	Innovative financing	20	9	2	2	24				1					6	9	2

Figure B-2: Evidence gap map of ongoing STIP impact evaluations

	Intervention categories	Levels of analysis			Sectors									Cross-cutting themes			
		Individual & household outcomes	Organisational outcomes	Community & societal outcomes	Education & academia	Global health	Democracy, human rights & governance	Agriculture & food security	Crises & conflict	Economic growth, finance & trade	Environment & global climate change	Water & sanitation	Energy	Long-term impact	Cost-analysis	Sex-disaggregated or sex-specific	Vulnerable or marginalised populations
Science	Fellowships & research grants																
	Material resources for scientific research																
	Technical assistance for scientific research																
	Research exchanges & collaborations																
	Policy & regulation for scientific research																
	Educational programmes to promote STEM	2			2												
Technology	Digital infrastructure development																
	Policy & regulation for digital services																
	Digital literacy	2	1							2					1		
	Digital inclusion	2					1			1						1	1
	Digital finance	11	2		2		1			10				1	1	1	
	e-Governance		1	1			2										
	Digitising identity	1								1							
	Data systems development	5				2	2	2							1		1
	Digital information services	9	1	4			4	3		1	1	1			1		2
	Technology assisted learning	3			1					3	1						1
	Mobile health	36	2	1	2	38								2	11	8	4
Innovation ecosystems	Access to capital																
	Grants & subsidies																
	Policies & regulation that affect innovation																
	Networks & collaboration for innovation		1							1							
	Capacity building for innovation																
Partnerships	Two entity partnerships																
	Global multi-stakeholder initiatives	1	1	1			1										1
	Innovative financing	3	2	4		5									1	3	

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Appendix C: EGM and bibliography of systematic reviews

Figure C-1: Evidence gap map of completed STIP systematic reviews

Intervention categories		Levels of analysis			Sectors								
		Individual & household outcomes	Organisational outcomes	Community & societal outcomes	Education & academia	Global health	Democracy, human rights & governance	Agriculture & food security	Crises & conflict	Economic growth, finance & trade	Environment & global climate change	Water & sanitation	Energy
Science	Fellowships & research grants												
	Material resources for scientific research												
	Technical assistance for scientific research												
	Research exchanges & collaborations												
	Policy & regulation for scientific research												
	Educational programmes to promote STEM												
Technology	Digital infrastructure development												
	Policy & regulation for digital services												
	Digital literacy												
	Digital inclusion												
	Digital finance												
	e-Governance												
	Digitising identity												
	Data systems development	1				1							
	Digital information services												
	Technology assisted learning												
	Mobile health	6				6							
Innovation ecosystems	Access to capital												
	Grants & subsidies												
	Policies & regulation that affect innovation												
	Networks & collaboration for innovation												
	Capacity building for innovation												
Partnerships	Two entity partnerships												
	Global multi-stakeholder initiatives												
	Innovative financing		1			1							

Completed systematic reviews

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