



## 3ie replication programme

3ie established its impact evaluation replication programme as a global public good in 2011. The programme was designed to help ensure the reliability and test the robustness of influential or innovative impact evaluation evidence used for development policymaking and programming.

Replication is the most established method of research validation in science. Replication studies attempt to reproduce and test the measurement and estimation assumptions of an original study. Where possible, researchers pre-specify the 'checks' they intend to assess. Results either demonstrate the robustness of the original study or encourage new avenues for research.

Replication researchers either reexamine a new population with similar characteristics ('external' replication) or test results robustness using existing data and credible research approaches ('internal' replication).

'Internal' replication researchers, as independent third parties, seek to reproduce original findings, as well as check the validity and robustness of the original estimations to reanalysis.

### Why replicate research?

- **To weed out human error** Internal replication studies both find and correct errors in original completed research. These are almost all simple human errors, not the result of malfeasance or misconduct. By demonstrating that mistakes happen, replication studies encourage researchers to re-examine their work before publication. Replication is a further correction mechanism in addition to the referee process in academic journals.
- **Science is not perfect** A number of social sciences used in international development, such as economics, rely heavily on statistical methodologies. Researchers make assumptions, select or create social and economic concepts to measure and employ estimation methods. All of these are steps in the impact evaluation process and are subject to judgements made by the research team. Replication allows third-party researchers to test these judgements using additional measurement, estimation and programme theory of change analyses.
- **Publish or perish** Researchers in all scientific and academic fields are encouraged by journals to report statistically significant results. This phenomenon leads to 'p-hacking', meaning the selective use or manipulation of data mining to show statistical significance. Replication can explore how 'selective' reported results seem to be, whether due to selection by the authors, referees or editors.
- **Policy recommendations** Research funders, such as 3ie, have explicit objectives to promote the use of research in policy, programming and practice. Researchers may make recommendations based on tested or implied theories of change without exploring alternative theories or causal mechanisms. Replication research, particularly internal replication research, explores the causal chain further, using the article's own data. It can also test the robustness of both policy recommendations and primary estimates.



Source: 3ie replication programme

## Worm wars

In July 2015, Aiken et. al published their 3ie-funded, two-part internal replication of Edward Miguel’s and Michael Kremer’s well-known and influential impact evaluation of a school-based deworming programme in Kenya in the *International Journal of Epidemiology*. The replication study almost instantly became the focus of intense debate in the international development community.

As well as the study, the journal published a response from the original authors, the replication authors’ comments on that response, and a synopsis of a systematic review of deworming evidence. An editorial acknowledged 3ie’s role in facilitating replication research.

The original study, published in 2004, found that deworming has a significant impact on reducing worm infections and increasing school attendance – a hugely influential finding in development economics. It was part of the evidence that led the Copenhagen Consensus Center to rank the deworming of children as fourth among the 16 most cost-effective investments to overcome the world’s biggest challenges in 2012.

The study reproduced the economists’ analysis from an epidemiological perspective. It ‘purely’ re-examined the coding and methodologies used by the original authors, and then applied alternative analyses, including testing alternative estimation strategies and examining the causal chain, to see how the study’s conclusions compared with those of the original publication.

Social media and international development media outlets were soon abuzz with commentaries and opinions. Key points of contention included the methodology to measure positive spillovers and the risk of bias assessments.

Researchers from the World Bank, and universities of Columbia, California, Berkeley and Oxford discussed the processes and results. Media outlets such as BuzzFeed, the Guardian and BBC News reported on the findings. 3ie’s Benjamin Wood wrote a blog on the importance of 3ie’s replication programme and process, while Macartan Humphreys at Columbia reanalysed the original paper and replication studies. David Evans of the World Bank compiled and published an anthology tracking the entire debate on the Development Impact blog.

The debate on the deworming study sparked a larger conversation about 3ie’s replication programme, both by increasing its exposure and testing its processes. 3ie came out wiser and applied lessons learned to improving the replication process. The deworming discourse reaffirmed for 3ie the valuable research space for quality, balanced and independent replication research. Despite its sensitivities, 3ie remains committed to promoting the validation of influential or innovative impact evaluations being used in international development.

## What does 3ie fund?

3ie funds internal replication studies use data from original papers. Unlike pure replication, which only uses original data, internal replication allows researchers to also use new methodologies and estimation and theory of change analyses.

## What does 3ie do to promote replication?

### Replication windows 1 and 2

3ie crowdsourced a list of influential or innovative studies for possible replication. The papers cover a diverse set of topics, including housing, property rights, deworming and conditional cash transfers.

### Replication windows 3 and 4

3ie focused on thematic areas requested and funded by the Bill & Melinda Gates Foundation. Replication window 3 includes five studies on HIV prevention and AIDS. Replication window 4 is funding seven studies on financial services for the poor. 3ie intends to publish results from these two windows in 3ie's Replication Paper Series.

### Replication Paper Series

3ie publishes all the internal replication studies that it funds or produces in this series. They must meet all quality standards, regardless of whether the findings uphold or question the original paper results. 3ie also accepts submissions of non-3ie-funded internal replication studies in the series. These must meet 3ie's review and publication standards. To date, 3ie has published more than 10 replication studies.

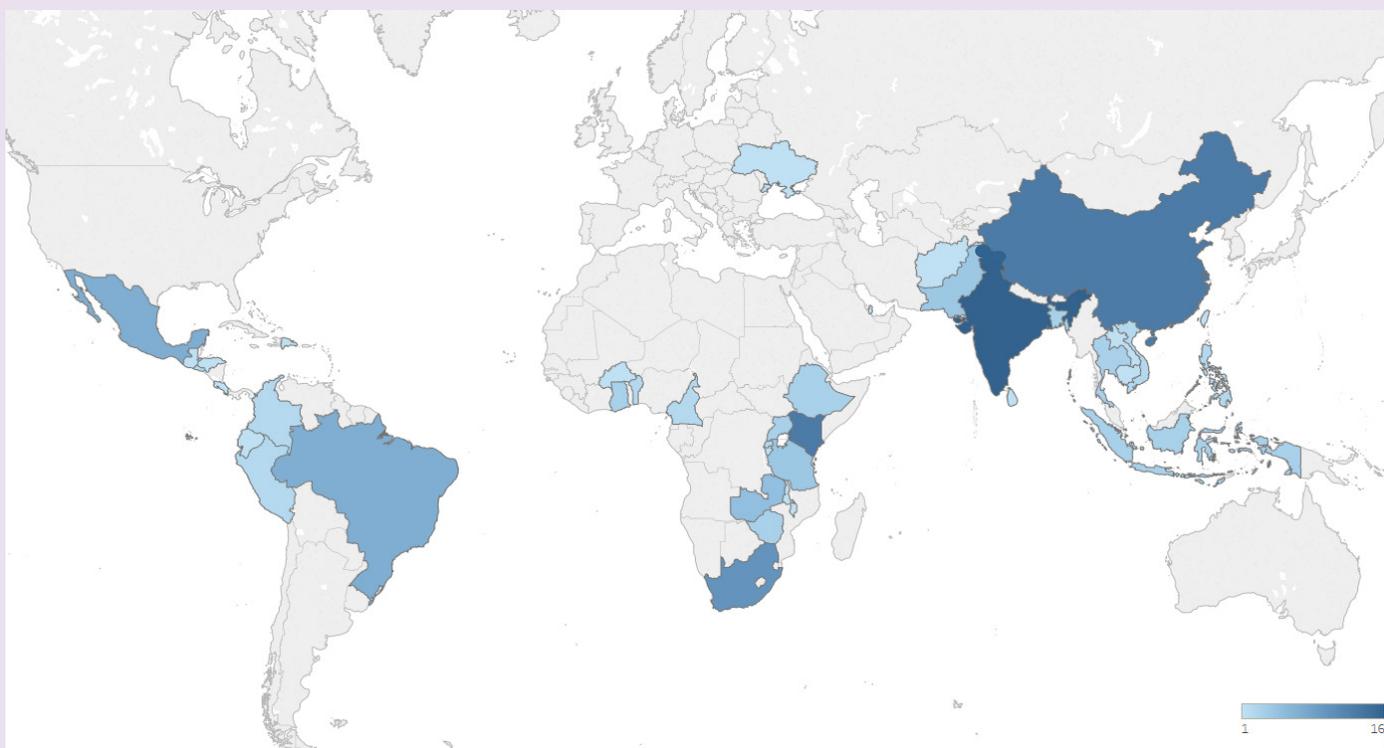
### In-house replication research

3ie evaluation specialists also perform replication studies. To date, 3ie staff have conducted studies on male circumcision for HIV prevention, and agricultural commercialisation interventions.

### Push-button replication

3ie's push-button replication (PBR) project is designed to validate published impact evaluation results across the development literature. PBRs use the original data and programming code from a paper to reproduce the original results, the premise being that independent third-party researchers should be able to arrive at the published results without making significant coding adjustments. 3ie's PBR project is currently piloting the concept on 122 impact evaluations published in 2014 in the 10 journals that historically publish the most development-related impact evaluation research.

## Push button replication: countries covered in studies



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## Processes in 3ie-funded replication

3ie-funded replication researchers are required to follow 3ie's standard replication process:

- **Replication plan:** Develop and adhere to a pre-specified set of robustness checks. 3ie staff and an external adviser review and comment on the plan. Once adequately incorporated, 3ie posts the finalized replication plans online to provide replication transparency.
- **Push-button replication:** Confirm the validity of published results by running the existing code on the original data with minimal manipulations. 3ie staff reviews the push-button report. Upon acceptance, 3ie posts the report and shares the results with the original authors.
- **Pure replication:** Attempt to reproduce the original results using the same data and methodology described in the original study. The researchers share the results with the original authors for their optional review.
- **Measurement and estimation analysis:** Use the data from the original study to evaluate the sensitivity of the results to measurement and/or estimation reanalysis. Examples include redefining and recalculating variables of interest, introducing additional control or interaction variables and using alternative estimation methodologies.
- **Theory of change analysis:** Explore different causal pathways and chains underlying the studied intervention.
- **Final report:** Analyse all the results from the previous steps, which is then reviewed by multiple 3ie and external referees. If the report meets 3ie's standards, it will be published in 3ie's Replication Paper Series. 3ie invites original authors to write a response to replication study findings for concurrent posting with the report on the 3ie website.

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## 3ie Replication Paper Series

Power to the people?: a replication study of a community-based monitoring programme in Uganda

Fighting corruption does improve schooling: a replication study of a newspaper campaign in Uganda

Male circumcision and HIV acquisition: reinvestigating the evidence from young men in Kisumu, Kenya

The effects of land titling on the urban poor: a replication of property rights for the poor

Walking on solid ground: a replication study on Piso Firme's impact

The impact of India's JSY conditional cash transfer programme: a replication study

Recalling extra data: a replication study of Finding missing markets

The long and short of returns to public investments in fifteen Ethiopian villages

Reanalysis of health and educational impacts of a school-based deworming program in western Kenya Part 1 and 2: pure replication and alternative analyses

TV, female empowerment and demographic change in rural India

Quality evidence for policymaking: I'll believe it when I see the replication

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## 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 help make development more effective and improve poor people's lives.



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