International Initiative for Impact Evaluation

Using big data for evaluating development outcomes: a systematic map

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Authors and acknowledgements

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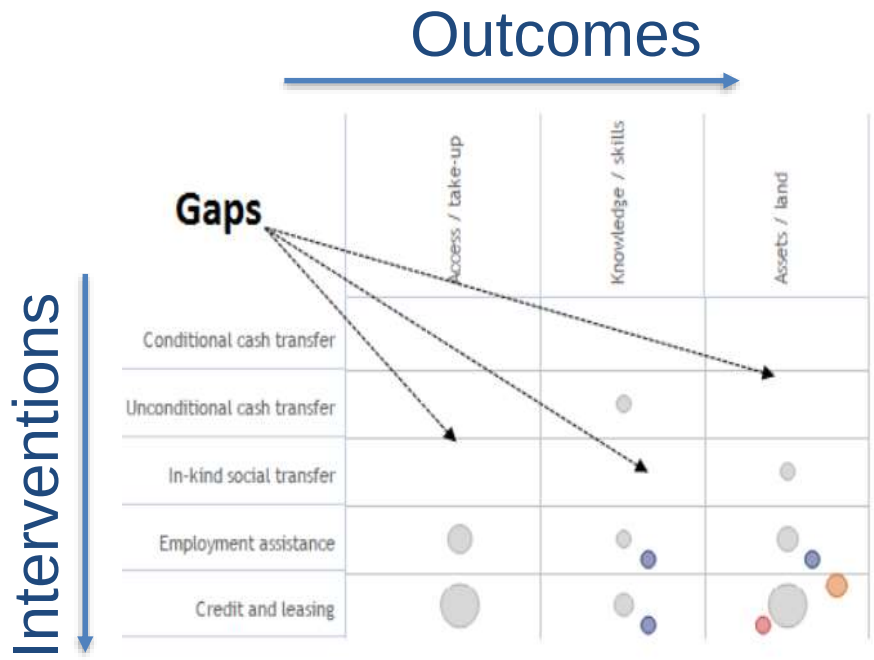
3ie

What is 3ie evidence gap map (EGM)?

- Systematic compilation of IEs and SRs in a sector or sub-sectors
- Presents a matrix of policy relevant interventions and outcomes
- A tool to navigate the evidence base and identify gaps, but does not synthesise the results from the included studies.
- Additional filters for region/country, study design, population, etc.

EGM approach was developed by Snilstveit, et. al. 2013, 2016 and 2017.



Why this systematic map?

- Significant data gaps remain in and evaluating development outcomes.
- Big offers a great potential for answering some of these data needs.
- Mapped studies using different sources of big data on to development outcomes to identify the current big data use and the gaps.
- Included IEs, SRs and measurement studies that show how big data can be used for measuring a development outcome.
- This systematic map aims to:
  - Map out how big data has been innovatively used in measuring and evaluating development outcomes.
  - Highlight unexplored and promising applications of big data for impact evaluations.
  - Show analytical and ethical challenges in using big data.

Methodology

- Scope of work: protocol
- Systematic search
- Screening according to set inclusion criteria
- Systematic data extraction
- Appraised the studies on reporting on data quality and ethics
- Analysis and reporting

EGM Inclusion criteria: Data sources

I. Human-sourced information

- Social Networks
- Internet searches
- Mobile data content
- Citizen Reporting or Crowdsourced data

II. Process-mediated data

- Data produced by public agencies
- Data produced by businesses
- Cell phone call record details

III. Machine-generated data

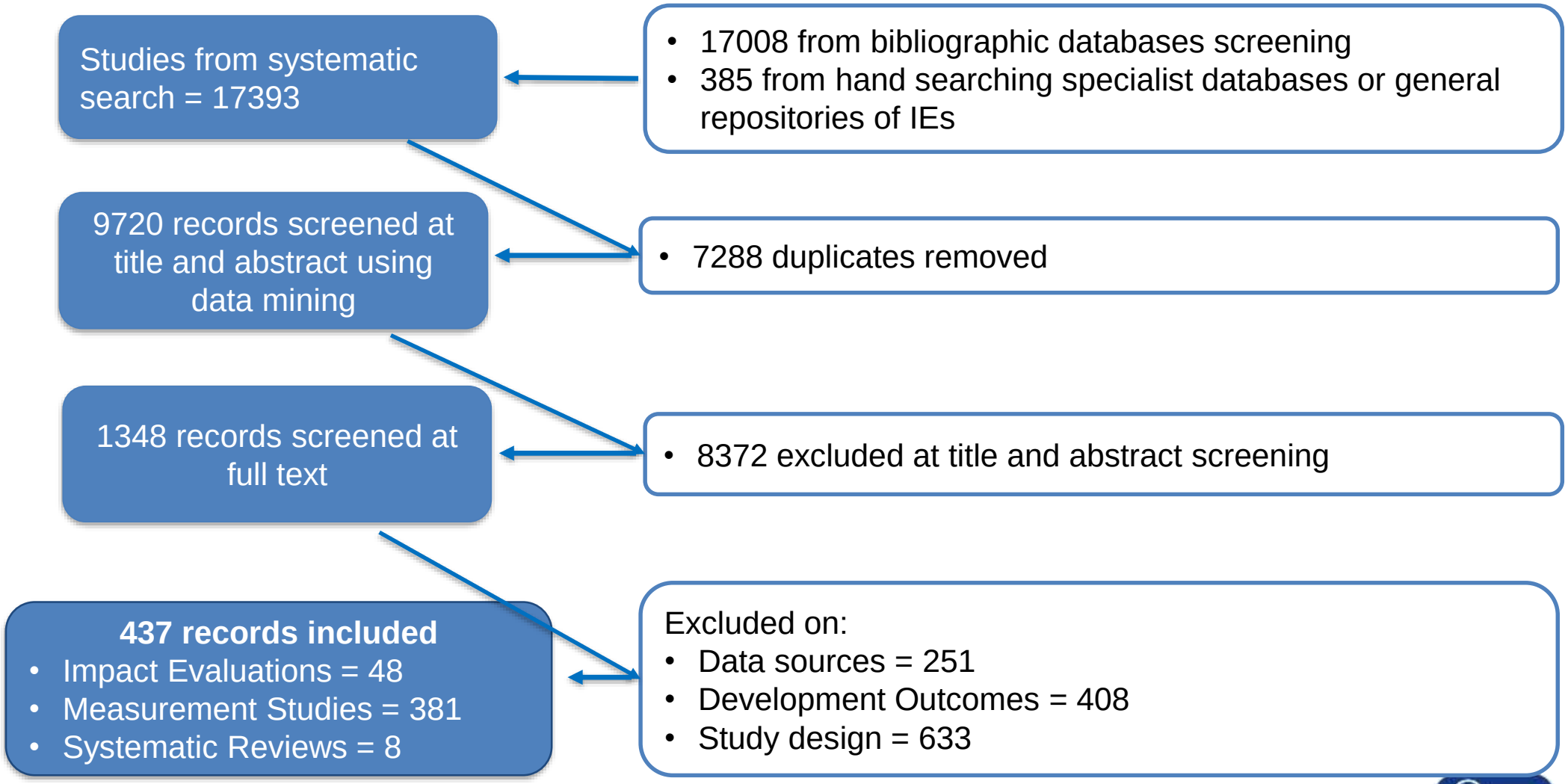
- Data from fixed sensors
- Data from mobile sensors (tracking)
- Data from Satellites

Source: Adapted from UN Global Pulse (2012 and 2013), United Nations Economic Commission for Europe (2014) and Blazquez and Domenech (2018).

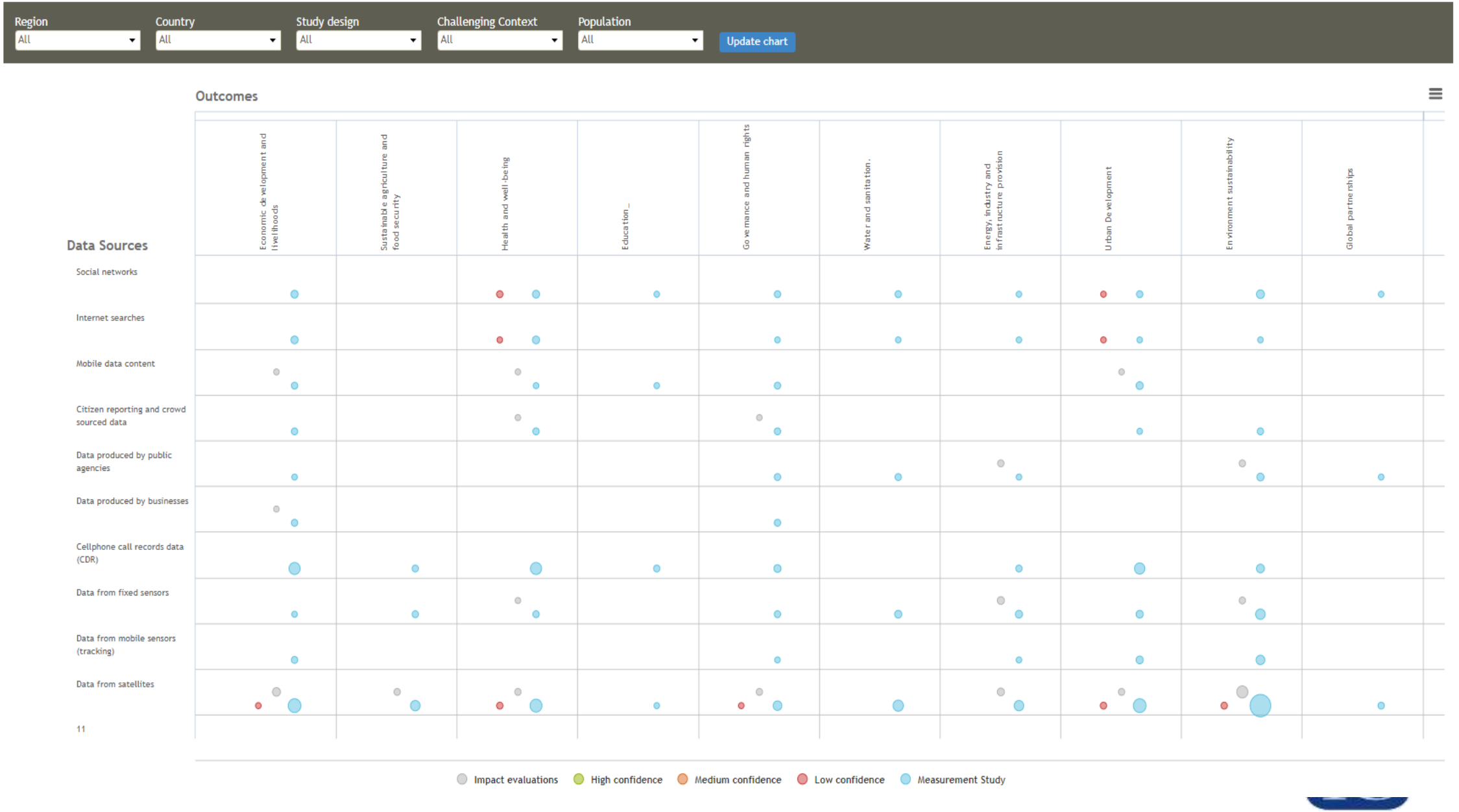
EGM Inclusion criteria: Outcomes

Category	Definition
Economic development and livelihoods (SDG 1 & 8)	• End poverty in all its forms everywhere; • Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Agriculture and food security (SDG 2)	• End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Health and well-being (SDG 3)	• Ensuring healthy lives and promoting well-being for all ages
Quality of education (SDG 4)	• Ensure inclusive and equitable quality education and promote life-long learning opportunities for all
Governance and human rights (SDG 5, 10 & 16)	• Achieving gender equality and empower all women and girls; • Reduce inequality within and among countries; • Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Water and Sanitation (SDG 6)	• Ensure availability and sustainable management of water and sanitation for all
Energy, industry and infrastructure provision (SDG 7 & 9)	• Ensure access to affordable reliable, sustainable, and modern energy for all; • Build resilient infrastructure promote inclusive and sustainable industrialization and foster innovation
Urban development (SDG 11)	• Make cities and human settlements inclusive, safe, resilient and sustainable
Environmental sustainability (SDG 12, 13, 14 & 15)	• Ensure sustainable consumption and production patterns; • Take urgent action to combat climate change and its impacts; • Conserve and sustainable use the oceans, seas and marine resources for sustainable development; • Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Partnerships for Goals (SDG 17)	• Strengthen the means of implementation and revitalize the global partnership for sustainable development

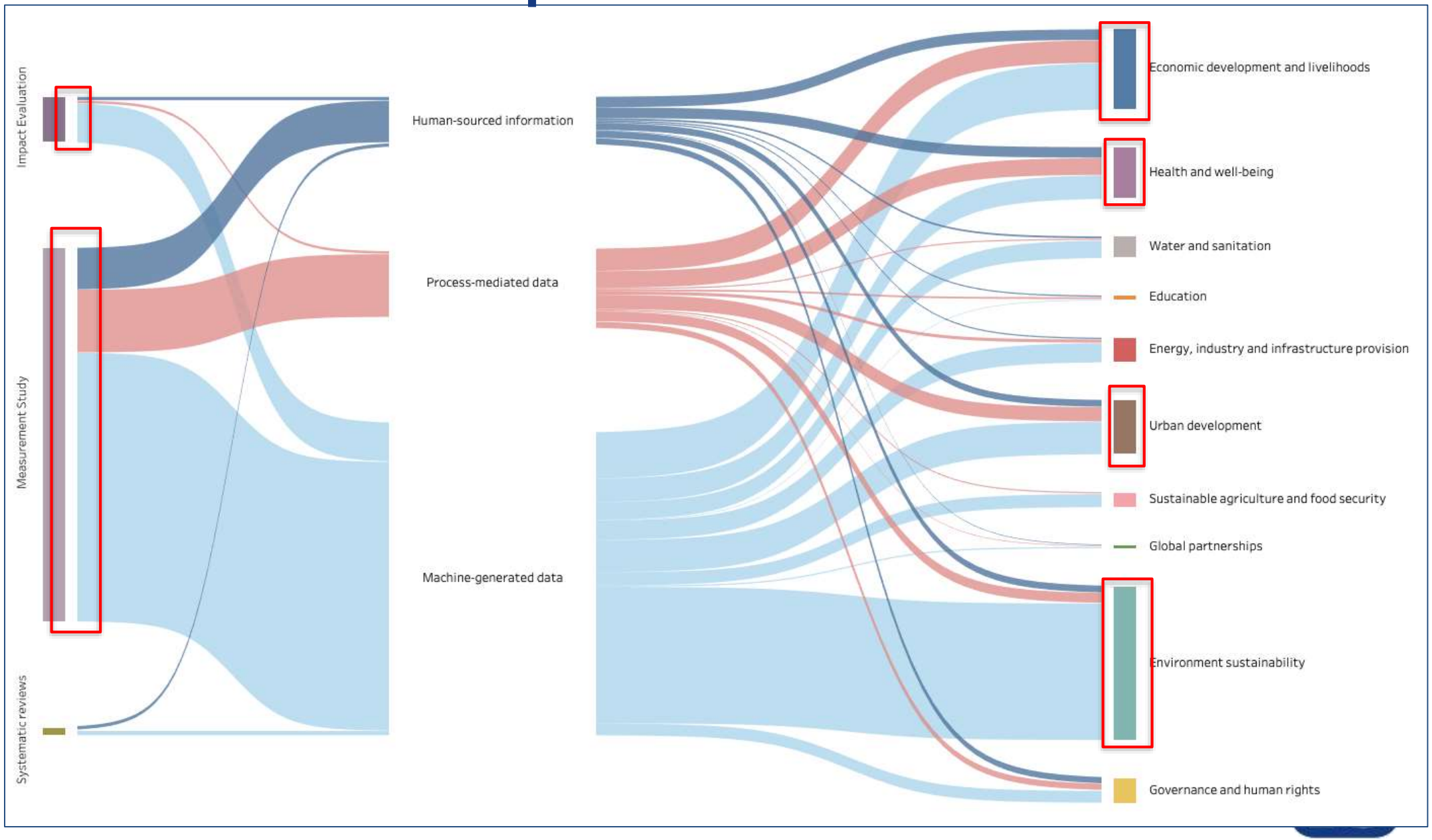
Search results and screening



The map

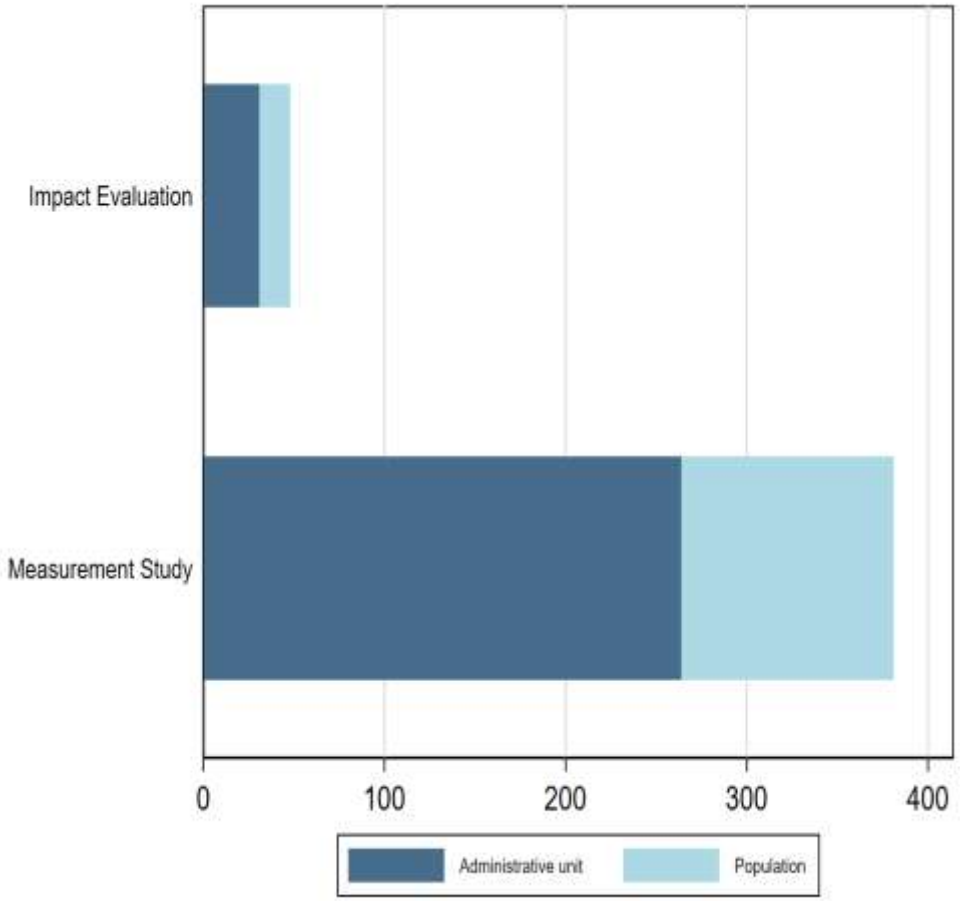

Region
All
Country
All
Study design
All
Challenging Context
All
Population
All
Update chart
Outcomes
Economic development and livelihoods
Sustainable agriculture and food security
Health and well-being
Education
Governance and human rights
Water and sanitation.
Energy, industry and infrastructure provision
Urban Development
Environment sustainability
Global partnerships
Data Sources
Social networks
Internet searches
Mobile data content
Citizen reporting and crowd sourced data
Data produced by public agencies
Data produced by businesses
Cellphone call records data (CDR)
Data from fixed sensors
Data from mobile sensors (tracking)
Data from satellites
11
Impact evaluations
High confidence
Medium confidence
Low confidence
Measurement Study

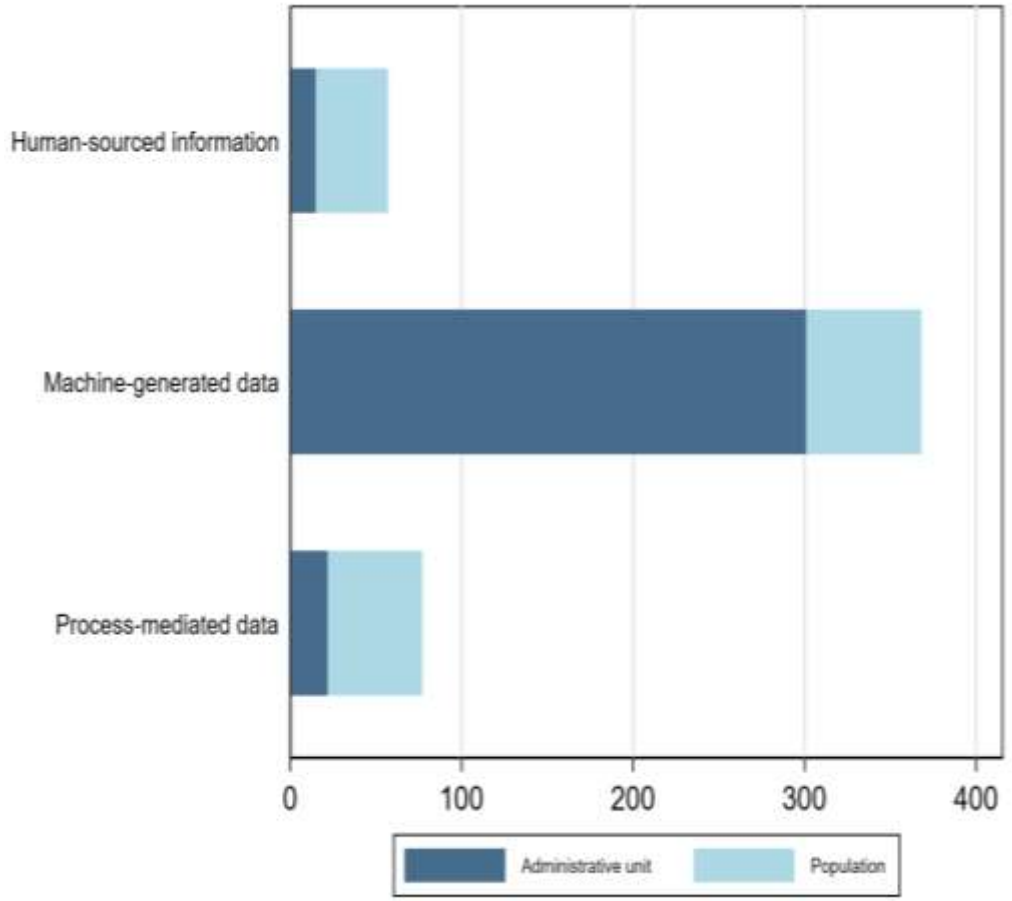
Overview of the map



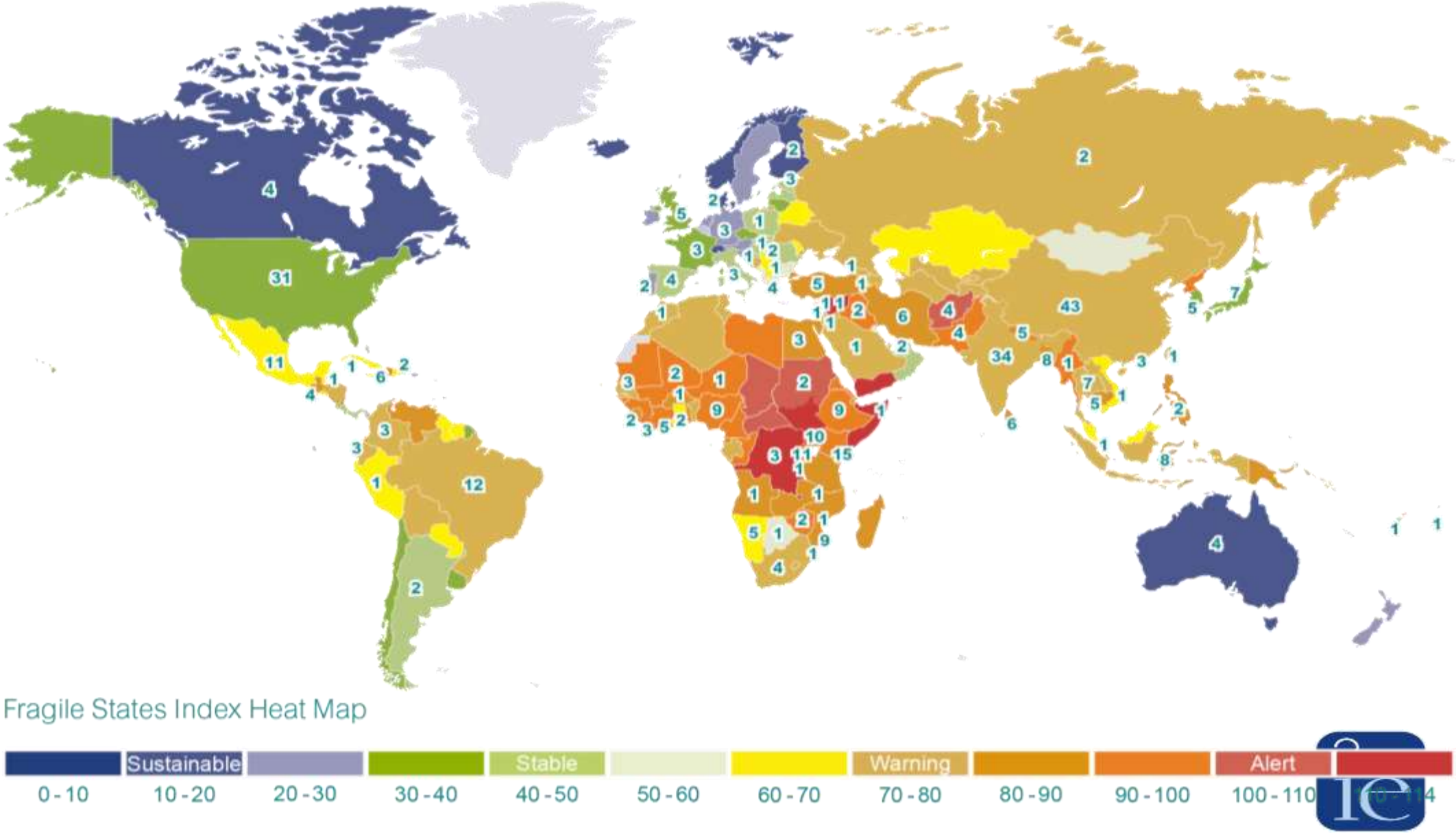
Geographical distribution of the studies

Unit of observation



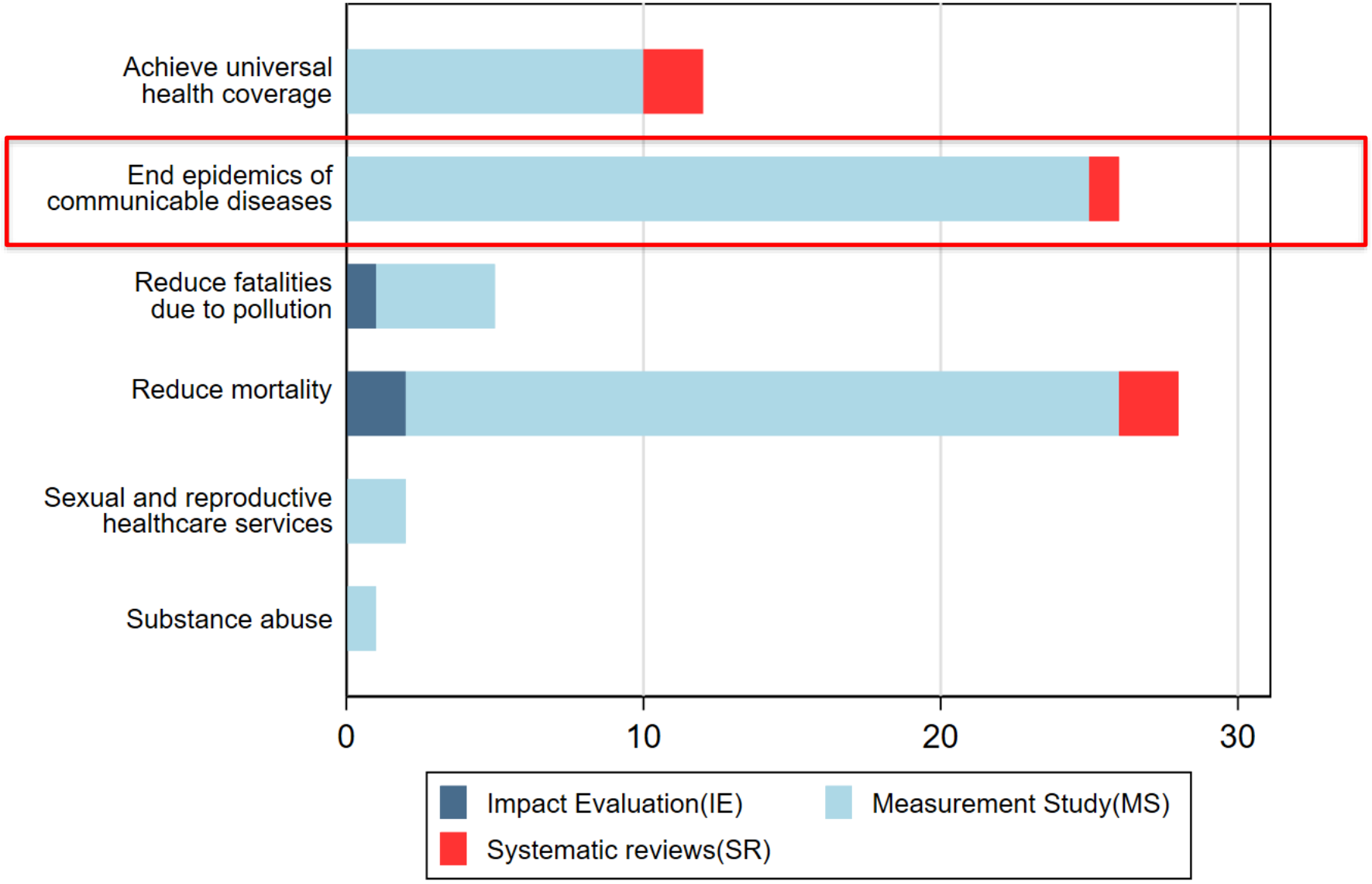


Distribution of studies based on the Fragile States Index (2019)

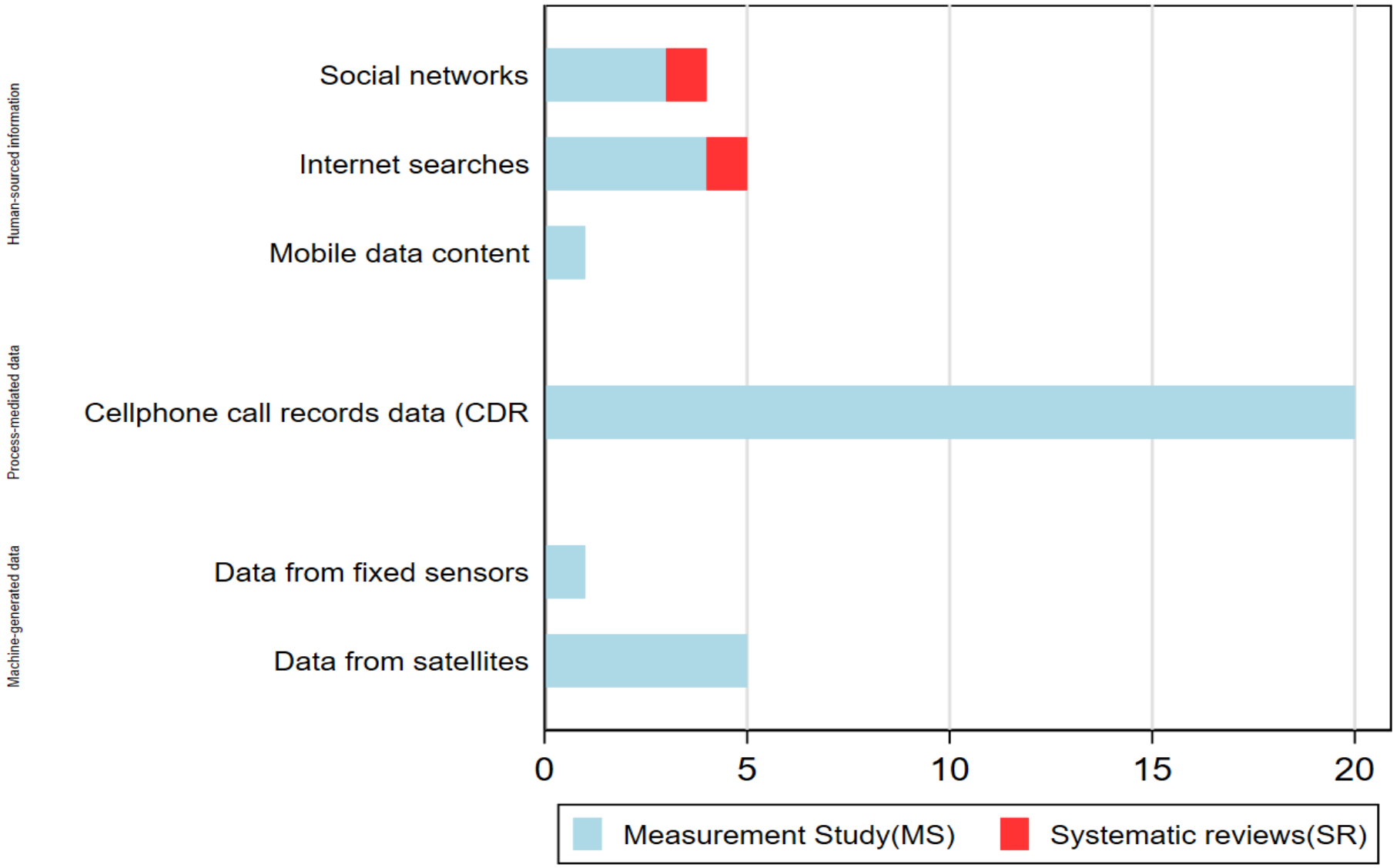


Using big data in the context of epidemics

Studies measuring different health indicators by type of design

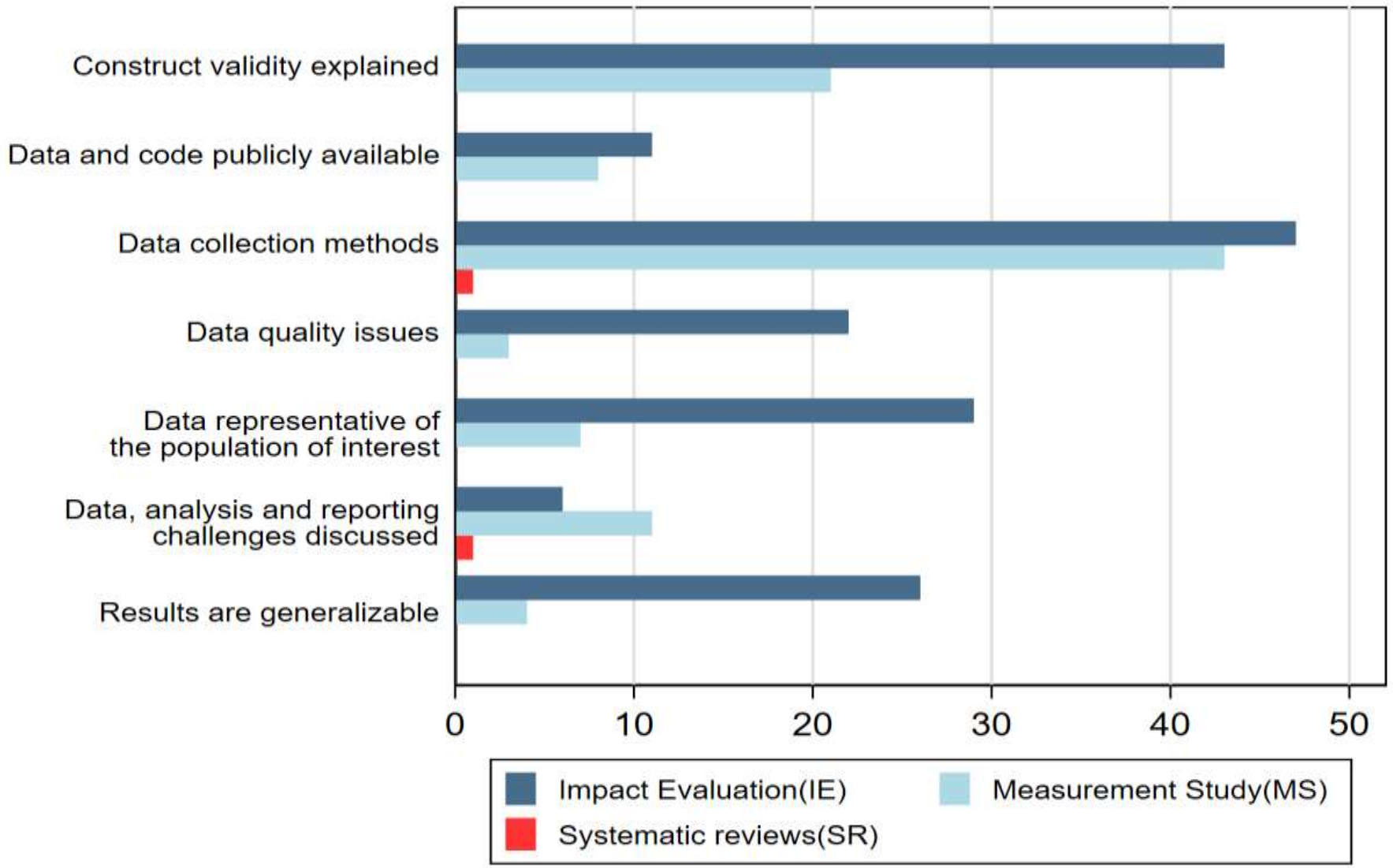


Studies looking into epidemics using big data

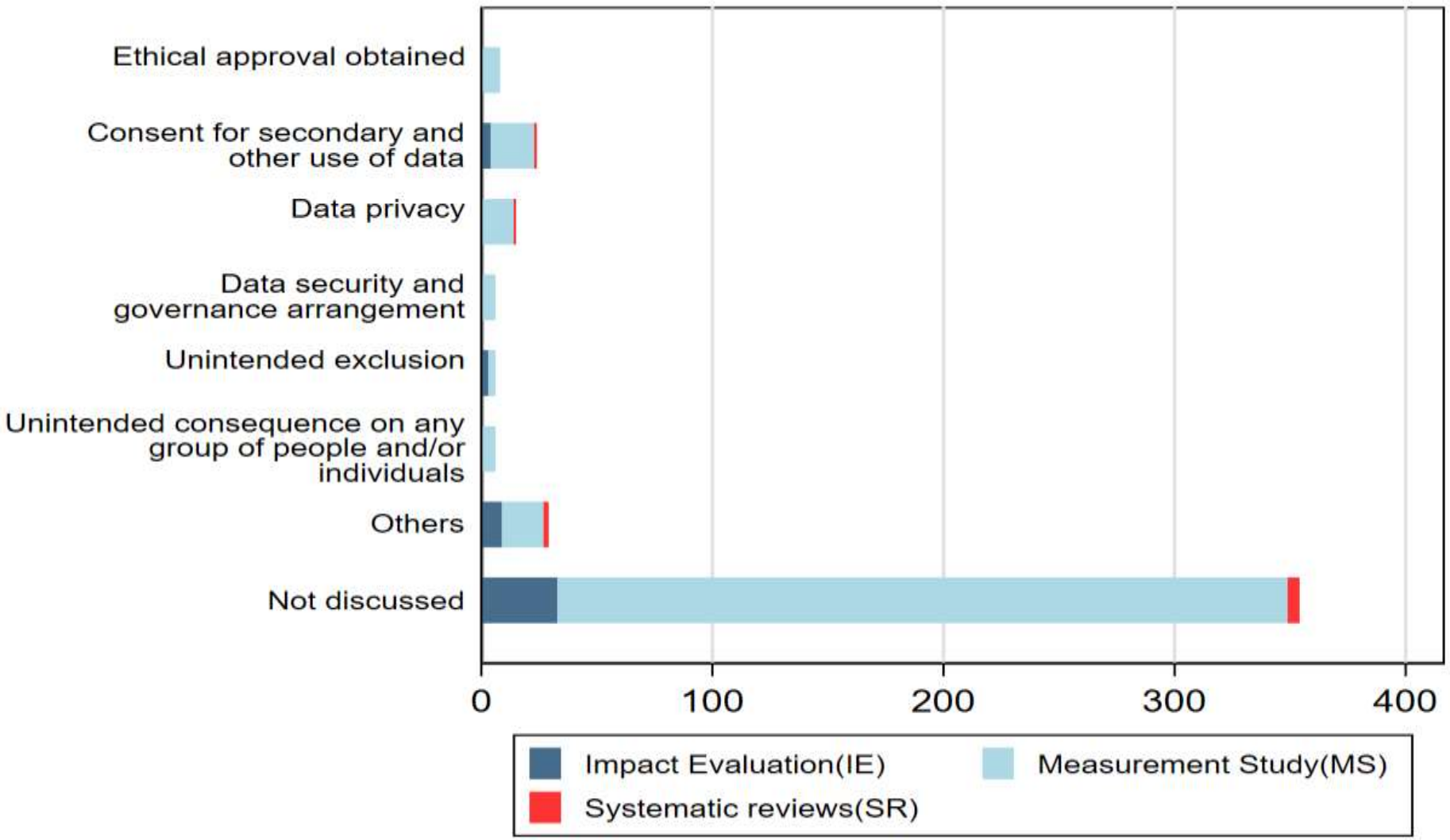


Data quality and ethical challenges

Number of IEs, MS against data quality and transparency



Number of studies reporting on ethics issues



Key findings

Evidence base and key gaps

- There is a considerable potential for measuring various development indicators using big data.
- There is potential for more IEs using big data on development interventions.
- Satellite data is used the most, and spatial dimension matters.
- CRD and human-sourced data have good proof of concepts indicating their potential for measuring and evaluating development outcomes but not used in IEs yet.
- East Africa is well represented, but not the rest of Africa.
- Big data holds great potential for conducting impact evaluations in fragile contexts, including during conflicts, humanitarian crises, epidemics and natural disasters.

Key findings…

Data quality and ethical challenges

- Reporting on data quality and transparency is inadequate.
- Ethical concerns are substantial.
- The cost of collecting, analysing and reporting big data is largely unknown.

Thank you

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