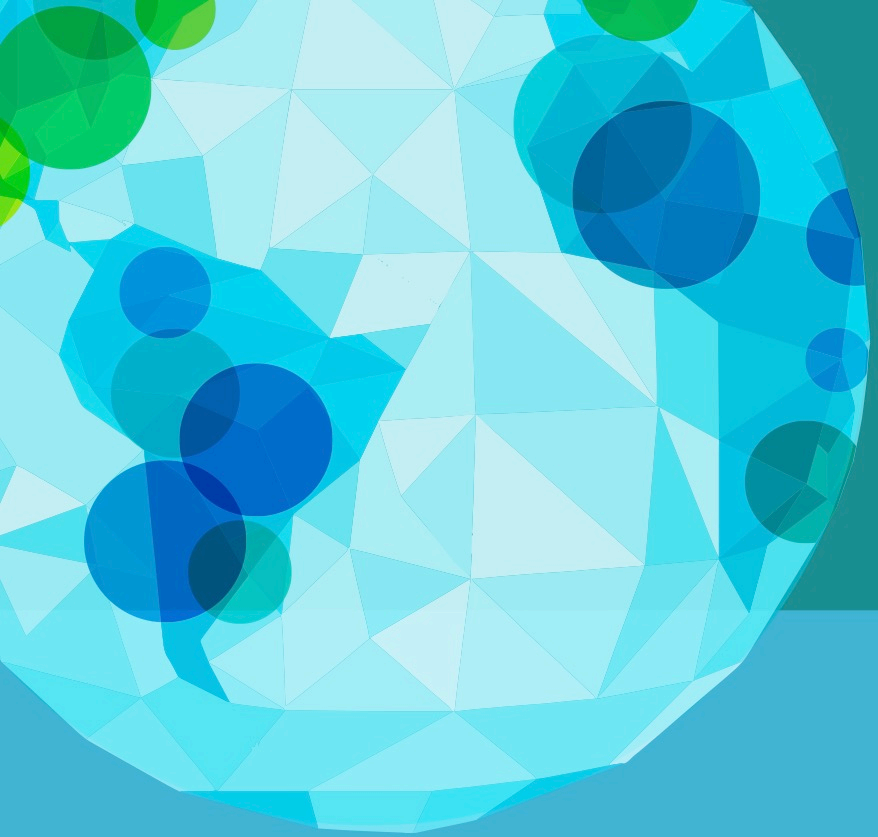

Implementation Science to Reduce Inequities in Global Cancer Control

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NIH NATIONAL CANCER INSTITUTE

Center for Global Health

August 31, 2021

Why implementation science?

- The need to close the 17-year evidence to practice translational gap (aka the “Know-Do” gap) is broadly recognized
- Using implementation science to expand use of proven cancer prevention and early detection strategies was one of 10 transformative research recommendations by the Cancer Moonshot℠ Blue Ribbon Panel
- The International Agency for Research on Cancer (IARC) 2021-2025 Strategic Plan includes Implementation Research as one of three emerging research priorities (in collaboration with the WHO)
- *How is implementation research different from general biomedical research?*

Research goal in biomedical science

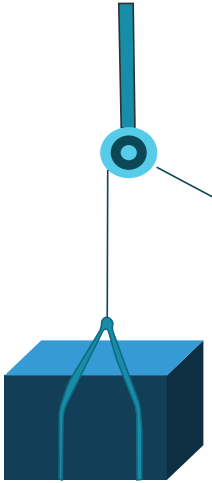
focus on health outcome

“Does the intervention work?”

Biomedical Innovation at NCI

Knowledge generation

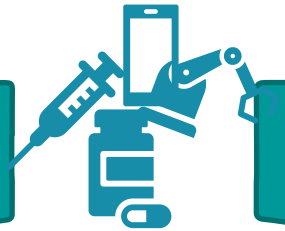
Scientific research ranging from basic to population science identifies targets for development of drugs, devices, or vaccines to prevent or treat cancer



Biomedical Research Workforce

INTERVENTION DESIGN: Drug, device, behavior change

RANDOMIZED CONTROLLED TRIALS



NEW EVIDENCE-BASED INTERVENTION

INTENDED IMPACT

Reduced burden of cancer

Research goal in implementation science

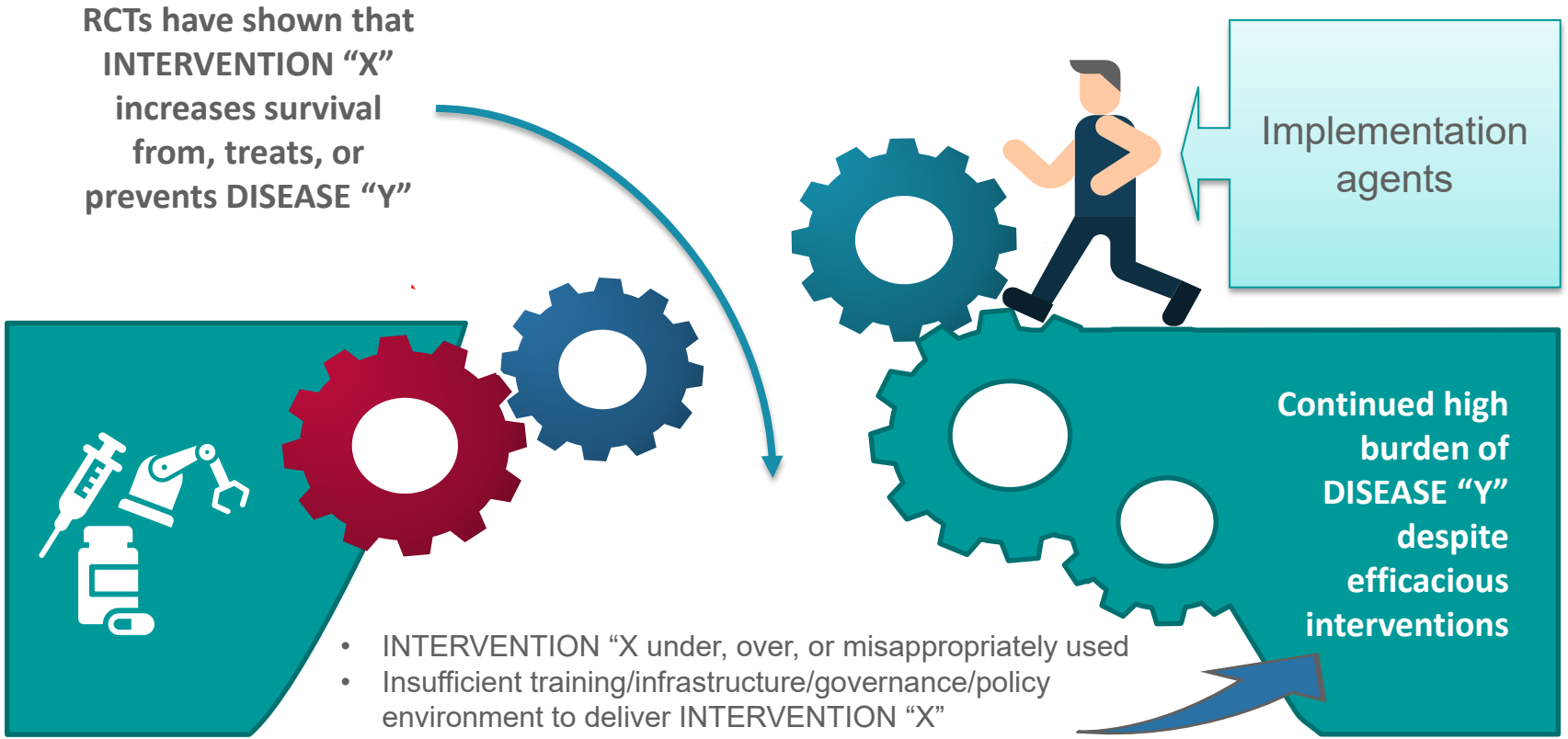
Focus on implementation outcome

"What works, for whom, in what circumstances, and why?"

- *Pawson and Tilley 1997*

UNDERSTANDING THE GAP

RCTs have shown that INTERVENTION "X" increases survival from, treats, or prevents DISEASE "Y"



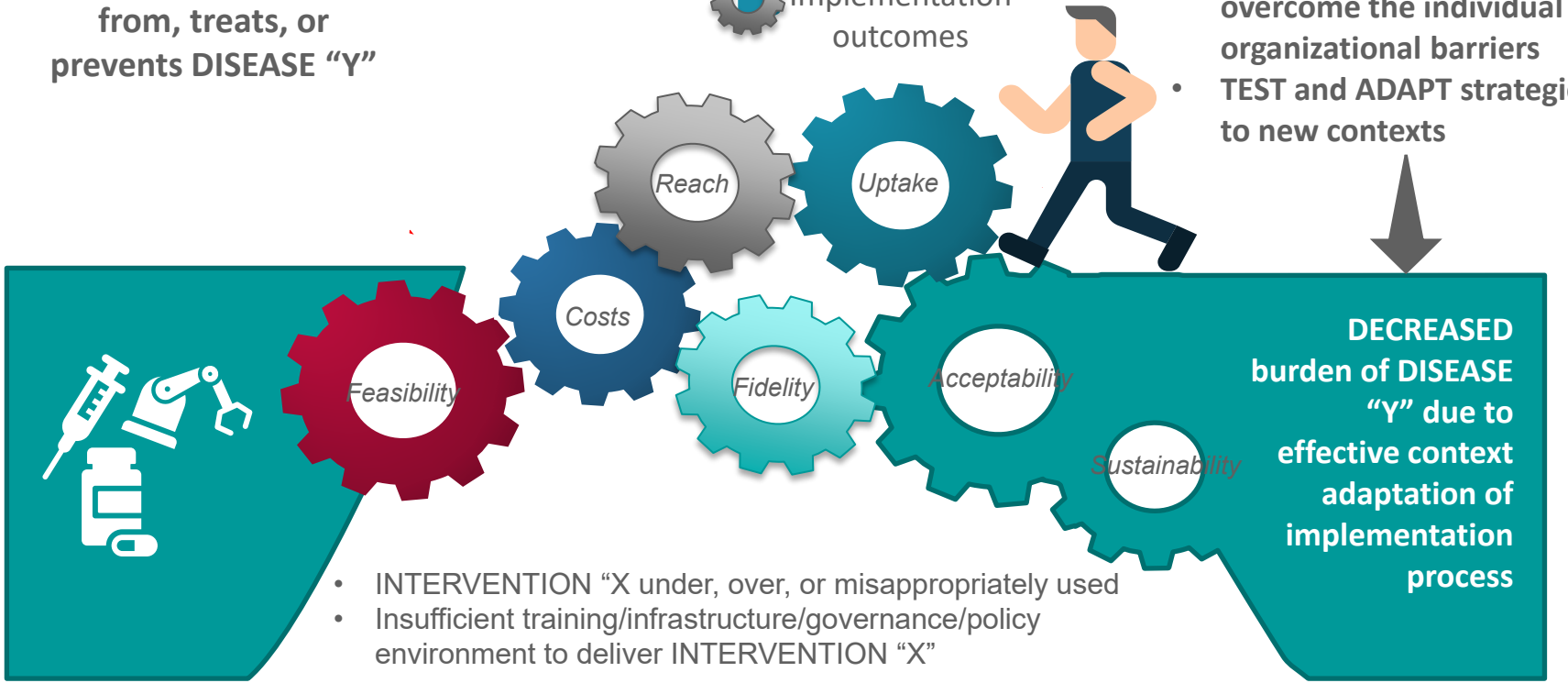
BRIDGING THE GAP – Implementation Science

RCTs have shown that INTERVENTION "X" increases survival from, treats, or prevents DISEASE "Y"

IMPLEMENTATION SCIENCE

Implementation outcomes

- UNDERSTAND implementation process barrier framed on implementation outcomes
- DESIGN strategies to overcome the individual or organizational barriers
- TEST and ADAPT strategies to new contexts



- INTERVENTION "X under, over, or misappropriately used
- Insufficient training/infrastructure/governance/policy environment to deliver INTERVENTION "X"

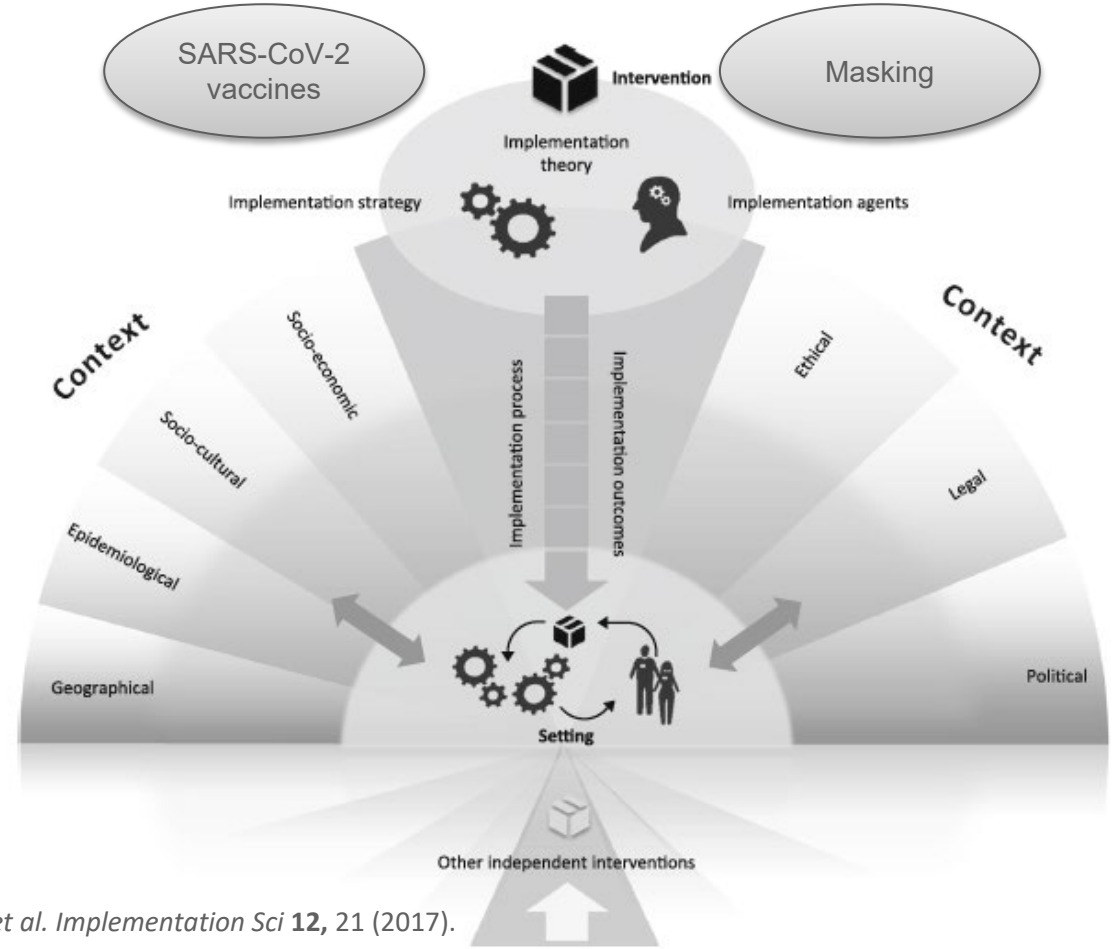
DECREASED burden of DISEASE "Y" due to effective context adaptation of implementation process

To summarize…

- "***Implementation science*** is the study of methods to promote the adoption and integration of evidence-based practices, interventions, and policies into routine health care and public health settings to improve our impact on population health."
- Implementation science views context and complexity as research *targets*
  - *This contrasts with traditional biomedical research (e.g., randomized controlled trials, or RCTs) which view context and complexity as confounders to be controlled.*
- Real-world effectiveness of evidence-based interventions requires understanding the interactions involved in implementing complex interventions into complex health systems in a variety of sociopolitical, socioeconomic, and cultural contexts.

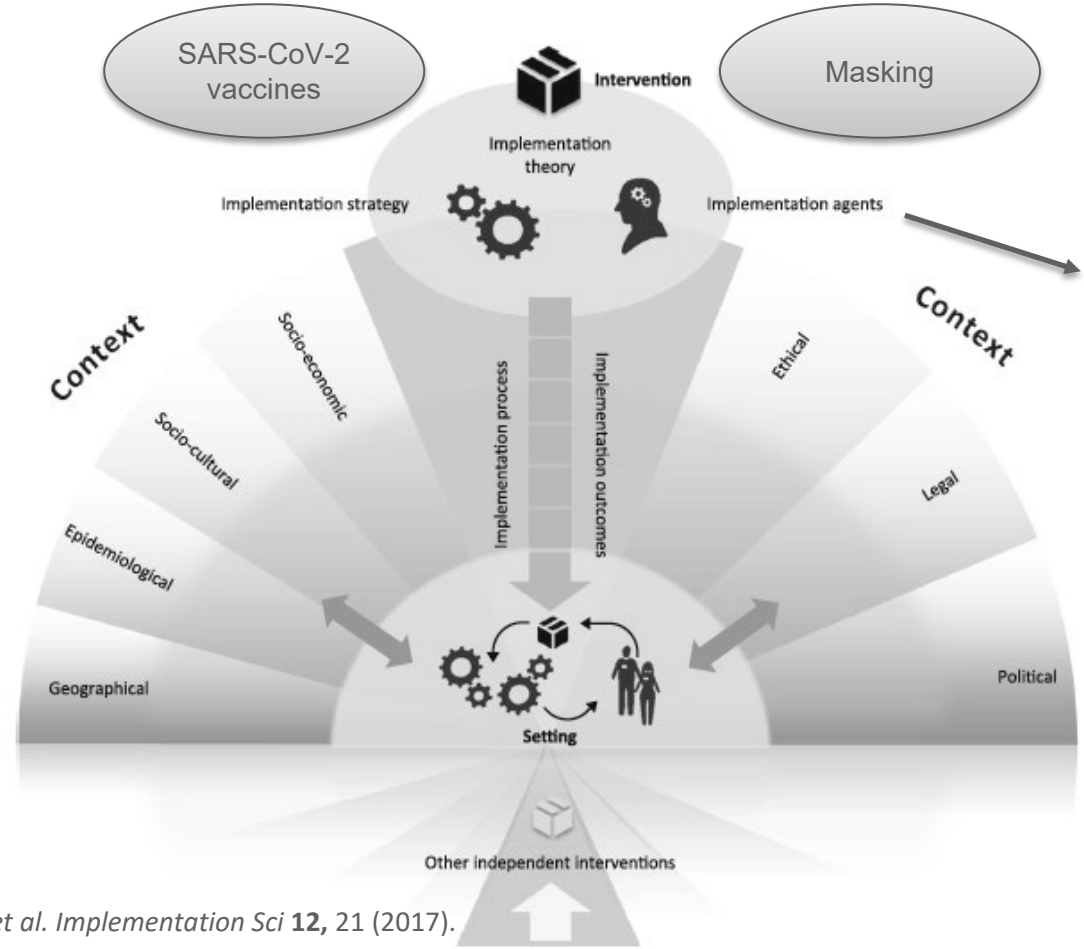
A topical example: COVID-19

The Context and Implementation of Complex Interventions (CICI) Framework



Pfadenhauer, L.M., *et al. Implementation Sci* **12,** 21 (2017).

The Context and Implementation of Complex Interventions (CICI) Framework

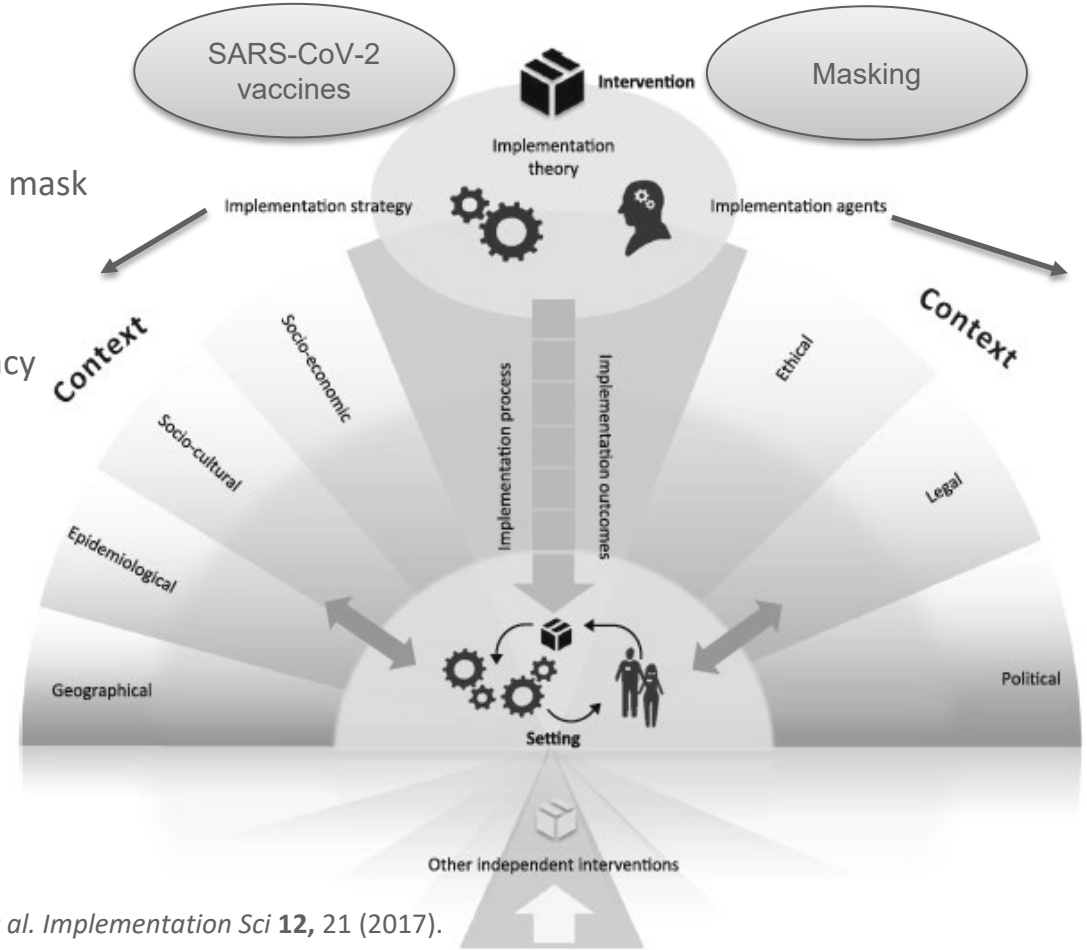


Public health agencies
Employers
Schools
Health systems
Pharmacies
Government
Community groups
Individuals
Etc…

Pfadenhauer, L.M., *et al. Implementation Sci* **12,** 21 (2017).

The Context and Implementation of Complex Interventions (CICI) Framework

Vaccine and mask mandates
Restrictions
Incentives
Peer advocacy
Etc.



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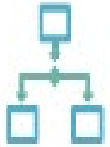
CENTER FOR GLOBAL HEALTH

STRATEGIC PLAN 2021-2025

GOAL 1: SUPPORTING INNOVATIVE, IMPACTFUL GLOBAL CANCER RESEARCH

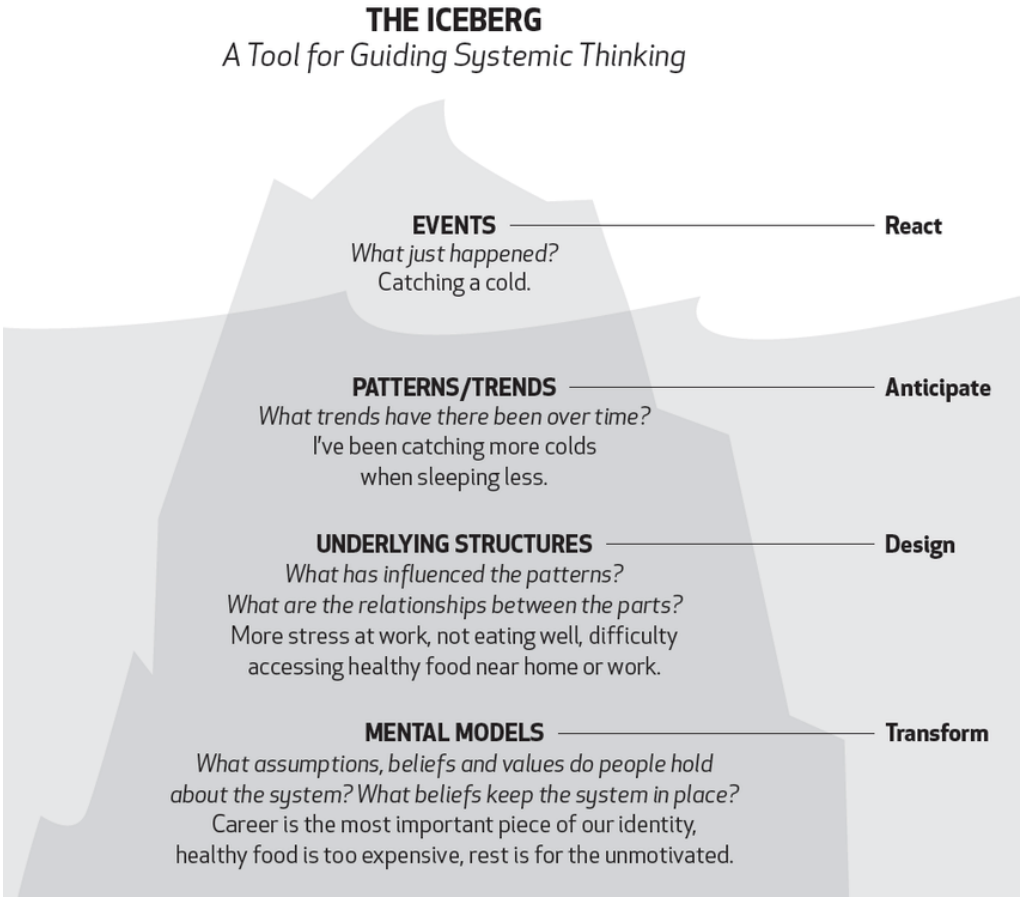


Accelerate global cancer implementation science.

https://www.cancer.gov/about-nci/organization/cgh/about/strategic-plan

Global implementation science through a systems lens

- Many of our implementation strategies are designed to react to observed events
- CGH seeks to support research that looks deeper to understand the patterns, underlying structures and mental models which result in similar events across a variety of contexts



Paradigm shift from traditional linear to complex systems

- Requires re-thinking research paradigms
- Move from purely reductionist methods to systems science

Table 1 Comparison of traditional and complex system analytic assumptions

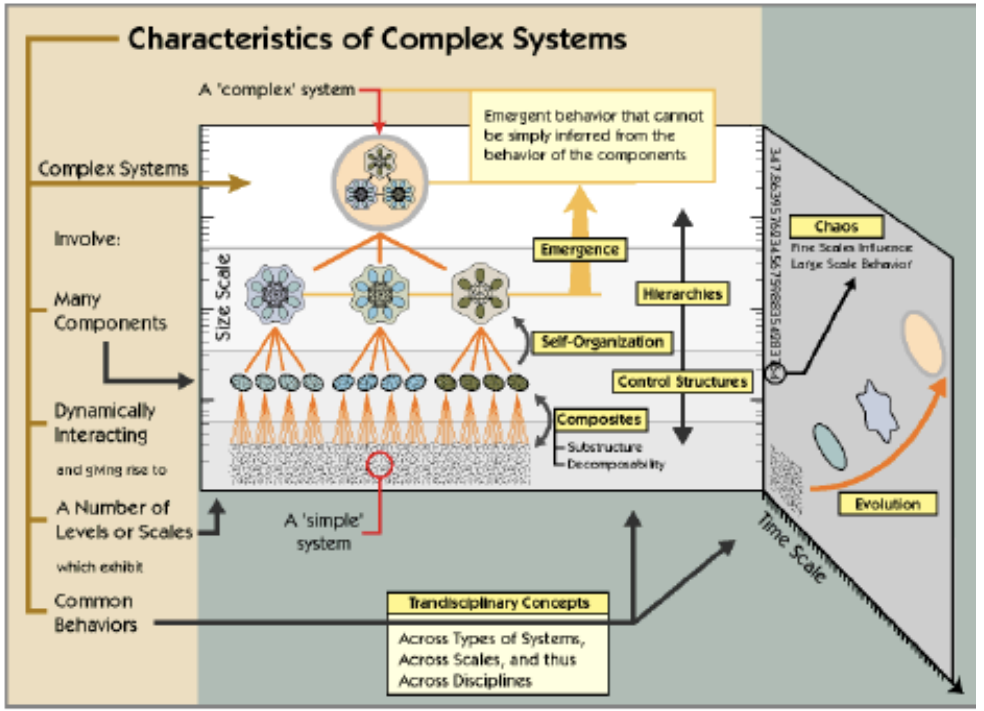
Domain	Traditional analytic techniques assumptions	Complex systems assumptions
Functional form	Linearity	Nonlinearity
Common distributions	Normality	Nonnormality
Characteristics of actors	Homogeneity	Heterogeneity
Level of analysis	Single level	Multiple levels
Temporality	Static or discretely longitudinal	Dynamic, with feedback
Fundamental relationships	Among variables	Interaction of actors
Perspective	Reductionist	Holistic

Luke & Stamatakis. Annual Review of Public Health. 2012.33:357-76

Complex systems: More than a sum of their parts

Complex Systems

- Made up of a large number of *heterogeneous elements*
- That *interact* with each other
- Producing an emergent *effect* that is different from the effects of the individual elements
- Which *persists* over time and *adapts* to changing circumstances



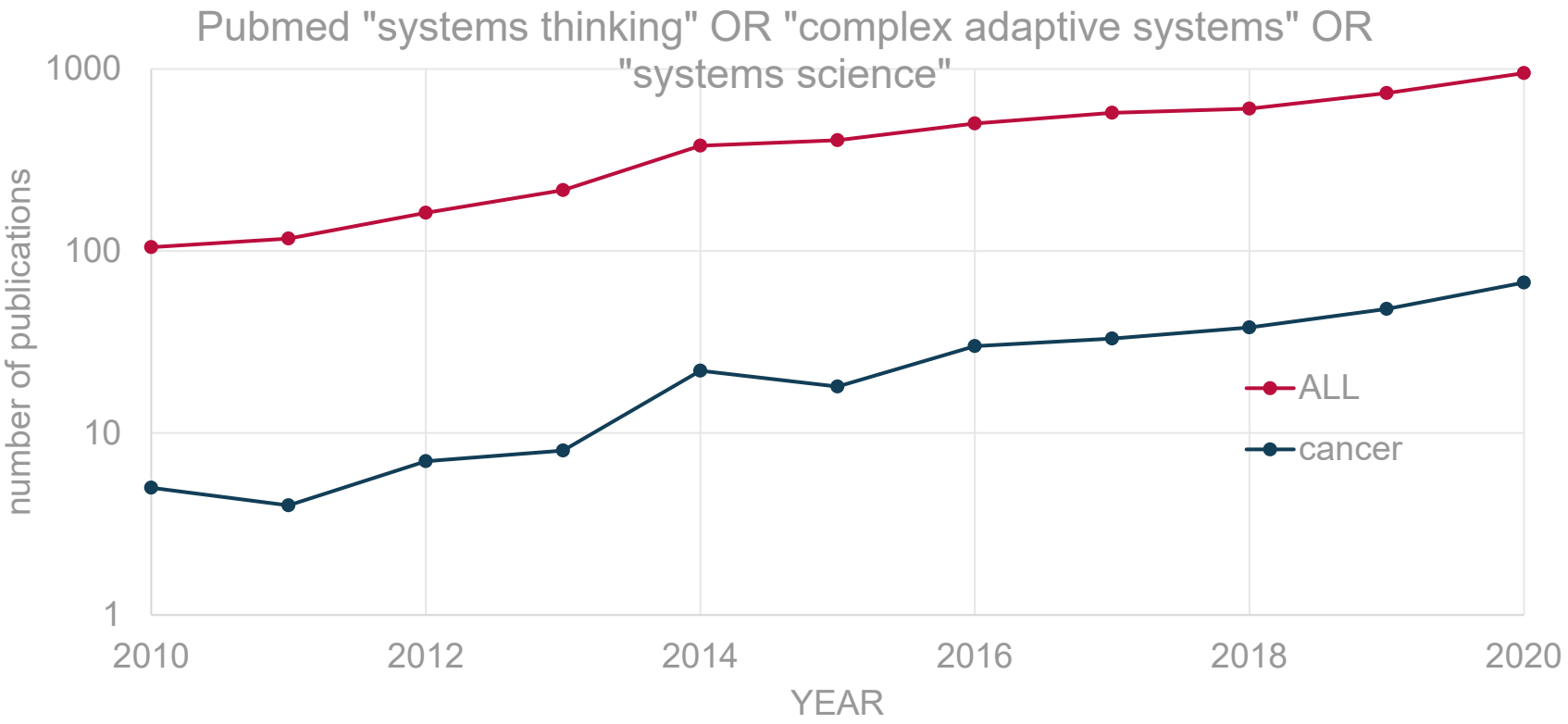
http://www.necsi.edu/visual/systems.html

With permission from Douglas Luke, Washington University in St. Louis

Study designs

- Hypothesis generation (non-experimental)
  - Mixed methods (integrated quantitative and qualitative designs)
- Hypothesis testing (pragmatic, quasi-experimental)
  - Pre-post design, or ‘natural experiments’
  - Stepped wedge designs
  - Interrupted time series
- Evidence synthesis
  - Realist evaluation
  - Computational modeling and systems science (system dynamics, network analysis, agent-based modeling)

Trends in systems approaches in cancer research



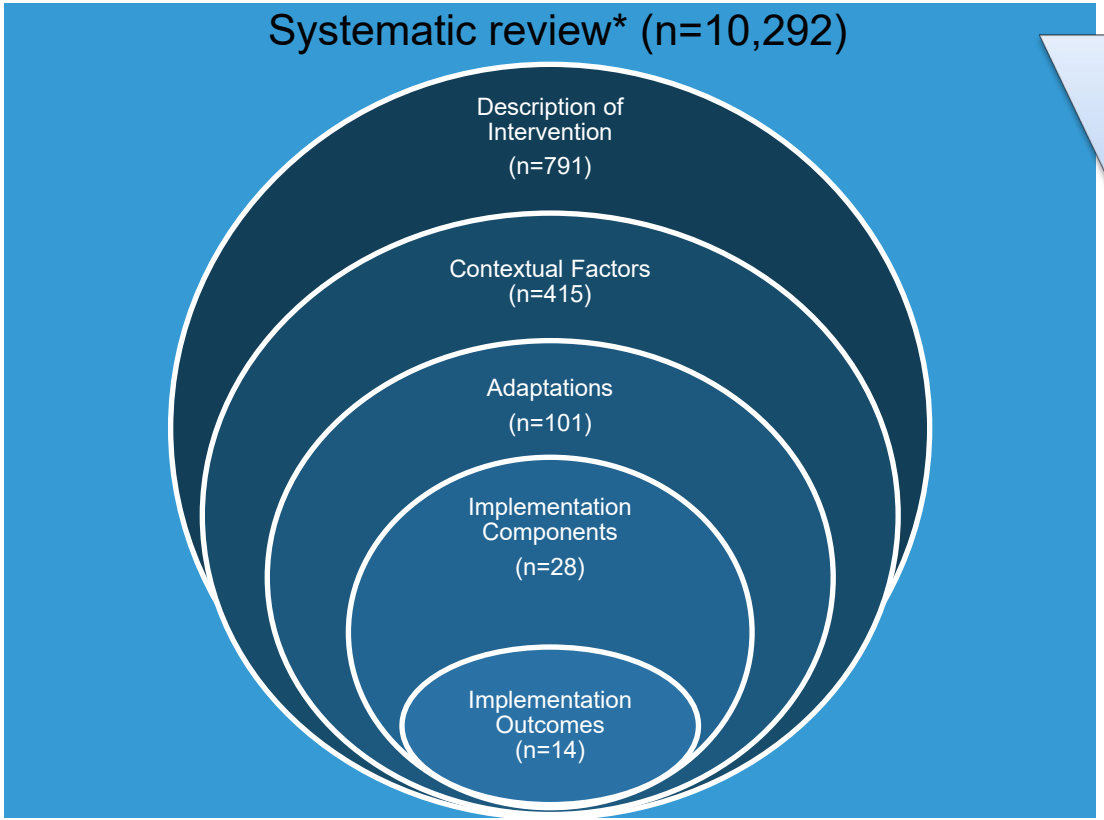
Global inequities in application of systems thinking in implementation research

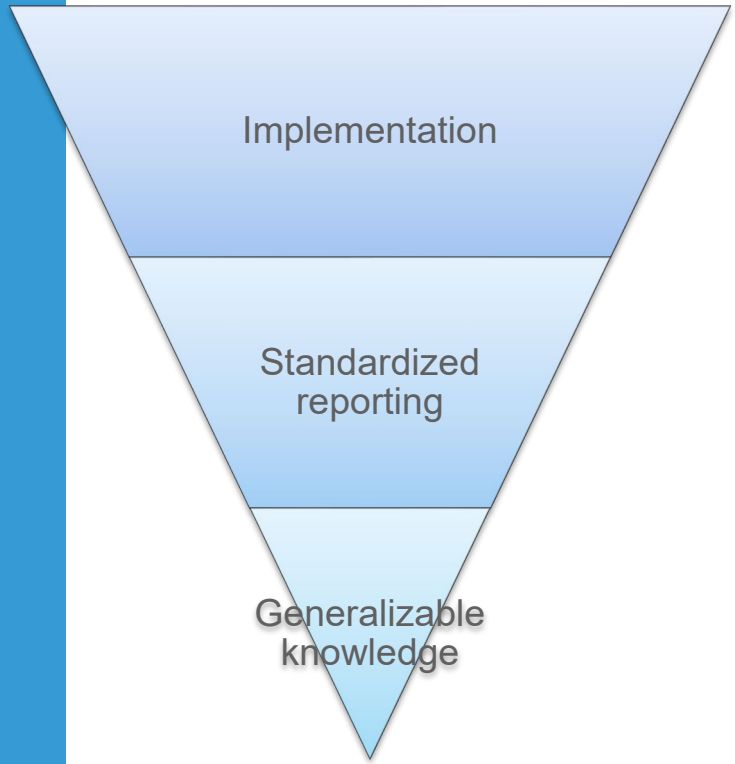
Figure 2 World map of the 1,386 MEDLINE records mentioning the terms "systems thinking", "complex adaptive systems", or "systems science". Source: GoPubMed, which reports the frequency that terms appear in MEDLINE indexes for publications, which include titles, abstracts, journal names and corresponding author's affiliation. This data was obtained on 14 August 2014.

What do we gain from global implementation science?

Re-thinking evidence synthesis to increase equity in cancer prevention and control

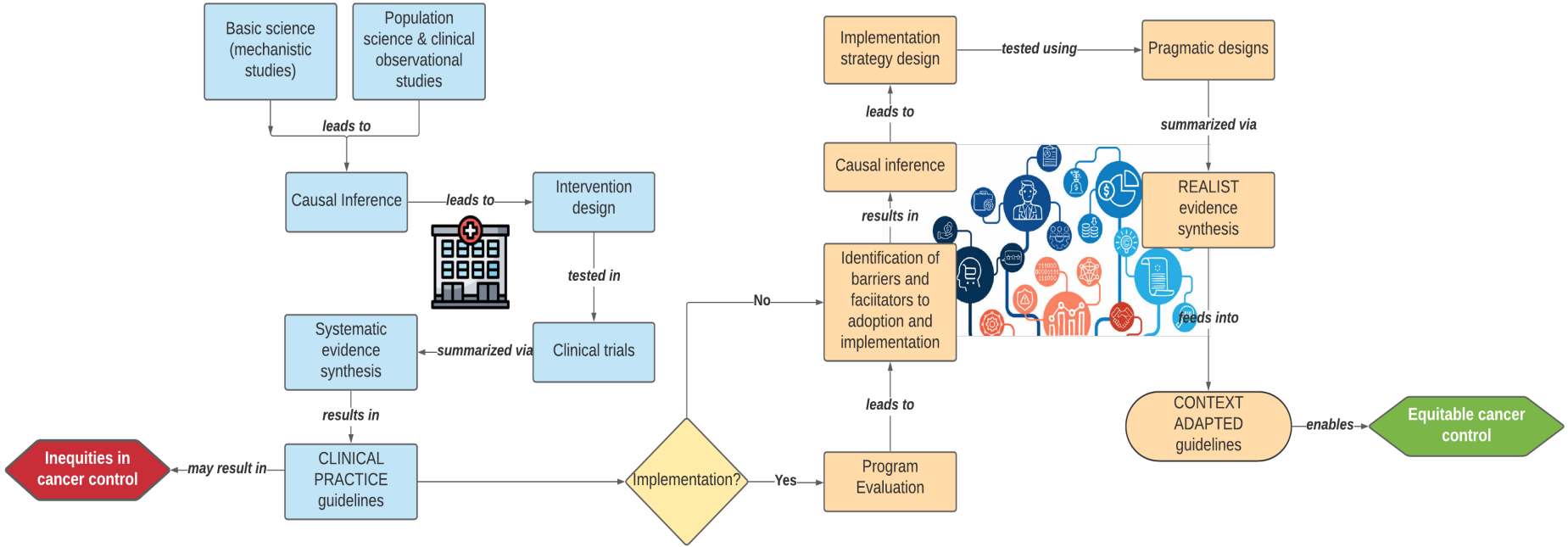
Implementation Science in LMICs – the research gap



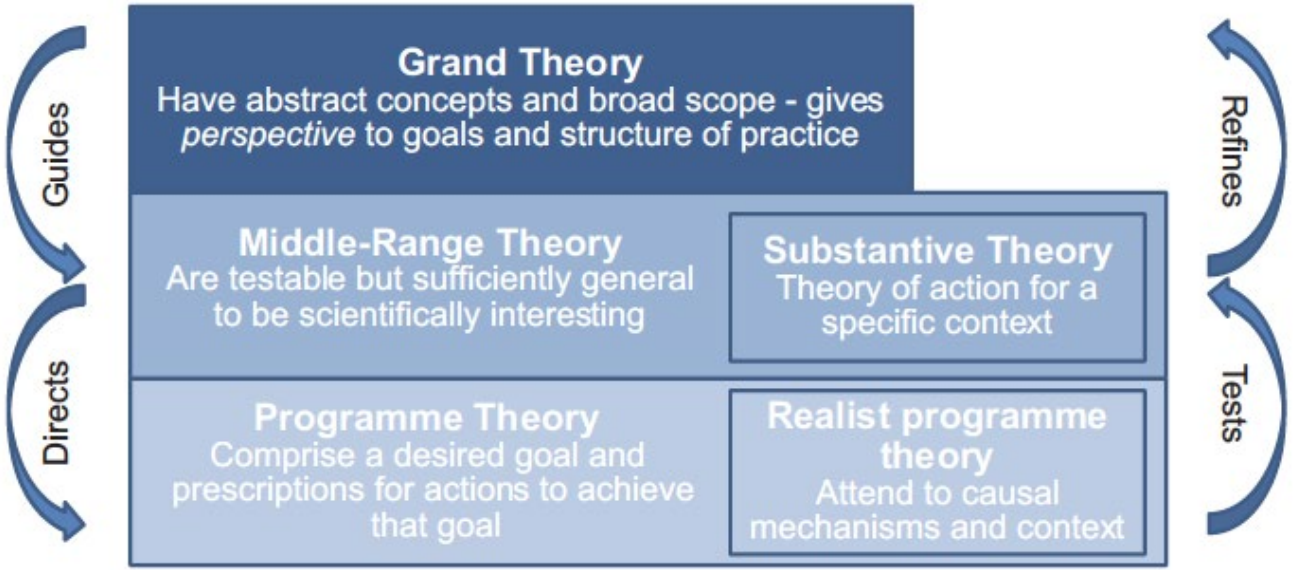


Alonge et al 2019 *BMJ Global Health*

Reducing inequities in cancer control through global IS



Modernizing our concepts of generalizability

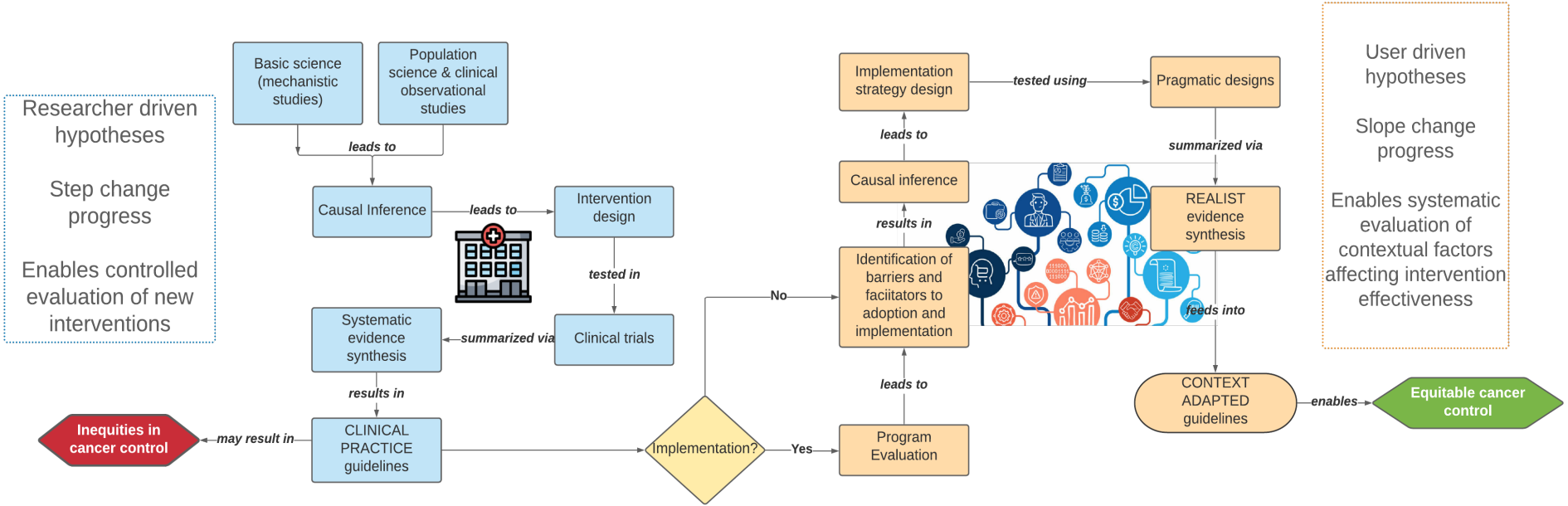


Adapted from Walker and Avant, (2005)

Realist evaluations result in context-specific 'theories of action', or generalizable 'rules of thumb' for implementation

Shearn K, et al. Int J Qualitative Methods. 2017;16:1-11

Reducing inequities in cancer control through global IS



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COLLABORATION

IMPACT

EQUITY

QUESTIONS?

NATIONAL CANCER INSTITUTE

cancer.gov

cancer.gov/espanol