



Introduction to LiST

<Location>

<Date>

Background and history

Learning Objectives

- Understand methods, assumptions, and sources of data used in LiST to calculate impact of scaling up interventions
- Recognize the strengths and limitations of LiST
- Explore potential uses of LiST

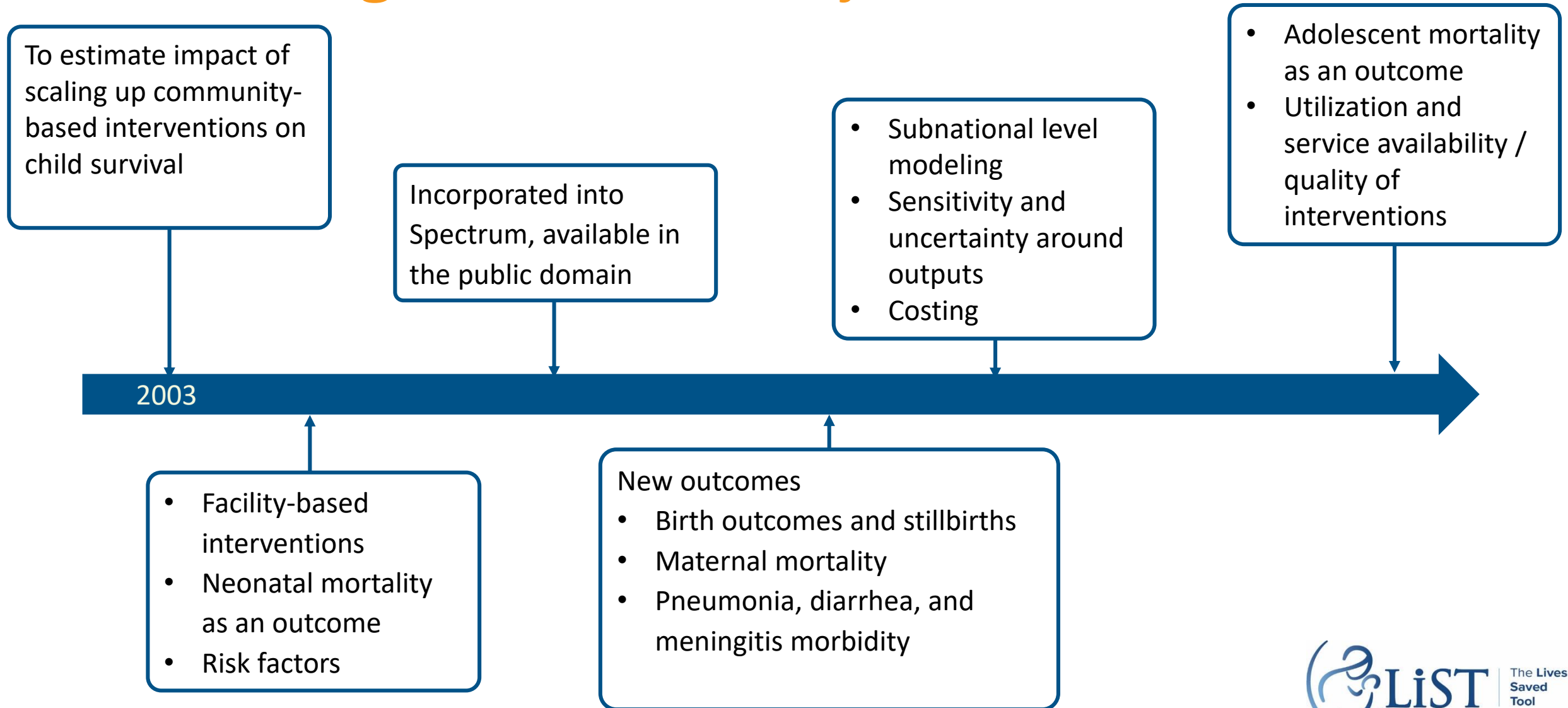
LiST: A multi-cause model of mortality

- Uses inputs
 - Baseline description of health status of a country
 - Effectiveness of interventions
 - Changes in the coverage of proven MNCH interventions
- Projects outputs or impact
 - Lives saved
 - Number of deaths
 - Mortality rates

LiST objectives and goals

- Objective
 - Estimate lives saved when introducing or scaling up MNCH interventions
- Goals
 - Promote evidence-based decision making
 - Aid in planning or prioritization of scale-up of MNCH interventions

LiST background and history



How LiST can be used



Prospective analysis

Strategic planning
Projecting lives saved



Retrospective analysis

Program/project evaluation
Attribution of lives saved to
interventions



Advocacy

Global, national, or subnational level

Who has used LiST?

International donors



International organizations



NGOs



Development and aid agencies



Country governments



Academic institutions

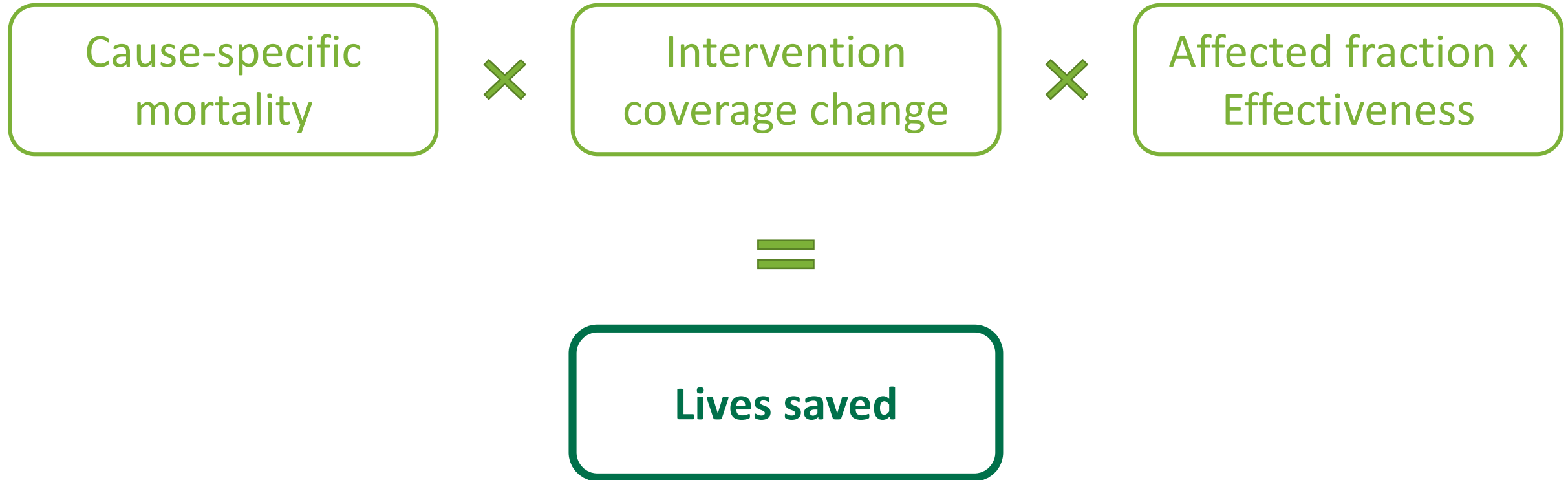


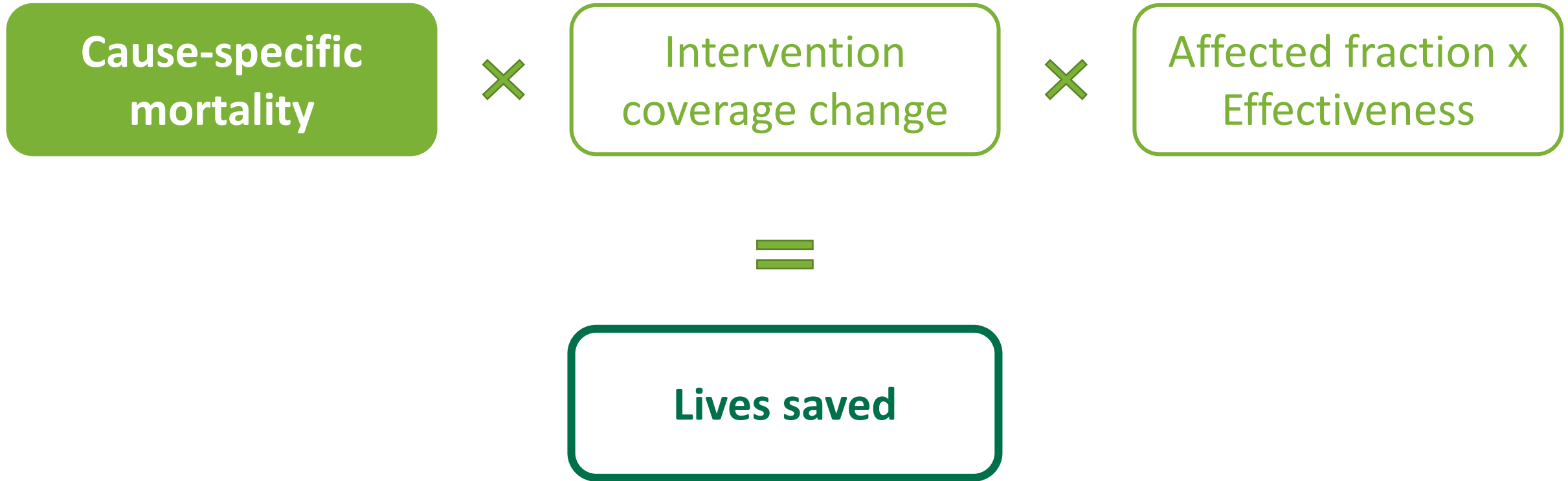
How is impact calculated in LiST?

Basic modeling structure of LiST

- Linear
 - Fixed relationships between inputs and outputs
- Mathematical
 - Assumes casual pathways of interventions reducing cause-specific mortality via reducing risk factors are correctly defined
- Deterministic
 - Tool will produce the same outputs each time the model is run with identical inputs.
- Population, not individuals
- Age cohorts

How is impact calculated in LiST?





Cause-specific mortality and data sources

- Cause-specific mortality = births x mortality rates x % deaths due to causes
 - Neonates <1 months
 - Children 1-59 months
 - Women 15-49 years
 - Stillbirths
- Mortality rates
 - [UN Inter-agency Group for Child Mortality Estimation \(IGME\)](#)
- Causes of death
 - [WHO Maternal and Child Epidemiology Estimation \(MCEE\)](#)



What is coverage?

Intervention
coverage change

$$\frac{\text{numerator}}{\text{denominator}} = \frac{\text{All who **received** intervention}}{\text{All who **needed** intervention}}$$

Which interventions are in LiST?

Proximate interventions

Distal variables improves coverage of proximate interventions

Work through health programs

Both community and facility-based

Feasible in low income countries

±80 countries with the highest MNC mortality

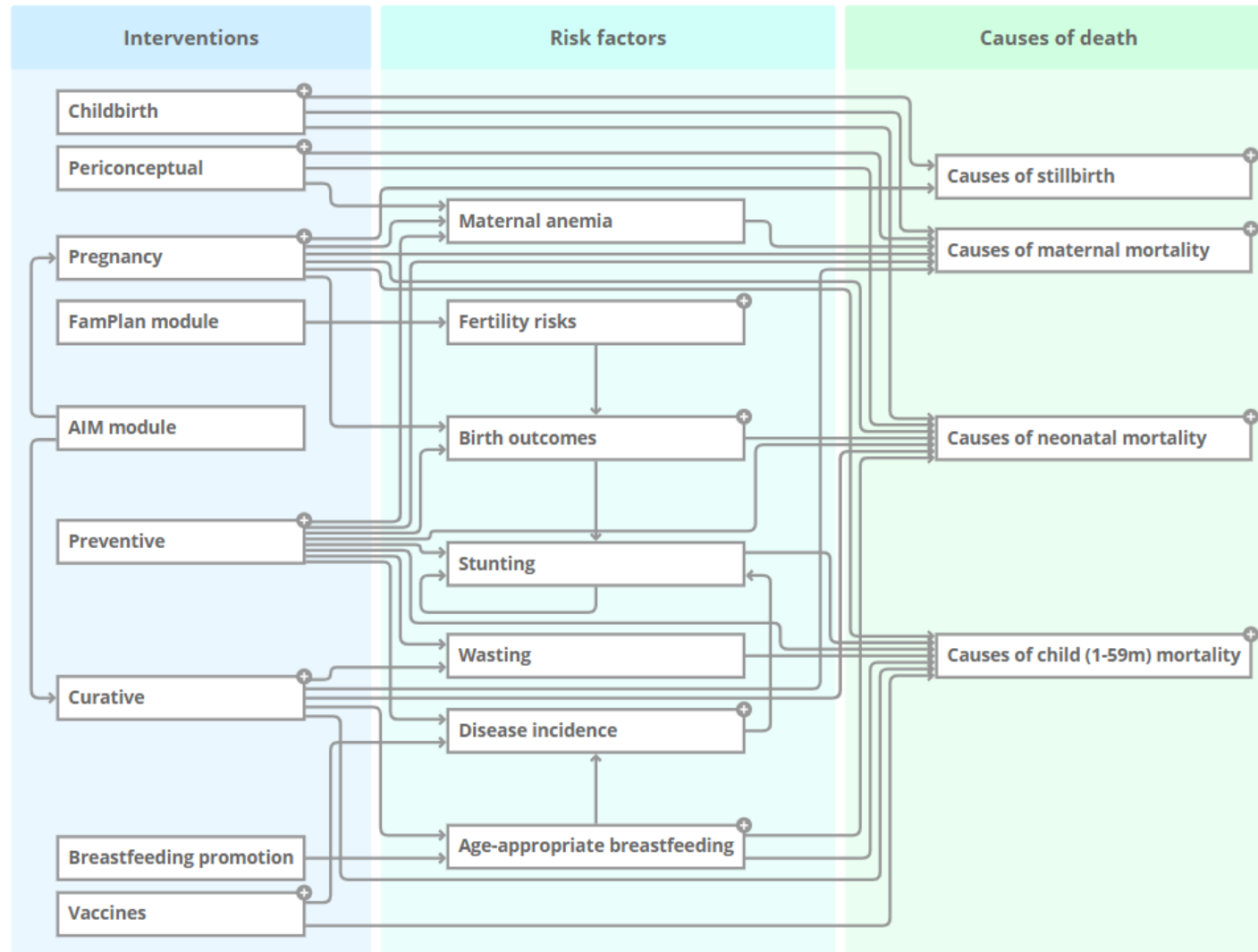
Cause-specific evidence of effect

Systematic reviews, meta-analyses, RCTs,
Delphi method
Updated frequently

How are interventions organized in LiST?



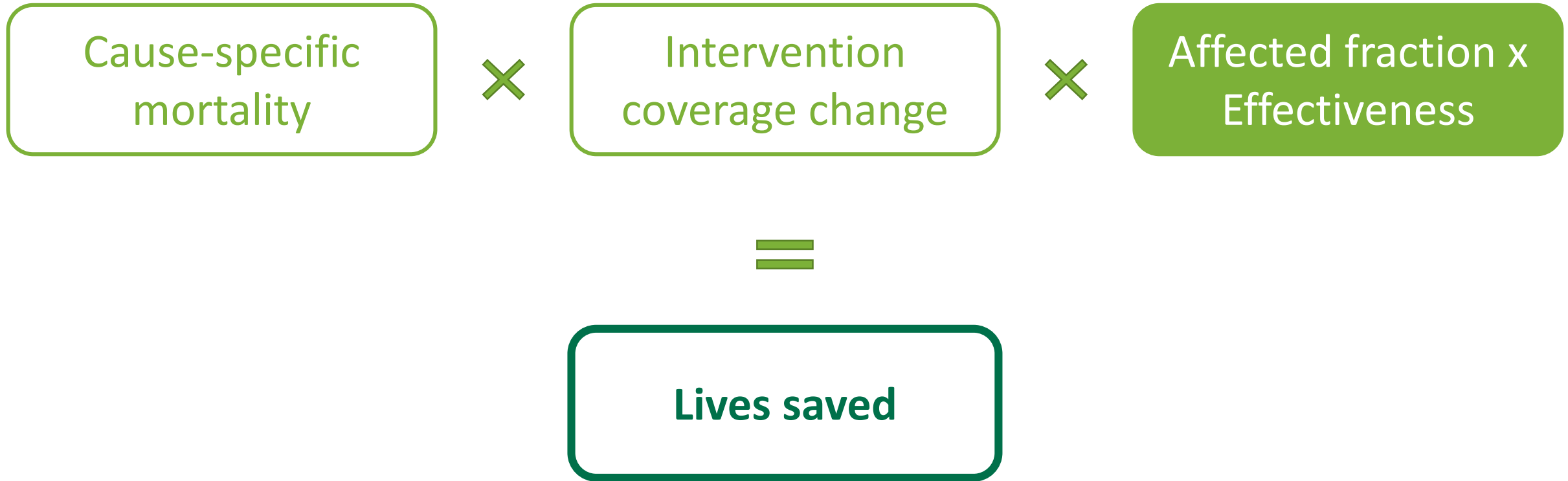
LiST impact model



<http://listvisualizer.org/>

Intervention coverage data sources

- Most MNCH interventions
 - [Demographic and Health Surveys \(DHS\)](#)
 - [Multiple Indicator Cluster Survey \(MICS\)](#)
- Water and sanitation
 - [WHO-UNICEF Joint Monitoring Program](#)
- Vaccines
 - [WHO-UNICEF Joint Reporting Process](#)
- User-entered data

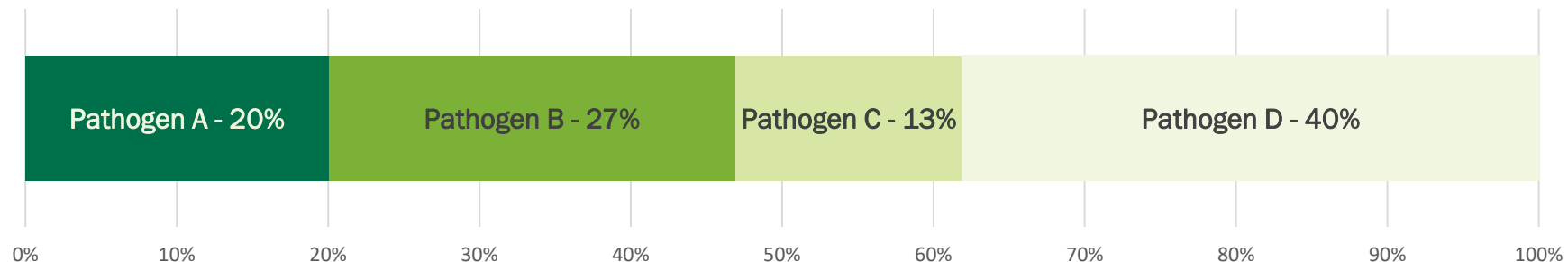


Affected fraction of an intervention

Proportion of cause-specific deaths that CAN be averted by a specific intervention

For example:

Diarrhea deaths by pathogens

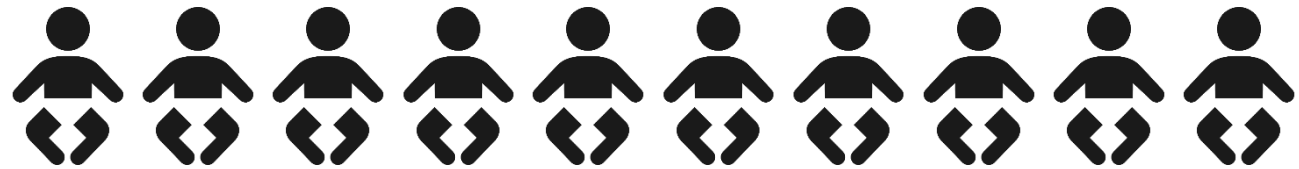


Of all deaths due to diarrhea, 20% are due to pathogen A (Rotavirus). The rotavirus vaccine, which can only avert rotavirus diarrhea deaths, has an affected fraction of 20%

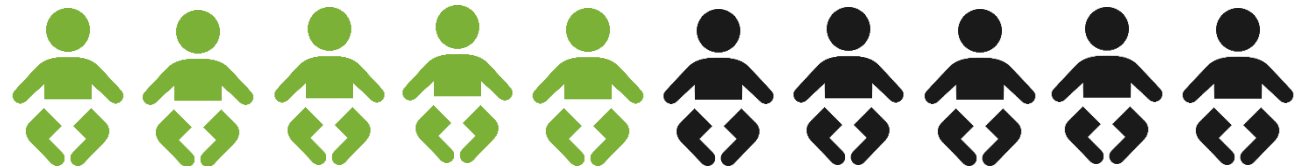
Effectiveness of an intervention

Proportion of pathogen-specific, cause-specific deaths that are averted by a given intervention

Total rotavirus diarrhea deaths



Rotavirus vaccine effectiveness 50%



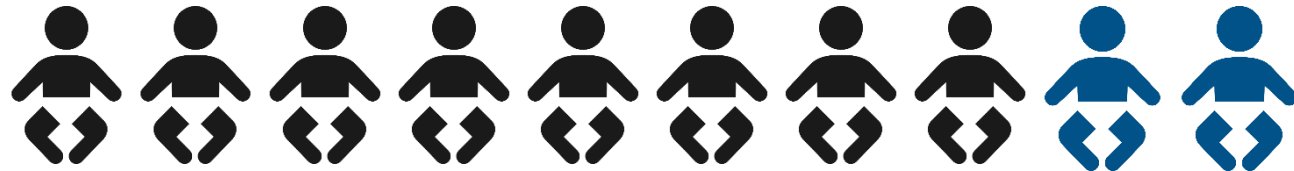
Note: the effectiveness presented is for each intervention individually

Affected fraction x effectiveness



Rotavirus vaccine
Affected fraction = 20%
Effectiveness = 50%

Of 10 children with diarrhea deaths, 2 are due to rotavirus diarrhea

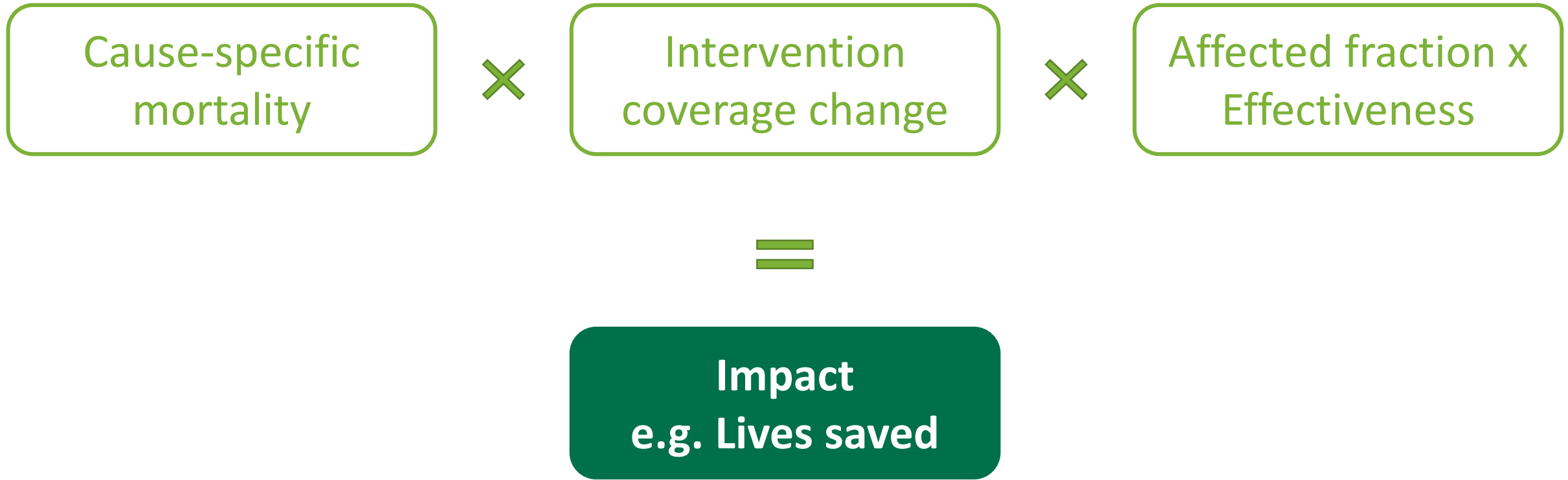


If all 10 children with diarrhea deaths are vaccinated with rotavirus vaccine, **1 life** will be saved by the vaccine



Effectiveness data sources

- Systematic reviews, meta-analyses, Delphi method, randomized control trials
- Global and regional
- Published in 5 supplements
 - [IJE April 2010](#)
 - [BMC Public Health 2011](#)
 - [BMC Public Health 2013](#)
 - [Journal of Nutrition 2017](#)
 - [BMC Public Health 2017](#)



Results available in LiST

Lives saved

- Total
- By cause
- By intervention
- By age group

Mortality rates

- Neonatal mortality rate
- Under 5 mortality rate
- Maternal mortality rate or ratio
- Stillbirth rate

Number of death

- Total
- By cause
- By intervention
- By age group

Risk factors

- Stunting
- Wasting
- Birth outcomes

Visualize by:

- Tables, graphs, pie charts
- Single/multiple countries
- Single/multiple scenarios

How does Spectrum work?

- Essentially a demographic projection (Demproj)
- Normally, demographic projections use trends in mortality and fertility to project population growth and structure
- However, within Spectrum, three modules alter this relationship:
 - AIM, for impact of interventions on HIV/AIDS mortality
 - FamPlan, for impact of family planning on fertility
 - LiST, for impact of interventions on maternal and child mortality

How other modules relate to LiST

- Demproj – underlying population and births
 - Gives LiST population size and births
- AIM – scale up HIV treatment
 - Gives LiST child deaths due to HIV/AIDS
- Famplan – scale up family planning
 - Change fertility trend and births in Demproj →
 - Change number of deaths in LiST
 - Change distribution of birth by risk categories → change birth outcomes
 - Change abortion incidence → change maternal deaths due to abortion

How to run a LiST analysis

- Basic approach in LiST is to establish a baseline projection of a country or region. This includes
 - Demography: population structure, fertility, contraceptive prevalence
 - Mortality rates
 - Cause of death structure
 - Current levels of risk factors and exposure
 - Current level of coverage of interventions

How to run a LiST analysis

- Scale up coverage of interventions
- Re-computes all inputs
- Compare to a counterfactual
 - Default: no coverage scale up
- Outputs include all of the inputs from baseline

How are lives saved calculated?

How are lives saved calculated?

- Single intervention
 - $\text{Lives saved} = (\text{Cause-specific deaths}) * (\text{Change in coverage}) * (\text{Intervention effectiveness} * \text{affected fraction})$
- Two or more interventions
 - Process prevention first, then curative
 - Interventions impacting same cause of death:
 - Total lives saved: process interventions in any order, but impact only on deaths not averted by previously applied interventions
 - Total lives saved by interventions (attribution): process each intervention by itself, then normalize intervention impacts to sum to total from step 2

Modeling approach: single intervention



Intervention A (preventive)

Baseline # of **diarrhea**
deaths =
10,000



Intervention A is
introduced, reaches
coverage of
50%



Effectiveness of the
intervention in reducing
diarrhea mortality =
10%



Mortality impact
 $10,000 \times 0.50 \times 0.10 =$
500 diarrhea lives saved

Modeling approach: two interventions



Intervention A
(preventive)



Intervention B
(preventive)

Intervention A

10,000



50%



10%



500

Intervention B

**New baseline # of
diarrhea deaths =**
 $10,000 - 500 =$
9,500



Intervention **B** is
introduced, reaches
coverage of
20%



Effectiveness of the
intervention in reducing
diarrhea mortality =
50%



Mortality impact
 $9,500 \times 0.20 \times 0.50 =$
950 diarrhea lives saved

Modeling approach: two interventions



Intervention A
(preventive)



Intervention B
(preventive)

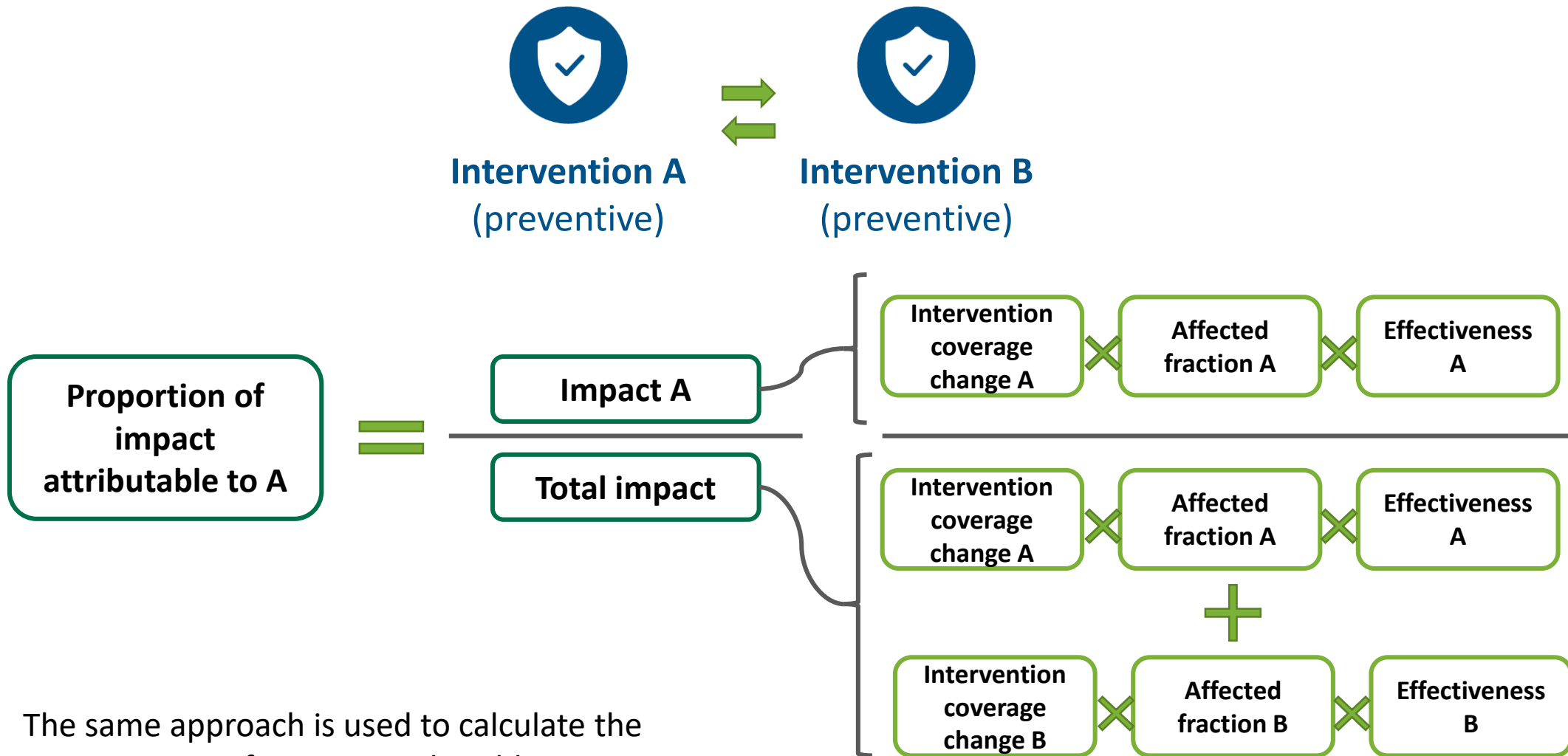
Intervention A first, B second

10,000	X	50%	X	10%	≡	500	1,450
9,500	X	20%	X	50%	≡	950	

Intervention B first, A second

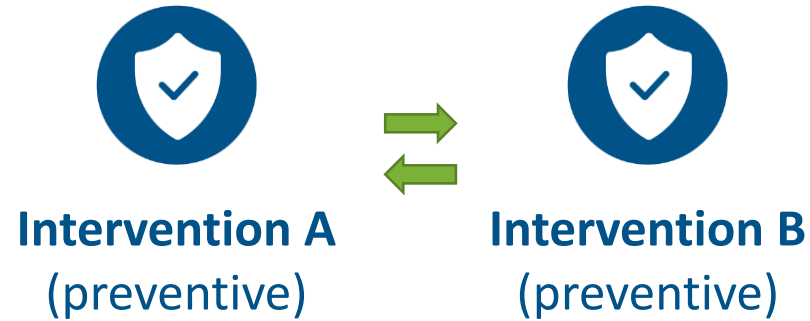
10,000	X	20%	X	50%	≡	1000	1,450
9,000	X	50%	X	10%	≡	450	

Modeling approach: two interventions - attribution

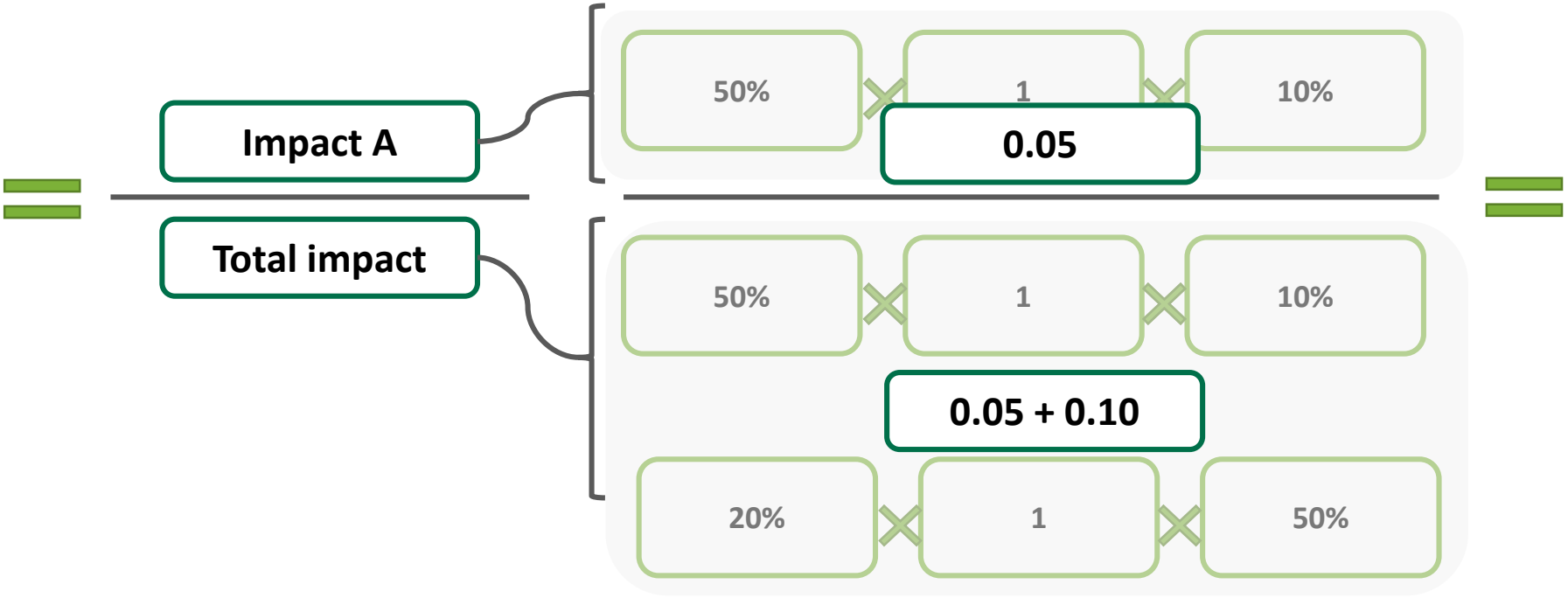


The same approach is used to calculate the proportion of impact attributable to B

Modeling approach: two interventions



Proportion of
impact
attributable to A



33%

Modeling approach: two interventions



Intervention A
(preventive)



Intervention B
(preventive)

Proportion of
impact
attributable to A



33%

Proportion of
impact
attributable to B



67%

Number of lives
saved attributable
to A



1,450



33%



483

Number of lives
saved attributable
to B



1,450



67%



967

Modeling approach: two interventions



For interventions at a different stage along the continuum of care, **order does matter**. Impact is calculated on residual deaths only.

LiST limitations

- Data availability
- Data quality
- Sensible coverage scale-up targets
 - Feasible
 - Acceptable
 - Cost
- Interventions not included in LiST
 - Some interventions not included because not enough data available to support including them
 - Interventions that are feasible in LMICs

LiST can NOT be used for:

As the final answer

Outputs are only as good as inputs
Also must consider cost, feasibility,
acceptability

To decide HOW to do anything

For program implementers to decide
Context MUST be considered

Advantages of LiST

- Ability to look at multiple interventions' impact on multiple disease causes
- Evidence-based
- Validated
- Published
- Regularly updated and maintained
- Free and available in the public domain

Advantages of LiST

- Default data sources are all high quality data
- Highly flexible tool
 - Accommodates user-entered data
 - Accommodates user-created interventions
- Quickly identify intervention impact pathways using <http://listvisualizer.org/>
- Visualize the highest impact using the missed opportunities
- Can tailor the tool to look at the impact of:
 - One single intervention
 - A package of interventions
 - Multiple countries at once

Additional features of LiST

- Subnational Wizard*
- Missed Opportunity Tool*
- Equity Tool*
- LiST Costing*
- Uncertainty Analysis

*recorded webinar available on LiST website



The Lives Saved Tool

-  Help files
-  Training material
-  User forum
-  Webinars

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