Introduction to LiST
March 28, 2019

Presented to NiPN countries
Learning objectives

- Understand methods, assumptions and data sources used in LiST to calculate impact of scaling up interventions
- Understand nutrition in LiST
- Recognise the strengths and limitations of LiST
- Explore the potential uses of LiST
Potential role of LiST in NiPN: Which relevant strategic questions can LiST help to answer?

- Which nutrition-specific intervention could contribute the most to the reduction of stunting in my country/region?

- By how much do we need to increase the coverage of WASH interventions in order to have a meaningful impact on the reduction of stunting?
Overview of LiST
Lives Saved Tool (LiST)

- Allows projections at various geographical levels:
  - Stillbirths and neonatal mortality
  - Maternal and child mortality
  - Mortality by cause and/or intervention
  - stunting

- By using data on:
  - Demography
  - Causes of death
  - Health indicators at national or subnational level
In order to estimate:

- Changes in population survival
- Effect of the main causes of death
- Potential impact of a programme on the health/nutrition of populations

Projections are based on the effect sizes available in the literature on the effectiveness and the affected percentage of the interventions – We are going to talk about these concepts later on in the webinar

To help:

- Make informed decisions about policies or interventions relating to maternal, neonatal and child health, and nutrition
Integrated into the SPECTRUM software, LiST is a program which projects changes in mother and child survival based on changes in coverage of mother and child interventions.
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 does Spectrum work?

- Spectrum provides demographic data at the national level.
- In the case of sub-national analysis, it is necessary to have the population for the desired level of disaggregation.
- It is also necessary to have inputs for this level (causes of death, fertility rates, etc.).
- This requires meticulous additional work which would take time.
How other modules relate to LiST

- **Demproj** – initially population and births
  - Provides population size and births to LiST

- **AIM** – increases the coverage for interventions against HIV/AIDS
  - Provides child mortality caused by HIV/AIDS

- **Famplan** – increases family planning
  - Changes birth and fertility trends in Demproj
    - Changes the number of deaths in LiST
    - Changes the distribution of births by risk category
    - Changes the incidence of abortions
      - Changes maternal mortality due to abortion
Which data is necessary in order to carry out a LiST analysis at a given geographical level?

The basic approach of LiST is to establish a base projection of a country or region with the data:

- **Demographic**
  - (population structure, fertility, contraceptive prevalence)
- **Mortality rate**
- **Death pattern**
- **Current risk factor and exposure levels**
- **Current levels of intervention coverage**
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 is impact calculated in LiST?

(Including the impact of nutrition interventions)
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 \( \times \) Intervention coverage change \( \times \) Affected fraction x Effectiveness = Lives saved
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?

\[
\frac{\text{numerator}}{\text{denominator}} = \frac{\text{All who received intervention}}{\text{All who needed intervention}}
\]
Which interventions are in LiST?

**Proximate interventions**
Distal variables improves coverage of proximate interventions

**Feasible in low income countries**
±80 countries with the highest MNC mortality

**Work through health programs**
Both community and facility-based

**Cause-specific evidence of effect**
Systematic reviews, meta-analyses, RCTs, Delphi method
Updated frequently
How are interventions organized in LiST?

Periconceptual → Pregnancy → Childbirth → Breastfeeding → Preventive → Vaccines → Curative
Which nutritional interventions are available?

http://listvisualizer.org/
Intervention coverage data sources

- Most MNCH interventions
  - Demographic and Health Surveys (DHS)
  - Multiple Indicator Cluster Survey (MICS)
  - Standardised Monitoring and Assessment of Relief and Transition (SMART)
- Water and sanitation
  - WHO-UNICEF Joint Monitoring Program
- Vaccines
  - WHO-UNICEF Joint Reporting Process
- User-entered data
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%
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 example**

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
Sources of data for effectiveness

- Systematic reviews, meta-analyses, randomised controlled trials, Delphi method
- 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
How are lives saved calculated?

- **Single intervention**
  - Lives saved = (Cause-specific deaths) \times (Change in coverage) \times (Intervention effectiveness \times 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
Results available in LiST

**Lives saved**
- Total
- By cause
- By intervention
- By age group

**Number of death**
- Total
- By cause
- By intervention
- By age group

**Mortality rates**
- Neonatal mortality rate
- Under 5 mortality rate
- Maternal mortality rate or ratio
- Stillbirth rate

**Risk factors**
- Chronic malnutrition
- Acute malnutrition
- Breastfeeding
- Birth outcomes

**Visualize by:**
- Tables, graphs, pie charts
- Single/multiple countries
- Single/multiple scenarios
Nutrition in LiST

Presented to NiPN countries
Risk factors linked to nutrition in LiST

- Stunting
- Maternal anaemia
- Birth outcomes
  - Small for gestational age (SGA)
  - Preterm
- Breastfeeding behaviour (early, exclusive, continued)
- Wasting
- Diarrhoea incidence

LiST doesn’t include: (Childhood overweight)

WASH interventions in LiST

- Improved sanitation – Use of latrines or toilets
- Improved water source
- Water connection in the home
- Hands washing with soap
- Hygienic disposal of children’s stools
Stunting as an example
Stunting as a risk factor
Stunting as a risk factor

The relative risk for cause-specific mortality due to stunting increases by level of stunting severity.
Effectiveness of nutrition on stunting

Impact of birth outcomes on stunting

- Term AGA
- Term SGA
- Pre-term AGA
- Pre-term SGA

Increased relative risk

Impact of previous stunting on stunting

Impact of complimentary feeding on stunting

- Food secure with promotion
- Food secure without promotion
- Food insecure with promotion and supplementation
- Food insecure with neither promotion nor supplementation

Increased relative risk

Impact of diarrhea

Impact of zinc supplementation on stunting
Complementary feeding approaches (6-23m)

Nutritional education

Dissemination of information on:

- Timely introduction of complementary feeding
- Food diversification
- Appropriate feeding
- Hygienic preparation and feeding

Supplementation (+/- education)

- Rich in macronutrients
  - Fortified flour +/- oil
  - Lipid based nutritional supplements (LNS)
  - Other local foods
- Macro + Micronutrients for fortification at home
  - Small quantities of lipid based supplements (SQ-LNS)

Images: UNICEF, Hospital for Sick Kids
LiST can be used for:

- **Prospective analyses**
  - Strategic planning
  - Projecting lives saved

- **Retrospective analyses**
  - Programme/project evaluation
  - Attribution of lives saved to interventions

- **Advocacy**
  - @ Global level
  - @ national level
  - @ sub-national level
Types of nutrition questions that can be addressed with LiST

Which interventions should be prioritised (and in which region(s), district(s), etc.) if the country wants to maximise its chances of reaching the chronic malnutrition target set in the multi-sectoral action plan for nutrition?

How could the nutritional interventions available in LiST contribute towards the target for reducing the rate of chronic malnutrition in my country’s multi-sectoral action plan?

How many cases of chronic malnutrition would be avoided if the targets of the nutrition interventions available in LiST and taken into account in the multi-sectoral plan of action for nutrition are met, per year and for the full duration of the implementation of the plan?
LiST can NOT be used

As a “Final response”
Outputs are only good as the inputs
Must consider also cost feasibility, acceptability and quality of interventions implementation must also be considered

To decide HOW to do something
For programme implementers decide Context must be considered
Advantages, limitations and potential uses of LiST
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
LiST limitations

- Data availability
  - Without baseline data, it is impossible to evaluate the impact accurately

- 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
What is not in LiST

- Deworming
- "Nutrition-sensitive" interventions (e.g. agriculture)
- Salt iodisation
- Air pollution

→ Problem = lack of data
Additional features of LiST

- Missed opportunities*
- Equity tool*
- Sub-national assistant*
- LiST costing
- Uncertainty analysis

*pre-recorded webinars are available on the LiST website
Who has used LiST?

Donors
- Bill & Melinda Gates Foundation
- Children's Investment Fund Foundation
- USAID
- Department for International Development
- Canada

International Organisations
- The Vaccine Alliance (Gavi)
- World Health Organization (WHO)
- UNICEF
- PAHO-WHO
- The World Bank

NGOs
- Save the Children
- Management Sciences for Health (msh)
- Jhpiego

Development aid agencies
- UNICEF

Governments
- DRC
- Malawi
- Mali
- Nigeria
- India
- Peru
- Mozambique
- Tanzania

Academic Institutions
- Johns Hopkins Bloomberg School of Public Health
- London School of Hygiene & Tropical Medicine
- Aga Khan University
