



Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries

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Presentation overview

- Motivation for our analysis
- Introduction to LiST
- Methods, assumptions, scenarios
- Results and interpretation
- Future analyses
- Running your own LiST analysis
- Questions

Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study

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Summary

Background While the COVID-19 pandemic will increase mortality due to the virus, it is also likely to increase mortality indirectly. In this study, we estimate the additional maternal and under-5 child deaths resulting from the potential disruption of health systems and decreased access to food.

Methods We modelled three scenarios in which the coverage of essential maternal and child health interventions is reduced by 9·8–51·9% and the prevalence of wasting is increased by 10–50%. Although our scenarios are hypothetical, we sought to reflect real-world possibilities, given emerging reports of the supply-side and demand-side effects of the pandemic. We used the Lives Saved Tool to estimate the additional maternal and under-5 child deaths under each scenario, in 118 low-income and middle-income countries. We estimated additional deaths for a single month and extrapolated for 3 months, 6 months, and 12 months.



Lancet Glob Health 2020

Published Online

May 12, 2020

[https://doi.org/10.1016/S2214-109X\(20\)30229-1](https://doi.org/10.1016/S2214-109X(20)30229-1)

See [Online/Comment](#)

[https://doi.org/10.1016/S2214-109X\(20\)30238-2](https://doi.org/10.1016/S2214-109X(20)30238-2)

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Motivation for our analysis

The problem

- The coronavirus pandemic has created a worldwide state of emergency
- Resources shift to respond to emergency
- Results in neglect of basic and regular essential health services

*“People, efforts, and medical supplies all shift to respond to the emergency. This often leads to the neglect of basic and regular essential health services. People with health problems unrelated to the epidemic find it harder to get access to health care services.”**

*World Health Organization. Managing epidemics: Key facts about major deadly diseases. Geneva, 2018, <https://www.who.int/emergencies/diseases/managing-epidemics/en/>

Why focus on maternal and child health now?

- Mortality rates for COVID-19 appear to be low in children and in women of reproductive age
- However, they may be disproportionately affected by the disruption of routine health services
 - 2014 West Africa Ebola outbreak showed that the indirect effects of the outbreak were more severe than the outbreak itself
- Potential disruption in provision and utilization of routine maternal and child health services

Potential reductions in RMNCH coverage

- Interrupted service provision:
 - Health resources reassigned for COVID-19 response
 - Reduction in health workforce
 - Supply chain disruption
 - Campaigns paused or reduced in scale
- Reduced service utilization:
 - Movement restrictions and other control responses (financial and physical barriers)
 - Reduced demand due to transmission fears
- Increase in wasting due to reduced food security
 - Doubling of food crises (WFP)
 - Causes of increased wasting rates outside of health sector, but expect significant immediate impact on child morbidity and mortality

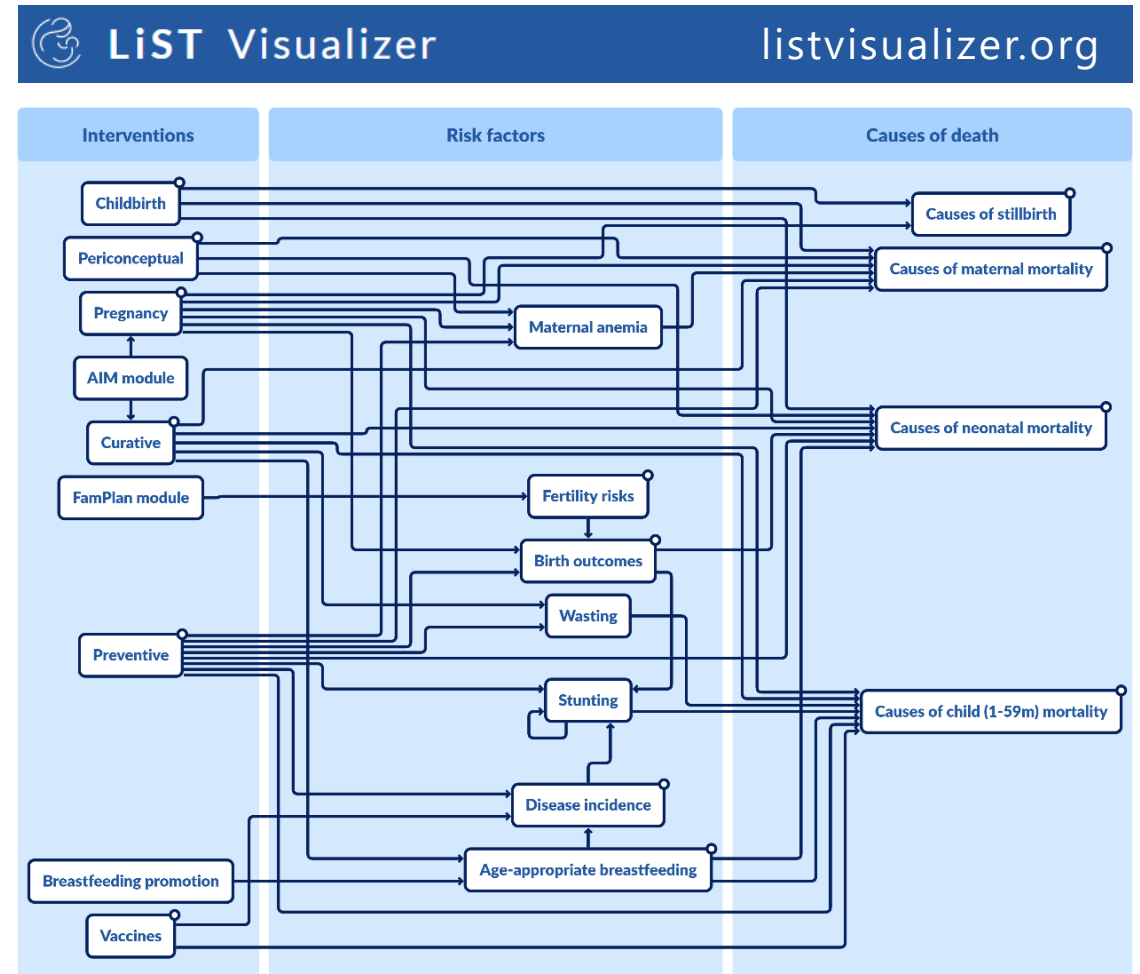
Our analysis

- If certain hypothetical COVID-19 outbreak and response scenarios were to occur, what would be the indirect impact on maternal and child mortality?
 - 3 scenarios of varying severity
 - 3, 6, 12 months
 - 118 LMICs
- Used Lives Saved Tool (LiST)
 - Model mortality impact of change in 70+ RMNCH interventions and risk factors
- Realistic, quantifiable estimates as a reference point for decision makers
- Engagement from WHO, UNICEF, World Bank (GFF), BMGF
- First phase; additional phases to come

Introduction to LiST

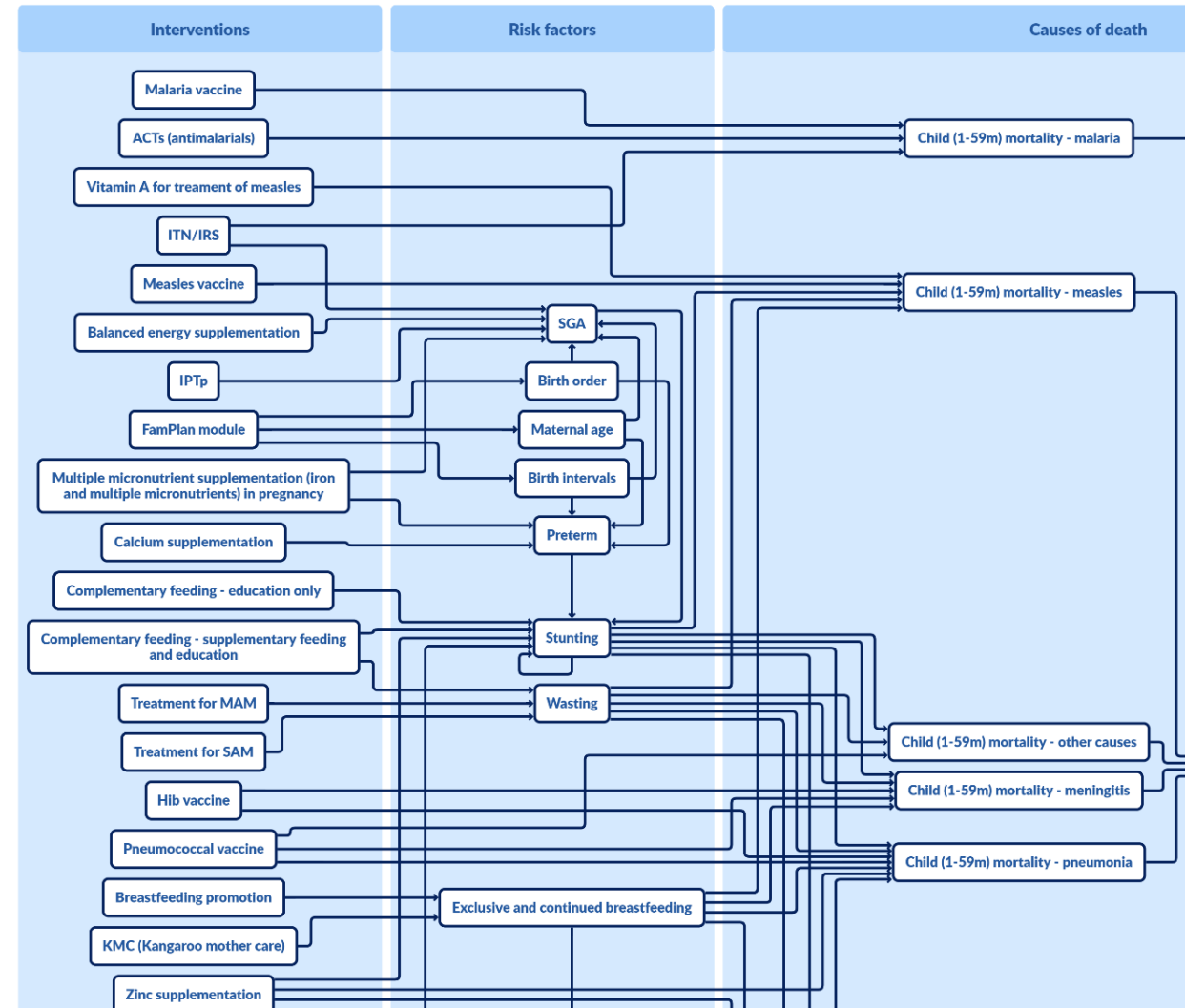
LiST: A multi-cause model of mortality

- Causal model
- Estimates mortality impact based on change in coverage of 70+ RMNCH interventions and prevalence of risk factors
- Housed with the Spectrum computer software package
 - Demographic projections based on trends in mortality and fertility
- Validated in numerous settings
- Developed by:
 - LiST team - Institute for International Programs (IIP) at JHSPH
 - Collaborators from numerous institutions



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How to run a LiST analysis

1. Establish a baseline projection for a country or region:

- Demography (WPP): population structure, fertility, contraceptive prevalence
- Mortality rates (IGME)
- Cause of death structure (MCEE)
- Current levels of risk factors and exposure (DHS/MICS)
- Current level of coverage of interventions (DHS/MICS or WHO-UNICEF Joint Monitoring)

Envelope of deaths by cause for set intervention levels

2. Scale up or down coverage of interventions and risk factors

3. Re-compute mortality by cause

How is mortality impact calculated in LiST?



Periconceptual

Pregnancy

Childbirth

Breastfeeding

Preventive

Vaccines

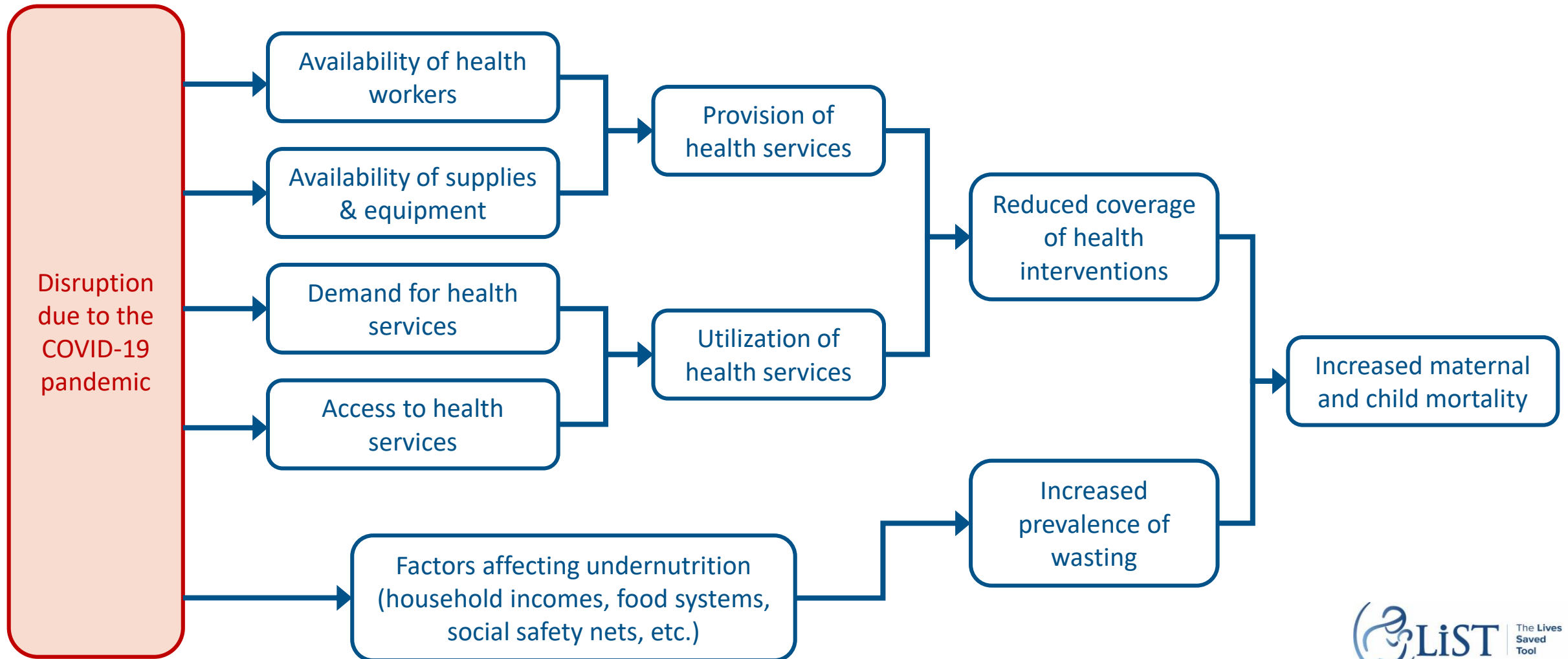
Curative

How to run a LiST analysis

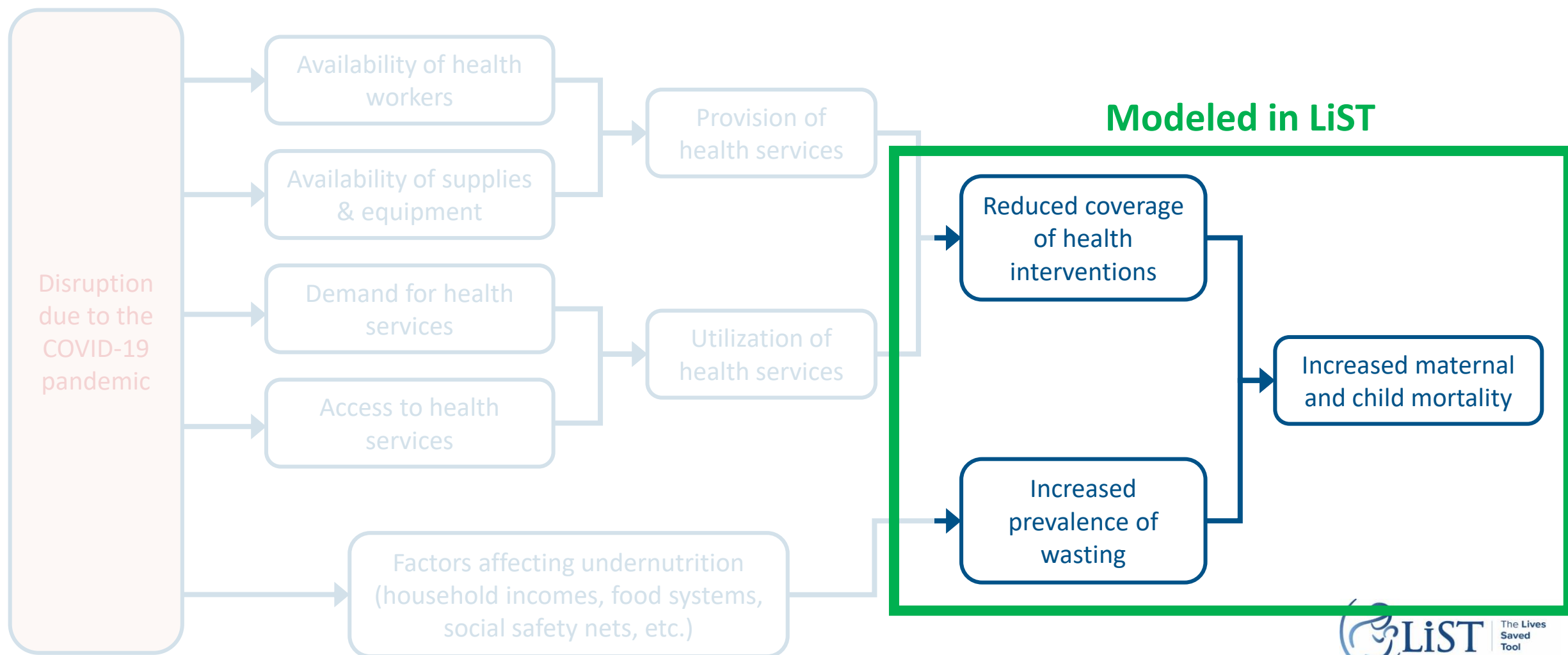
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2. Scale up or down coverage of interventions
3. Re-compute mortality by cause
4. Compare to a counterfactual
 - No coverage change
 - Difference in modelled deaths by intervention and cause

Methods, assumptions, scenarios

Framework for indirect effects of the pandemic

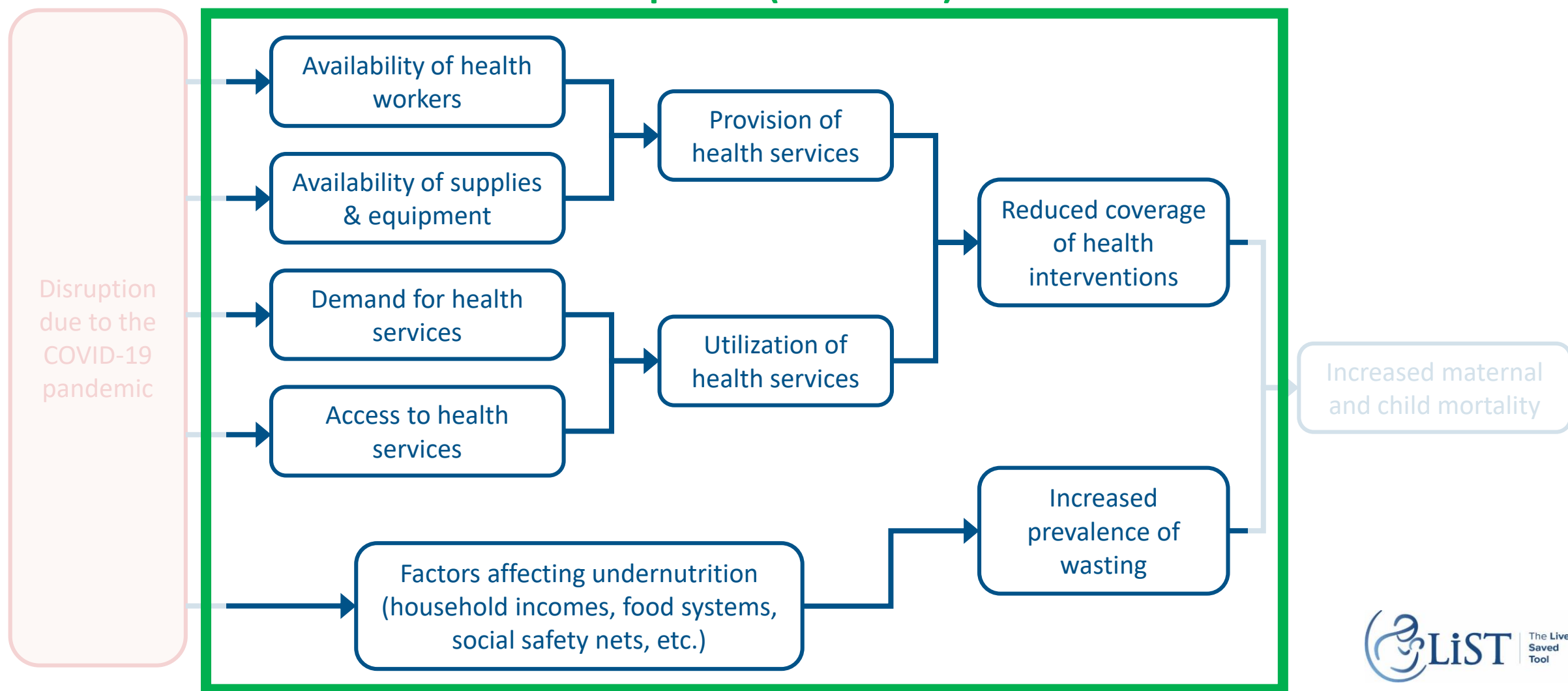


Framework for indirect effects of the pandemic

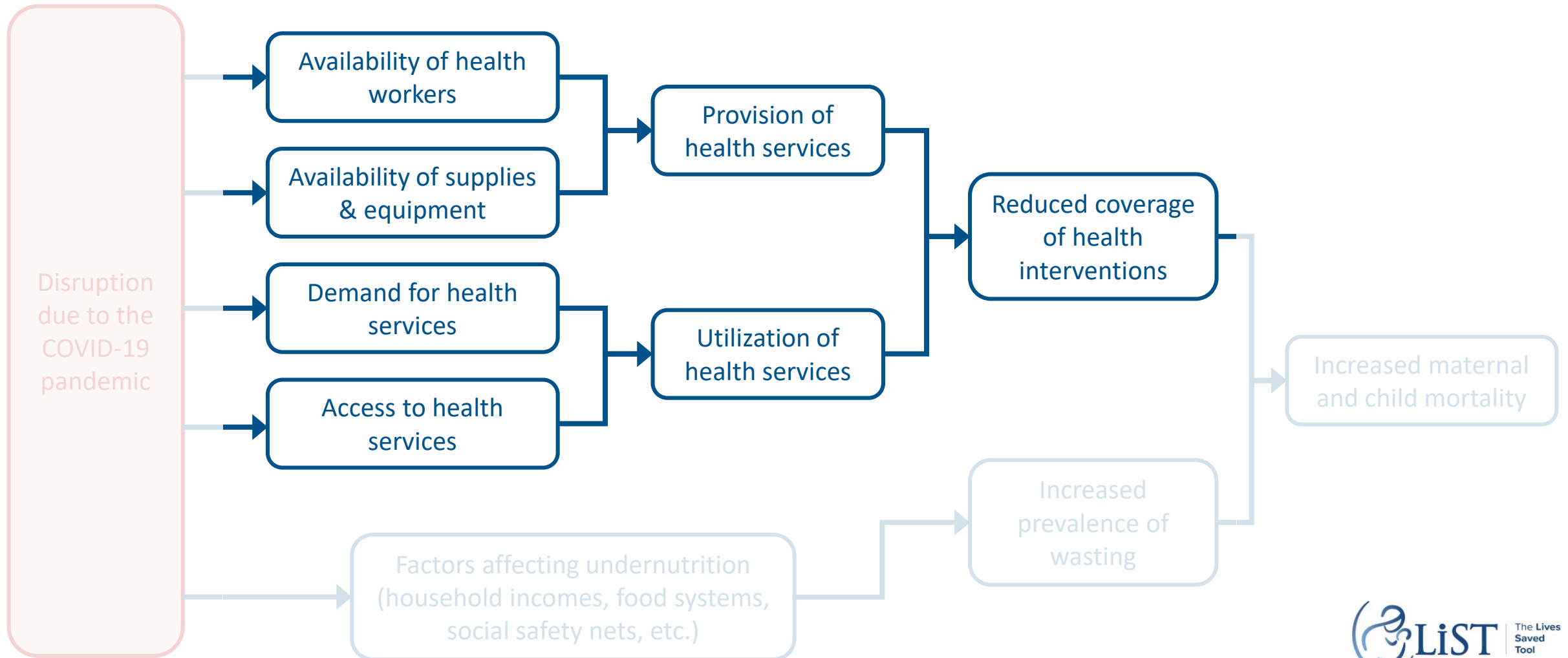


Framework for indirect effects of the pandemic

Assumptions (scenarios)



Framework for indirect effects of the pandemic



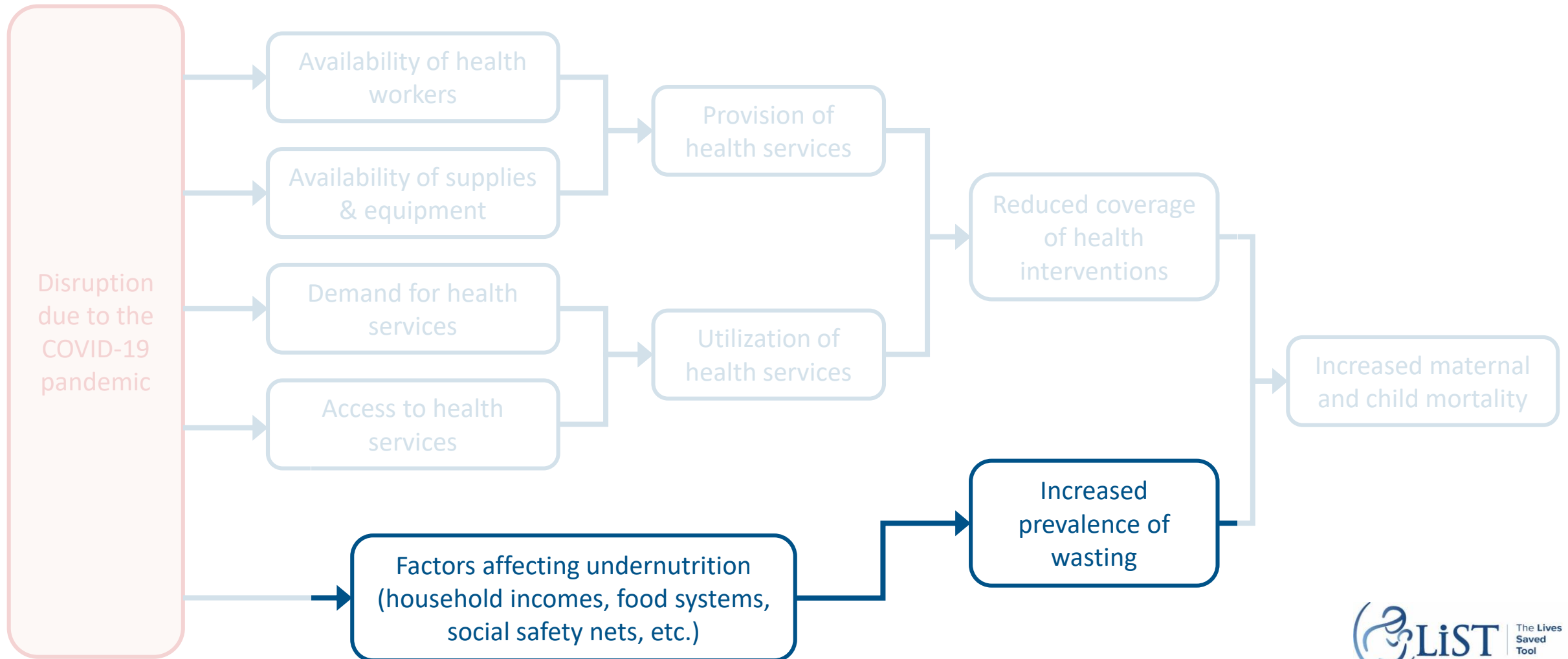
Intervention categories

- Family planning
- Antenatal, childbirth, postnatal care
- Vaccinations
- Early childhood preventative and curative
- Wasting

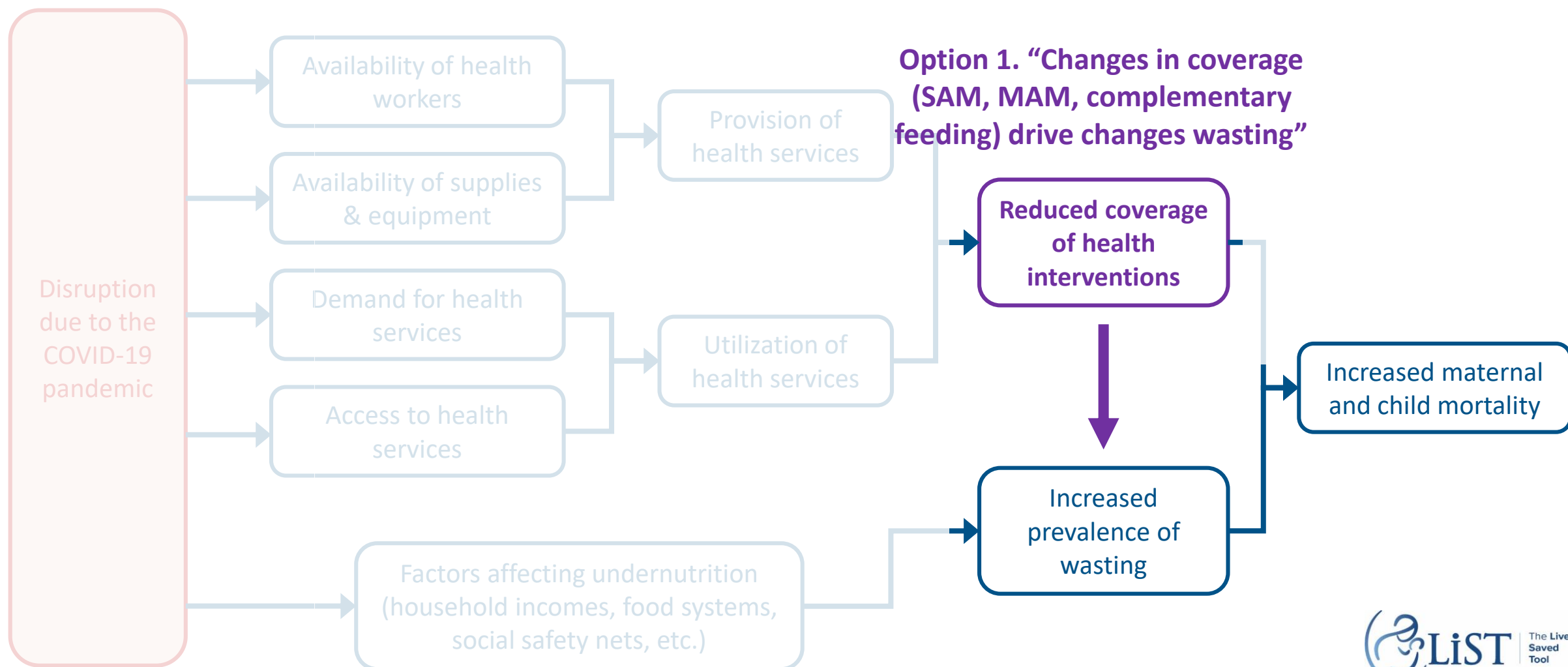
We did NOT include changes for:

- Breastfeeding, WASH, HIV
- Increased deaths due to population growth (due to decreased CPR)
- Stunting

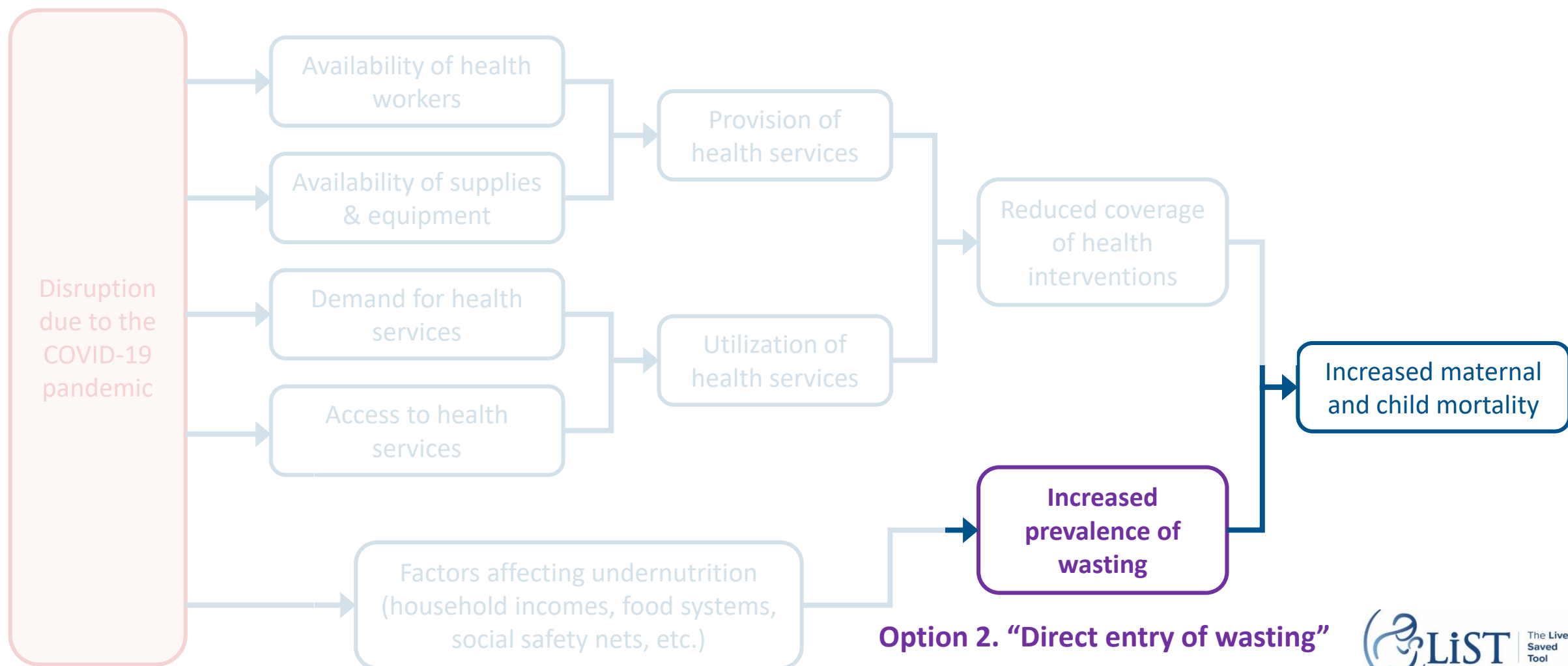
Framework for indirect effects of the pandemic



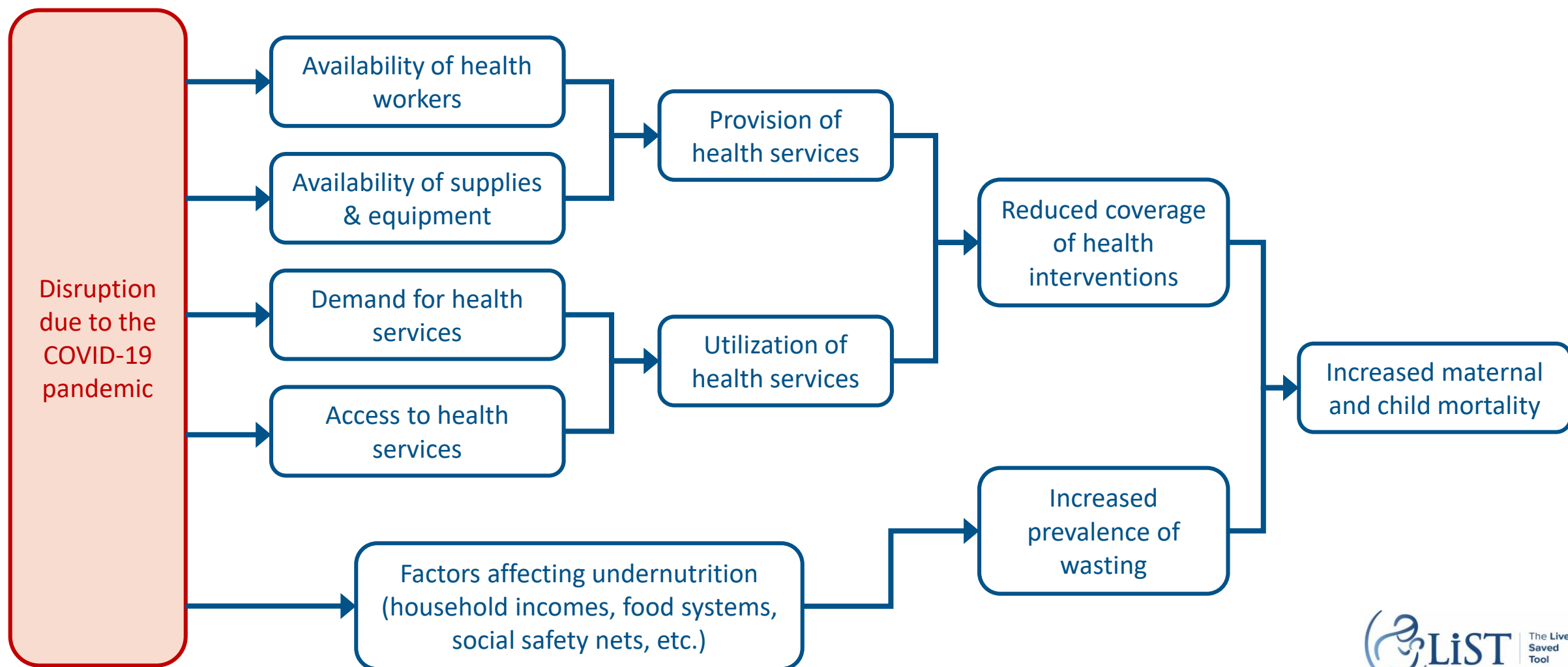
Framework for indirect effects of the pandemic



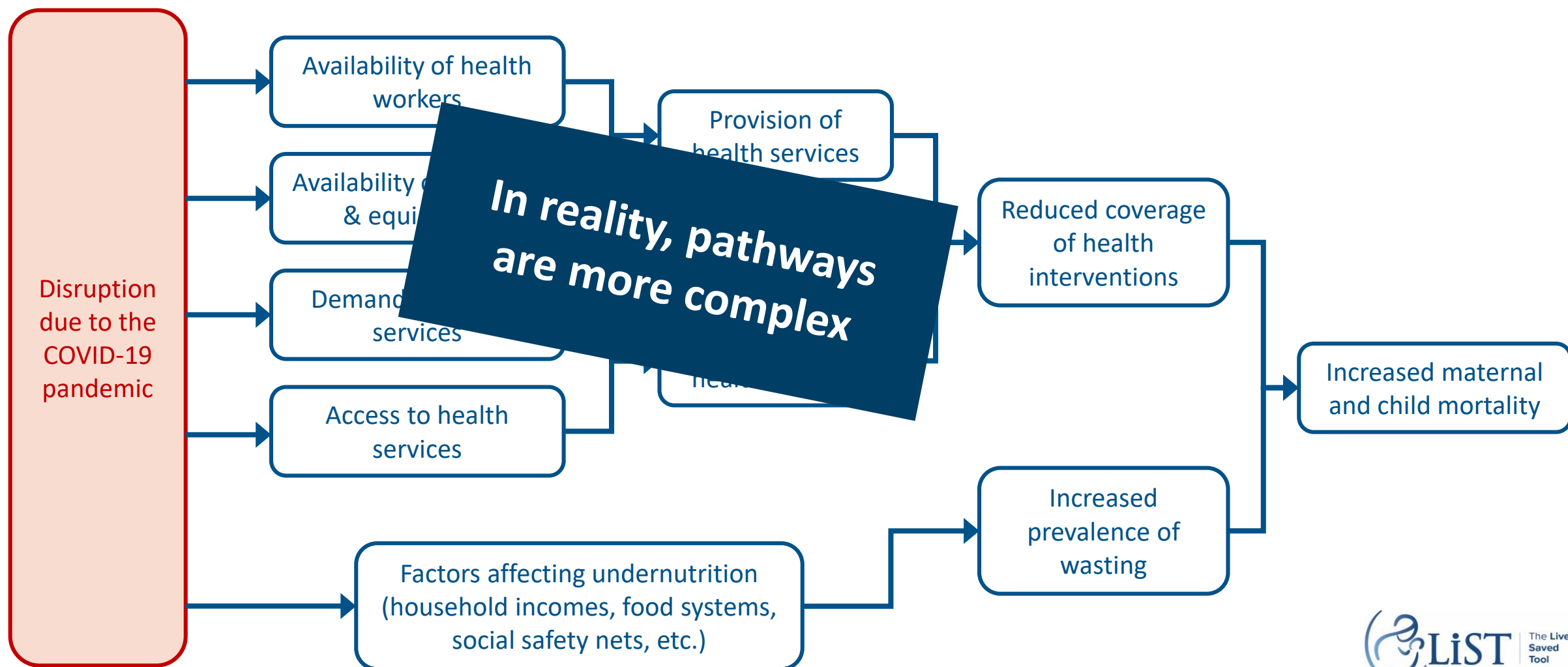
Framework for indirect effects of the pandemic



Framework for indirect effects of the pandemic



Framework for indirect effects of the pandemic



Scenario 1

	Workforce Reduction	Supplies Reduction	Demand Reduction	Access Reduction	Coverage Reduction
Family planning	None (0%)	Small (5%)	None (0%)	Small (5%)	9.8%
Antenatal Care	Small (5%)	Small (5%)	Small (5%)	Small (5%)	18.5%
Childbirth Care	Small (5%)	Small (5%)	None (0%)	Small (5%)	14.3%
Postnatal Care	Small (5%)	Small (5%)	Small (5%)	Small (5%)	18.5%
Early Child Vaccinations	Small (5%)	Small (5%)	Small (5%)	Small (5%)	18.5%
Early Child Preventative	None (0%)	Small (5%)	Small (5%)	Small (5%)	14.3%
Early Child Curative	Small (5%)	Small (5%)	None (0%)	Small (5%)	14.3%

Relative increase in the proportion of children who are wasted **10%**

Scenario 2

	Workforce Reduction	Supplies Reduction	Demand Reduction	Access Reduction	Coverage Reduction
Family planning	Small (5%)	Moderate (10%)	None (0%)	Small (5%)	18.8%
Antenatal Care	Moderate (10%)	Moderate (10%)	Small (5%)	Small (5%)	26.9%
Childbirth Care	Moderate (10%)	Moderate (10%)	None (0%)	Small (5%)	23.1%
Postnatal Care	Moderate (10%)	Moderate (10%)	Small (5%)	Small (5%)	26.9%
Early Child Vaccinations	Moderate (10%)	Moderate (10%)	Small (5%)	Small (5%)	26.9%
Early Child Preventative	Small (5%)	Moderate (10%)	Small (5%)	Small (5%)	22.8%
Early Child Curative	Moderate (10%)	Moderate (10%)	None (0%)	Small (5%)	23.1%

Relative increase in the proportion of children who are wasted **20%**

Scenario 3

	Workforce Reduction	Supplies Reduction	Demand Reduction	Access Reduction	Coverage Reduction
Family planning	Moderate (10%)	Moderate (10%)	None (0%)	Large (25%)	39.3%
Antenatal Care	Large (25%)	Moderate (10%)	Small (5%)	Large (25%)	51.9%
Childbirth Care	Large (25%)	Moderate (10%)	None (0%)	Large (25%)	49.4%
Postnatal Care	Large (25%)	Moderate (10%)	Small (5%)	Large (25%)	51.9%
Early Child Vaccinations	Large (25%)	Moderate (10%)	Small (5%)	Large (25%)	51.9%
Early Child Preventative	Moderate (10%)	Moderate (10%)	Small (5%)	Large (25%)	42.3%
Early Child Curative	Large (25%)	Moderate (10%)	None (0%)	Large (25%)	49.4%

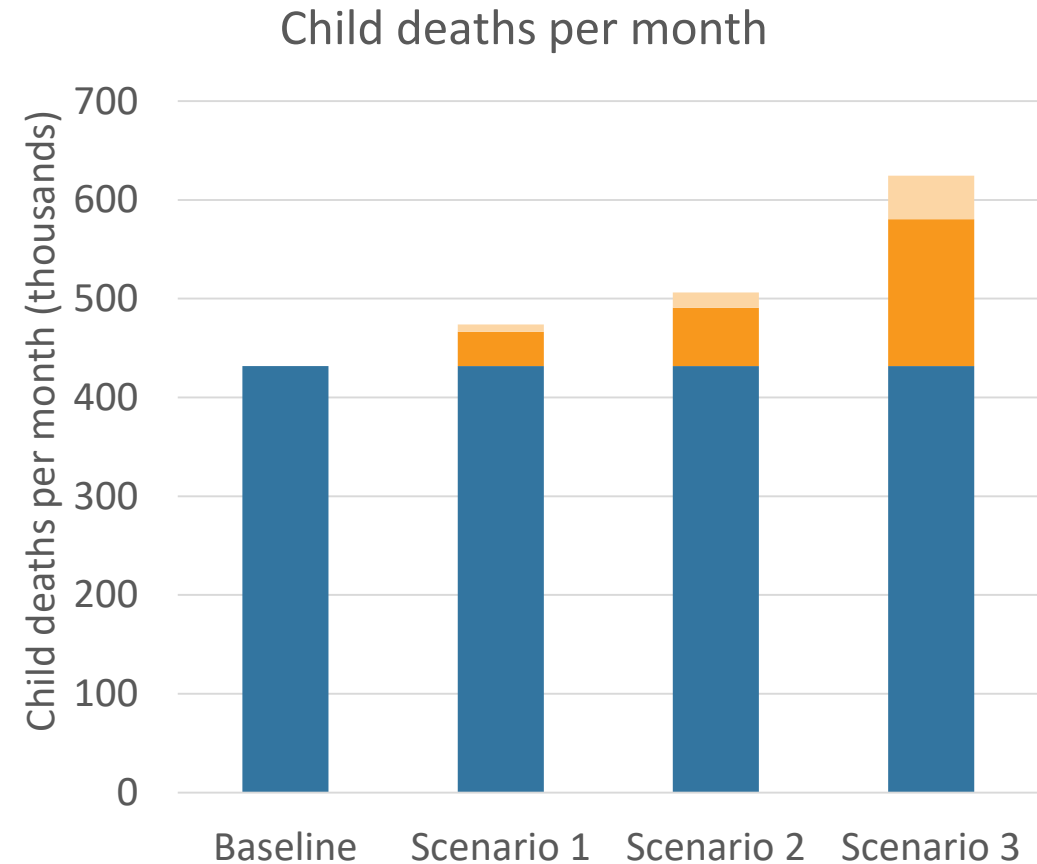
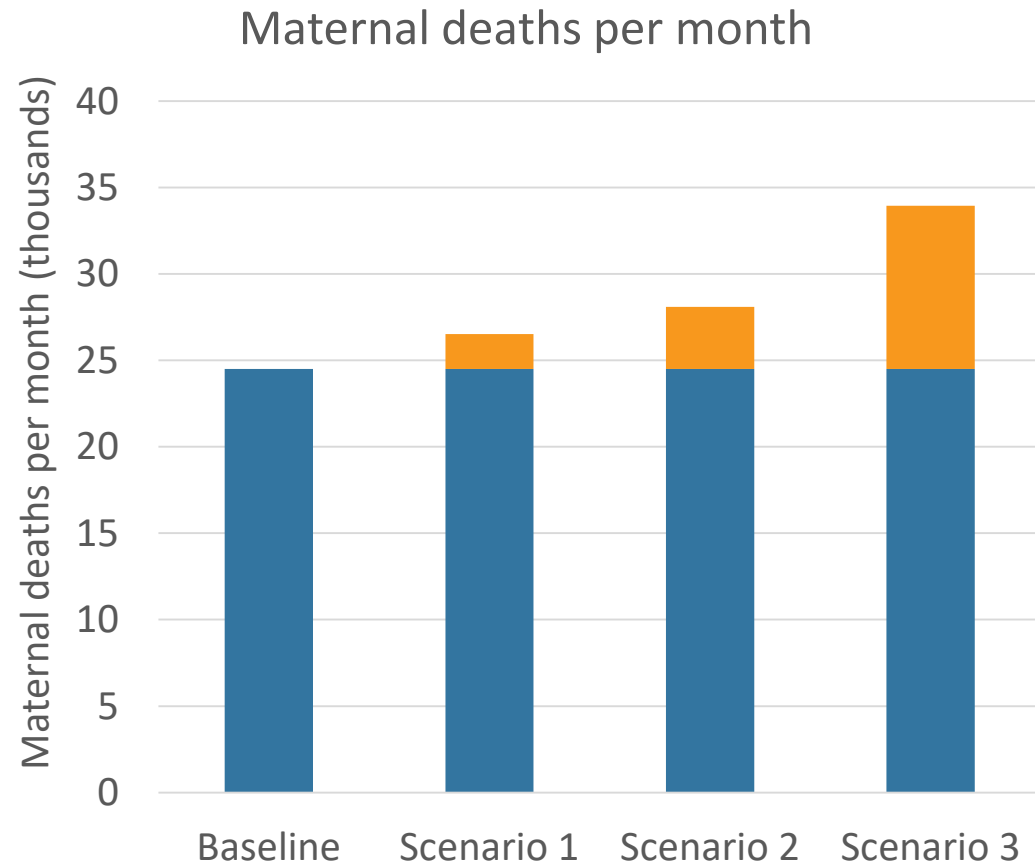
Relative increase in the proportion of children who are wasted **50%**

Setting up LiST

- Used multi-country features of LiST
 - Scenario Generator
 - Extract
- Calculated for one year, divided by 12 for “per month” numbers
- Attenuated the impact of vaccine coverage reductions

Results and interpretation

Maternal and child deaths per month, by scenario

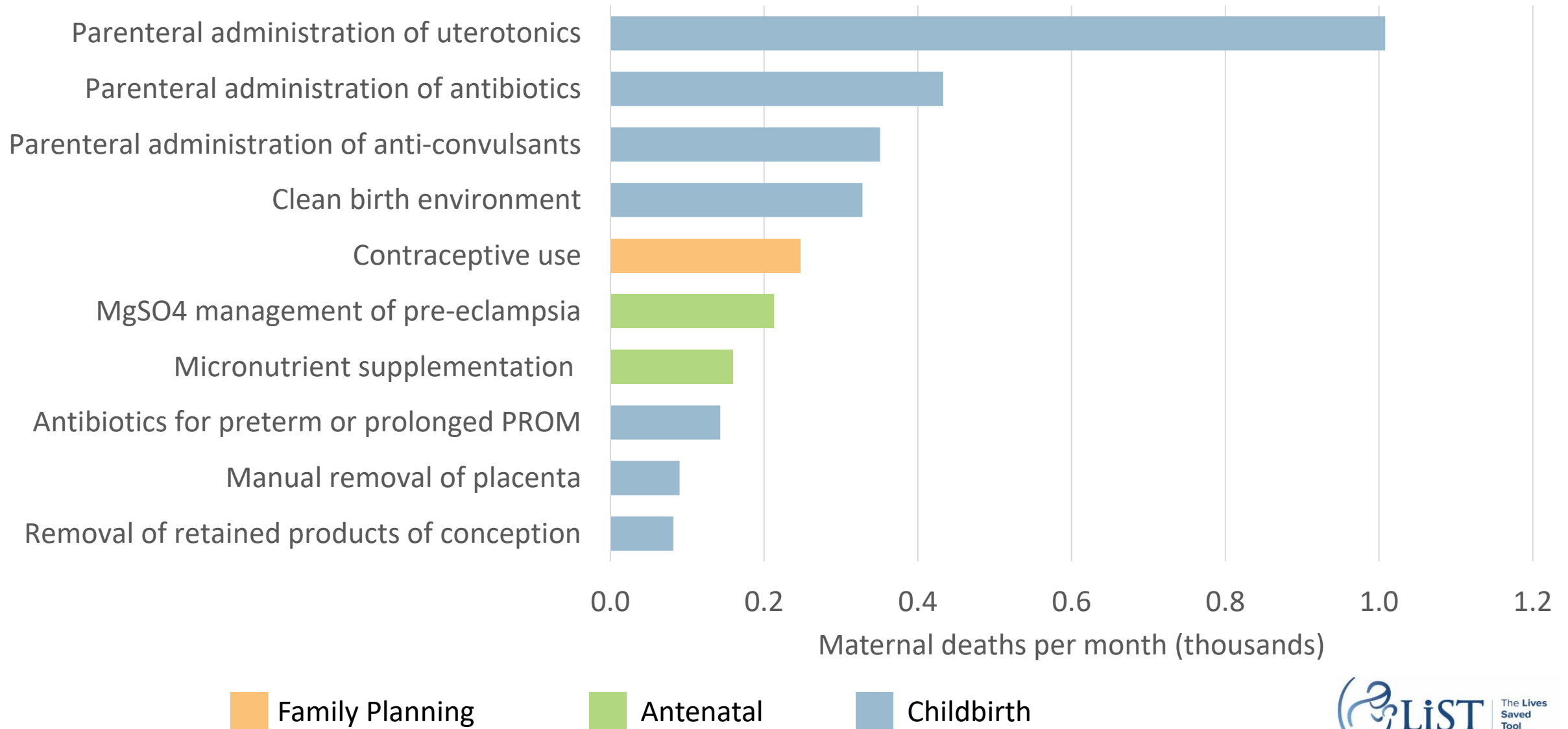


- Baseline
- Additional deaths due to reduction in intervention coverage
- Additional deaths due to increase in wasting

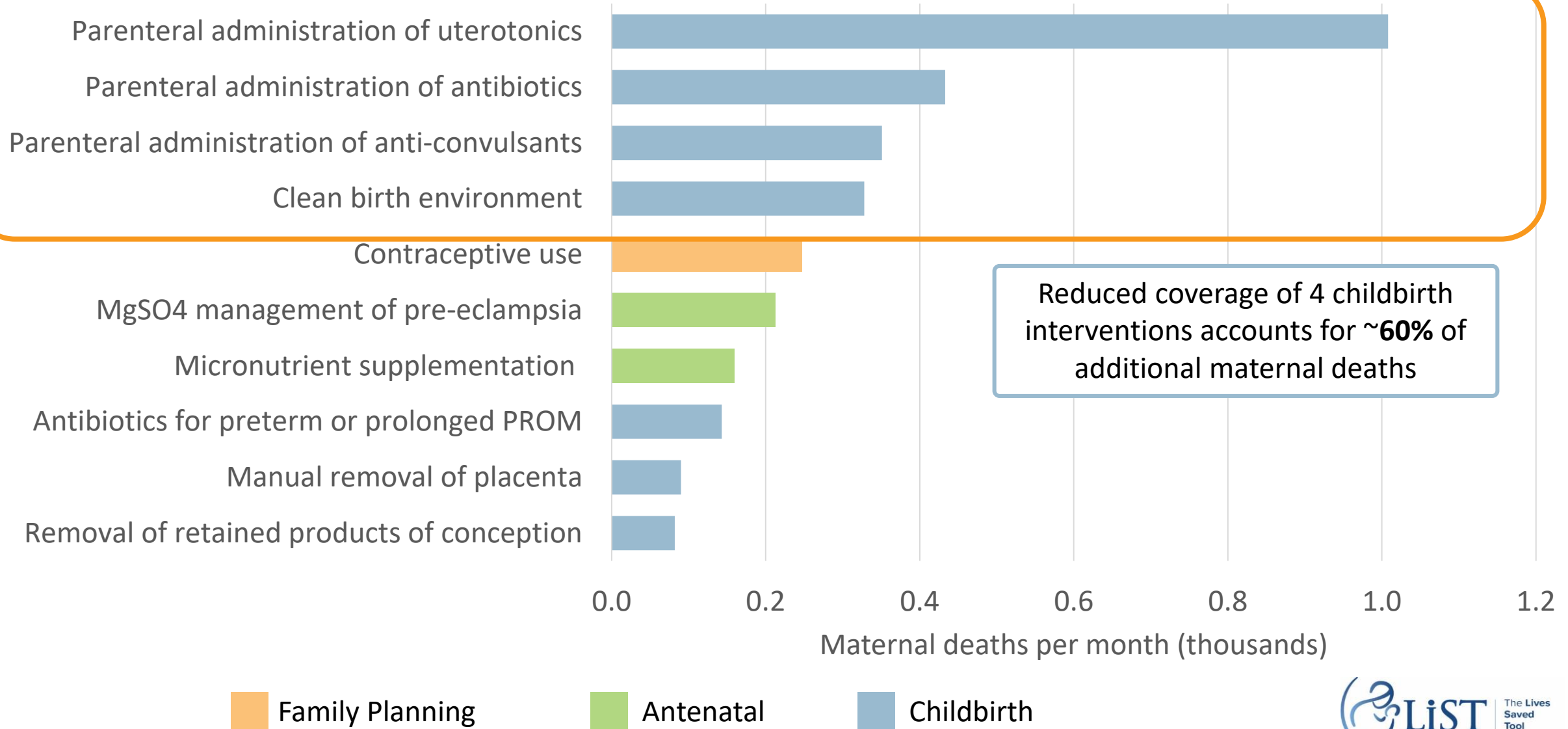
Additional deaths among 118 countries

	Per month			3 months additional deaths	6 months additional deaths	12 months additional deaths
	Baseline deaths	Additional deaths	Relative increase			
Maternal deaths						
Scenario 1	24,500	2,030	8.3%	6,100	12,200	24,400
Scenario 2	24,500	3,600	14.7%	10,800	21,600	43,100
Scenario 3	24,500	9,450	38.6%	28,300	56,700	113,400
Child deaths, excluding the impact of increased wasting						
Scenario 1	431,690	34,750	8.0%	104,300	208,500	417,000
Scenario 2	431,690	58,910	13.6%	176,700	353,500	706,900
Scenario 3	431,690	148,870	34.5%	446,600	893,200	1,786,400
Child deaths, including the impact of increased wasting						
Scenario 1	431,690	42,240	9.8%	126,700	253,500	506,900
Scenario 2	431,690	74,530	17.3%	223,600	447,200	894,400
Scenario 3	431,690	192,830	44.7%	578,500	1,157,000	2,313,900

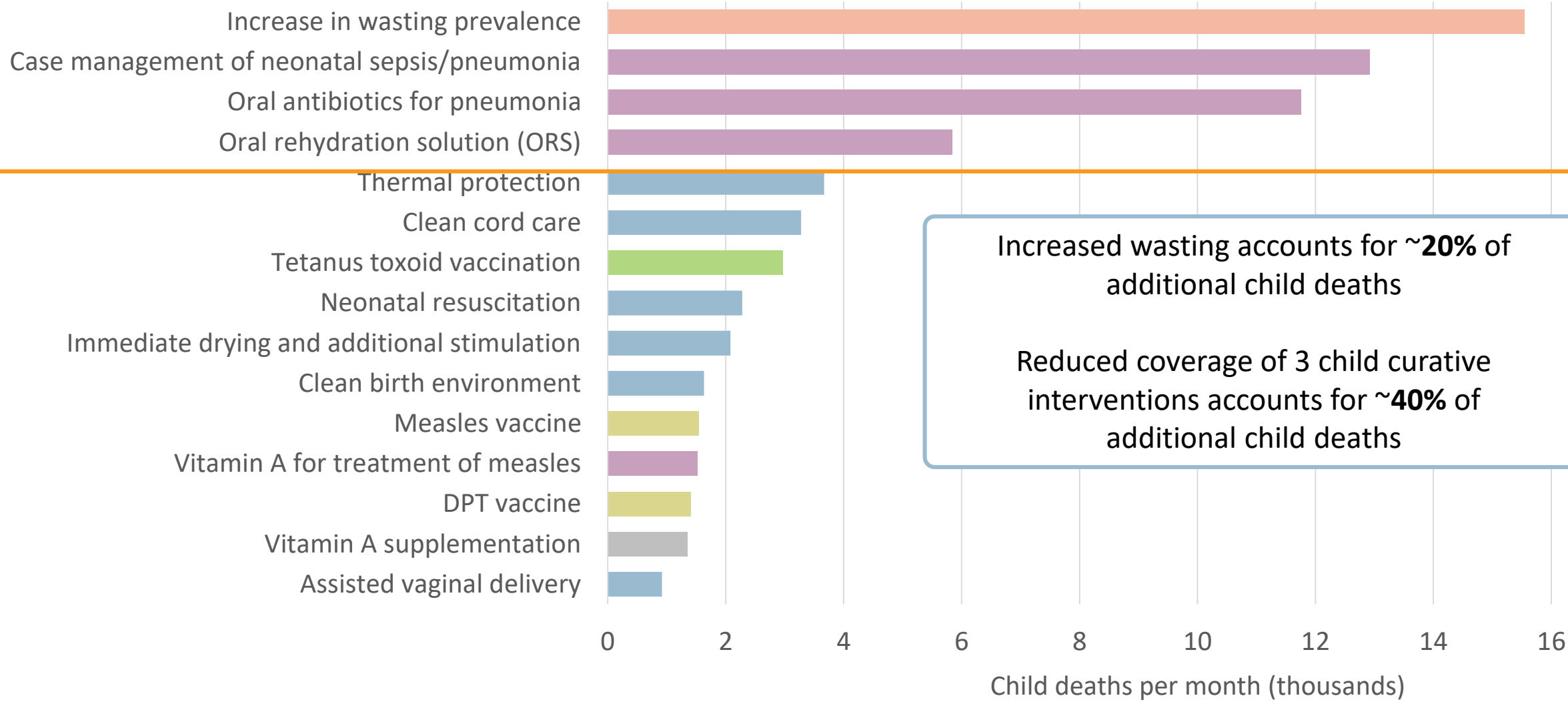
Additional maternal deaths per month by intervention, scenario 2



Additional maternal deaths per month by intervention, scenario 2



Additional child deaths per month by intervention, scenario 2



■ Antenatal
 ■ Childbirth
 ■ Preventative
 ■ Vaccines
 ■ Curative

Interpretation

- We aim to show what could happen under scenarios of differing severity and duration, to serve as reference point for decision-making
- If health and food systems are disrupted, significant number of additional maternal and child deaths
- Specific interventions may need to be prioritized:
 - Maintaining core childbirth interventions and treatment of common child illnesses would prevent large proportion of excess deaths
 - Cannot be mitigated through post-outbreak activities or averted through vertical health programs → these services should be available throughout the pandemic
- Increases in childhood wasting accounted for ~20% of additional child deaths
 - Multi-sectoral action needed (e.g. strengthen and expand social safety nets, support local food and agricultural system, RUTF availability)

Limitations

- Our scenarios are meant as hypothetical futures
 - Little empirical data on COVID-19 impact in LMICs
 - Assumptions largely based on experiences in high-income countries and previous outbreaks (i.e. Ebola)
- LiST constraints:
 - Defined set of health-sector interventions
 - Does not directly estimate the effects of income, agriculture, or food markets
 - Does not capture individual infectious disease dynamics (e.g. potential secondary outbreak)
- We did not detail long-term effects

Future analyses

Future analyses

- Refine scenarios in consultation with experts
 - Intervention and country-specific assumptions
 - Updated and expanded assumptions for nutrition, family planning, HIV
 - Potential sub-national variation in disruption
 - Longer-term impacts
- Estimate indirect impacts using “real world” empirical data
 - Health system effects (HMIS, facility surveys)
 - Care-seeking and coverage from population-based sources

Running your own LiST analysis

Resources

- Main website: LivesSavedTool.org
 - Download the software, manual, presentations, FAQs
- Youtube videos: youtube.com/user/LivesSavedTool/videos
 - Tutorials, examples, explanations
- Re-running our COVID-19 analysis
 - Data and projection files (link is in Appendix and below):
<https://drive.google.com/drive/folders/1ENwjV-Ybp2EoET05F91GSuLWuNRpqgcv>
 - Can use these as a base for your own analysis (or start from scratch with default data)

Funding acknowledgement

The Lives Saved Tool, on which all authors work, is funded by the Bill & Melinda Gates Foundation with additional support from Global Affairs Canada

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Questions