



The MMS Cost-Benefit Tool

User Interface and Interpretation Guide

Updated March 2020

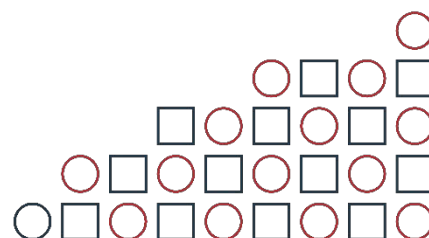


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Introduction

Recent evidence has encouraged low- and middle-income countries (LMIC) to consider transitioning from long-standing iron and folic acid supplementation (IFAS) to multiple micronutrient supplementation (MMS) during pregnancy. However, global guidance to facilitate this transition is limited.

To aid countries' decision-making, the *MMS Cost-Benefit Tool* was developed. It uses a rigorous methodology to calculate the incremental benefits and costs of transitioning from IFAS to MMS in various countries (Kashi et al., 2019). In this context, the term “transition” refers to substituting IFAS with MMS for pregnancy care in a government’s antenatal service package.

With the *MMS Cost-Benefit Tool*, users can construct and test different scenarios by updating the assumptions within the tool. Up to eight health outcomes are included in the analysis, and these are aggregated using disability-adjusted life years (DALY). A DALY represents one lost year of perfect health. It is calculated by aggregating the effect of a health issue on mortality and morbidity. Interventions seek to avert DALYs.

The tool has been designed to balance simplicity of use with meaningful results. This user guide provides an overview of the functionality of each section of the tool. It also provides guidance on interpretation of the results.

Report Interface

MMS Cost-Benefit Tool

Report
Custom Analysis

Key Parameters and Results for Bangladesh

Assumptions	Health Outcome Analysis	Cost-Effectiveness Analysis																								
<p>Population: 2,965,826</p> <p>Timespan: 10</p> <p>Coverage: 30% 889,748</p> <p>Costs per beneficiary</p> <p>IFAS: \$2.27</p> <p>MMS: \$3.27</p> <p>Transition</p> <p>Cost: \$0</p> <p>Source of health effects</p> <p><input type="radio"/> Keats et al. 2019 (Cochrane)</p> <p><input checked="" type="radio"/> Smith et al. 2017 (Lancet)</p> <p>Significant outcomes only</p> <p style="text-align: center;">Reset all inputs</p>	<p style="text-align: center;">Additional DALYs averted by MMS Compared to IFAS (Significant outcomes only)</p> <table style="width: 100%;"> <tr><td>Stillbirth</td><td style="text-align: right;">465,147</td></tr> <tr><td>Neonatal mortality (F)</td><td style="text-align: right;">436,075</td></tr> <tr><td>Neonatal mortality (M)</td><td style="text-align: right;">0</td></tr> <tr><td>Infant mortality</td><td style="text-align: right;">0</td></tr> <tr><td>Pre-term</td><td style="text-align: right;">209,865</td></tr> <tr><td>Low birth weight</td><td style="text-align: right;">4,582</td></tr> <tr><td>Small for gestational age</td><td style="text-align: right;">152,398</td></tr> <tr><td>Maternal mortality</td><td style="text-align: right;">0</td></tr> <tr><td>Maternal anaemia</td><td style="text-align: right;">0</td></tr> </table> <p style="text-align: center;"> ■ significant ■ not significant ■ not reported </p> <table style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;">1,268,067</td> <td style="width: 33%;">12,640</td> <td style="width: 33%;">100.0%</td> </tr> <tr> <td>Additional DALYs averted</td> <td>Additional child deaths averted</td> <td>Confidence in positive health outcomes</td> </tr> </table>	Stillbirth	465,147	Neonatal mortality (F)	436,075	Neonatal mortality (M)	0	Infant mortality	0	Pre-term	209,865	Low birth weight	4,582	Small for gestational age	152,398	Maternal mortality	0	Maternal anaemia	0	1,268,067	12,640	100.0%	Additional DALYs averted	Additional child deaths averted	Confidence in positive health outcomes	<p style="text-align: center;">Cost-Effectiveness Analysis</p> <p style="text-align: center; font-size: 1.2em;">\$3,696,039,235</p> <p style="text-align: center;">Value of DALYs averted</p> <p style="text-align: center; font-size: 1.2em;">\$7,589,729</p> <p style="text-align: center;">Additional investment over 10 years</p> <p style="text-align: center; font-size: 1.2em;">487</p> <p style="text-align: center;">Benefit-Cost Ratio</p> <p style="text-align: center; font-size: 1.2em;">\$5.99</p> <p style="text-align: center;">Additional cost per DALY averted</p> <p style="text-align: center; font-size: 1.2em;">Very Cost Effective</p> <p style="text-align: center;">according to WHO guidelines</p>
Stillbirth	465,147																									
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Last updated: 2019-10-05

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Please note: screenshots are for information only. Numbers may not be accurate.

MMS Cost-Benefit Tool

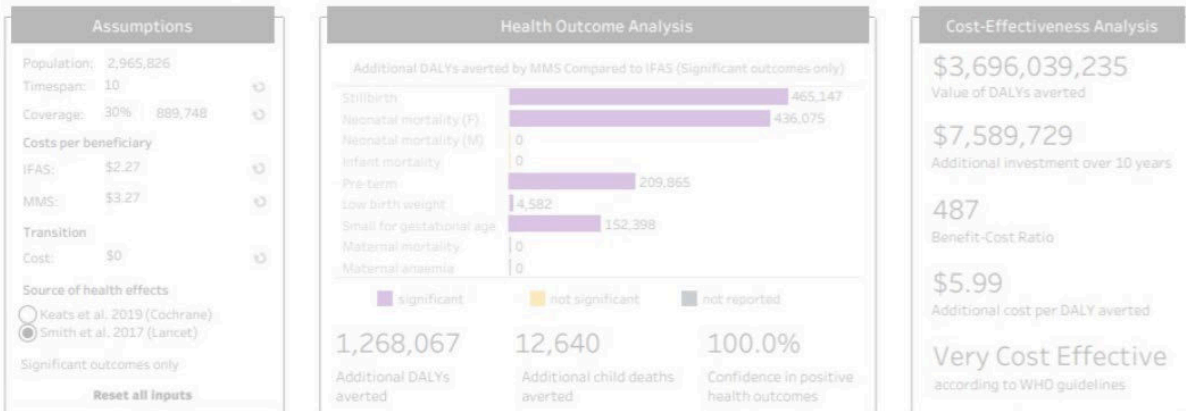
Report

Custom Analysis

The first step to running an analysis is to choose between the *Report* interface and the *Custom* interface.

- Bangladesh
- Burkina Faso
- Ethiopia
- India
- Indonesia
- Kenya
- Madagascar
- Nigeria
- Pakistan
- Philippines
- Senegal
- Tanzania

Key Parameters and Results for Bangladesh



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MMS Cost-Benefit Tool

Report Custom Analysis

- Bangladesh
- Burkina Faso
- Ethiopia
- India
- Indonesia
- Kenya
- Madagascar
- Nigeria
- Pakistan
- Philippines
- Senegal
- Tanzania

Key Parameters and Results for Bangladesh

Assumptions

Population: 2,965,826
 Timespan: 10
 Coverage: 30% 889
 Costs per beneficiary
 IFAS: \$2.27
 MMS: \$3.27
 Transition
 Cost: \$0
 Source of health effects
 Keats et al. 2019 (Cochrane)
 Smith et al. 2017 (Lancet)
 Significant outcomes only
[Reset all inputs](#)

■ significant
 ■ not significant
 ■ not reported

1,268,067	12,640	100.0%
Additional DALYs averted	Additional child deaths averted	Confidence in positive health outcomes

Effectiveness Analysis


1,039,235
 DALYs averted
729
 Investment over 10 years
 Ratio:
\$5.99
 Additional cost per DALY averted
Very Cost Effective
 according to WHO guidelines

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MMS Cost-Benefit Tool

Report
Custom Analysis

Clicking the Home button in the top left corner of the map will restore the map to its default view.



Hovering the cursor over a point on the map will reveal a tooltip with country-specific information.

Key Parameters and Results for Bangladesh


Assumptions	Effectiveness Analysis
Population: 2,965,826	Additional DALYs averted: 6,039,235
Timespan: 10	Additional investment over 10 years: \$7,589,729
Coverage: 30% 889,748	Benefit-Cost Ratio: 487
Costs per beneficiary:	Additional cost per DALY averted: \$5.99
IFAS: \$2.27	<p>Very Cost Effective according to WHO guidelines</p>
MMS: \$3.27	
Transition Cost: \$0	
Source of health effects: <input type="radio"/> Keats et al. 2019 (Cochrane) <input checked="" type="radio"/> Smith et al. 2017 (Lancet)	
Significant outcomes only	
Reset all inputs	


1,268,067 Additional DALYs averted

12,640 Additional child deaths averted

100.0% Confidence in positive health outcomes

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Double-clicking the map will zoom the view of the map. Clicking and holding will pan the view of the map.

Key Parameters and Results

MMS Cost-Benefit Tool

Report

Custom Analysis

The bottom half of the report interface displays key assumptions and results for the selected country.

Key Parameters and Results for Bangladesh

Assumptions	Health Outcome Analysis	Cost-Effectiveness Analysis																								
Population: 2,965,826 Timespan: 10 Coverage: 30% 889,748 Costs per beneficiary IFAS: \$2.27 MMS: \$3.27 Transition Cost: \$0 Source of health effects <input type="radio"/> Keats et al. 2019 (Cochrane) <input checked="" type="radio"/> Smith et al. 2017 (Lancet) Significant outcomes only Reset all inputs	Additional DALYs averted by MMS Compared to IFAS (Significant outcomes only) <table border="1"> <tr><td>Stillbirth</td><td>465,147</td></tr> <tr><td>Neonatal mortality (F)</td><td>436,075</td></tr> <tr><td>Neonatal mortality (M)</td><td>0</td></tr> <tr><td>Infant mortality</td><td>0</td></tr> <tr><td>Pre-term</td><td>209,865</td></tr> <tr><td>Low birth weight</td><td>4,582</td></tr> <tr><td>Small for gestational age</td><td>152,398</td></tr> <tr><td>Maternal mortality</td><td>0</td></tr> <tr><td>Maternal anaemia</td><td>0</td></tr> </table> <p> <input checked="" type="checkbox"/> significant <input type="checkbox"/> not significant <input type="checkbox"/> not reported </p> <table border="1"> <tr> <td>1,268,067</td> <td>12,640</td> <td>100.0%</td> </tr> <tr> <td>Additional DALYs averted</td> <td>Additional child deaths averted</td> <td>Confidence in positive health outcomes</td> </tr> </table>	Stillbirth	465,147	Neonatal mortality (F)	436,075	Neonatal mortality (M)	0	Infant mortality	0	Pre-term	209,865	Low birth weight	4,582	Small for gestational age	152,398	Maternal mortality	0	Maternal anaemia	0	1,268,067	12,640	100.0%	Additional DALYs averted	Additional child deaths averted	Confidence in positive health outcomes	Cost-Effectiveness Analysis \$3,696,039,235 Value of DALYs averted \$7,589,729 Additional investment over 10 years 487 Benefit-Cost Ratio \$5.99 Additional cost per DALY averted Very Cost Effective according to WHO guidelines
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Additional DALYs averted	Additional child deaths averted	Confidence in positive health outcomes																								

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Assumptions

MMS Cost-Benefit Tool

Report Custom Analysis

Bangladesh
 Burkina Faso
 Ethiopia
 India
 Indonesia
 Kenya

The left hand pane groups together assumptions that the user can modify. Hovering over any of the parameter names will reveal a tooltip that provides more information about the parameter.

Key Parameters and Results

Assumptions

Population: 2,965,826

Timespan: 10

Coverage: 30% 889,748

Costs per beneficiary

IFAS: \$2.27

MMS: \$3.27

Transition

Cost: \$0

Source of health effects

Keats et al. 2019 (Cochrane)

Smith et al. 2017 (Lancet)

Significant outcomes only

Reset all inputs

The values in input fields can be changed by clicking on the input field and typing in the new value.

An input can be reset to its default value by clicking on the circular arrow button to the right side of the input field.

All input values can be reset at once by clicking the *Reset all inputs* button.

Additional DALYs averted by MMS Compared to IFAS (Significant outcomes only) **\$3,696,039,235**
Value of DALYs averted

Stillbirth: 465,147
Number of neonatal deaths (NND): 436,075

Small for gestational age: 152,398

Maternal mortality: 0

Maternal anaemia: 0

Benefit-Cost Ratio: \$5.99

Additional DALYs averted Additional child deaths averted Confidence in positive health outcomes

Very Cost Effective
according to WHO guidelines

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NUTRITION
Lancet

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MMS Cost-Benefit Tool

- Bangladesh
- Burkina Faso
- Ethiopia
- India
- Indonesia
- Kenya
- Madagascar
- Nigeria
- Pakistan
- Philippines
- Senegal
- Tanzania

The population of pregnant women in the intervention area is calculated based on the national population and crude birth rate. Sources for these values can be found in the *Data Sources* file which is available for download from Nutrition International's web page where the tool is embedded.

Length of the supplementation program over which costs and benefits are counted. Maximum allowable timespan for analysis is 20 years. Additional benefits provided by MMS begin in Year 1 of the MMS supplementation program. The costs and benefits are calculated for the over the lifespan of each mother and child in of each cohort year.

Key Parameters and Results

Assumptions

Population: 2,967,826
 Timespan: 10
 Coverage: 30% 889,748
Costs per beneficiary
 IFAS: \$2.27
 MMS: \$3.27
Transition
 Cost: \$0
Source of health effects
 Keats et al. 2019 (Cochrane)
 Smith et al. 2017 (Lancet)
 Significant outcomes only
 Reset all inputs

Proportion (%) and number of pregnant women in the intervention area who will receive 180 supplements.

Default supplement unit costs for IFA were reported from the current UNICEF supply catalogue. User can modify to different value. Transition cost is the cost for non-commodities expenses related to transition from a IFA to MMS program, which could include development of training materials and new policies/regulations, training of health workers, or behaviour change communications, etc related to the startup of the new program. The calculations assume that transition costs are all incurred in Year 0 (i.e. the year during which the transition from IFAS to MMS begins). The transition cost should be input as the total present value of the transition cost. If transition costs are anticipated in more than one year, input the total anticipated transition cost across all years.

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MMS Cost-Benefit Tool

Report
Custom Analysis

- Bangladesh
- Burkina Faso
- Ethiopia
- India
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- Madagascar
- Nigeria
- Pakistan
- Philippines
- Senegal
- Tanzania

Key Parameters and Results

Assumptions	
Population:	2,965,826
Timespan:	10
Coverage:	30% 889,748
Costs per beneficiary	
IFAS:	\$2.27
MMS:	\$3.27
Transition	
Cost:	\$0
Source of health effects	
<input type="radio"/>	Keats et al. 2019 (Cochrane)
<input checked="" type="radio"/>	Smith et al. 2017 (Lancet)
<input type="checkbox"/> Significant outcomes only	
Reset all inputs	

Two meta-analyses comparing MMS and IFAS in LMICs were used as the sources of health effect sizes. A Cochrane Review was published by Keats et. al. in 2019 (1) and a meta-analysis of individual patient data (IPD) was published in the Lancet by Smith et. al., 2017 (2). While the inclusion criteria for these two meta-analyses were comparable, Keats et. al. included studies that compared MMS with IFAS or iron alone. Smith et. al. only included studies comparing MMS to IFAS, and looked at additional health effects including very preterm birth and gender dis-aggregated values for neonatal mortality. Smith et al. found that when compared to IFA, MMS reduces the risk of stillbirth, very LBW, LBW, early preterm birth and SGA; Keats et al. reported only significant effects for the reduced risk of LBW and SGA.

The tool can compare IFAS and MMS through all health outcomes, or only those that are reported in the meta-analyses to have an impact that is statistically significant from 0. By default, the tool includes only significant outcomes in the analysis.

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In the **assumptions pane**, a number of assumptions are required in order to undertake the analysis. Two recent meta-analyses that compared MMS and IFAS in LMICs were used as the **sources of health effects**. The user can select which meta-analysis to use for the analysis. One source was published in Cochrane (Keats et al., 2019) and the other in The Lancet (Smith et al., 2017). While the inclusion criteria of these meta-analyses were comparable, the Cochrane (Keats et al., 2019) meta-analysis included studies that compared MMS with IFAS or iron alone. The Lancet (Smith et al., 2017) meta-analysis only included studies comparing MMS to IFAS and looked at additional health effects including very preterm birth and sex disaggregated values for neonatal mortality. Both reviews found improved health outcomes among pregnant women receiving MMS and showed no risk of increased harm to the mother or baby. Smith et al. found that compared to IFA, MMS had a significant reduction on the risk of stillbirth (using the fixed effects analysis), Low Birth Weight (LBW), Very Low Birth Weight (VLBW), early preterm birth, preterm birth and Small for Gestational Age (SGA) and mortality outcomes such as

female neonatal mortality and female infant mortality while Keats et al. only found evidence of significant effects on LBW and SGA (Bourassa et al., 2019).

The **population** is the number of pregnant women in the intervention area where the supplementation program will take place. The default value assumes the intervention area is the whole country. It is calculated based on the national population and crude birth rate. Sources for these values can be found in the [Data Sources](#) file. To generate an analysis for a sub-national population the user will need to input the population of pregnant women for the area of interest (sub-national population X crude birth rate). The **timespan** is the length of the supplementation program over which the costs and benefits are counted. It must be a value between 1 and 20 years. The costs and benefits are calculated for the lifespan of both the mother and the child for each cohort year. **Coverage** is expressed as a percentage and a number. It represents the proportion or number of pregnant women in the intervention area who will receive 180 supplements. This is aligned with the trials included in the meta-analyses.

The **costs per beneficiary** refers to the cost of 180 supplements. The default values were taken from UNICEF's supply catalogue which is in USD. The **transition cost** is the cost for non-commodities expenses related to transition from an IFA to MMS program, which could include development of training materials and new policies/regulations, training of health workers, or behaviour change communications, etc. related to the startup of the new program. The calculations assume that transition costs are all incurred in Year 0 (i.e. the year during which the transition from IFAS to MMS begins). The transition cost should be input as the total present value of the transition cost. If transition costs are anticipated in more than one year, input the total anticipated transition cost across all years

Health Outcome Analysis

MMS Cost-Benefit Tool

Report
Custom Analysis

- Bangladesh
- Burkina Faso
- Ethiopia
- India
- Indonesia
- Kenya
- Madagascar
- Nigeria
- Pakistan
- Philippines
- Senegal
- Tanzania

The middle pane reports several measures of the change in health outcomes from resulting from the transition from IFAS to MMS.

Results for Bangladesh

Health Outcome Analysis

Additional DALYs averted by MMS Compared to IFAS (Significant outcomes only)

Stillbirth	465,147
Neonatal mortality (F)	436,075
Neonatal mortality (M)	0
Infant mortality	0
Pre-term	209,865
Low birth weight	4,582
Small for gestational age	152,398
Maternal mortality	0
Maternal anaemia	0

■ significant
■ not significant
■ not reported

1,268,067

Additional DALYs averted

12,640

Additional child deaths averted

100.0%

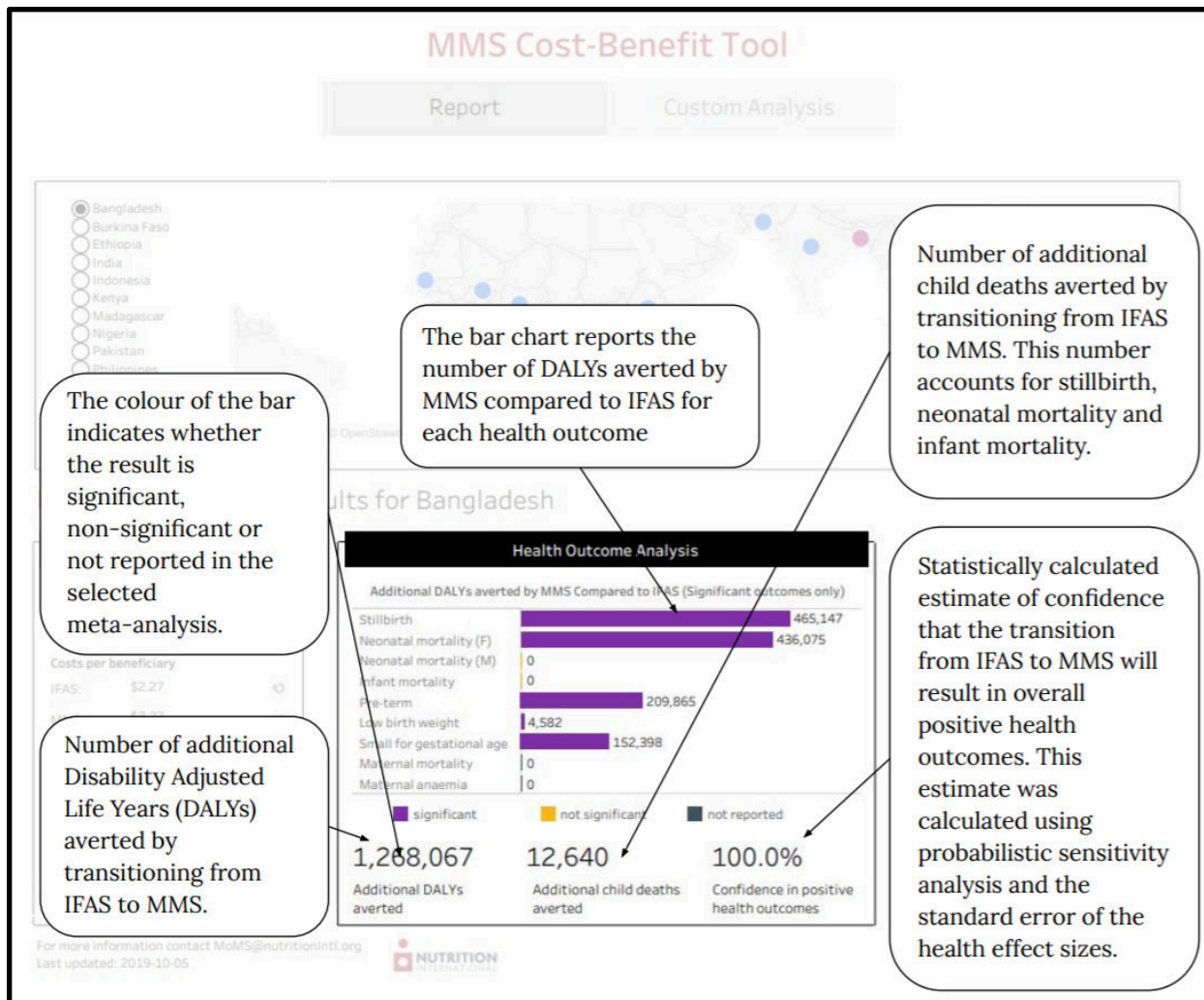
Confidence in positive health outcomes

The results are calculated based on only those health outcomes that have been selected for inclusion in the analysis.

Very Cost Effective
according to WHO guidelines

As with other elements in the tool, hovering over a bar in the chart reveals a tooltip with more information.

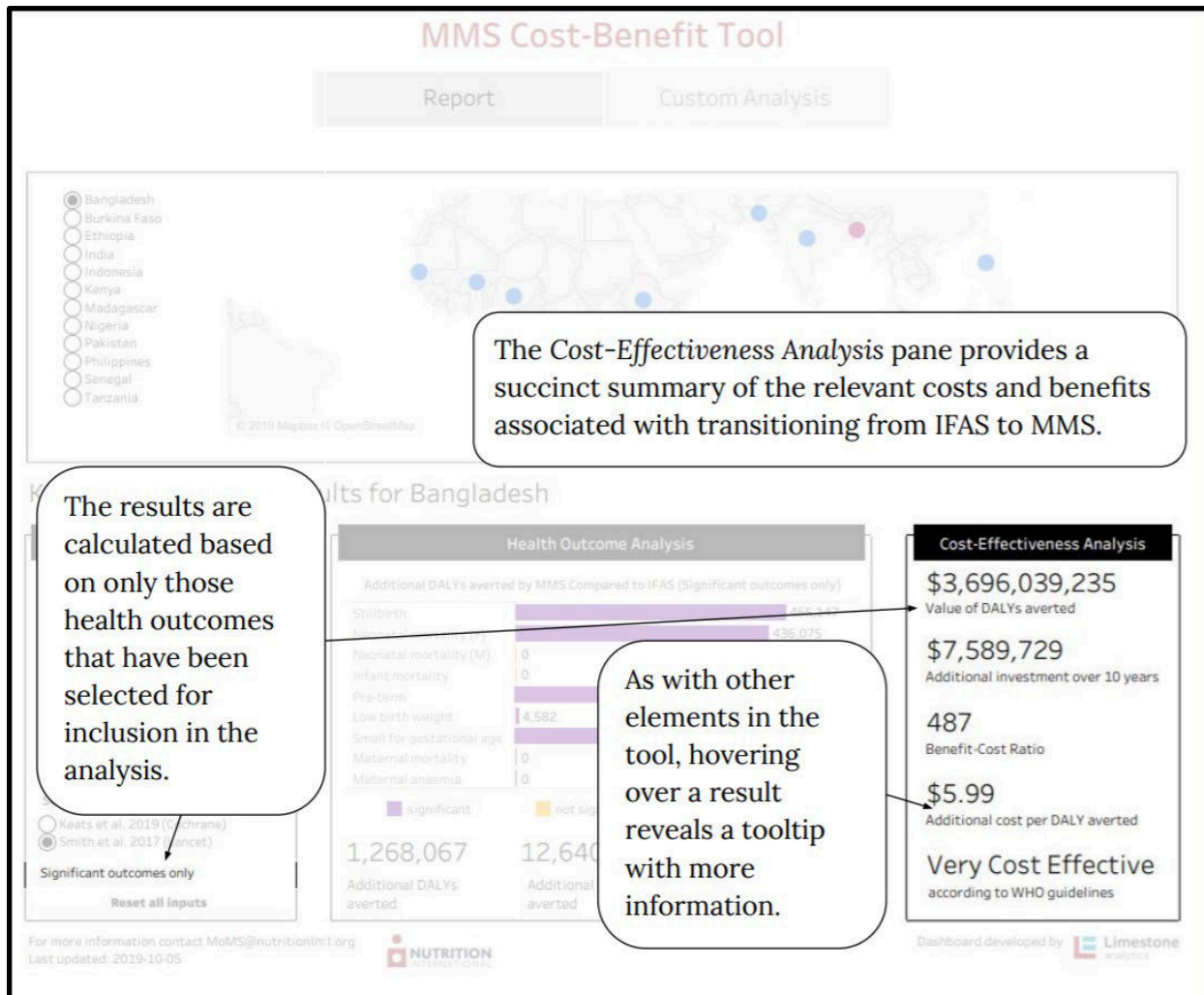
For more information contact MoMS@nutritionintf.org
Last updated: 2019-10-05



In the **Health Outcome Analysis pane**, the bar chart reports the number of **DALYs averted** by transitioning from IFAS to MMS for each health outcome. The calculation for the number of **DALYs averted** factors in a discount rate of 3% in line with the Bill and Melinda Gates Foundation (BMGF) Methods for Economic Evaluation Project Reference Case in Global Health (BMGF & NICE International, 2014). The tool can compare IFAS and MMS through all health outcomes, or only those that are reported in the selected meta-analyses to have an impact that is statistically significant from 0. By default, the tool includes only significant outcomes in the analysis. The colour of the bar indicates whether the result is significant, non-significant or not reported in the selected meta-analysis. Below the bar chart are three summary measures of the change in health outcomes resulting from the switch from IFAS to MMS. To the left, the **total number of DALYs averted** across all included health outcomes is reported. In the center, the number of **child deaths averted** is reported. This number is calculated by summing the DALYs averted from stillbirth, neonatal and infant mortality and dividing by life expectancy at

birth in the selected country. To the right, the *confidence in positive health outcomes*, which is the statistically calculated estimate of confidence that the transition from IFAS to MMS will result in overall positive health outcomes. This estimate was calculated using probabilistic sensitivity analysis and the standard error of the health effect sizes, and is reported as a percentage.

Cost-Effectiveness Analysis



A common method of quantifying the economic value of improved health outcomes is using a measure called the Value of Statistical Life (VSL). The VSL can be thought of as the amount of money that a person would be willing to pay to avoid injury or illness. There are a number of different ways to calculate the VSL for a country. Viscusi and Masterman report the most recent estimates of the VSL in all low- and middle-income countries (Viscusi and Masterman, 2017). A country's VSL is converted into a Value of a Statistical Life Year (VSLY) by dividing the VSL by the expected life expectancy at birth. Then, a monetized DALY approach is taken by multiplying the number of DALYs averted by the VSLY.

How much more the MMS program will cost than the IFAS program. Calculated based on an average annual supplement cost for IFAS and MMS per beneficiary, and a transition cost based on a countries population. Amount in current USD.

The *Value of DALYs averted* (the benefits) is divided by the *Investment required* (the costs) to produce the *Benefit-Cost Ratio (BCR)*. In this example, this means that the value of the benefits is 487 times greater than the costs.

The additional cost per DALY averted is calculated based on an average annual supplement cost for IFAS and MMS per beneficiary, and a transition cost also based on a countries population. Amount in current USD.

The bottom measure provides a different estimate of cost-effectiveness based on a guideline from the World Health Organization (Leech et. al 2018). This guideline suggests that if the cost of transition per DALY averted is less than the country's Gross Domestic Product (GDP) per capita, then the transition can be considered "Very Cost Effective." If the cost of transition per DALY averted is less than three times the country's GDP per capita, then the transition can be considered "Cost Effective." Otherwise, the transition is considered "Not Cost Effective."

Cost-Effectiveness Analysis

- \$3,696,039,235 Value of DALYs averted
- \$7,589,729 Additional investment over 10 years
- 487 Benefit-Cost Ratio
- \$5.99 Additional cost per DALY averted
- Very Cost Effective according to WHO guidelines

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Value of DALYs averted is the economic value of the benefits of the transition. It is estimated based on the number of DALYs averted and a measure of the Value of Statistical Life (VSL) for the country under analysis. The VSL can be thought of as the amount of money that a person would be willing to pay to avoid injury or illness. There are a number of different ways to calculate the VSL for a country. Viscusi and Masterman report the most recent estimates of the VSL in all LMIC (Viscusi and Masterman, 2017). A country's VSL is converted into a Value of a Statistical Life Year (VSLY) by dividing the VSL by the expected life expectancy at birth. Then, a monetized DALY approach is taken by multiplying the number of DALYs averted by the VSLY. The calculation for the number of *DALYs* averted factors in a discount rate of 3%.

Additional investment required over timespan indicator reports how much more the MMS program will cost than the IFAS program in total over the timespan being

considered. This amount is based on the difference in IFAS and MMS supplement costs and the *Transition cost* input from the *Assumptions* pane.

The *Value of DALYs averted* (the benefits) is compared with the *Investment required* (the costs) to produce the ***Benefit-Cost Ratio (BCR)***. If the BCR is greater than 1, then the value of the benefits of transitioning to MMS exceeds the costs.

The bottom two measures provide a different estimate of cost-effectiveness based on a guideline from the World Health Organization (Leech et al., 2018). This guideline suggests that if the ***Incremental cost per DALY averted*** (i.e. the amount of additional investment required to prevent one DALY) is less than the country's Gross Domestic Product (GDP) per capita, then the transition can be considered "***Very Cost Effective***." If the cost of transition per DALY averted is less than three times the country's GDP per capita, then the transition can be considered "***Cost Effective***." Otherwise, the transition is considered "***Not Cost Effective***."

Custom Interface

The screenshot displays the 'MMS Cost-Benefit Tool' interface. At the top, there are two buttons: 'Report' and 'Custom Analysis'. A callout box points to the 'Custom Analysis' button with the following text:

Clicking on the *Custom Analysis* button beneath the tool title will open a new interface that allows the user to manually input parameter values to create a custom report. This is useful when there is a need to explore outcomes of transitioning from IFAS to MMS at sub-national levels, or when there is a need to simulate outcomes in a country that is not included in the pre-loaded options in the *Report* interface.

The interface includes a map of South Asia with a country selection list on the left: Bangladesh (selected), Burkina Faso, Ethiopia, India, Indonesia, Kenya, Madagascar, Nigeria, Pakistan, Philippines, Senegal, and Tanzania. Below the map is a 'Key Parameters and Assumptions' section with the following data:

Assumptions	Value
Population	2,965,826
Timespan	10
Coverage	30% (889,748)
Costs per beneficiary	
IFAS	\$2.27
MMS	\$3.27
Transition Cost	\$0

The 'Source of health effects' is set to 'Smith et al. 2017 (Lancet)'. A 'Reset all inputs' button is located at the bottom of this section.

The central part of the interface shows a bar chart of 'Additional DALYs averted' and 'Additional child deaths averted' for various health outcomes:

Health Outcome	Value	Significance
Neonatal mortality (N)	436,075	significant
Infant mortality (I)	0	not reported
Pre-term	209,865	significant
Low birth weight	4,582	significant
Small for gestational age	152,398	significant
Maternal mortality	0	not reported
Maternal anaemia	0	not reported

Summary statistics at the bottom of the chart area:

Metric	Value
Additional DALYs averted	1,268,067
Additional child deaths averted	12,640
Confidence in positive health outcomes	100.0%

The 'Cost-Effectiveness Analysis' section on the right provides the following results:

Metric	Value
Value of DALYs averted	\$3,696,039,235
Additional investment over 10 years	\$7,589,729
Benefit-Cost Ratio	487
Additional cost per DALY averted	\$5.99
Conclusion	Very Cost Effective according to WHO guidelines

Footer information includes: 'For more information contact MoMS@nutritionintl.org', 'Last updated: 2019-10-05', 'NUTRITION INTERNATIONAL', and 'Dashboard developed by Limestone analytics'.

MMS Cost-Benefit Tool

Report
Custom Analysis

Country:	Country <input type="text"/>	Stillbirth per 1000 births:	0.0 <input type="text"/>	Low birth weight (LBW):	0.00% <input type="text"/>
Region:	Caucasus a.. <input type="text"/>	Neonatal mortality (female) per 1000 live female births:	0.0 <input type="text"/>	Small for gestational age:	0.00% <input type="text"/>
GDP per capita:	\$0.00 <input type="text"/>	Neonatal mortality (male) per 1000 live male births:	0.0 <input type="text"/>	Preterm birth:	0.00% <input type="text"/>
Value of Statistical Life:	\$0 <input type="text"/>	Neonatal mortality (total) per 1000 live births:	0.0 <input type="text"/>	Maternal anaemia:	0.00% <input type="text"/>
Life expectancy at birth:	30.0 <input type="text"/>	Infant mortality per 1000 live births:	0.0 <input type="text"/>	Sex Ratio at birth:	0 <input type="text"/>
Life expectancy at median age of first pregnancy:	30.0 <input type="text"/>	Maternal mortality per 100,000 live births:	0.0 <input type="text"/>		

Reset all inputs

Key Parameters and Results for Country

Assumptions

Population: 100,000

Timespan: 10

Coverage: 30% 30,000

Costs per beneficiary

IFAS: \$2.27

MMS: \$3.27

Transition

Cost: \$0

Source of health effects

Keats et al. 2019 (Cochrane)

Smith et al. 2017 (Lancet)

Significant outcomes only

Reset all inputs

Health Outcome Analysis

Additional DALYs averted by MMS Compared to IFAS (Significant outcomes only)

Stillbirth	0
Neonatal mortality (F)	0
Neonatal mortality (M)	0
Infant mortality	0
Pre-term	0
Low birth weight	0
Small for gestational age	0
Maternal mortality	0
Maternal anaemia	0

significant
 not significant
 not reported

0

Additional DALYs averted

0

Additional child deaths averted

Confidence in positive health outcomes

Cost-Effectiveness Analysis

\$0

Value of DALYs averted

\$255,906

Additional investment over 10 years

0

Benefit-Cost Ratio

Additional cost per DALY averted

according to WHO guidelines

For more information contact MoMS@nutritionintl.org
Last updated: 2019-10-10

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The custom analysis inputs are similar to the inputs in the *Assumptions* pane, with tooltips that open when hovered over and reset buttons. The *Reset all inputs* button in the *Custom Analysis* pane will only reset the inputs in the *Custom Analysis* pane, but will not reset the inputs in the *Assumptions* pane. The bottom half of the *Custom Analysis* interface is identical to the bottom half of the *Report* interface.

The *Data Sources* file serves as a guideline on the sources of information for the parameters. Recommended data sources for prevalence values include: World Bank Open Data, UNICEF and Demographic and Health Surveys.

MMS Cost-Benefit Tool

Default Custom Analysis

Country:

Region:

GDP per capita:

Value of Statistical Life:

Life expectancy at birth:

Life expectancy at median age of first pregnancy:

Name of the country

Region in which the country is located

Gross Domestic Product (GDP) per capita (Current International \$)

A common method of quantifying the economic value of improved health outcomes is using a measure called the Value of Statistical Life (VSL). The VSL can be thought of as the amount of money that a person would be willing to pay to avoid injury or illness. There are a number of different ways to calculate the VSL for a country. Viscusi and Masterman report the most recent estimates of the VSL in all low- and middle-income countries (Viscusi and Masterman, 2017).

Life expectancy at birth: Average number of years that a newborn could expect to live if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her birth, for a specific year, in a given country, territory or geographical area. (WHO)

Life expectancy at median age at first birth among women aged 25-49 years (World Bank).

Key Parameters and Results

Assumptions	
Population:	100,000
Timespan:	10
Coverage:	30% 30,000
Costs per beneficiary	
IFAS:	\$2.27
MMS:	\$3.27
Transition	
Cost:	\$0
Source of health effects	
<input type="radio"/> Keats et al. 2019 (Cochrane) <input checked="" type="radio"/> Smith et al. 2017 (Lancet)	
Significant outcomes only	
Reset all inputs	

Low birth weight

Small for gestational age

Maternal mortality

Maternal anaemia

Additional DALYs averted

Additional child deaths averted

Confidence in positive health outcomes

0

Benefit-Cost Ratio

Additional cost per DALY averted

according to WHO guidelines

For more information contact MoMS@nutritionintl.org
Last updated: 2019-10-10

Dashboard developed with Limestone analytics

Number of stillbirths per 1000 total births. Stillbirths can occur antepartum or intrapartum. For purposes of international comparison, stillbirths are defined as third trimester fetal deaths (≥ 1000 g or ≥ 28 weeks). (WHO)

Number of deaths during the first 28 days of life, expressed per 1,000 live births (UNICEF).

Number of deaths among women who were pregnant or within 42 days of termination of pregnancy (irrespective of the duration and site of the pregnancy or its management but not from accidental or incidental causes) (WHO) expressed per 100,000 live births.

Number of deaths between birth and exactly 1 year of age, expressed per 1,000 live births (UNICEF). To observe the separate effects on neonatal and infant mortality this model subtracts neonatal mortality from infant mortality in the calculation of DALYs averted.

The screenshot displays the user interface of the MMS Cost-Benefit Tool. It features several input fields for mortality rates: Stillbirth per 1000 births, Neonatal mortality (female) per 1000 live female births, Neonatal mortality (male) per 1000 live male births, Neonatal mortality (total) per 1000 live births, Infant mortality per 1000 live births, and Maternal mortality per 100,000 live births. Below these inputs is a 'Results for Country' section with two main analysis panels. The 'Health Outcome Analysis' panel shows a table of 'Additional DALYs averted by MMS Compared to IFAS (All outcomes)' with categories like Stillbirth, Neonatal mortality (F), Neonatal mortality (M), Infant mortality, Pre-term, Low birth weight, Small for gestational age, Maternal mortality, and Maternal anaemia, each with a value of 0. A legend indicates 'significant' (purple), 'not significant' (yellow), and 'not reported' (grey). The 'Cost-Effectiveness Analysis' panel shows a 'Value of DALYs averted' of \$0, 'Additional investment over 10 years' of 0, and a 'Benefit-Cost Ratio' of 0. The dashboard also includes a 'Reset all inputs' button and footer information: 'NUTRITION INTERNATIONAL', 'For more information contact MoMS@nutritionintl.org', 'Last updated: 2019-10-05', and 'Dashboard developed by Limestone Analytics'.

The screenshot displays the MMS Cost-Benefit Tool interface. On the left, there are input fields for MMS (\$3.27), Transition, and Cost (\$0). Below these are radio buttons for 'Source of health effects' (Keats et al. 2019 (Cochrane) and Smith et al. 2017 (Lancet)) and a 'Reset all inputs' button. The main panel shows a 'Key Parameters and Results for Country' section with a table of parameters and their values:

Pre-term	0
Low birth weight	0
Small for gestational age	0
Maternal mortality	0
Maternal anaemia	0

Below the table are three metrics: 'Additional DALYs averted' (0), 'Additional child deaths averted' (0), and 'Confidence in positive health outcomes'. A legend indicates 'significant' (purple), 'not significant' (yellow), and 'not reported' (grey). A 'Cost-Effectiveness Analysis' section shows 'Additional cost per DALY averted' according to WHO guidelines. A 'Reset all inputs' button is also present in this section.

Callouts on the left explain the parameters:

- Proportion (%) of live births that weigh less than 2500 grams; 5.5 pounds. (WHO)
- Proportion (%) of low birth weight (LBW) infants that are full-term and appropriate size for gestational age (AGA). Used to adjust the prevalence of LBW to avoid double-counting LBW infants that are also preterm and small for gestational age (SGA).
- Proportion (%) of infants with a birthweight that is below the 10th percentile for gestational age.
- Proportion (%) of small for gestational age (SGA) infants that are preterm. Used to adjust the prevalence of SGA to avoid double-counting SGA infants that are also preterm.
- Number of babies born alive before 37 weeks of pregnancy are completed. (WHO)
- Proportion (%) of pregnant women aged 15–49 years with a haemoglobin concentration less than 110 g/L. (WHO)

Callouts on the right include:

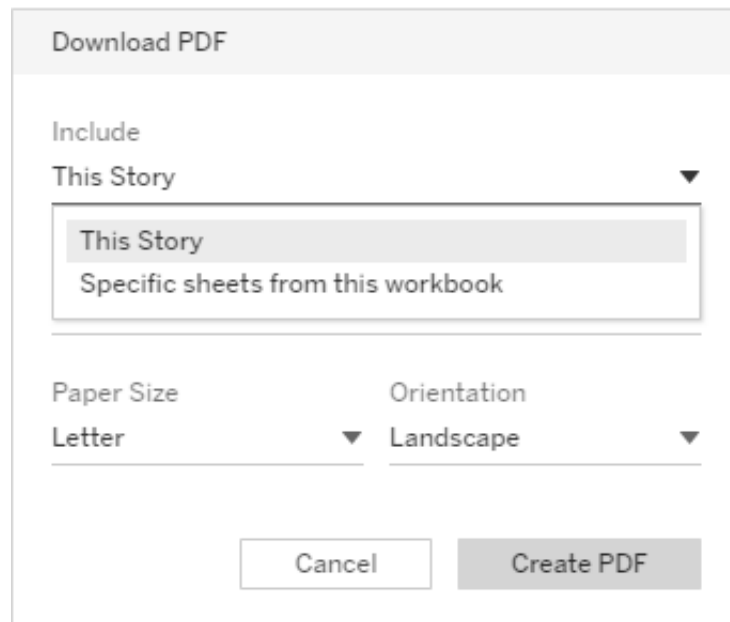
- Reset all inputs in Custom pane
- Note: All percentage values must be input as a decimal (eg. Enter 0.15 for 15%).

At the bottom, the interface includes the NUTRITION logo, contact information (MoMS@nutritionintl.org), a last updated date (2019-10-05), and the Limestone Analytics logo.

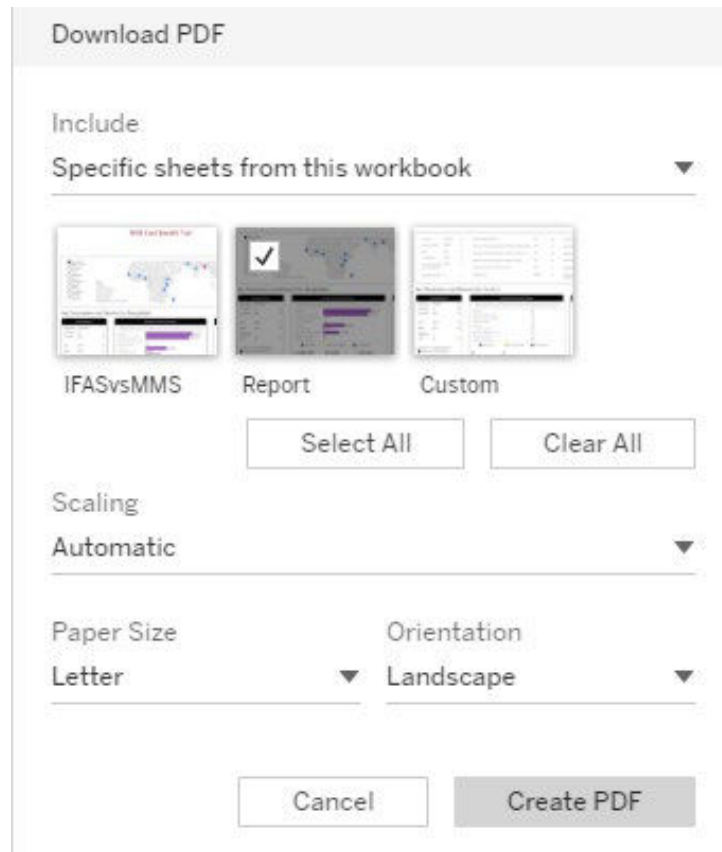
When the tool calculates DALYs averted, the prevalence of LBW and infant mortality is adjusted for double counting. Among LBW babies, most are preterm, SGA, or both. Therefore, reductions in preterm and SGA will result in fewer LBW babies. For this reason, LBW prevalence is adjusted to reflect only the change in term and adequate for gestational age (AGA) infants. The prevalence of SGA is adjusted to remove preterm SGA infants (Kozuki N, Katz J, Clermont A & Walker N, 2017). Since infant mortality (death in the first year of life) is inclusive of neonatal mortality (death in the first 28 days of life), the prevalence of infant mortality used in the calculation is net of neonatal mortality.

Exporting & Troubleshooting

The results of the analysis can be downloaded as a PDF by clicking the *Export to PDF* button below the tool on Nutrition International's webpage. By default, the tool downloads both the *Report* and *Custom* interfaces. To export only one of the interfaces to PDF, click the drop-down arrow under *Include* in the PDF Export dialog box. Click the option *Specific sheets from this workbook*.



Select the interfaces that you would like to include in the PDF report, set the Scaling, Paper Size and Orientation options and click the *Create PDF* button.



The tool will time out if left idle for more than five minutes. Click the refresh symbol in the web-browser to reset. However, please be aware the tool will return to default and you will lose any new data. If using the *Custom Interface*, it is recommended that you compile your data in advance.

For assistance, please email MoMS@NutritionIntl.org.

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