



Selection of Sample Countries for the Model

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SUMMARY

In 2016 the International Food Policy Research Institute (IFPRI) and the International Institute for Sustainable Development (IISD) projected the cost of ending world hunger by 2030 using a computable general equilibrium (CGE) model combined with household surveys from a sample of seven countries from sub-Saharan Africa (Laborde, Bizikova, Lallemand, & Smaller 2016). This technical note sets out how the sample of countries can be expanded to improve the robustness of the global cost estimate. Four new priority countries are suggested for inclusion: Bangladesh and Guatemala (to improve regional representativeness), and Ethiopia and Rwanda (countries with a high prevalence of hunger). If additional funding is available, three additional countries are nominated for inclusion: Cambodia, Nepal and Tajikistan. Importantly, the data set for each sample country will also expand by including variables on agricultural productivity and sustainability.

BACKGROUND

In 2015 world leaders adopted the Sustainable Development Goals (SDGs), which included an agreement to end world hunger by 2030 (SDG 2.1). Laborde et al. (2016) used a two-stage approach to project the cost of ending world hunger. First, detailed household survey data was combined with a multi-country general equilibrium model to estimate the cost of ending hunger in a subset of countries (focus countries). The survey data was a powerful addition to the general equilibrium model because it provided information at the household level, such as on calorie intake, that would have been lost if using country-wide averages (the more common approach used in economic modelling). Due to data and resource constraints, it was not possible to use household survey data for all developing countries.

A second stage of modelling was used to expand from the subset of countries to the global level. A global data set was built for all countries using data on undernourishment, poverty and other key variables. Countries were clustered together based on their similarities. Each cluster contained at least one of the focus countries for the purposes of calibration. Sensitivity analysis was performed on the cluster analysis to address some of the limitations of the approach. The average per capita costs from the focus countries were then applied to all countries within the same group (see Laborde et al., 2016). The result was a projected cost of an additional USD 11 billion per year of public spending from 2016 to 2030 to achieve the target.

The seven focus countries, all in Africa, were chosen based on the availability of data, reliance on foreign aid, income, prevalence of undernourishment, importance of the agricultural sector and relative size of the rural population. They contain a significant proportion of the world's hungry people. Ideally—resources permitting—household data would include 15–20 countries, including from Asia and Latin America, representing 90 per cent of the global hunger headcount (Laborde et al., 2016).

OBJECTIVES AND METHODS

The aim of this technical note is to identify ways to expand the underlying data set in order to generate up-to-date and more geographically representative global estimates for the cost of ending hunger (SDG 2).

The household data for the seven focus countries needs to be updated, as some of the countries have experienced major structural changes in the last decade. Variables will also be included to track two high-priority SDG sub-targets: SDG 2.3, double the agricultural productivity and incomes of small-scale food producers, and SDG 2.4, ensure sustainable food production systems (United Nations, n.d.).¹

Household data from additional countries would increase the representativeness of the sample. Criteria for prioritizing country selection are provided in Table 3.1, along with relevant indicators.

TABLE 3.1. CRITERIA FOR COUNTRY SELECTION AND RELEVANT INDICATORS

PRIORITY	CRITERIA	QUANTITATIVE INDICATORS
1	Availability of household and smallholder data	World Bank's <i>Living Standards Measurement Study</i> surveys, agricultural census
2	Level of undernourishment and potential costs for ending hunger	Poverty rate headcount (USD1.90 per day poverty line), prevalence of undernourishment (POU), GDP per capita
3	Potential costs for achieving priority sub-targets 2.3 and 2.4	Stages of agricultural production as defined in Laborde et al. (2018), share of labour force in agricultural sector, the agricultural official development assistance (ODA) per capita
4	Priority to donors in terms of dependence on ODA flows for SDG strategy	Based on analysis in Laborde et al. (2016); see Appendix 7
5	Likely impact on aggregate global projections	Based on country size in terms of ODA or potential costs
6	Ability to add significant diversity to the model (needed to improve relevance of clustering approach)	Number of hungry people, structural patterns and problems

Source: Laborde et al., 2016.

¹ Final methodological choices will be discussed in deliverables 1.1.f and 1.1.g about modelling options for these two SDG sub-targets.

COUNTRY ANALYSIS

Table 3.2 shows the countries of interest for inclusion of household data based on the criteria set out in Table 3.1. Data availability is the key constraint on including new countries. Many countries with good data availability are also those with higher development indicators—less hunger now or projected in 2030—and therefore lower priority.

TABLE 3.2. PRIORITY COUNTRIES

REGION	COUNTRY	SHARE OF LABOUR FORCE IN AGRICULTURE (%)	POVERTY RATE (% BELOW USD 1.90 POVERTY LINE)	PREVALENCE OF UNDER-NOURISHMENT	GDP PER CAPITA (USD)	AG. ODA PER CAPITA (USD)	PRIORITY STATUS
Sub-Saharan Africa	Ghana	42.00	13.60	5.35	\$2,668.87	\$8.99	On target
	Nigeria	30.57	50.01	6.47	\$5,429.92	\$0.84	Low
	Senegal	46.10	38.00	11.78	\$2,230.03	\$10.31	Medium
	Malawi	83.57*	70.90	21.07	\$1,064.16	\$10.15	High
	Tanzania	68.05	49.10	33.28	\$2,328.19	\$3.75	Medium
	Uganda	71.68	34.60	25.08	\$1,644.91	\$5.44	High
	Zambia	55.81	60.95	49.40	\$3,517.46	\$4.92	Medium
	Benin	45.11	51.30	9.97	\$1,918.34	\$6.40	High
	Niger	81.00*	47.90	10.17	\$965.23	6.45	On target
	Ethiopia	22.02	33.50	34.58	\$1,336.98	\$8.36	High
Rwanda	75.33	60.35	34.15	\$1,560.91	\$11.05	High	
East Asia & Pacific	Philippines	31.50	10.20	13.62	\$6,328.08	\$1.08	Low
	Cambodia	54.14	n.a.	15.85	\$2,976.13	\$6.31	Medium
	Vietnam	46.48	3.27	12.73	\$5,175.30	\$3.41	Low
	Laos	60.3*	22.70	20.56	\$4,733.81	\$10.47	Medium
	Myanmar	70.00*	6.50	16.55	\$4,488.41	\$0.95	On target
	Timor Leste	51.21	n.a.	29.55	\$2,028.08	\$28.02	n.a.
South Asia	Nepal	81.00*	15.00	8.55	\$2,162.74	\$3.80	High
	Bangladesh	47.48	18.50	17.05	\$2,854.41	\$2.07	Medium
	India	51.06	21.20	15.47	\$5,072.88	\$0.41	Low
Europe & Central Asia	Georgia	50.89	13.75	8.95	\$8,175.11	\$6.28	On target
	Tadjikistan	73.5*	17.83	35.38	\$2,433.25	\$4.22	Medium
Latin America & Caribbean	Guatemala	33.57	10.50	15.15	\$7,038.52	\$4.22	Medium
	Nicaragua	32.19	3.60	18.28	\$4,602.11	\$12.49	Medium
	Peru	25.24	3.82	9.48	\$11,166.33	\$2.95	On target
	Bolivia	30.00	7.74	20.57	\$6,064.84	\$10.93	Low
	Haiti	40.1*	24.90	50.93	\$1,605.22	\$13.13	High

*Due to the lack of usable surveys, the share of rural population was used as a proxy for this country.
Source: Laborde et al., 2018.

TABLE 3.2. PRIORITY COUNTRIES (CONTINUED)

REGION	COUNTRY	AGRICULTURAL TRANSFORMATION PHASE	DATA AVAILABILITY	CERES2030 STATUS
Sub-Saharan Africa	Ghana	2. Ag. Integrated Into the Macro Economy	Data available	Ongoing update
	Nigeria	2. Ag. Integrated Into the Macro Economy	Data available	Ongoing update
	Senegal	2. Ag. Integrated Into the Macro Economy	Data available	Ongoing update
	Malawi	5. Getting Ag. Moving	Data available	Ongoing update
	Tanzania	5. Getting Ag. Moving	Data available	Ongoing update
	Uganda	5. Getting Ag. Moving	Data available	Ongoing update
	Zambia	6. Subsistence Ag.	Data available	Ongoing update
	Benin	2. Ag. Integrated Into the Macro Economy	Data not available	
	Niger	2. Ag. Integrated Into the Macro Economy	Data available	Potential inclusion in 2019
	Ethiopia	5. Getting Ag. Moving	Data available	Potential inclusion in 2018
	Rwanda	5. Getting Ag. Moving	Data available	Potential inclusion in 2018
East Asia & Pacific	Philippines	2. Ag. Integrated Into the Macro Economy	Data source identified	Potential inclusion in 2020
	Cambodia	2. Ag. Integrated Into the Macro Economy	Data available	Potential inclusion in 2019
	Vietnam	3. Ag. as a Contributor to Growth	Data available	Potential inclusion in 2019
	Laos	3. Ag. as a Contributor to Growth	Data not available	
	Myanmar	3. Ag. as a Contributor to Growth	Data not available	
	Timor Leste	4. Moving Labour Out of Ag.	Data not available	
South Asia	Nepal	3. Ag. as a Contributor to Growth	Data source identified	Potential inclusion in 2020
	Bangladesh	3. Ag. as a Contributor to Growth	Data available	Potential inclusion in 2018
	India	3. Ag. as a Contributor to Growth	Data available	
Europe & Central Asia	Georgia	3. Ag. as a Contributor to Growth	Data not available	
	Tadjikistan	4. Moving Labour Out of Ag.	Data available	Potential inclusion in 2019
Latin America & Caribbean	Guatemala	2. Ag. Integrated Into the Macro Economy	Data source identified	Potential inclusion in 2020
	Nicaragua	2. Ag. Integrated Into the Macro Economy	Data not available	
	Peru	2. Ag. Integrated Into the Macro Economy	Data not available	
	Bolivia	4. Moving Labour Out of Ag.	Data not available	
	Haiti	6. Subsistence Ag.	Data not available	

REGIONAL ANALYSIS

The seven **African** countries included in Laborde and al. (2016) should be retained because they represent a diverse set of countries for sub-Saharan Africa, including countries lagging behind in agricultural transformation and of medium to high priority for donors. While Ghana is on target to eliminate hunger by 2030, it is retained in the analysis to monitor its performance on SDGs 2.3 and 2.4. For this region, Rwanda and Ethiopia are important for inclusion. Both have a high POU (above 30 per cent), low levels of agricultural transformation and were considered as high priority for donors. They are among the highest receivers of agricultural ODA per capita (above USD per capita per year).

No countries in **East Asia and the Pacific** were identified as high priority for household data inclusion. The country with the highest challenge, Timor Leste, has serious data gaps. Vietnam has good data but is not likely to be a country with major challenges by 2030. Cambodia is a medium priority for donors and has data available. As such, it could be included to expand regional representativeness.

In **South Asia**, Nepal and Bangladesh face major challenges in ending hunger and have a high dependency on ODA. Based on existing data sets, Bangladesh can be added to the analysis more readily than Nepal.

Very few countries in **Eastern Europe and Central Asia** are forecast to have problems in achieving SDG 2.1 or to be dependent on ODA to reach SDG 2.3 or SDG 2.4. The key country in this region could be Tajikistan, but we have limited opportunities to access the required data.

No countries in **Latin and Central America and the Caribbean** have a data set that would be easy to include in the framework. The country with the most acute hunger problem, Haiti, has major data limitations that cannot be overcome in the context of this study. Guatemala is more promising: it shares similar features with Nicaragua in terms of the magnitude of challenges, but the relevant data sets are more accessible. Sustainability is also an important issue for Guatemala due to land use and land degradation concerns.

RECOMMENDATIONS

Based on this analysis, we recommend the following countries, in order of priority, for inclusion in the expanded sample of countries for the model. The number of countries included in the final list will depend on donor funding and priorities.

1. The **seven original African** countries: Ghana, Malawi, Nigeria, Senegal, Tanzania, Uganda and Zambia. The data for these countries will be updated to take into account new household surveys and variables related to SDG 2.3 and 2.4.
2. **Bangladesh** in 2018 and **Guatemala** in 2019, to improve regional representativeness.
3. **Rwanda** in 2018 and **Ethiopia** in 2019: While Africa is already well represented in the model, Rwanda and Ethiopia are high priorities in terms of hunger and represent “low-hanging fruit” in terms of data availability.

If further funding were available:

4. **Cambodia** in 2018, to improve regional representativeness.
5. **Nepal** in 2019, a high-priority country that would also improve regional representativeness. Additional funding would be needed to source and prepare data for inclusion in the model.
6. **Tajikistan** in 2019, to improve regional representativeness. Additional funding would be needed to source and prepare data for inclusion in the model.

To reduce the cost of inclusion in the framework, partners or stakeholders could be asked to provide data (already available or from an outsourced collector) through a pre-defined template.

REFERENCES

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APPENDIX: LIST OF COUNTRIES AND THEIR PRIORITY LEVELS FOR DONOR SUPPORT: *ENDING HUNGER: WHAT IT WILL COST?* PROJECT (OCTOBER 2016)

NUMBER	COUNTRY	PRIORITY LEVEL
1	Afghanistan	High Priority
2	Armenia	Low Priority
3	Bangladesh	Medium Priority
4	Benin	High Priority
5	Bolivia	Low Priority
6	Burkina Faso	High Priority
7	Burundi	High Priority
8	Cambodia	Medium Priority
9	Cameroon	Medium Priority
10	Cape Verde	Low Priority
11	Central African Republic	High Priority
12	Chad	High Priority
13	Comoros	High Priority
14	Congo	Low Priority
15	Cote d'Ivoire	Medium Priority
16	Djibouti	Medium Priority
17	DR Congo	High Priority
18	El Salvador	Low Priority
19	Eritrea	Medium Priority
20	Ethiopia	High Priority
21	Federated States of Micronesia	Medium Priority
22	Guatemala	Medium Priority
23	Guinea-Bissau	High Priority
24	Guyana	Low Priority
25	Haiti	High Priority
26	Honduras	Medium Priority
27	India	Low Priority
28	Jamaica	Low Priority

NUMBER	COUNTRY	PRIORITY LEVEL
29	Laos	Medium Priority
30	Lesotho	High Priority
31	Liberia	High Priority
32	Madagascar	High Priority
33	Malawi	High Priority
34	Mauritania	Medium Priority
35	Mozambique	High Priority
36	Nepal	High Priority
37	Nicaragua	Medium Priority
38	Nigeria	Low Priority
39	Pakistan	Medium Priority
40	Papua New Guinea	Medium Priority
41	Philippines	Low Priority
42	Rwanda	High Priority
43	Senegal	Medium Priority
44	Sierra Leone	High Priority
45	South Sudan	High Priority
46	Sudan	High Priority
47	Swaziland	Medium Priority
48	Tajikistan	Medium Priority
49	Tanzania	Medium Priority
50	Togo	High Priority
51	Uganda	High Priority
52	Uzbekistan	Low Priority
53	Vietnam	Low Priority
54	Yemen	Medium Priority
55	Zambia	Medium Priority
56	Zimbabwe	High Priority

Source: Laborde et al. (2016)

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Sustainable Solutions to End Hunger

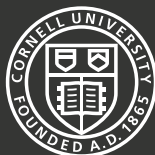


ABOUT CERES2030

Ceres2030 brings together three institutions who share a common vision: a world without hunger, where small-scale producers enjoy greater agricultural incomes and productivity, in a way that supports sustainable food systems. Our mission is to provide the donor community with a menu of policy options for directing their investments, backed by the best available evidence and economic models.

The partnership brings together Cornell University, the International Food Policy Research Institute (IFPRI) and the International Institute for Sustainable Development (IISD). Funding support comes from Germany's Federal Ministry of Economic Cooperation and Development (BMZ) and the Bill & Melinda Gates Foundation (BMGF).

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