



# Ending Hunger: What would it cost?

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## 1. The Turning Point

We are at a major turning point in history. For the first time ever the world has committed to ending hunger. Not to reduce or halve it—but to end hunger. When world leaders adopted the Sustainable Development Goals (SDGs) in September 2015, they agreed that this should be done by 2030.

The International Institute for Sustainable Development (IISD) and the International Food Policy Research Institute (IFPRI) joined forces to estimate what it would cost to end hunger, and the contribution that donors need to make. We consider that a country has achieved this goal when the number of hungry people is less than 5 per cent of the population. This follows the approach used in the Millennium Development Goals (MDGs) and the Food and Agriculture Organization of the UN's (FAO's) *State of Food Insecurity in the World* (SOFI) report, which use the same threshold.

### Key Findings

1. Today 800 million people are hungry. 90 million are children under the age of five (FAO, 2015). By 2030, our estimates show that 600 million people will be hungry. Investments in ending hunger need to be scaled up.
2. It will cost on average an extra USD 11 billion per year of public spending from now to 2030 to end hunger. USD 4 billion of the additional spending needs to come from donors. The remaining USD 7 billion will come from poor countries themselves. Donors currently spend USD 8.6 billion per year on hunger, and the extra cost represents a 45 per cent increase on current donor spending.
3. The additional public spending will, on average, spur an extra USD 5 billion in private investment per year.



## 2. How Do We Calculate the Cost of Ending Hunger?

### Categories of Interventions

We consider that ending hunger requires additional expenditures in five areas that impact both food consumption and production capacities of hungry households (see Figure 1).



- **Category I: Social safety nets**  
Support to consumers through cash transfers and food stamps



- **Category II: Farm support**  
Helping producers through fertilizer and seed subsidies, capital investments (e.g. tractors), R&D, improved technology, extension services and better organizing



- **Category III: Rural development**  
Infrastructure, education, storage, market access and value chains



- **Category IV: Enabling policies**  
Land reform, tax reform, trade and investment policies and institutional reform



- **Category V: Nutrition**  
Addressing the global nutrition concerns, including stunting, exclusive breastfeeding, wasting, anemia, low birth weight, and overweight.

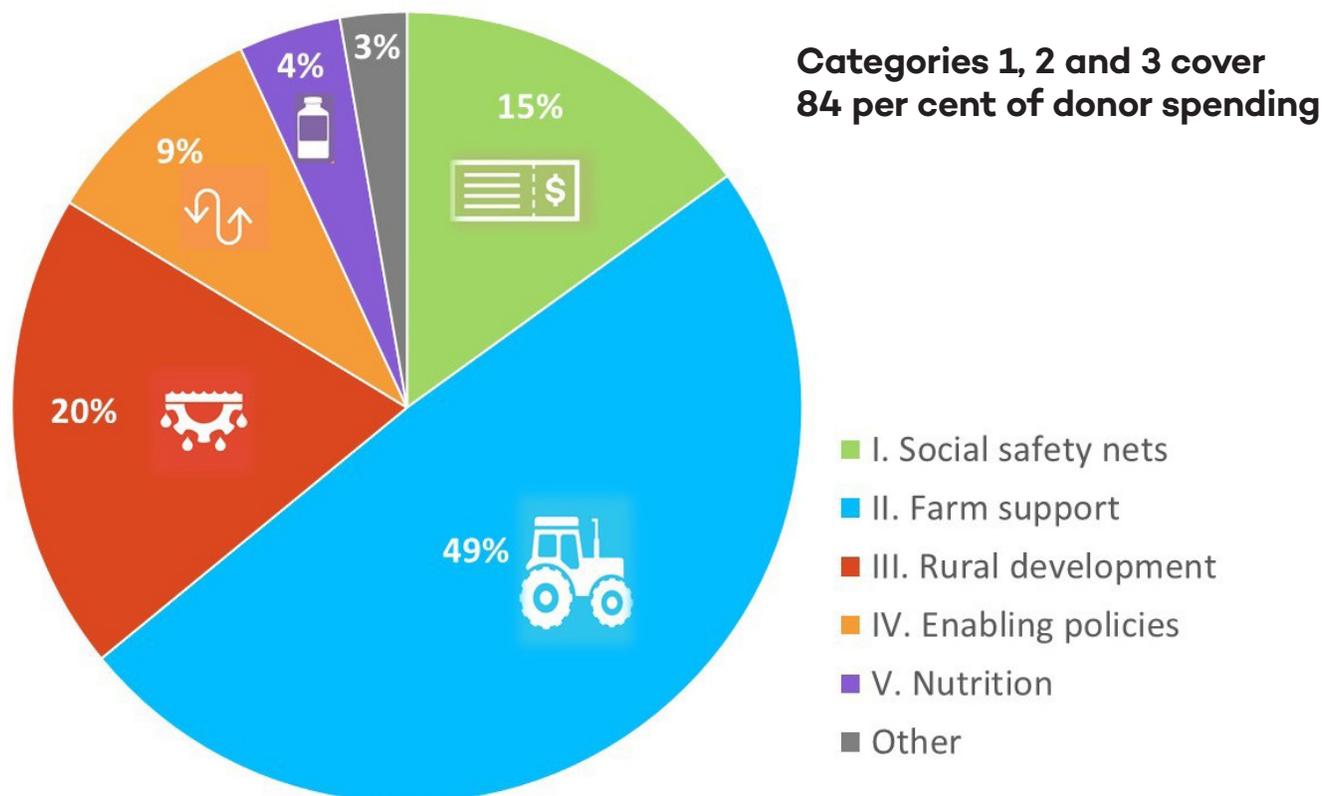
**Figure 1: Five categories of interventions to end hunger**

*Note: These categories can be mapped to the donor classification system of the Organisation for Economic Co-operation and Development (OECD).*

Our analysis focused on the cost of ending hunger through increased spending in the first three categories: social safety nets directly targeting consumers, farm support to expand production and increase poor farmers' income, and rural development that reduces inefficiencies along the value chain and enhances rural productivity. We focused on these three categories because there is a clear and measurable link between these expenditures and increased calorie consumption, either because the interventions increased poor households' incomes or because food prices declined.

The focus on the first three categories does not detract from the importance of the other two: the enabling policies and nutrition. Indeed, legal and policy reform on land, tax, trade and investment, along with institutional reform, is a critical ingredient to ending hunger and providing a sustainable environment for reducing poverty. However, costing the impacts of legal and policy reform is much more complex, and the benefits went far beyond SDG 2. The model did not cost nutrition interventions because our household dataset had limited coverage on micronutrient availability and health-related indicators.<sup>1</sup> Importantly, our focus is consistent with donor priority interventions: of the USD 8.6 billion spent annually on aid for food and nutrition security, 84 per cent focused on the first three categories of interventions (see Figure 2).

<sup>1</sup> There are global efforts such as 1000 days, R4D and the World Bank that have estimated the cost of ending malnutrition using a different model (See Shekar et. al., 2016).



**Figure 2. Donor spending in the five investment categories (2013)**

Sources: Authors' computation based on *The Brookings Institute – Ending Rural Hunger* dataset

## Modelling the Cost to End Hunger

We applied the MIRAGRODEP economic model—a dynamic computable general equilibrium (CGE), multi-country, and multi-sector model. The model simulated national and international markets, taking into account production, demand and prices and integrated it with an analysis of biophysical and socioeconomic trends (Laborde et al., 2013). The model integrated the key economic factors that affect agriculture, thereby providing a robust quantitative framework for estimating costs.

This is the first time that a multi-country macroeconomic model has been combined with household surveys.<sup>2</sup> The bottom-up approach allowed us to understand changes in consumption and production for major food items, as well as the dynamics of other sources of income. This detailed framework meant we targeted our interventions based on the precise characteristics of hungry households and not national averages, which is the more common method. Satellite accounts were used to gather additional data, including data on the cost of different interventions.

This approach had two main effects. First, it helped us to understand the causes of hunger at the household level, including what people eat, whether they are urban or rural, and their sources of income, either agricultural production or other sectors of the economy. Second, it allowed us to directly target those households that were hungry, and the households that played a key role in food production. The better targeting increased efficiencies and reduced spending, and therefore reduced the overall costs of ending hunger.

<sup>2</sup> Household surveys from the World Bank and national governments are used.



The model computes the optimal allocation of spending in the first three categories, for each country, in order to increase household calories consumption above the Minimum Dietary Energy Requirements (MDERs), our definition of hunger.<sup>3</sup> Indeed, when the calorie value of the household food basket is above this threshold, the household is no longer considered hungry. SDG 2 is achieved when the number of hungry people is less than 5 per cent of the population within a country. This 5 per cent threshold follows the approach used in the MDGs and the FAO’s SOFI report. Each intervention impacts the economic system in different ways as depicted in Figure 3.

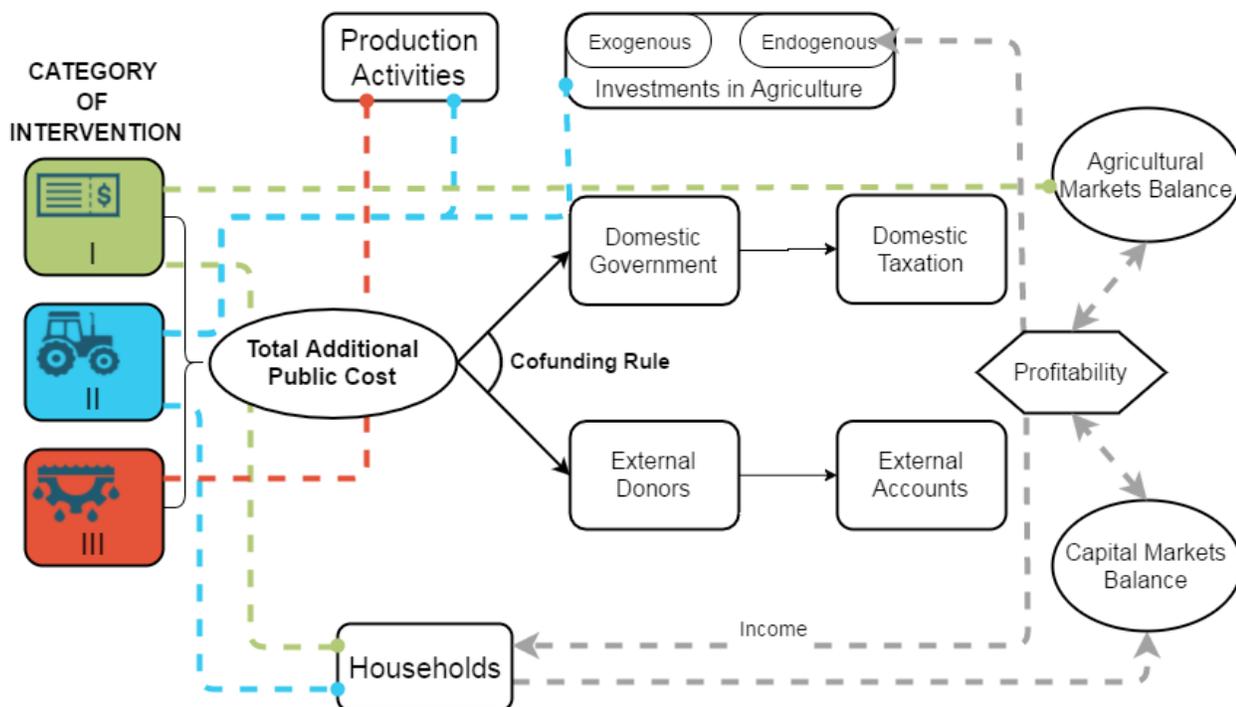


Figure 3. A dynamic model structure targeting hungry households and triggering private savings and investments

### Calculating the Donor Share

Our model determines the total additional expenditures required for each country annually and the split between the country share and the donor share. To calculate the donor share, we created a rule based on average annual donor contributions from 2009 to 2013. We called this the “co-funding” rule. First, we conducted an econometric analysis of existing donor support to developing country budgets. The analysis gave us an external share of donor contributions to developing country budgets by level of GDP per capita. We found that the donor contribution declined as a country got richer: the co-funding rule is applied on an annual and country basis—the external share decreased over time depending on each country’s economic performance. Governments provided the remaining costs through increased taxes or loans. Finally, the co-funding share remained the same across all the categories of intervention.

<sup>3</sup> MDER is a calorie threshold set by the FAO. An adult is considered hungry if they consume on average less than 1,750 calories per day.



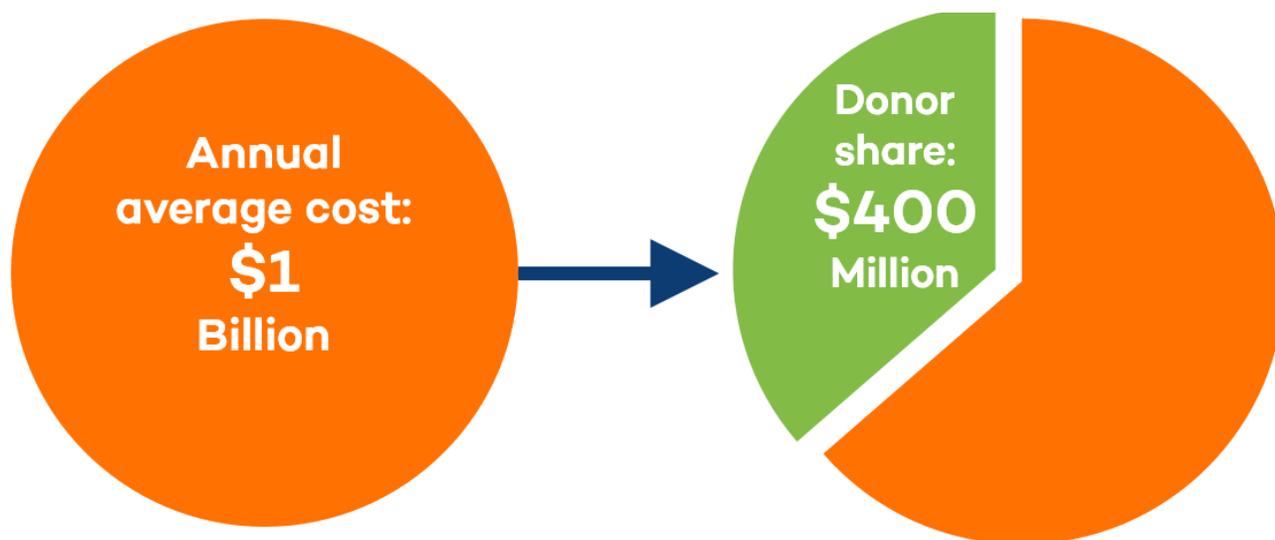
### 3. What Would It Cost to End Hunger?

#### A Focus on Seven African Countries

In order to develop a global estimate, the dynamic model was applied to a representative sample of seven African countries: Ghana, Malawi, Nigeria, Senegal, Tanzania, Uganda, and Zambia for which we applied our detailed methodology. The countries were selected because of the availability and reliability of data, the diversity of socioeconomic and agricultural situations, and the relevance to donors. This sample gave us sufficient data to confidently extrapolate the cost of ending hunger and the donor contributions at a global scale.

Currently, 331 million people inhabit these 7 countries, of whom 52 million (16 per cent of the population) are hungry, while 160 million subsist on less than USD 1.90 a day.<sup>4</sup> Donors spend USD 1.1 billion a year on food security and nutrition in these countries, about 13 per cent of global official development assistance (ODA). By 2030, the population in these 7 countries is projected to exceed 500 million people, and, while the share of the population affected by hunger is expected to reduce to 13 per cent, the absolute number of hungry people is expected to increase, affecting 67 million people.

We found it will cost on average an extra USD1 billion per year from now to 2030 to end hunger in these seven African countries (Figure 4). Some USD 400 million of the extra cost needs to come from donors, while the remainder will come from governments. This represents a 40 per cent increase on current donor spending in these seven countries. Importantly, these expenditures will trigger on average an extra USD 2.8 billion of private agricultural investment.



**Figure 4.** What would it cost to end hunger in the seven African countries

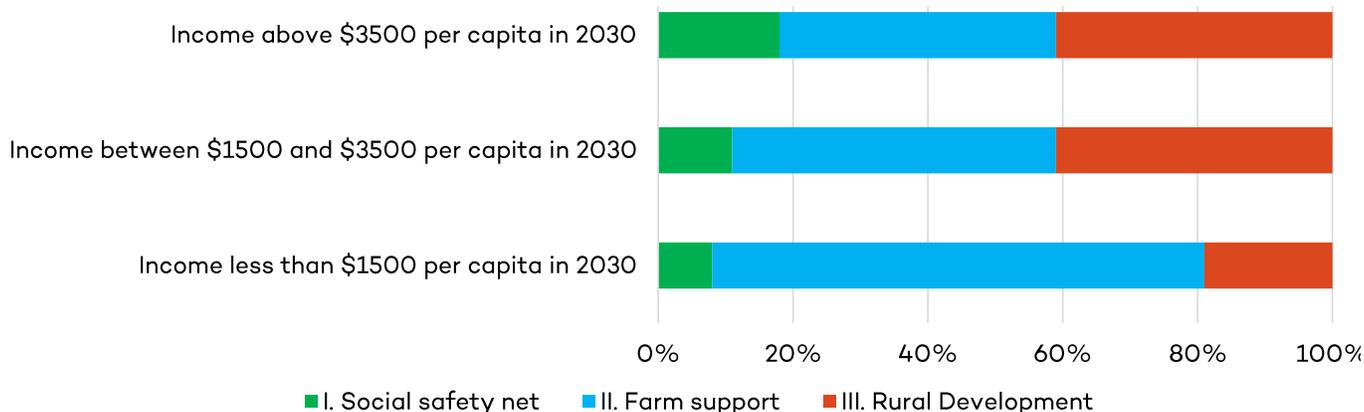
These results illustrate important conclusions from the model. Bringing the number of hungry people below the 5 percent threshold is ambitious in the context of a fast-growing population. The targeting of interventions should thus be improved: within countries, by selecting the most appropriate interventions for each situation, but also between countries since the intensity of the efforts and the needs of external support vary greatly.

Regarding the type of interventions, the structure of spending evolves over time and depends on each country's situation (see Figure 5). For instance, infrastructure investments as well as extension services are mainly concentrated in the first five years, while the food stamps initiatives scale up slowly over time and reach their peaks in 2030. Across countries, we see that farmer support in Malawi and Tanzania represent the main share of expenditures, while rural development

<sup>4</sup> Extreme poverty line definition by the World Bank.



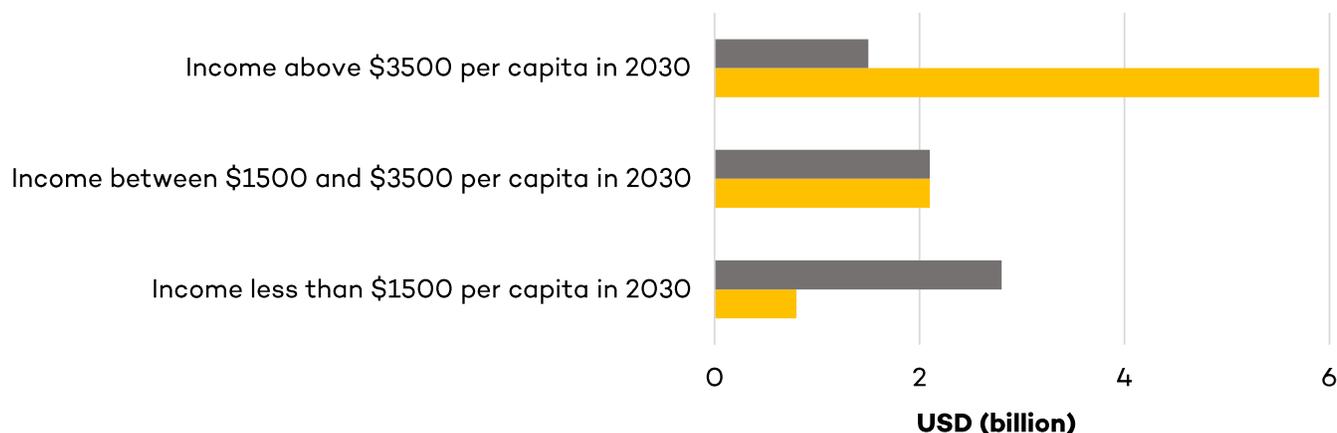
plays a critical role for the intermediate income group. We also see the most prominent share of the contribution of social safety net—our food stamps program—in countries with higher incomes and higher share of urban population, such as in Nigeria and Ghana.



**Figure 5: Structure of additional spending by type of intervention and group of countries, total from 2015 to 2030**

*Note: Income less than USD 1500 per capita in 2030 includes Malawi and Uganda; income between USD 1500 and USD 3500 per capita in 2030 includes Tanzania and Senegal; and income above USD 3500 per capita in 2030 includes Ghana, Nigeria and Zambia.*

The relative donor contribution also varies greatly among our seven countries. For example, Malawi is expected to still have a low per capita GDP in 2030; therefore, we calculate that the country will still depend on donors to cover 90 per cent of their public budget. Nigeria, on the other hand, is expected to have a higher per capita GDP in 2030, and, as a result we calculate that they will depend on donors for less than 10 per cent of their public budget. Figure 6 shows the relative contribution between domestic governments and external donors for the different group of countries in our sample. This will require a reallocation of efforts to the most vulnerable countries. For instance, our low-income group represents over 40 per cent of the additional donor spending (compared to 30 per cent currently); the high-income group share will represent only 23 per cent of additional spending by 2030 compared to 40 per cent today.



**Figure 6: Ending hunger: Domestic vs external contributions from 2015 to 2030, results for seven African countries. 2011 constant USD**

*Note: Income less than USD 1500 per capita in 2030 includes Malawi and Uganda; income between USD 1500 and USD 3500 per capita in 2030 includes Tanzania and Senegal; and income above USD 3500 per capita in 2030 includes Ghana, Nigeria and Zambia*



## What Would It Cost to End Hunger Globally?

To calculate the global costs, we first categorized countries in line with the data we had collected from the seven African countries. Countries were clustered together based on key variables (such as hunger and poverty levels, the size of rural populations and land area) in order to estimate a per-capita average cost for ending hunger in each group. Countries where the estimated hunger level by 2030 is below the 5 per cent threshold were not included in the global cost estimate (Annex 1). Next, we estimated the global poverty and hunger level in 2030 using macroeconomic projections at the country level. We then applied the cluster average per-capita cost to get the total cost of ending hunger for each country in the cluster. Finally, we applied our co-funding rule on a year-by-year basis at the country level.

In 2015, there were 800 million people hungry (FAO, 2015). Taking into account projections of population growth, this number is expected to reach over 1 billion people by 2030, if there is no further economic growth or donor contributions. When taking into account current economic growth projections and current donor contributions till 2030 (referred to as the business-as-usual scenario, or BAU), we estimated that there would be 600 million people hungry in 2030. Therefore, significant additional investments are needed to reach the 5 per cent threshold (Figure 7).

We found that it will cost on average an extra USD 11 billion per year of public spending from now to 2030 to end hunger. USD 4 billion of the additional spending needs to come from donors. The remaining USD 7 billion will come from poor countries themselves. Importantly, this public spending will generate on average an additional USD 5 billion of private investment per year until 2030 (Figure 8).

## Millions of undernourished people

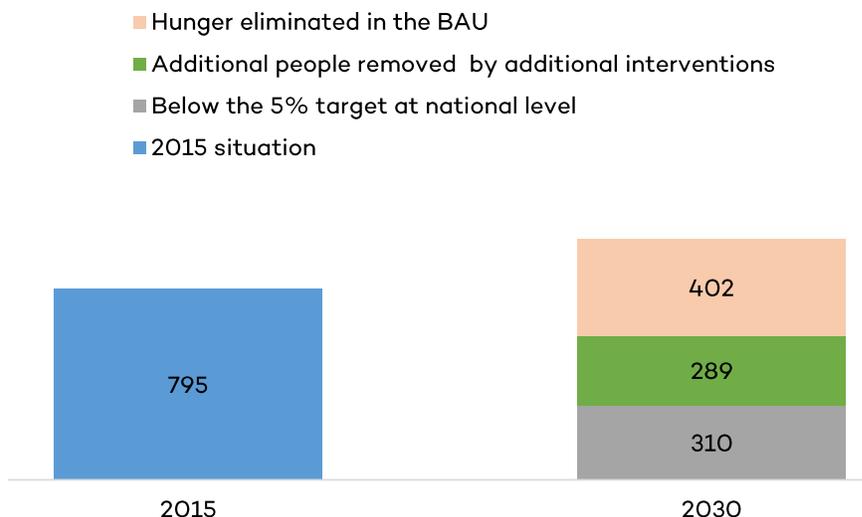


Figure 7: Population affected by undernourishment in 2015 and 2030

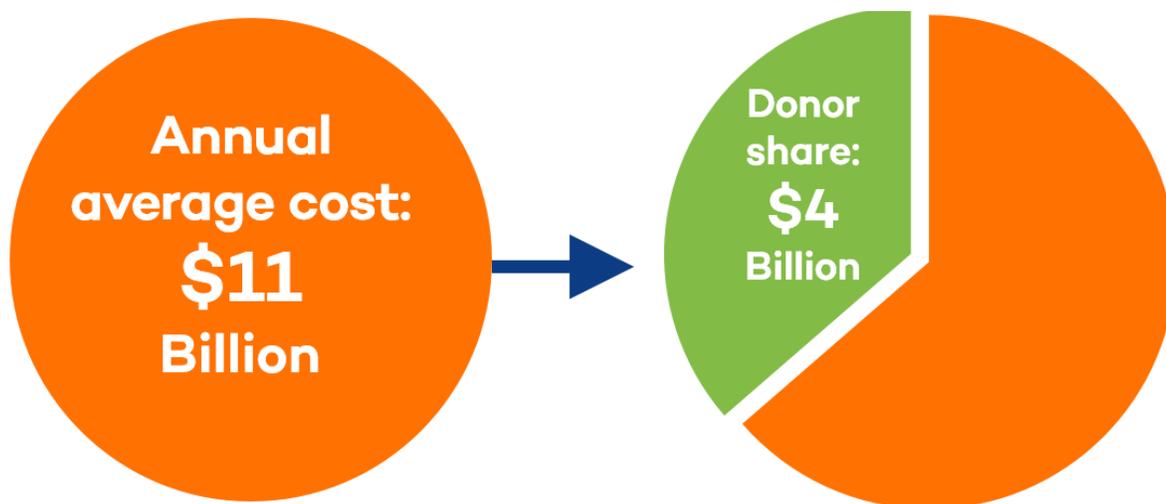
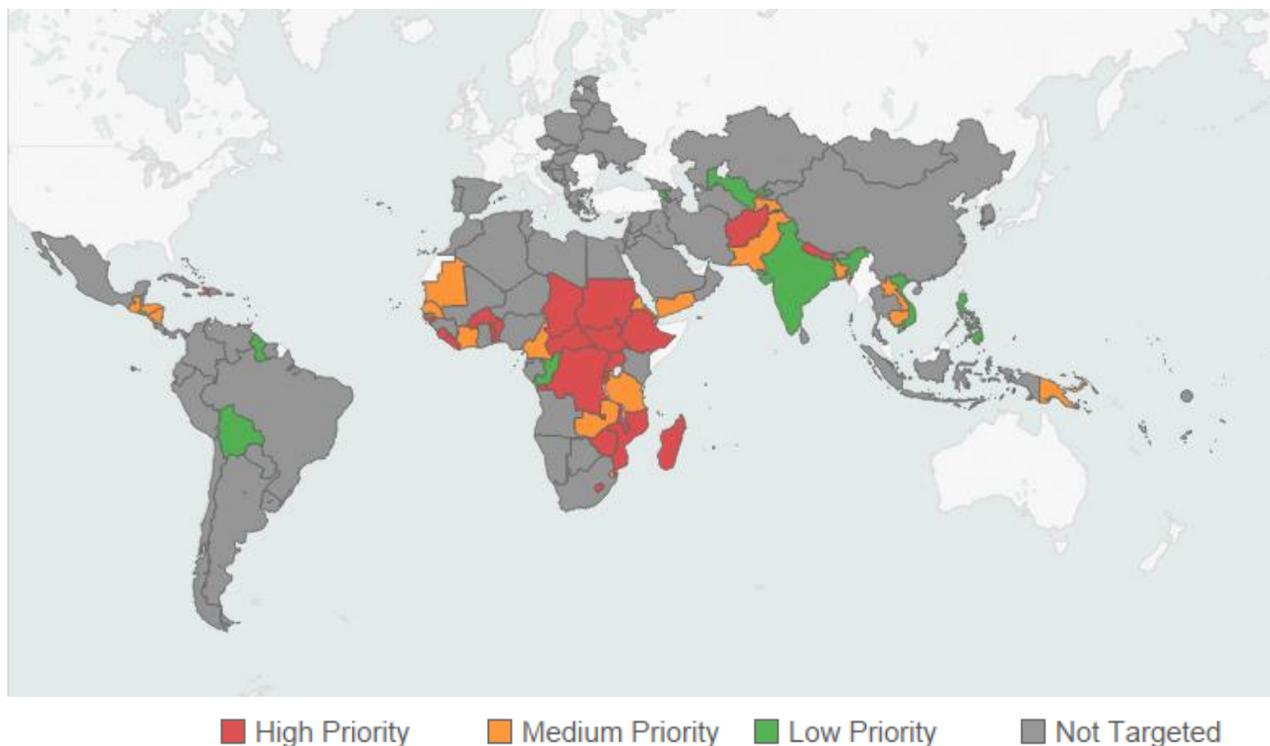


Figure 8. Total costs of ending world hunger by 2030



Donors currently spend USD 8.6 billion per year to end hunger globally, so the extra cost represents a 45 per cent increase on current spending. This extra donor support is spread differently across each country, as defined by our co-funding rule. The map below illustrates the priority levels for countries and regions (Figure 9). Over 73 countries are expected to still have more than 5 per cent of their population hungry by 2030 in our business-as-usual scenario (see Annex 1). 18 of those countries should have enough domestic resources to address the issue independently from donors (for example, China). Africa will need the greatest level of support, particularly Central Africa and South East Africa, where the situation of hunger is exacerbated by conflict. Some countries, such as the Democratic Republic of Congo, South Sudan and Eritrea, will depend on donor support for more than 90 per cent of their public budgets.



**Figure 9. Priority countries for donor investment based on their dependency on external resources until 2030**

*Note: High priority includes countries that will depend on donors for over 50 per cent of their budgets; Medium priority includes countries that will depend on donors for between 30 to 50 per cent of their budgets; and Low priority includes countries that will depend on donors for less than 30 per cent of their budgets. Not targeted includes countries that will need to retain existing levels of donor support but will not need any extra donor support from now until 2030.*



## 4. Conclusions

The world has committed to ending hunger by 2030. Meeting that goal would mark a monumental turning point in human history. Our model has made clear that with improved targeting, this goal is both achievable and affordable. We found that it will cost on average an extra USD 11 billion per year of public spending from now to 2030 to end hunger. USD 4 billion of the additional spending needs to come from donors. The remaining USD 7 billion will come from poor countries themselves.

The next step is to work with stakeholders in countries to identify the specific interventions needed to ensure the additional investments are the most effective and relevant way possible. It is time to turn these numbers into real commitments to ending hunger.

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## About the Authors

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