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World Food Assistance 2018

Preventing Food Crises

WFP
World Food Programme

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Beneficiaries of the Resilience and Climate Change Programme in El Salvador purchase food at the local supermarket with e-vouchers.
WFP/Rein Skullerud

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Foreword

In just the past few years, we have seen a dramatic increase in the number of people around the world who are trapped in food crises. Conflict, climate-related disasters and overall instability and insecurity are the main factors for why 124 million people in 51 countries were in food crisis in 2017, up from 108 million in 48 countries in 2016.

This report builds on datasets and analytical approaches that were first introduced in World Food Assistance 2017: Taking Stock and Looking Ahead. This year's report quantifies how short-term events and long-term factors influence the outbreak and intensity of food crises. Examining these phenomena through the lens of WFP's food assistance expenditures sheds unique insight into both drivers and deterrents of food crises.

We can and should do better in how we plan for the short-term natural disasters and other shocks that always happen. But that's just in the short term. In the long-term, we need to have a broader, deeper strategic plan that would help enhance the economies of communities, regions and countries that are susceptible to food crises. If we do this right, we might spend more money up front, but we'll be far more effective in the long run by making these areas more resilient. And if they are more resilient, they will be more stable and peaceful.

The message of World Food Assistance 2018 is clear: we can stem the tide of food crises – stopping them in many cases, and preventing them from expanding and persisting in others. The impact of effective prevention would be dramatic, not just in terms of the money we save, but the lives we change. We must remain committed to working with partners around the globe, from national authorities to the international community, to improve and enhance our work. If we do, then the dream of Zero Hunger can become a reality.

David Beasley
Executive Director
World Food Programme

Acknowledgements

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Children enjoy high-energy biscuits distributed as part of the WFP school feeding programme in Cox's Bazar, Bangladesh.

WFP/Shehzad Noorani

Summary

Chronic hunger is increasing, and food crises are spreading and intensifying across the world. *World Food Assistance 2018: Preventing Food Crises (WoFA 2018)* focuses on these crises, and asks what causes them to break out, what determines their scale and how they might be prevented.

Existing knowledge suggests that food crises are driven by combinations of short-term events such as conflicts and natural disasters and long-term influencers of poverty and food insecurity. Hence the prevention of food crises entails short-term action and long-term investment. But precisely which actions and investments should be prioritized in different contexts, and why, are still not clear.

WoFA 2018 seeks to reduce this knowledge gap through ground-breaking analysis of linkages between food assistance expenditures by the United Nations World Food Programme (WFP) and a range of other factors. Food assistance is uniquely positioned at the intersection of short-term humanitarian action and long-term hunger reduction. Food assistance expenditures thus constitute a powerful lens through which the drivers and deterrents of outbreak and intensity of food crises can be examined. The vision of the report is that increased understanding of the drivers of food assistance will lead to greater comprehension of the causes of food crises. This should in turn expand scope to prevent them.

A dataset covering 152 countries between 2009 and 2015 is analysed in two stages. In the first stage the probability of a food crisis in all 152 countries is examined; the presence of WFP food assistance is taken as an indicator of a food crisis. The aim is to identify factors influencing the probability that a country will need WFP food assistance, which in turn sheds light on causes of food crisis outbreaks. The second stage focuses on the scale of food crises. Only the 77 countries receiving food assistance from WFP are included, and the aim is to identify the factors that influence the level of food assistance expenditures and hence show what determines the scale of the underlying food crisis.

The results indicate that the likelihood of a food crisis outbreak increases in accordance with the share of a population affected by natural disasters, displacement and/or chronic hunger. The likelihood of outbreaks decreases with greater availability of food, better food absorption capacity and better access to markets and services.

The scale of a food crisis increases in line with the share of population affected by natural disasters and displacement and by lower food absorption capacity. The higher the income, the greater the level of education and the greater the political stability the smaller the scale of food crises. The size of a country does not affect the outbreak or scale of a food crisis.

Political instability, displacement, poor education and sparse infrastructure emerge as especially potent drivers of food assistance expenditures, and hence also of the food crises reflected in these expenditures. Exposure to natural disasters and food system congestion lead to greater than proportionate increases on food assistance expenditures. Lower income increases food assistance expenditures but less than proportionately.

The findings suggest that improved management of natural and man-made shocks in the short-term, and greater investments in political, social and economic underpinnings of societies in the longer term can reduce risks of food crises and lower food assistance expenditures significantly. For instance, such investments could have reduced WFP's global food assistance expenditures in 2016 by US$ 5.1 billion. This would have been equivalent to almost 96 percent of the US$ 5.3 billion WFP actually spent that year.

There are similarities and differences in priorities for preventing outbreaks of food crises and for containing them. Each component of the prevention agenda requires short-term and long-term action and investment to address the effects of identified risk factors. Priorities for preventing outbreaks of food crises and for containing them are inherently country-specific, but regional patterns are apparent. Priorities also vary across income groups.

A core argument in WoFA 2018 is that international food assistance signals the existence of food crises. The analysis shows that these crises are linked to myriad performance gaps in national food sectors, economies and political and social systems. The analysis also shows that international food assistance reveals challenges and opportunities at the humanitarian-development-peace nexus. The greater the level of international food assistance, the greater the challenges and opportunities at the nexus. The identified priorities for action and investment to prevent food crises can therefore justifiably be interpreted as priorities to generate and seize major dividends at the nexus.

Hunger, Food Crises and Food Assistance

Globally, 124 million people are caught up in food crises that condemn them to acute hunger and food insecurity (FSIN, 2018). Food crises are far more common among populations suffering from prolonged hunger and malnutrition (Timmer, 2010). About 11 percent of the world's population – 815 million people – are chronically hungry. In 2016 this number increased for the first time in a decade from 775 million in 2015 (FAO, IFAD and WFP, 2017). Risks of further food crises are therefore high and increasing.

World Food Assistance 2018: Preventing Food Crises (WoFA 2018) seeks to build an understanding of the factors that cause food crises to break out, persist and expand. Most important, WoFA 2018 seeks to identify how food crises can be prevented.

A mother feeds her children at the distribution centre at Gode wereda in Dolo Baad in the Somali region of Ethiopia.

WFP/Michael Tewelde

Many experts have addressed these quandaries: Barrett, 1996; Barrett and Bellamare, 2011; Brinkman et al., 2010; HLPE, 2011; Timmer, 2010; Timmer et al., 1983; World Bank, 2006. Considerable evidence indicates that rising labour productivity through economic growth, stable food prices and access to food by the poor are important (Dorward, 2013; FAO, 2011; Timmer, 2010). This suggests that food crises are caused not only by large-scale shocks such as the conflicts and natural disasters that dominate the news, but also by less visible underlying drivers of poverty and food insecurity. Hence the prevention of food crises entails two objectives: i) reducing short-term spikes of hunger; and ii) putting in place deep mechanisms of long-term pro-poor economic growth (Timmer, 2010).

To what degree does this short-term vs. long-term perspective hold in actuality? Which factors raise risks of sharp spikes of hunger that signal food crises? Which ones reduce those risks? Which are the most potent crisis intensifiers? Which are the most effective crisis mitigators? With the number of hungry people increasing again, the need for answers to these questions could not be more urgent. Precisely which actions and investments should be prioritized in different contexts, and why, are still unclear.

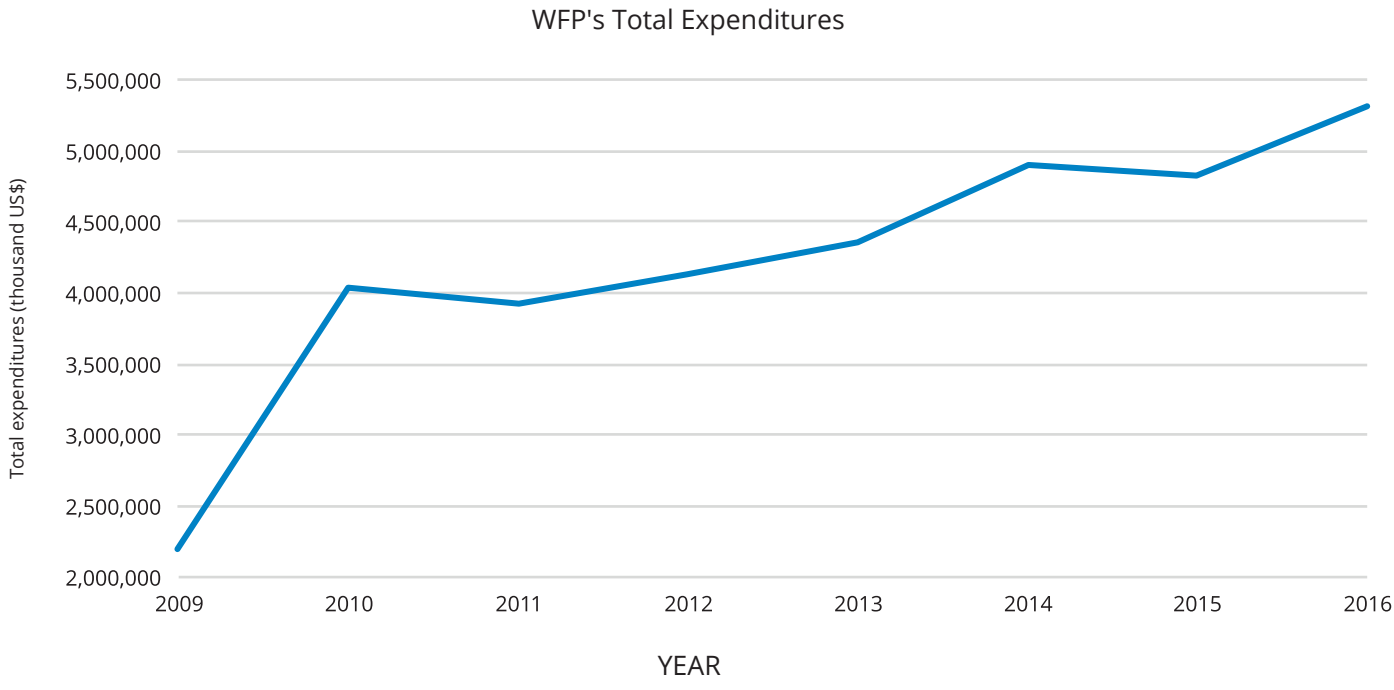
WoFA 2018 seeks to help to fill this knowledge gap through ground-breaking analysis of food assistance expenditures. The focus on food assistance expenditures is both novel and valuable. Almost by definition wherever there is an actual or potential food crisis, food assistance is required (OCHA, 2016). Food assistance accounts for 40 percent of humanitarian assistance (GHAR, 2016). In general, the more acute the humanitarian crisis the greater the demand for food assistance (WFP, 2017). In recent years, as humanitarian crises have grown in number and complexity, food assistance expenditures have expanded significantly, more than doubling between 2009 and 2016 (Figure 1).

But there is much more to food assistance than its role in averting starvation in humanitarian crises. As set out in World Food Assistance 2017: Taking Stock and Looking Ahead (WFP, 2017a), food assistance refers to multi-faceted efforts to empower vulnerable and food-insecure people and communities to access nutritious food. It seeks to save lives and livelihoods in the short term and to combat the root causes of hunger in the medium term and long term. Hence although expenditures on international food assistance are concentrated in countries in deep crises, the demand is much wider (Figure 2). When food assistance investments by national authorities are considered, the coverage is truly global (WFP, 2017a).

Women line up to be registered in WFP's SCOPE system to receive food assistance in Wajid, Somalia.
WFP/Kabir Dhanji

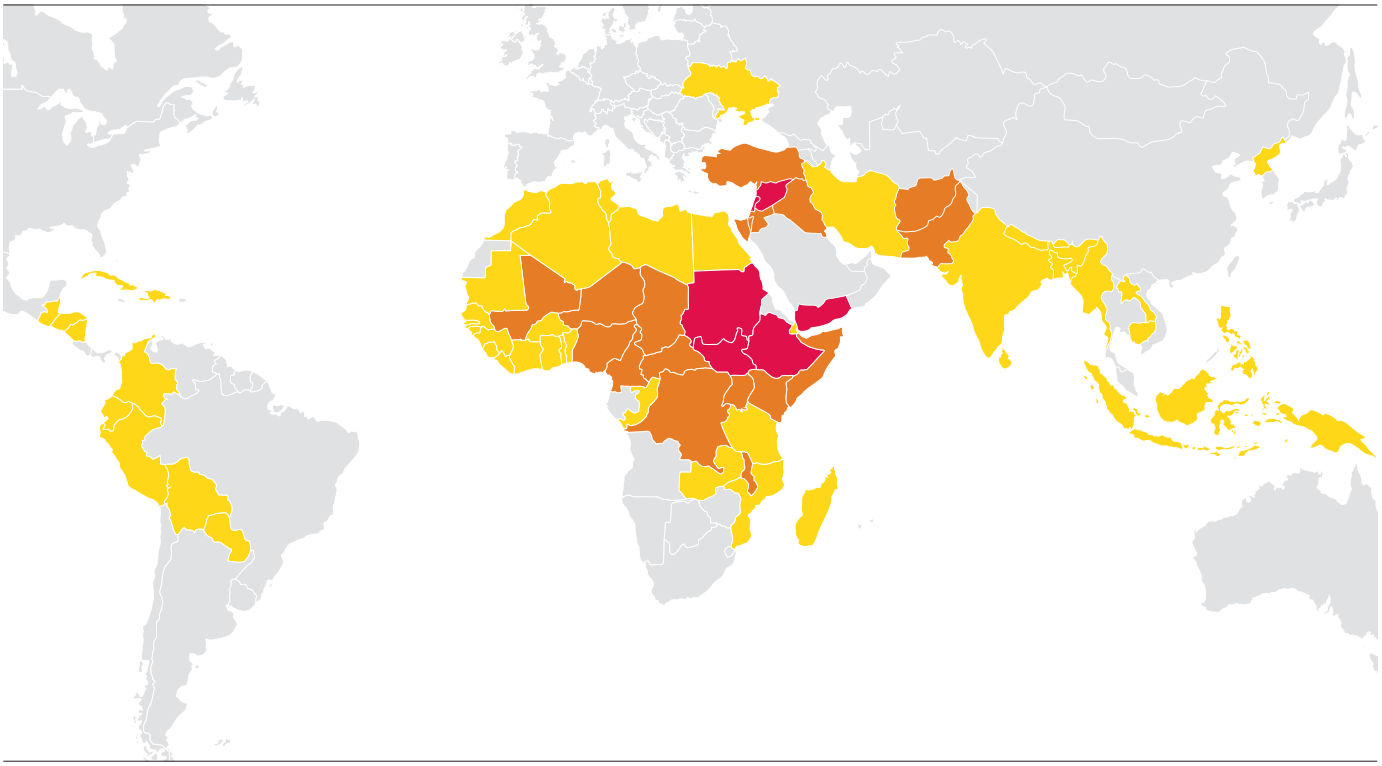
Adam Abu Bakr Khamis is a trader participating in WFP's cash and voucher programme in Otash Camp in Nyala, Sudan.
WFP/Gabriela Vivacqua

FIGURE 1: Food assistance expenditures by WFP more than doubled between 2009 and 2016



Source: WFP (2017).

FIGURE 2: WFP food assistance expenditures in 2016 were substantial and widespread, but they varied by country



Less than US$ 50 m

US$ 50 m - US$ 200 m

More than US$ 200 m

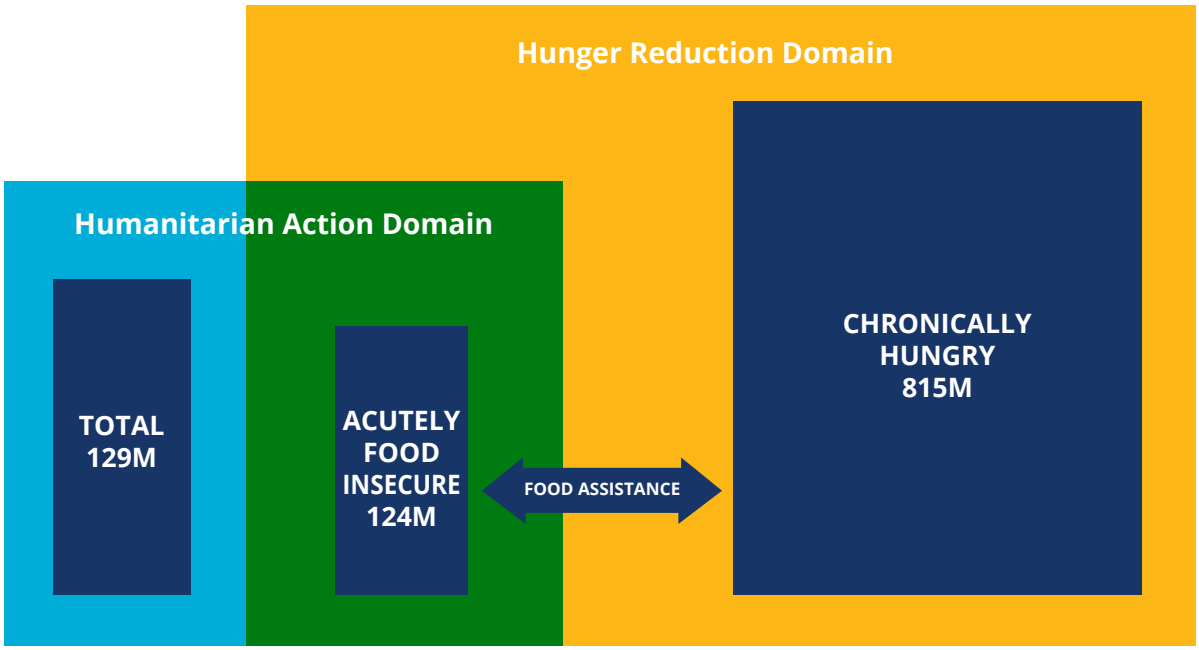
Source: WFP data, 2016-2017.

Food assistance is uniquely positioned at the intersection of short-term humanitarian action and long-term hunger reduction (Figure 3). It is therefore not only a fundamental building block of humanitarian action, but also an essential component of interventions that address vulnerability and food insecurity in transition and development contexts by seeking to enhance the resilience and performance of food systems (WFP, 2017a).

Food assistance expenditures thus constitute a powerful lens through which the drivers of food crises and the determinants of their scale can be examined (Figure 4).

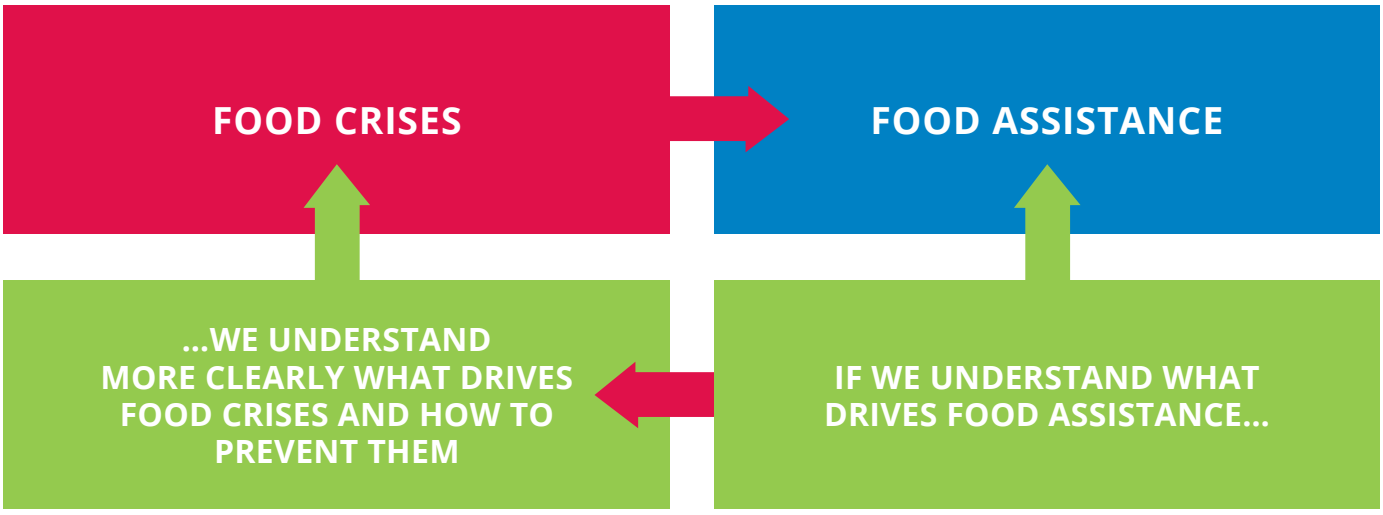
The vision is that increased understanding of the drivers of food assistance will lead to greater comprehension of the causes of food crises, which will increase the chance of preventing them. The next three sections present the analytical approach, empirical modelling strategy and dataset employed to build that understanding. The findings are then presented. Conclusions and implications round out this report.

FIGURE 3: Food assistance is situated at the intersection of short-term humanitarian action and long-term hunger reduction



Sources: FAO (2017); FSIN (2018); OCHA (2018); WFP (2017a).

FIGURE 4: Improved understanding of food assistance can increase understanding of food crises and how to prevent them



Women carry bags filled with sorghum during a food distribution in Gode wereda in Dolo Baad in the Somali region of Ethiopia.
WFP/Michael Tewelde

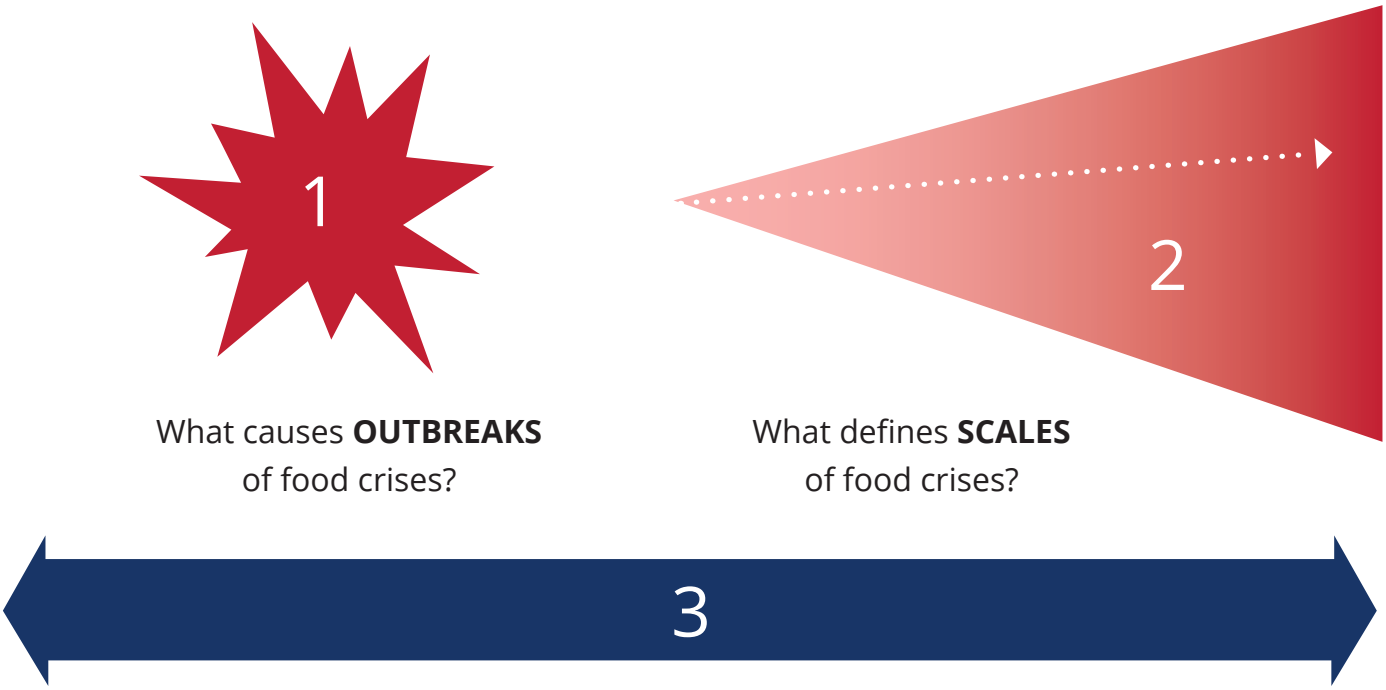
Questions and Analytical Approach

WoFA 2018 considers three main questions:

1. What causes food crises to break out?
2. What determines the scale of food crises?
3. How can food crises be prevented and diminished?

Coherent answers require a unified analytical approach in which outbreaks and scales of food crises are treated as distinct but highly related phenomena, and in which prevention relates to both (Figure 5).

FIGURE 5: WoFA 2018 seeks to understand how food crises can be prevented by examining the causes of outbreaks and factors that define their scale



The analytical focus is on international food assistance expenditures at the country level. Two broad issues are addressed: i) Does a country receive food assistance or not? If so, why; if not, why not? And ii) If a country receives food assistance, how much does it receive and why? The approach thus requires simultaneous analysis of the recipients and non-recipients of food assistance.

The available data on World Food Programme (WFP) food assistance expenditures and other variables yield a dataset covering 152 countries between 2009 and 2015, of which 77 were recipients of food assistance from WFP over this period and 75 were not. The analytical approach considers all 152 countries together in a two-stage analysis (Figure 6).

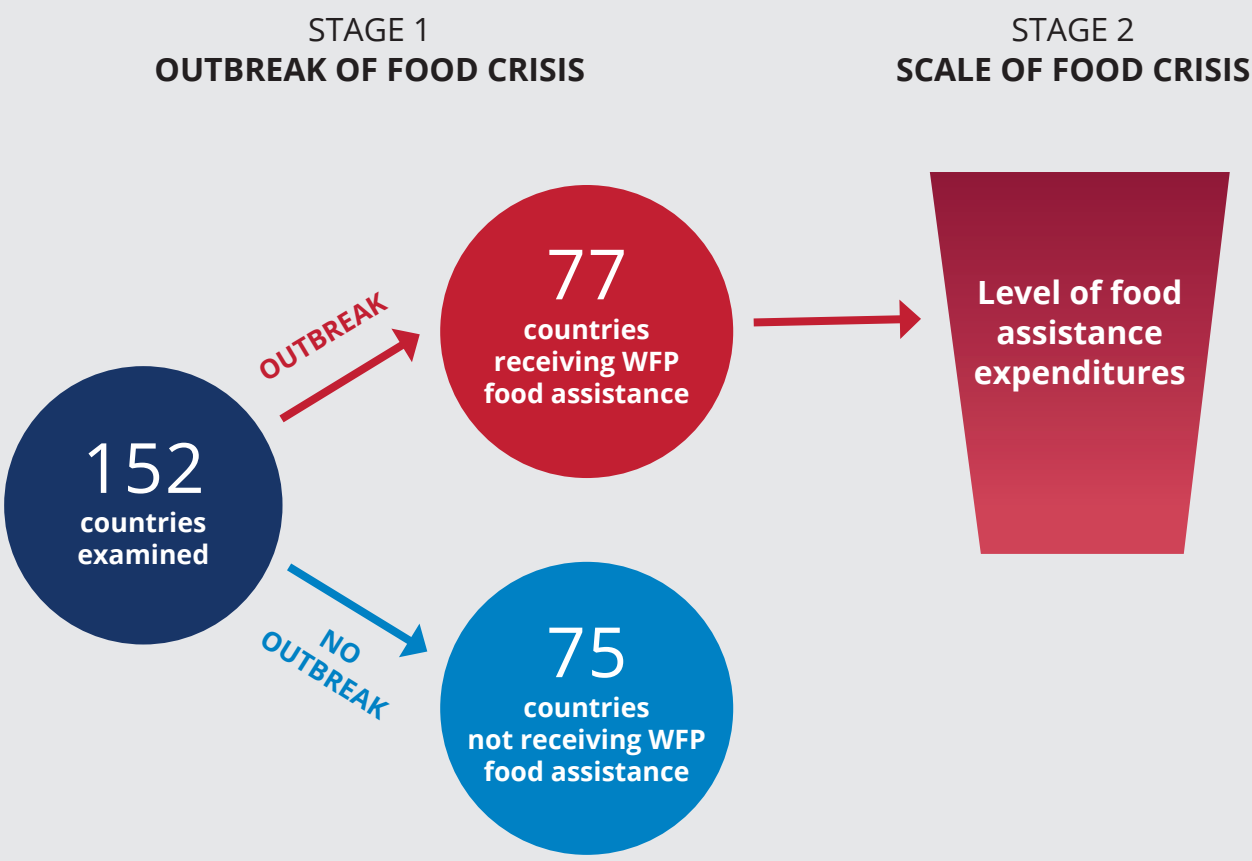
In the first stage the probability of a food crisis outbreak in all 152 countries is examined. The presence of WFP food assistance is taken as an indicator of a food crisis somewhere in the country. This stage aims to identify factors influencing the probability that a country will request or need international food assistance, thereby shedding light on what causes food crisis outbreaks.

In the second stage, only the 77 countries receiving food assistance from WFP are included. The aim is to identify the factors that influence the level of food assistance expenditures, revealing what determines the scale of underlying food crises.[i]

Hoda lives in Zaatari refugee camp with her father. She is one of 500,000 Syrians benefiting from WFP's e-voucher programme in Jordan.

WFP/Giulio d'Adamo

FIGURE 6: The WoFA 2018 analytical approach enables rigorous identification of factors influencing the presence and level of WFP food assistance in a country



Modelling Strategy

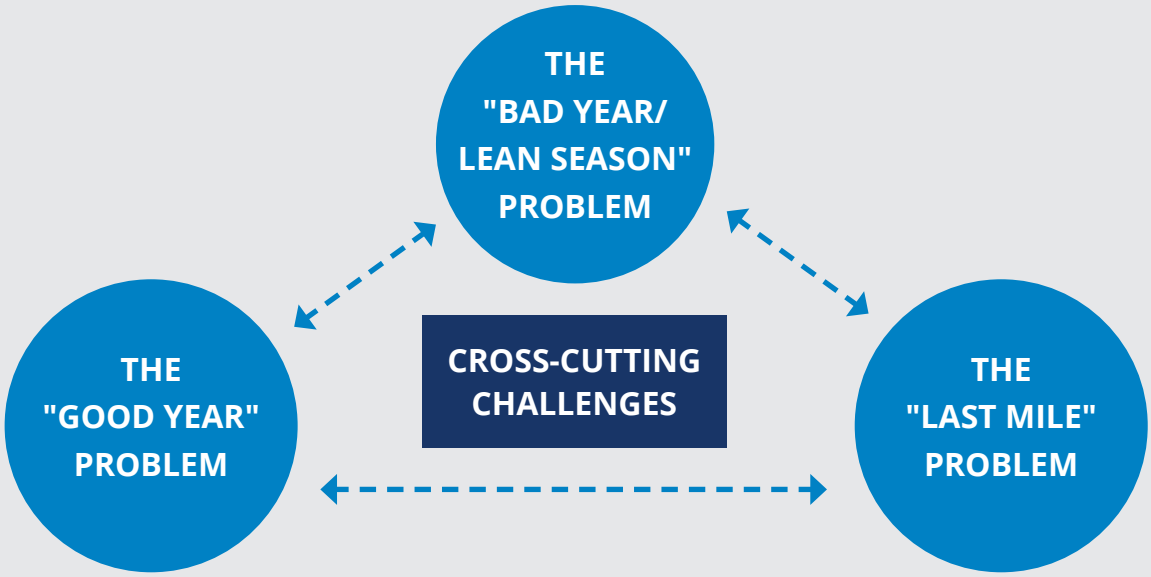
The modelling strategy proposes that the occurrence and scale of food crises are rooted in three systemic problems in food systems, as well as in a number of cross-cutting challenges (Figure 7). The three systemic problems are:

i. the bad year or lean season problem – linked to a range of unexpected shocks and seasonal factors that severely constrain access to nutritious food;

ii. the last mile problem – linked to the physical, economic, social and political isolation and marginalization of the hungry poor; and

iii. the good year problem – linked to the paradoxical challenge of absorbing food surpluses under conditions of limited storage, transport and financial capacity.

FIGURE 7: Food crises are linked to three systemic problems and numerous cross-cutting challenges facing food systems



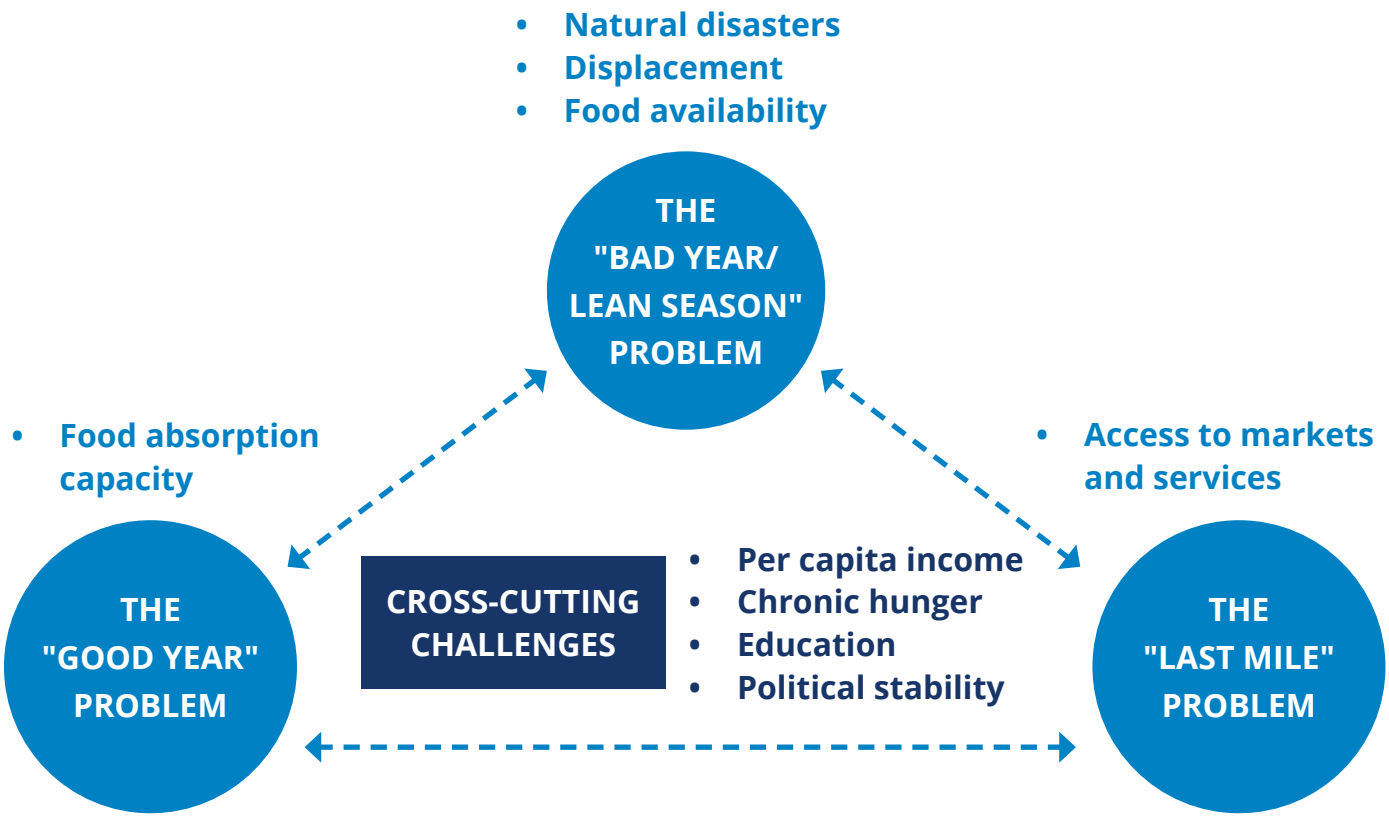
When ignored or inadequately addressed, the three systemic problems spur and perpetuate hunger. These problems also weaken food systems, increasing the risk that they will collapse under shocks. Such collapses lead to crises that require food assistance. Cross-cutting challenges are linked to conditions and outcomes that determine and reflect the overall performance of the economy, with strong implications for food systems. The argument is that when the three systemic problems and cross-cutting challenges are inadequately dealt with, food crises emerge and deepen. On the other hand, when they are effectively addressed food crises can be prevented or diminished (WFP, 2017a).

Data

Complete and fully comparable data on WFP food assistance expenditures are available for a large number of countries between 2009 and 2015. This period therefore defines the time coverage of the analysis. Data on variables that precisely capture systemic problems and cross-cutting challenges are patchy (e.g. food prices), unreliable (e.g. employment), erratic (e.g. income inequality), or simply non-existent for many countries (e.g. gender inequality).

But a number of existing datasets yield ten highly relevant measures available for 77 WFP countries of operation plus an additional 75 non-WFP countries for a total of 152 countries over this period (Figure 8 and Table 1). Three of the measures are linked to the bad year/lean season problem – natural disasters, uprooted populations and food availability; one is linked to the last mile problem – access to markets and services; and one is linked to the good year problem – food absorption capacity. Five are cross-cutting – per capita income, chronic hunger, education, political stability and country size.

FIGURE 8: The three systemic problems and cross-cutting challenges are captured by several phenomena



A girl attends WFP nutrition activities in Karamoja, Uganda.
WFP/Claire Nevill

The expected relationship between each factor and food assistance expenditures is shown in Table 1. On the basis of trends and patterns of food assistance reported in WoFA 2017 (WFP, 2017a), higher food assistance expenditures are expected to be associated with higher shares of populations that are affected by natural disasters, that are uprooted and that are chronically hungry. Conversely, higher food availability, greater access to markets and services, greater capacity to absorb food and agricultural surpluses, higher national income, higher education levels and greater political stability are expected to be associated with lower food assistance expenditures. The expected relationship between food assistance expenditures and the size of a country in terms of population is not conclusive *a priori* – it is positive in some cases, negative in others.

TABLE 1: The measures capturing the systemic problems and cross-cutting challenges have distinct expected relationship to food assistance expenditures

PROBLEM	DRIVER/ INFLUENCER	MEASURE	GLOBAL AVERAGE 2009	GLOBAL AVERAGE 2015	EXPECTED RELATIONSHIP
Bad year/ lean season problem	Natural disasters	Share of population affected by natural disasters (%)	**1.69**	**3.31**	↑
	Displacement	Share of population uprooted (%)	**0.62**	**1.18**	↑
	Food availability	Cereal yield growth rate (%)	**8.84**	**2.62**	↓
Last mile problem	Access to markets and services	Road density (km/1,000 people)	**3.4**	**11.01**	↓
Good year problem	Food absorption capacity	(AgGDP/Urban Population) growth rate (%)	**1.6**	**1.33**	↓
Cross-cutting	Per capita income	GDP per capita, PPP (constant 2011 international $)	**15 876**	**17 367**	↓
	Chronic hunger	Prevalence of undernourishment (%)	**12.14**	**11.34**	↑
	Educational achievement	Years of schooling (years)	**7.84**	**8.35**	↓
	Political stability	Index of political stability (score)	**-0.08**	**-0.09**	↓
	Size of country	Total population (millions)	**35.5**	**38.3**	↑↓

Findings

The econometric analysis confirms most of the expected relationships.[ii] It also reveals that the outbreak and scale of food crises are driven by different sets of factors.

Causes of Outbreaks

A country is significantly more likely to experience a food crisis if a share of its population is affected by natural disasters, displaced and/or chronically hungry; in each case, the larger the share, the greater the likelihood. Outbreaks are less likely where food availability, food absorption capacity and access to markets and services are better (Figure 9). Food availability and chronic hunger are important drivers of outbreaks, but do not influence the scale of food crises.

Determinants of Scale

Just as the share of a population affected by natural disaster and displacement raises the probability of a food crisis, it also significantly increases the scale (Figure 10). And just as greater access to markets and services lowers the probability of outbreaks, it also significantly reduces their scale. National income is not a significant determinant of food crises, but it exerts a significant impact on their scale: the higher the income, the lower the scale. Similarly, education level and political stability do not exert significant influences on the probability of food crises – but they are significant determinants of the scale of food crises when they occur: the greater the level of education and the greater the political stability, the smaller the scale of food crises. The size of a country does not affect either the occurrence or the scale of food crises.

FIGURE 9: Some of the factors increase the risk of a food crisis outbreak, others decrease it and others have no quantifiable impact

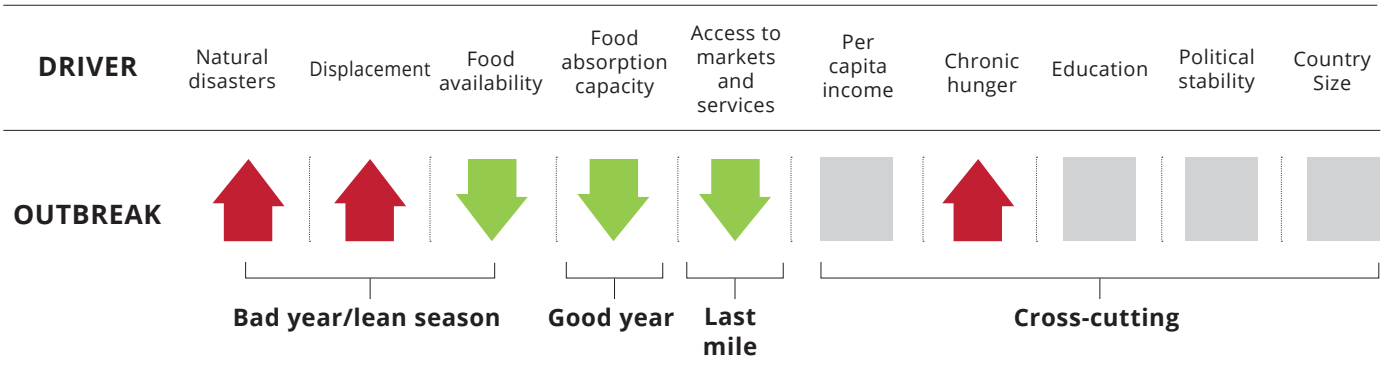
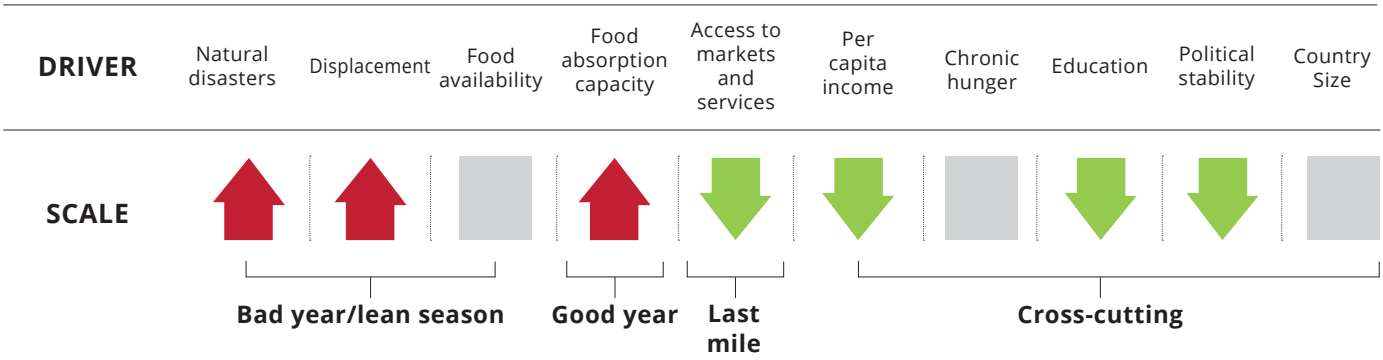


FIGURE 10: A different array of factors can increase the scale of food crises, while others decrease it and some have minimal impact

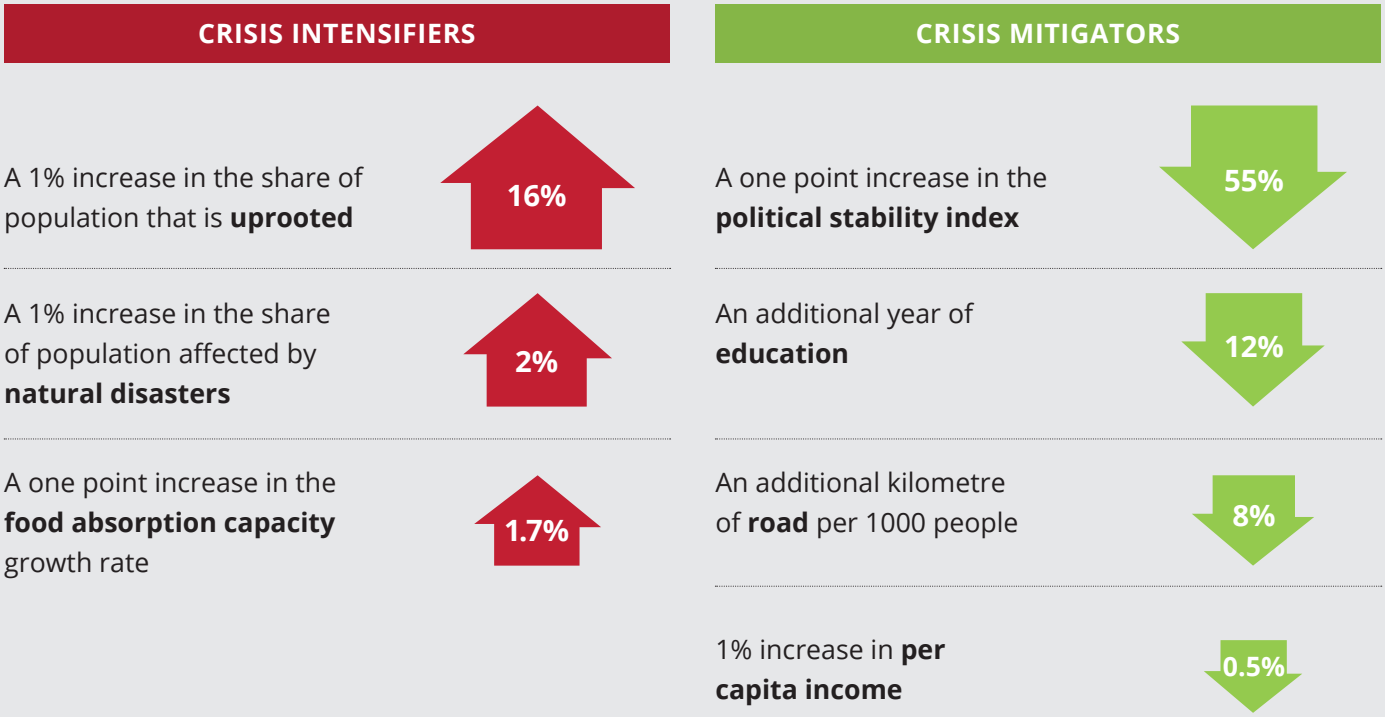


Estimated Impacts

The relative sizes of the quantitative impacts of these effects on food assistance expenditures differ significantly (Figure 11). It is not useful or appropriate to compare them directly. The underlying phenomena are highly diverse in nature, and the variables representing them are constructed in very different ways. The modelled changes are qualitatively dissimilar. But it is evident that none of these estimated impacts is trivial, and each is informative in its own right.

Political instability, displacement, poor education and sparse infrastructure appear to be especially potent drivers of food assistance expenditures, and thus also of the food crises these expenditures reflect. Increases in exposure to natural disasters and food system congestion lead to greater than proportionate increases in food assistance expenditures. Lower income increases food assistance expenditures, but less than proportionately.

FIGURE 11: The identified risk factors have different intensifying or mitigating effects on food crises



Potential Savings

Taken together, the set of estimated impacts presented in Figure 11 would have reduced WFP's global food assistance expenditures in 2016 by US$ 5.1 billion (Table 2) – 96 percent of the US$ 5.3 billion WFP actually spent that year. The savings would have been distributed across WFP's operational regions, and across income groupings according to underlying patterns of actual expenditures (Figure 12). The savings would have averaged US$ 56.7 million per country, with a high of US$ 562 million in South Sudan and a low of US$ 63,400 in Togo.

At this time of political ferment and conflict around the world, the quantitative importance of political stability and peace cannot be over-stated. The country-level impacts of even a one-point improvement in the World Bank's Index on Political Stability and Absence of Violent Conflict are significant. On the basis of 2016 expenditures, if Yemen registered a one-point improvement on the World Bank index, there would be an annual reduction in WFP's annual food assistance expenditure of US$ 205 million. In the Syrian Arab Republic a one-point increase on the index would save WFP US$ 300 million. Similarly, in Somalia, WFP would save US$ 85 million.

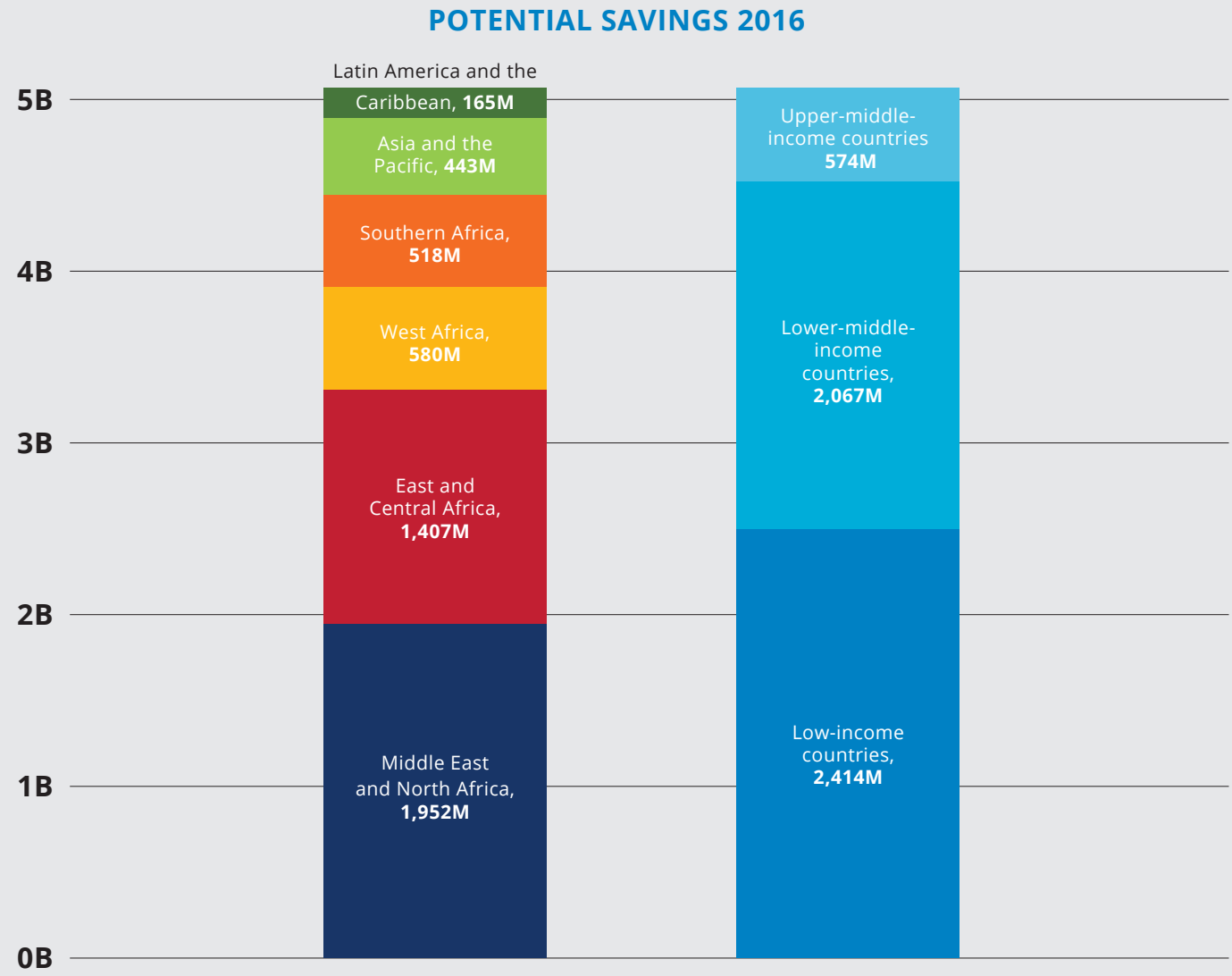
TABLE 2: Changes in crisis drivers could generate major decreases in food assistance expenditures

Change in crisis driver	**Estimated % decrease in food assistance expenditures**	**Estimated associated decrease in annual food assistance expenditures in 2016** (US$)
A one point increase in the political stability index	55	2.94B
A 1% decrease in uprooted share of population	16	841M
An additional kilometre of road for every 1000 people	12	435M
One additional year of education	8	652M
A 1% decrease in share of population affected by natural disasters	2	115M
A one point increase in food absorption capacity growth rate	1.7	89M
A 1% increase in per capita income	0.5	27M
TOTAL		**5.1B**

Internally displaced women and children at Kabasa camp in Dolow, Somalia.

WFP/Georgina Goodwin

FIGURE 12: The distribution of food assistance savings across regions and income groups fits with patterns of actual expenditures (US$)



Patterns Across Regions and Income Groups

The countries included in the analysis can be ranked on the basis of each of the identified factors that significantly increase the risk of food crises.[iii] Taking 2013 to 2015 as a reference point, as expected, these factors are more important in the crisis-affected countries where WFP was operational than they were in the other countries (Figure 13). The blue contour representing the crisis-affected countries lies wholly outside the red contour representing other countries. But the relative importance of each risk factor differs significantly by region and income group (Figures 14 and 15).

Although the analysis is completed at country level, examining regions and income groups builds understanding of patterns of exposure to different risk factors. Between 2013 and 2015, Eastern and Central Africa

(ECA) was the most exposed region, followed by West Africa (WA), Southern Africa (SA), the Middle East and Northern Africa (MENA), the Asia and the Pacific region (APR), and Latin America and the Caribbean (LAC).[iv] In APR natural disasters, access to markets and services and education were fundamental. In LAC natural disasters, access to markets and services were also important, but so were political stability and chronic hunger. In MENA political stability and displaced populations were clearly significant; access to markets and services was also important. In WA education, income and food availability were prominent. Compared with other regions all risk factors mattered in ECA, with displaced populations, education and income especially prominent. In SA education, income and food availability were the major risk factors.

Low-income countries (LICs) were more exposed than lower-middle-income countries (LMICs), which were more exposed than upper-middle-income countries (UMICS) and high-income countries (HICs).[v] In LICs education, access to markets and services, and chronic hunger were the major risk factors in addition to obvious challenges linked to low income levels. In LMICs education, political stability and access to markets and services were major factors. In UMICs and HICs political stability, displaced populations and natural disasters are most important. These differences across regions and income groups may have changed in the years since 2015. For instance, political stability would likely be much more important in West Africa. Unfortunately, the data required to identify such changes are not yet available.

FIGURE 13: The factors that increase the risk of food crises are more important in WFP's operational countries than others

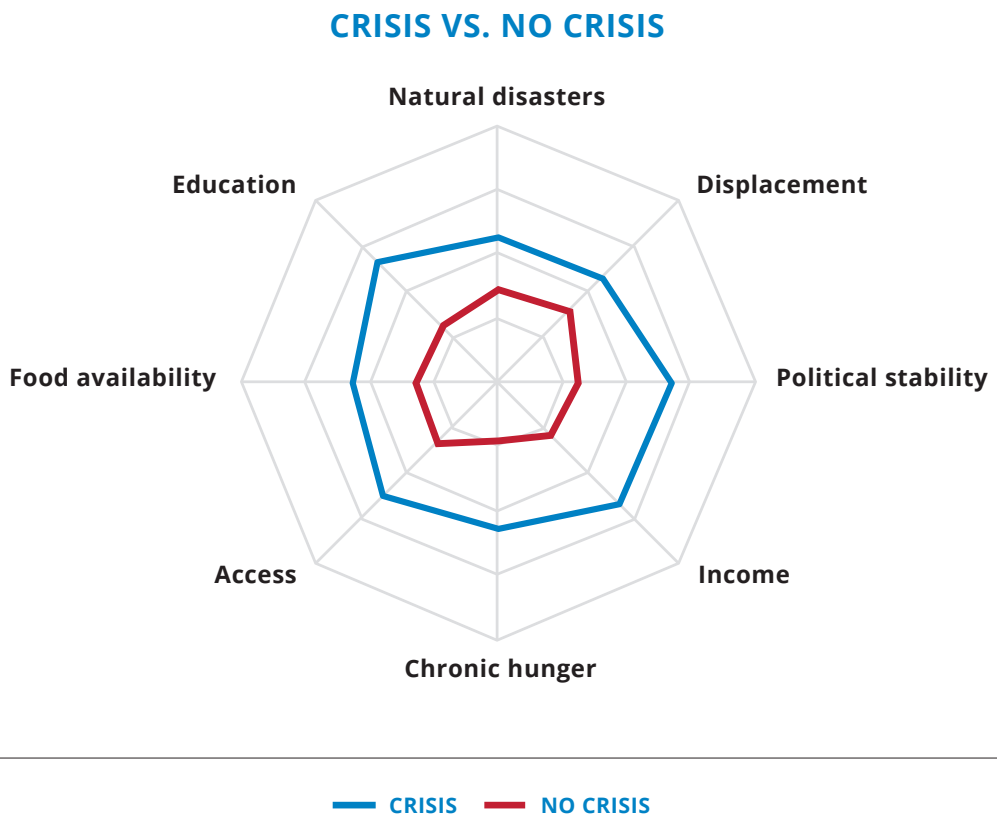
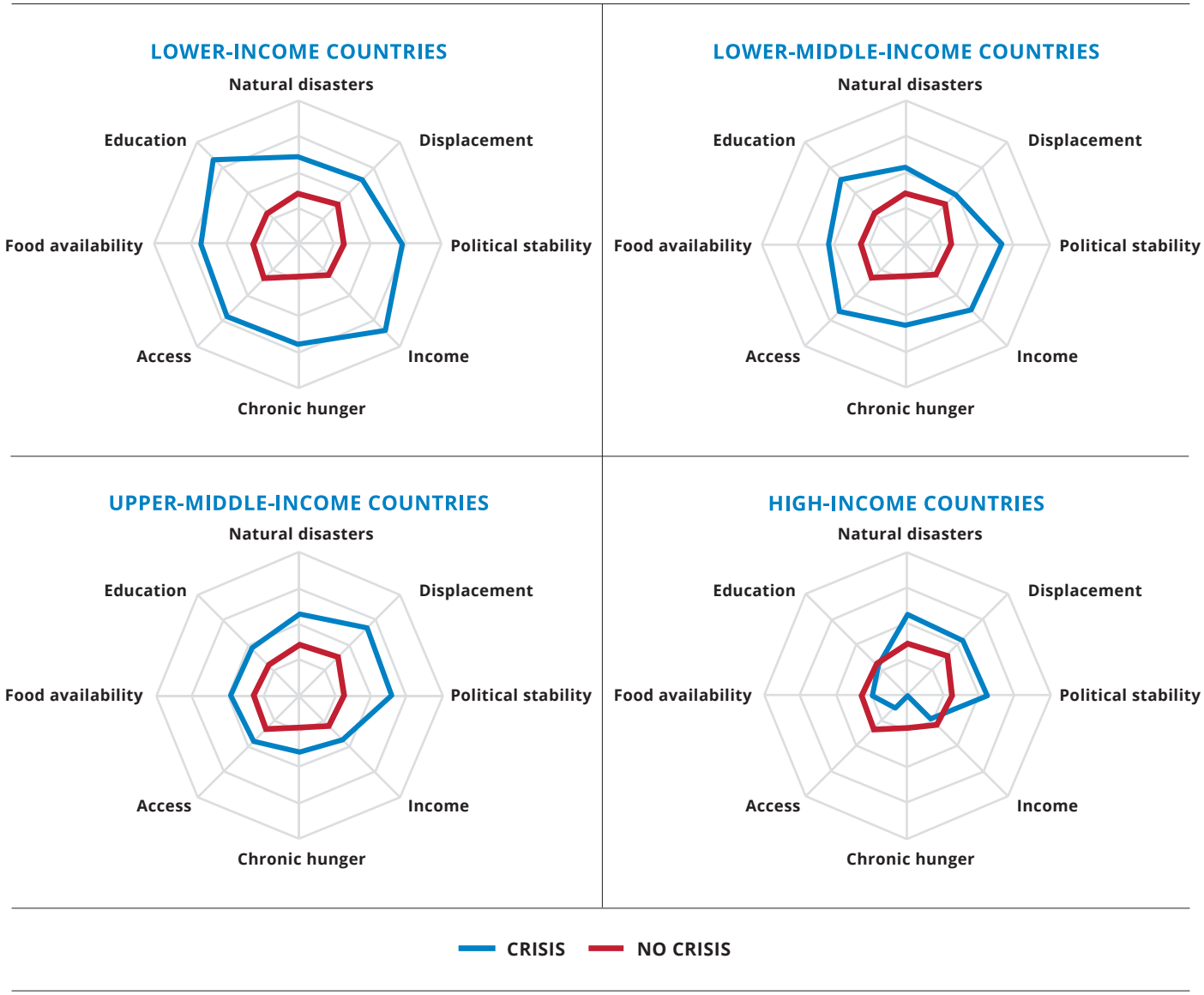


FIGURE 14: Risk factors for food crises differ by region

FIGURE 15: Risk factors for food crises differ by income group



Dividends at the Humanitarian-Development-Peace Nexus

The findings add important insight into challenges and opportunities at the so-called humanitarian-development-peace nexus (World Bank, 2016). The basic recognition is that the identified significant risk factors can be clustered under each of the three dimensions of the nexus (Figure 16). This allows for a simple but coherent estimation of a food assistance-related humanitarian-development-peace "dividend." First, the estimated impacts shown in Table 2 are applied to all expenditures by WFP between 2009 and 2016 in all of the countries in which it operated. Second, the computed savings associated with each risk factor are clustered as shown in Figure 16. The results are summarized in Figure 17.

FIGURE 16: Food crisis risk factors straddle the humanitarian-development-peace nexus

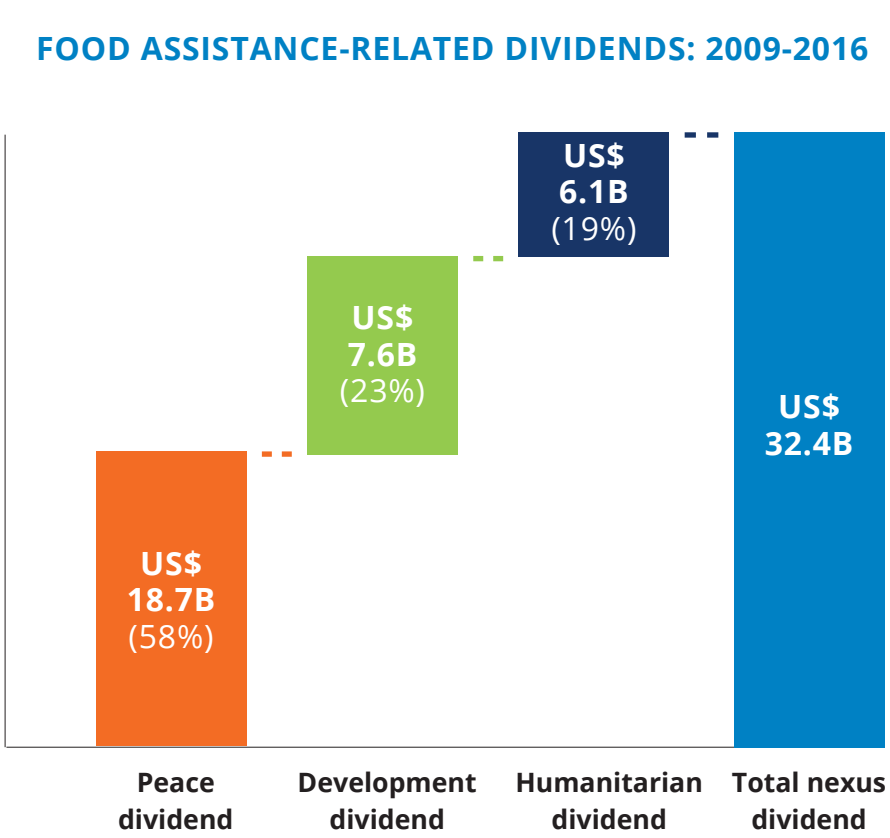
Mothers and their children shop at a fresh food market in Bhashantek, Bangladesh.

WFP/Wahid Adnan

The food assistance "nexus dividend" from 2009 to 2016 is estimated at US$ 32.4 billion. This translates into an average dividend of US$ 4.04 billion per year, or US$ 49.7 million per country per year. The peace dividend accounts for the bulk of the total: US$ 18.7 billion overall, US$ 2.33 billion per year and US$ 28.7 million per country per year. This reflects the size of the underlying impact of political instability on food crises. The development and humanitarian dividends are smaller but nonetheless significant: development – US$ 953 million per year and US$ 11.7 million per country per year; humanitarian – US$ 759 million per year and US$ 9.3 million per country per year.

The focus on international food assistance expenditures by WFP renders these estimates of nexus dividends illustrative rather than definitive. Not only is WFP only one of many providers of international food assistance, national expenditures are far greater than international flows. Nevertheless, the estimates – which represent the first unified attempt to quantify humanitarian-development-peace dividends – are highly informative with regard to the magnitude of potential benefits linked to action and investment at the nexus.

FIGURE 17: Estimated food assistance-related humanitarian-development-peace dividends between 2009 and 2016 are significant



Priorities for Action and Investment

There are similarities and differences in priorities for preventing outbreaks of food crises and for containing them (Table 3). Each component of the prevention agenda requires short-term and long-term action and investment to address the effects of identified risk factors. The identified significant risk factors generate challenges and opportunities in several sectors, but because WoFA 2018 focuses on food crises the priorities in Table 3 relate primarily to challenges and opportunities in the food sector.

Priorities are inherently country-specific, but regional patterns are apparent (Figure 18). Measures to improve political stability, access to markets and services, incomes and education are important in a number of regions. Coping with risks posed by displaced populations is paramount in MENA and ECA, where complex emergencies dominate food assistance. Measures to address chronic hunger are particularly important in SA, and efforts to increase food availability are especially important in WA. Effective management of and response to natural disasters are particularly significant in APR and LAC.

Priorities also vary by income group (Table 4). The higher a country's income level, the greater the importance of initiatives to promote political stability and the capacity to manage natural and man-made shocks. The lower a country's income level, the more decisive are measures to address factors that induce vulnerability such as access to markets and services, chronic hunger, and education.

Children at a WFP food distribution in Mboro, South Sudan.
WFP/Lara Atanasijevic

TABLE 3: Limiting the scale of food crises requires both short-term and long-term action and investment

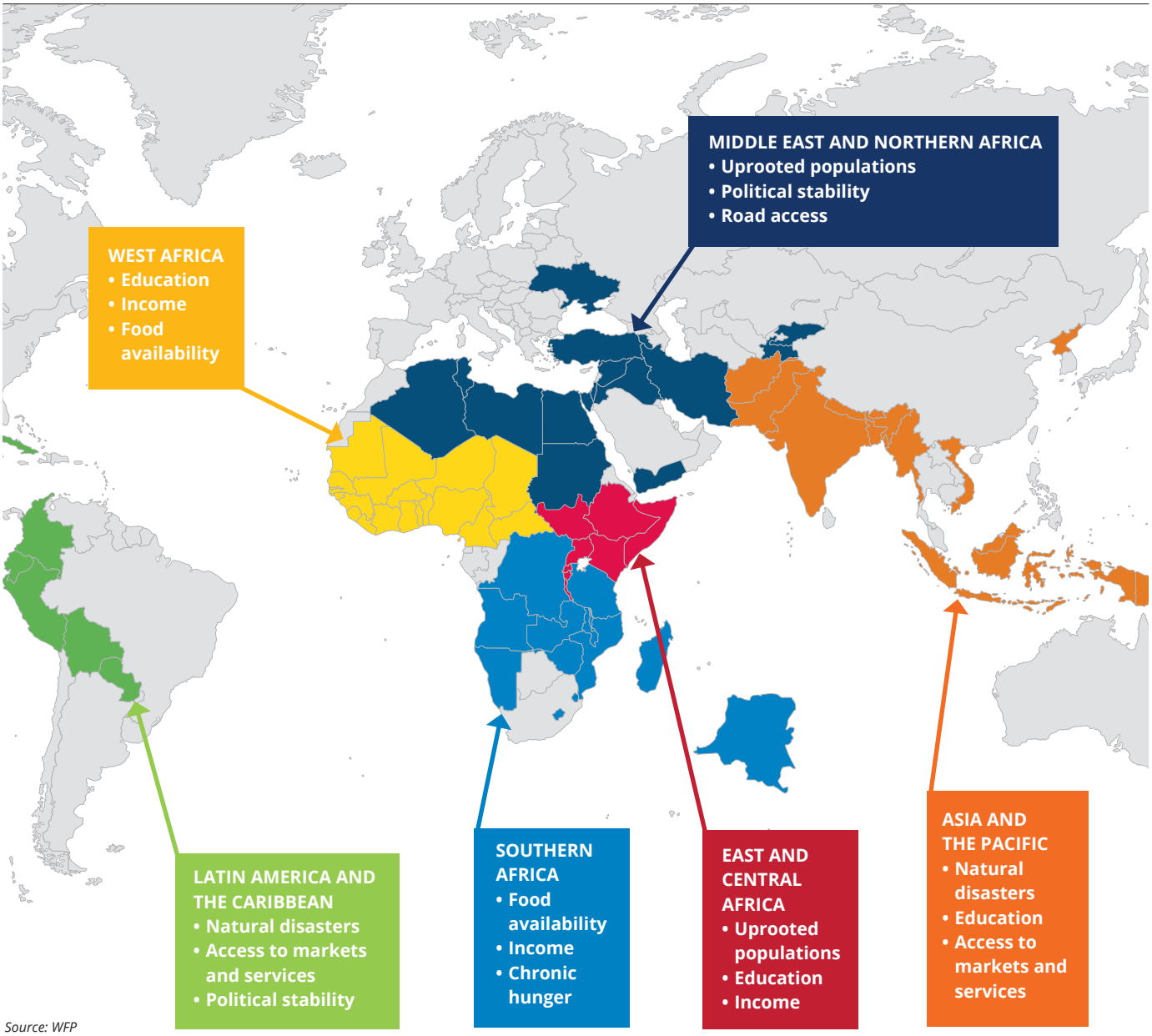
Identified risk factor	Time frame	Priority actions and investments to prevent food crises	Priority actions and investments to limit the scale of food crises	Sources
Displacement	Short term	• Provide timely and targeted support to shock-affected populations before they migrate • Support host communities	• Provide timely and targeted support to shock-affected populations before they migrate • Support host communities	Mabiso et al. (2014); UNHCR (2016); WFP (2017b); World Bank (2011).
	Long term	• Enhance emergency preparedness and response systems • Improve livelihood resilience for vulnerable groups	• Enhance emergency preparedness and response systems • Improve livelihood resilience for vulnerable groups	
Natural disasters	Short term	• Provide timely and targeted support for affected populations	• Provide timely and targeted support for affected populations	CRS (2013); DFID (2011); FEWS (2017); ISAC (2013); World Bank (2015a).
	Long term	• Enhance emergency preparedness and response systems • Integrate enhanced disaster risk management, reduction and transfer mechanisms and instruments into shock-responsive social protection systems	• Enhance emergency preparedness and response systems • Integrate enhanced disaster risk management, reduction and transfer mechanisms and instruments into shock-responsive social protection systems	
Food availability	Short term	-	Not applicable	CFS (2015); FAO (2013); Reardon, T. and Zilberman, D. (2016).
	Long term	• Improve agricultural research and extension systems • Increase the efficiency and effectiveness of public food reserves	Not applicable	
Food absorption	Short term	Not applicable	• Liberalize domestic and cross-border trade	Abrahamsson, M. and Rehme, J. (2010); Del Ninno et al. (2003); Macharia, J. (2015); World Bank (2012).

Identified risk factor	Time frame	Priority actions and investments to prevent food crises	Priority actions and investments to limit the scale of food crises	Sources
Food absorption	Long term	Not applicable	• Expand aggregation and financing options for smallholder farmers and small and medium scale agrifood enterprises • Increase access to improved storage and post-harvest management technologies and practices • Upgrade technical and organizational capacities of food supply chain service providers, especially aggregators • Expand processing capacity	
Access to markets and services	Short term		• Liberalize domestic and cross-border trade	Abrahamsson, M. and Rehme, J. (2010); AGRA (2012); Reardon, T. (2015).
	Long term	• Extend and upgrade road and communication infrastructures, including market information systems • Expand and upgrade physical infrastructure of food markets and supply chains • Upgrade technical and organizational capacities among food supply chain service providers, especially aggregators	• Extend and upgrade road and communication infrastructures, including market information systems • Expand and upgrade physical infrastructure of food market and supply chain • Upgrade technical and organizational capacities of food supply chain service providers, especially aggregators	
Chronic hunger	Short term	• Expand nutrition-specific interventions targeting vulnerable groups	Not applicable	FAO, IFAD and WFP (2015); FAO (2013); World Bank (2015b).
	Long term	• Expand nutrition education for vulnerable groups • Develop nutrition-sensitive food systems and value chains • Promote supply and uptake of locally produced fortified nutritious foods • Integrate nutrition-specific and nutrition-sensitive platforms in social protection systems • Improve design and enforcement of food quality and safety standards	Not applicable	
Education	Short term	Not applicable	• Expand school meals programmes and make meals more nutritious	Alderman, H. and Bundy, D. (2012); Hoddinott, J. and de Brauw, A. (2011).
	Long term	Not applicable	• Integrate nutrition education into school curricula	

Identified risk factor	Time frame	Priority actions and investments to prevent food crises	Priority actions and investments to limit the scale of food crises	Sources
Income	Short term	Not applicable	• Develop and strengthen shock-responsive social protection systems	Del Ninno et al. (2009); De Janvry, A. and Sadoulet, E. (2012); Von Braun, J. and Thorat, S. (2014); World Bank (2015b).
	Long term	Not applicable	• Enhance productive safety nets within shock responsive social protection systems	
Political stability	Short term	Not applicable	• Advocate strongly for adherence to humanitarian principles in conflict-affected areas to enhance access to affected populations • Leverage and coordinate food security interventions with peace-building and negotiation processes	GHAR (2016); Hopp-Nishanda. (2012); Kumar, C. and De la Haye, J. (2012); United Nations (2015a); World Bank (2011).
	Long term	Not applicable	• Promote political tolerance and conflict resolution • Leverage food-oriented community based participatory approached to strengthen inclusive local institutions	

Girls in Sar-e-kutal camp near Kabul benefit from WFP Afghanistan's cash-based transfer programme.
WFP/Julie Martinez

FIGURE 18: Priorities for action and investment vary by region, 2013-2015



Source: WFP

TABLE 4: Priorities for action and investment vary by income level, 2013-2015

LOWER-INCOME COUNTRIES	LOWER-MIDDLE-INCOME COUNTRIES	UPPER-MIDDLE-INCOME COUNTRIES	HIGH-INCOME COUNTRIES
• Income • Education • Chronic hunger	• Political stability • Education • Access to markets and services	• Uprooted populations • Political stability • Access to markets and services	• Natural disasters • Uprooted populations • Political stability

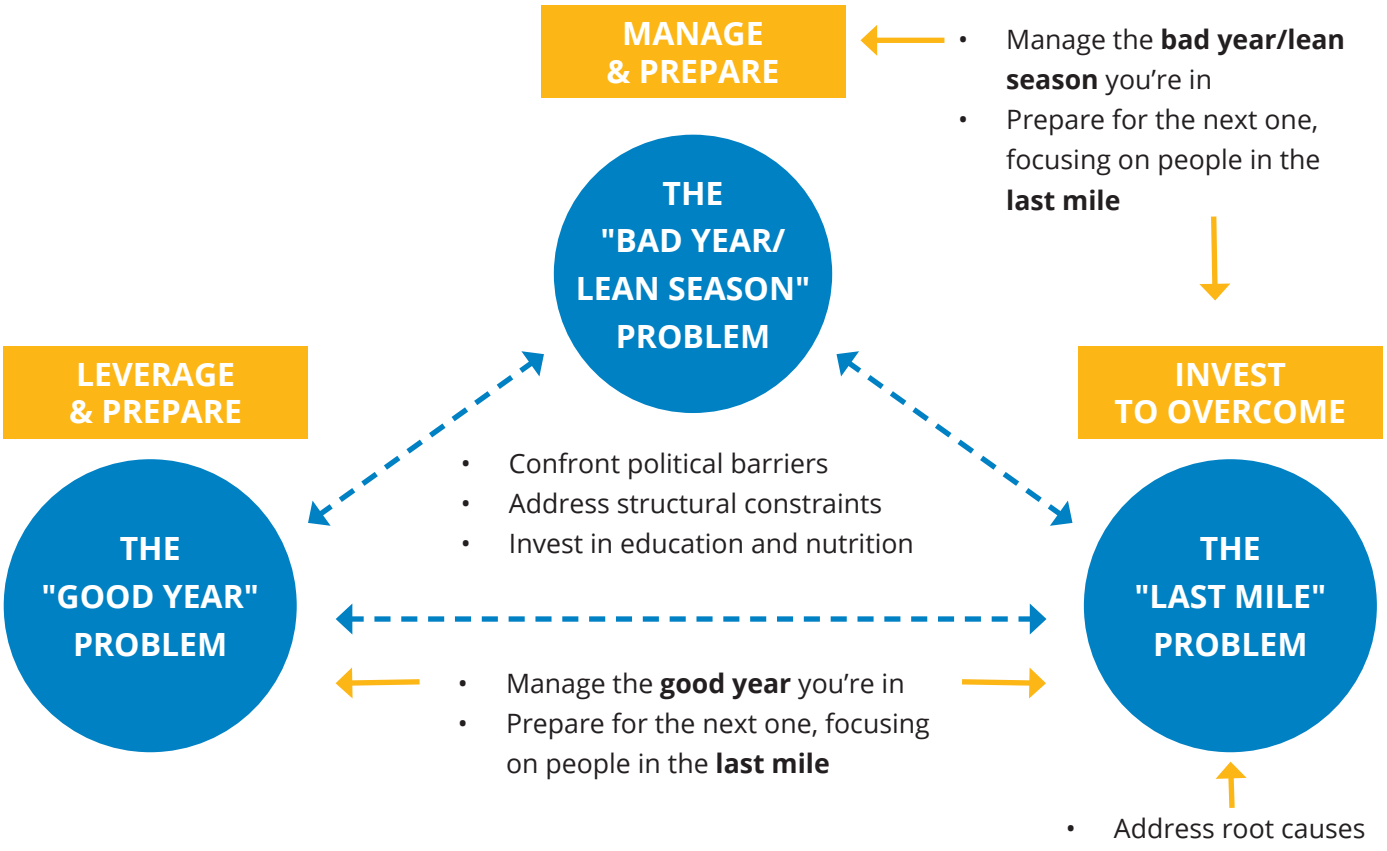
Conclusions

The pioneering demonstration of "food assistance analysis" in WoFA 2018 confirms that food crises have short-term and long-term drivers. Preventing food crises entails effective short-term management and responses to factors that cause spikes in hunger, along with long-term investments to combat the underlying drivers of hardship and exclusion. Additional analysis with more complete and refined data is required to implement the modelling strategy in full, but the findings affirm its core logic.

To prevent food crises, countries must recognize: i) that in any given year segments of their food systems will be experiencing bad years, lean seasons or good years; and ii) that the negative impacts of bad years, lean seasons and good years will be felt most strongly in the communities and households in the last mile. Four general rules emerge for preventing food crises (Figure 19):

1. Manage the current bad year or lean season and prepare for the next one, focusing on people in the last mile.
2. Leverage the current good year and prepare for the next one, again focusing on people in the last mile.
3. Address the root causes of isolation and exclusion in the last mile.
4. Address cross-cutting challenges, especially those with a political dimension.

FIGURE 19: Preventing food crises entails management, leverage and preparation for food system outcomes



A core argument of WoFA 2018 is that international food assistance signals the existence of food crises. The analysis shows that these crises are linked to myriad performance gaps in national food sectors, economies, political systems and social organization. The analysis also shows that international food assistance reveals challenges and opportunities at the humanitarian-development-peace nexus: the greater the level of international food assistance, the greater the challenges and opportunities. The identified priorities for action and investment to prevent food crises can therefore justifiably be interpreted as priorities to achieve major dividends at the nexus.

This shop vendor in Umerkot in Pakistan participates in WFP's blockchain-based cash-based transfer programme.
WFP/Alexandra Alden

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Technical Annex

DATA DESCRIPTION

1. FOOD ASSISTANCE EXPENDITURES

These are WFP's total direct expenditures in US$, not including Indirect Support Costs.
Source: WFP Information Network and Global Systems (WINGS), accessed in January 2017.

2. SHARE (%) OF POPULATION AFFECTED BY NATURAL DISASTERS

Total number of people affected by natural disasters divided by total population.
Source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium
Construction: The total number of people affected by natural disasters is the sum of the injured, homeless, and affected.

Injured: People suffering from physical injuries, trauma or an illness requiring immediate medical assistance as a direct result of a disaster.

Homeless: Number of people whose house is destroyed or heavily damaged and therefore need shelter after an event.

Affected: People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance.

3. SHARE (%) OF POPULATION UPROOTED

This is the total number of refugees and internally displaced persons by destination country divided by total population.
Source: UNHCR Population Statistics Reference Database
Construction: *Refugees* include individuals recognised under the 1951 Convention relating to the Status of Refugees; its 1967 Protocol; the 1969 OAU Convention Governing the Specific Aspects of Refugee Problems in Africa; those recognised in accordance with the UNHCR Statute; individuals granted complementary forms of protection; or those enjoying temporary protection. Since 2007, the refugee population also includes people in a refugee-like situation.

Internally displaced persons (IDPs) are people or groups of individuals who have been forced to leave their homes or places of habitual residence, in particular as a result of, or in order to avoid the effects of armed conflict, situations of generalised violence, violations of human rights, or natural or man-made disasters, and who have not crossed an international border. For the purposes of UNHCR's statistics, this population only includes conflict-generated IDPs to whom the Office extends protection and/or assistance. Since 2007, the IDP population also includes people in an IDP-like situation. For global IDP estimates, see www.internal-displacement.org

4. CEREAL YIELD GROWTH RATE (LAG1)

This is the year-on-year growth rate of country-level cereal yield.
Source: Food and Agriculture Organization of the United Nations (FAO)

5. ROAD DENSITY (KM PER 1000 PEOPLE)

Road density is computed as the ratio of the length in kilometers of the road network divided by the population measured in thousands. The cumulated length of the road network includes motorways, highways, and main or national roads, secondary or regional roads, and all other roads in a country. It is computed as a 3-year moving average.
Source: OSM © OpenStreetMap contributors.

6. GDP PER CAPITA, PPP (CONSTANT 2011 INTERNATIONAL $)

GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States.
Source: World Bank: World Development Indicators: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD
Construction: GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2011 international dollars.

7. MEAN YEARS OF SCHOOLING

Average number of years of education received by people aged 25 and older, converted from education attainment levels using official durations of each level.
Source: HDRO based on UNESCO Institute for Statistics (2016), Barro and Lee (2016), ICF Macro Demographic and Health Surveys and UNICEF's Multiple Indicator Cluster Surveys.

8. TOTAL POPULATION

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.
Source: World Bank, WDI.

9. PREVALENCE OF UNDERNOURISHMENT

The prevalence of undernourishment shows the percentage of the population whose food intake is insufficient to meet dietary energy requirements continuously. The prevalence of undernourishment is a three-year moving average that measures food deprivation based on average food available for human consumption per person, the level of inequality in access to food, and the minimum calories required for an average person.
Source: Food and Agriculture Organization of the United Nations (FAO), State of Food Insecurity in the World.

10. POLITICAL STABILITY AND ABSENCE OF VIOLENCE/TERRORISM

The Political Stability and Absence of Violence/Terrorism indicator measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Political Stability and Absence of Violence/ Terrorism is part of the process by which governments are selected, monitored, and replaced.
Source: Annually computed data available at the World Bank. Detailed documentation of the WGI, interactive tools for exploring the data, and full access to the underlying source data available at www.govindicators.org

"NUMBER OF FOOD ASSISTANCE PROGRAMMES"

"Number of food assistance programmes" is the number of years in which a country receives food assistance in the 2009-2016 period.
Source: WFP Information Network and Global Systems (WINGS), accessed in January 2017.

Estimation Methodology

Analysing the determinants of food assistance allocations contends with the fact that not only do countries receive different amounts of aid, many countries do not receive any aid at all. In other words, two stages can be distinguished in the process of aid allocation. The first stage is the OUTBREAK stage where it is determined which countries receive aid. The second stage is the SCALE stage, where it is determined how much aid is allocated to a country, which has been selected as an aid recipient in the first stage.

We frame our econometric analysis to ensure that we not only account for both decisions, but also account for the fact that they are interdependent.

We follow the lead of McGillivray and Oczcowsky (1992) and Neumayer (2003) in aid allocation literature, and adopt Heckman's (1979) sample selection model, which explicitly allows the error terms from both stages of aid allocation to be correlated. In our application, the two stages are estimated jointly via maximum likelihood estimation. Regression estimates using the non-selection hazard (what Heckman (1979) referred to as the inverse of the Mills' ratio from the selection equation) provide starting values for maximum likelihood estimation.

The general model (ignoring recipient/time detail) is therefore given as:

$$y_i = \mathbf{x}_i\boldsymbol{\beta} + u_{1i} \qquad \text{Scale stage}$$
$$\mathbf{z}_i\boldsymbol{\gamma} + u_{2i} > 0 \qquad \text{Outbreak stage}$$

Where:

$$u_1 \sim N(0, \sigma)$$
$$u_2 \sim N(0,1)$$
$$\text{corr}(u_1, u_2) = \rho$$

The log-likelihood function for observation i, $\ln L_i = l_i$, is

$$l_i = w_i \ln\Phi\left\{\frac{\mathbf{z}_i\boldsymbol{\gamma} + (y_i - \mathbf{x}_i\boldsymbol{\beta})\rho/\sigma}{\sqrt{1-\rho^2}}\right\} - \frac{w_i}{2}\left(\frac{y_i - \mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right)^2 - w_i \ln\left(\sqrt{2\pi}\sigma\right)$$
$$if\ y_i\ observed$$

and

$$l_i = w_i \ln\Phi(-\mathbf{z}_i\boldsymbol{\gamma})$$
$$if\ y_i\ not\ observed$$

Where Φ(.) is the standard cumulative normal and w_i is an optional weight for observation i. In the maximum likelihood estimation σ and ρ are not directly estimated. Directly estimated are lnσ and atanh *ρ*:

$$\operatorname{atanh}\rho = \frac{1}{2}\ln\left(\frac{1+\rho}{1-\rho}\right)$$

The standard error of $\lambda = \rho\sigma$ is approximated through the propagation of error (delta) method; that is, $\mathrm{Var}(\lambda) \approx \mathbf{D}\mathrm{Var}\{(\operatorname{atanh}\rho \ \ln\sigma)\}\ \mathbf{D'}$

Where **D** is the Jacobian of λ with respect to atanh *ρ* and ln*σ*.

On these grounds, we estimate the following empirical model.

The outbreak stage is expressed as follows:

$$\text{Selection}_{it} = \alpha_0 + \alpha_1 \ln(\text{GDP per capita})_{it} + \alpha_2 \text{share of population affected by natural disasters}_{it} + \alpha_3 \text{share of population uprooted}_{it} + \alpha_4 \text{prevalence of undernourishment}_{it} + \alpha_5 \text{cereal yield growth rate}_{it-1} + \alpha_6 \text{road density}_{it} + \alpha_7 \text{political stability}_{it} + \alpha_8 \text{mean years of schooling}_{it} + \alpha_9 \text{food absoprtion capacity growth rate}_{it} + \alpha_{10} \text{Number of food assistance programmes}_{t} + u_{it} \quad (1)$$

The scale stage is expressed as follows:

$$\ln(\text{food assistance expenditures})_{it} = \beta_0 + \beta_1 \ln(\text{GDP per capita})_{it} + \beta_2 \text{share of population affected by natural disasters}_{it} + \beta_3 \text{share of population uprooted}_{it} + \beta_4 \text{prevalence of undernourishment}_{it} + \beta_5 \text{cereal yield growth rate}_{it-1} + \beta_6 \text{road density}_{it} + \beta_7 \text{political stability}_{it} + \beta_8 \text{mean years of schooling}_{it} + \beta_9 \text{food absorption capacity growth rate}_{it} + v_{it} \quad (2)$$

Regional and year dummies are included in both equations but are suppressed for brevity in Table B. The data for the 7 years are pooled. To allow for the use of robust standard errors and to correct for unspecified serial correlation within countries, while assuming independence between them, the data are clustered by country.

The Heckman two-step estimator requires an exclusionary variable that has a significant impact upon the first-step (the outbreak stage), but not upon the second step (the scale stage) for the purpose of model identifiers. "Number of food assistance programs" is our exclusionary variable. This variable is defined as the number of years in which a country receives food assistance in the period under analysis. For example, if a country participates in food assistance only twice during the period 2009-2015 then "number of food assistance programs" takes a value of two.

The rationale is that the number of years in which a country participates in food assistance programs signals the "fixed cost" incurred by WFP to set up a programme in that country. Hence the more frequently the country is selected as a recipient of food assistance programs the more likely it will continue to receive assistance. Nevertheless, as the fixed cost has been paid and become sunk, it should not affect how much the country receives. Therefore, it is reasonable to exclude the variable from the level equation.

TABLE A: Overall descriptive statistics

Variable	Observations	Mean	Standard deviation	Min	Max
Food assistance expenditures (thousand US$)	648	48 114.26	86 451.84	0.5	546 824.90
Share of population affected by natural disasters (%)	1 530	1.87	6.74	-	95.30
Share of population uprooted (%)	1 531	0.86	2.82	-	40.52
GDP per capita, PPP (constant 2011 international $)	1 466	16 691.03	18 755.08	588.39	129 349.90
Prevalence of undernourishment (%)	1 166	11.51	11.02	2.40	58.60
Cereal yield growth rate (%)	1 227	4.39	24.61	- 83.89	337.36
Cereal yield (kg per hectare)	1 228	3 478.26	4 653.85	177.80	74 205.60
Road density (km/1 000 people)	1 319	7.51	9.63	0.03	81.25
Food absorption capacity growth rate (%)	1 376	2.15	8.18	- 49.30	59.60
Political stability (score)	1 526	- 0.09	0.99	- 3.31	1.55
Population (millions)	1 531	37.10	138.14	0.01	1 378.67
Mean years of schooling (years)	1 304	8.13	3.11	1.40	13.40

TABLE B: Model Estimation Results

	Stage 1 (Outbreak)		Stage 2 (Scale)	
	Coeff.	*Rob. Std. Err.*	*Coeff.*	*Rob. Std. Err.*
Ln(food assistance expenditures)				
Share of population affected by natural disasters	0.061**	(0.024)	0.021**	(0.010)
Share of population uprooted	0.168***	(0.057)	0.147***	(0.044)
Prevalence of undernourishment (%)	0.071*	(0.041)	0.011	(0.011)
Cereal yield growth rate (Lag1)	-0.0058*	(0.0027)	0.00095	(0.0013)
Food absorption capacity growth rate	-0.026*	(0.014)	0.017**	(0.008)
Road access (km/1000 people)	-0.088**	(0.038)	-0.085***	(0.026)
Ln(GDP per capita)	0.295	(0.273)	-0.509**	(0.237)
Political stability	0.069	(0.219)	-0.807***	(0.203)
Ln(population)	0.076	(0.075)	0.135	(0.128)
Mean years of schooling	0.008	(0.055)	-0.131*	(0.069)
Year dummies	yes		yes	
Region dummies	yes		yes	
Number of food assistance programs	0.77***	(0.097)		
Constant	-6.94***	(2.77)	17.35***	(2.69)
Observations	1053			
Wald test of indep. eqns.	p = 0.0001			

**p<0.1; **p<0.05; ***p<0.01*

TABLE C: Country averages for each identified risk factor, 2009-2016

Country	Food assistance expenditures (thousand USD)	Share of population affected by natural disasters (%)	Share of population uprooted (%)	GDP per capita, PPP (constant 2011 international $)	Prevalence of undernourishment (%)	Cereal yield growth rate (%)	Cereal yield (kg per hectare)	Road density (km/1000 people)	Food absorption capacity growth rate (%)	Political stability (score)	Population (millions)	Mean years of schooling (years)
Afghanistan	142 611.22	0.93	2.56	1 715.94	22.91	2.71	1 894.67	2.66	6.13	-2.56	31.26	3.36
Albania	127.18	1.28	0.00	10 462.27	6.36	4.04	4 662.17	6.32	3.04	0.06	2.90	9.40
Algeria	18 149.57	0.01	0.25	13 263.00	5.40	4.29	1 484.47	2.82	7.96	-1.22	37.99	7.46
Andorra		-	-					6.66		1.32	0.08	9.85
Angola	23.92	1.21	0.07	6 051.75	17.00	11.92	681.50	1.60		-0.37	25.60	4.81
Antigua and Barbuda		0.66	0.00	19 620.90	27.39	-0.06	1 596.53	11.71	1.24	0.94	0.10	9.26
Argentina		0.20	0.01	18 824.39	3.76	3.62	4 371.56	9.57	1.86	0.03	42.32	9.73
Armenia	2 932.43	0.33	0.35	7 477.81	5.06	3.78	2 626.31	5.89	4.33	-0.08	2.90	11.26
Australia		0.18	0.13	42 687.20	2.50	9.12	1 937.30	30.00	2.26	0.95	22.91	13.03
Austria		0.00	0.68	43 842.61	2.50	3.85	6 622.47	32.29	0.07	1.18	8.49	11.09
Azerbaijan		0.13	6.49	16 123.46	2.51	-0.61	2 527.14	2.39	3.02	-0.54	9.35	11.10
Bahamas, The		0.59	0.00	22 461.92	11.23	11.35	6 935.61	12.47	-2.74	1.01	0.37	10.90
Bahrain		-	0.02	42 390.36				2.36	2.68	-0.86	1.31	9.11
Bangladesh	44 544.06	1.96	0.15	2 790.10	16.39	2.00	4 350.04	0.13	3.76	-1.34	156.67	5.09
Barbados		0.11	0.00	15 390.52	4.74	0.36	2 878.83	7.43	-1.63	1.15	0.28	10.09
Belarus		0.06	0.01	16 936.20	2.50	4.90	3 309.96	16.40	1.92	0.10	9.48	11.99
Belgium		0.00	0.24	41 190.25	2.50	1.55	9 195.81	11.14	-1.27	0.78	11.11	11.27
Belize		1.05	0.02	7 920.01	6.00	4.87	3 177.19	13.34	-1.86	0.09	0.34	10.49
Benin	2 740.18	1.42	0.04	1 907.52	11.23	6.08	1 352.91	1.27	1.91	0.21	9.88	3.06
Bhutan	1 554.90	0.34	-	7 048.58		7.87	2 741.23	2.88	2.71	0.87	0.76	2.67
Bolivia, Plurinational State of	3 240.10	2.87	0.01	5 966.49	23.59	3.10	2 079.99	8.42	3.31	-0.37	10.32	8.01
Bosnia and Herzegovina	22.92	3.71	2.97	10 243.10	2.51	4.98	3 930.43	9.22	0.32	-0.49	3.63	8.24
Botswana		0.06	0.13	14 540.03	26.57	-5.52	348.40	18.61	0.52	1.05	2.11	9.06
Brazil		2.28	0.00	14 721.79	2.50	4.19	4 213.23	3.96	1.71	-0.13	201.40	7.24
Brunei Darussalam		-	-	78 255.36	2.83	4.73	785.44	3.96	1.46	1.19	0.40	8.87
Bulgaria		0.08	0.12	16 114.31	4.76	17.17	4 125.86	9.91	-2.15	0.21	7.29	10.67
Burkina Faso	21 462.19	5.36	0.12	1 496.56	20.46	4.31	1 097.86	1.93	0.58	-0.54	16.85	1.40
Burundi	22 496.83	0.31	1.43	767.22		0.56	1 225.73	0.93	1.90	-1.57	9.48	2.81
Cambodia	15 191.53	5.29	0.00	2 906.35	17.53	3.13	3 074.47	1.96	2.53	-0.17	14.91	4.43
Cameroon	25 795.75	0.21	1.01	2 810.33	9.71	0.13	1 672.19	1.99	4.76	-0.75	21.40	5.67
Canada		0.08	0.43	41 917.03	2.50	3.47	3 593.20	28.45	2.53	1.13	34.95	12.87
Cape Verde	261.86	0.57	-	5 937.38	14.90	23.51	220.83	4.16	1.32	0.76	0.52	4.51
Central African Republic	41 520.75	0.22	7.29	761.25	43.67	7.93	1 370.97	4.37	-4.00	-2.01	4.50	4.17
Chad	124 693.87	4.98	3.68	1 935.16	37.40	3.62	773.56	1.63	3.20	-1.31	12.94	2.09
Chile	55.53	3.03	0.01	21 153.19	3.97	1.60	6 331.59	8.45	1.66	0.48	17.38	9.87
China		6.00	0.02	11 548.54	10.93	1.47	5 690.43	0.60	4.00	-0.55	1 354.42	7.37
Colombia	15 098.79	1.25	10.71	11 994.90	9.43	2.52	3 582.23	2.40	2.05	-1.31	47.08	7.30
Comoros		1.49	-	1 419.81		0.39	1 342.93	1.15	1.74	-0.38	0.73	4.50
Congo	8 600.19	0.06	1.90	5 286.12	28.99	1.09	800.97	2.37	5.46	-0.42	4.69	6.19
Congo, Democratic Republic of the	122 031.09	0.08	3.43	673.00		0.01	771.77	2.55	3.60	-2.15	70.32	5.74
Costa Rica		0.75	0.35	13 945.29	5.41	1.12	3 619.21	5.02	1.58	0.64	4.68	8.44

Country	Food assistance expenditures (thousand USD)	Share of population affected by natural disasters (%)	Share of population uprooted (%)	GDP per capita, PPP (constant 2011 international $)	Prevalence of undernourishment (%)	Cereal yield growth rate (%)	Cereal yield (kg per hectare)	Road density (km/1000 people)	Food absorption capacity growth rate (%)	Political stability (score)	Population (millions)	Mean years of schooling (years)
Cote d'Ivoire	18 843.31	0.01	0.99	2 905.79	15.77	5.45	1 998.67	1.55	2.45	-1.17	21.74	4.53
Croatia		0.04	0.03	20 485.48	2.51	5.74	5 645.74	15.96	-4.17	0.62	4.28	10.96
Cuba	3 140.19	0.56	0.00		2.50	0.79	2 545.71	5.14	1.19	0.43	11.40	11.43
Cyprus		-	0.41	31 788.90	4.57	-5.79	1 635.17	17.16	-2.87	0.54	1.14	11.51
Czech Republic		1.56	0.03	29 037.75	2.50	5.74	5 256.90	17.03	3.87	1.01	10.51	12.33
Denmark		-	0.34	44 617.27	2.50	2.82	6 276.74	20.95	3.85	0.96	5.61	12.86
Djibouti	10 328.03	2.94	2.02	2 818.46	18.66	1.60	1 895.99	2.22		-0.11	0.89	4.03
Dominica		4.93	-	10 145.54	5.64	1.89	1 521.40	13.05	2.59	1.01	0.07	7.86
Dominican Republic	873.40	2.41	0.01	12 042.33	14.90	-0.71	4 153.54	2.54	5.56	0.14	10.21	7.47
Ecuador	5 848.06	1.25	0.77	10 201.54	12.09	2.63	3 050.10	4.01	3.63	-0.37	15.54	7.91
Egypt	21 680.90	0.00	0.18	9 896.80	4.46	-0.20	7 163.76	0.87	3.06	-1.32	88.92	6.77
El Salvador	10 202.13	2.40	0.00	7 584.04	12.49	-0.41	2 690.16	1.72	0.61	0.03	6.24	6.43
Equatorial Guinea		-	-	32 162.00				3.63	6.99	0.04	1.06	5.50
Eritrea	18.40	-	0.11	1 446.22		6.45	527.14	0.60		-0.80	4.39	3.89
Estonia		-	0.01	25 416.69	2.67	3.80	2 976.21	31.23	3.04	0.66	1.32	12.34
Ethiopia	349 414.16	3.10	0.46	1 292.31	30.53	7.19	1 926.93	0.77	5.83	-1.52	93.77	2.43
Fiji	415.06	7.06	0.00	7 946.62	4.49	-0.73	2 452.66	4.42	0.37	0.16	0.88	10.04
Finland		-	0.21	39 521.82	2.50	0.51	3 552.80	42.92	2.40	1.29	5.42	10.69
France		0.10	0.36	37 342.19	2.50	2.44	7 162.79	18.51	0.23	0.39	65.82	11.19
Gabon		0.59	0.19	16 129.36	8.16	-0.53	1 601.97	5.56	3.64	0.19	1.79	7.83
Gambia	3 898.69	3.80	0.51	1 585.81	9.81	0.29	949.09	1.89	-0.51	-0.06	1.83	3.04
Georgia	1 193.65	0.54	7.64	7 935.08	7.57	2.97	1 978.91	13.38	1.51	-0.57	3.82	12.19
Germany		0.00	0.57	42 364.57	2.50	4.09	7 118.30	19.49	-3.80	0.82	81.30	13.07
Ghana	8 699.15	0.19	0.06	3 573.71	6.24	4.24	1 689.53	1.42	4.00	0.01	26.05	6.83
Greece	14.53	0.09	0.11	25 719.50	2.50	1.06	4 303.87	15.47	1.01	-0.17	10.98	10.33
Grenada		-	0.00	11 709.00	25.47	0.05	1 008.97	9.20	9.81	0.60	0.11	8.50
Guatemala	11 799.22	5.59	0.00	6 992.45	15.89	-1.93	2 066.96	1.30	3.46	-0.71	15.44	5.27
Guinea	19 783.79	0.18	0.10	1 210.79	17.33	-2.38	1 278.53	2.48	5.19	-1.18	11.44	2.20
Guinea-Bissau	5 386.57	0.46	0.50	1 418.46	24.61	-0.01	1 489.81	1.80	2.42	-0.71	1.66	2.74
Guyana		3.24	0.00	6 480.63	10.14	3.15	4 517.23	5.02	1.26	-0.35	0.76	8.33
Haiti	82 307.42	13.78	0.00	1 606.20	49.13	0.80	1 008.16	1.97		-0.79	10.36	4.91
Honduras	26 183.14	2.05	0.48	4 146.36	15.49	0.41	1 688.74	1.92	3.86	-0.42	8.58	5.69
Hungary		0.09	0.04	23 351.73	2.50	11.41	4 975.59	13.26	-0.15	0.70	9.92	11.80
Iceland		-	0.03	41 084.71	2.50			67.60	0.01	1.23	0.32	11.41
India	4 179.71	3.90	0.02	5 028.52	15.27	2.12	2 809.20	0.52	3.36	-1.17	1,270.15	5.69
Indonesia	5 369.31	0.27	0.00	9 418.26	9.80	1.92	4 933.40	0.65	3.87	-0.61	250.36	7.63
Iran, Islamic Republic of	2 465.35	0.09	1.25	16 684.65	5.66	-2.54	1 947.43	1.98	5.23	-1.22	76.96	8.44
Iraq	81 026.37	0.03	6.97	14 211.90	26.90	8.33	1 906.17	1.48	5.87	-2.15	33.42	6.53
Ireland		0.00	0.15	49 865.73	2.50	3.14	7 626.89	21.35	3.52	0.96	4.62	11.84
Israel		3.23	0.45	30 901.61	2.50	7.57	3 450.37	4.53	0.60	-1.16	8.00	12.57
Italy		0.03	0.14	35 064.63	2.50	1.56	5 389.76	10.70	0.17	0.44	59.96	10.13
Jamaica		1.90	0.00	8,080.13	8.94	-0.89	1,263.69	2.80	4.77	-0.02	2.84	9.57
Japan		0.13	0.00	36,592.37	2.49	0.08	6 052.57	7.48	-3.40	0.98	127.55	11.99
Jordan	91 362.55	-	6.52	8,957.46	3.86	13.67	1,563.44	2.99	3.39	-0.50	8.18	9.96
Jordan	91 362.55	-	6.52	8,957.46	3.86	13.67	1,563.44	2.99	3.39	- 0.50	8.18	9.96

Country	Food assistance expenditures (thousand USD)	Share of population affected by natural disasters (%)	Share of population uprooted (%)	GDP per capita, PPP (constant 2011 international $)	Prevalence of undernourishment (%)	Cereal yield growth rate (%)	Cereal yield (kg per hectare)	Road density (km/1000 people)	Food absorption capacity growth rate (%)	Political stability (score)	Population (millions)	Mean years of schooling (years)
Kazakhstan		0.06	0.01	21 982.36	2.74	10.42	1 121.50	7.68	4.01	0.02	16.93	11.56
Kenya	199 102.99	3.90	1.54	2 647.45	21.66	0.31	1 559.84	1.26	4.05	-1.27	44.28	6.21
Kiribati		0.19	-	1 805.16	3.40			4.41	1.86	1.15	0.11	7.76
Korea, Democratic People's Republic of	33 119.57	11.32	-		41.46	5.41	3 711.49	1.07		-0.50	24.92	
Korea, Rep.		0.03	0.00	32 142.28	2.50	1.46	6 443.56	1.85	-0.06	0.27	50.30	11.87
Kuwait		-	0.01	75 207.14	2.50	42.63	10 723.34	2.30	2.71	0.16	3.47	6.99
Kyrgyzstan	8 748.81	4.72	0.97	3 031.18	7.46	-0.01	2 596.50	5.51	2.31	-0.87	5.69	10.66
Lao People's Democratic Republic	10 344.44	2.50	-	4 701.72	18.81	2.44	4 120.79	3.35	2.77	0.14	6.46	4.91
Latvia		-	0.01	21 007.57	2.50	3.42	3 199.59	24.43	3.88	0.45	2.03	11.73
Lebanon	109 105.46	2.14	9.54	14 526.30	4.76	2.89	2 615.41	2.21	1.95	-1.63	5.10	8.31
Lesotho	10 338.63	9.99	0.00	2 579.70	13.60	32.33	574.73	4.38	3.79	0.11	2.11	5.91
Liberia	30 866.45	1.76	1.11	756.38	38.66	-0.74	1 291.30	2.36	1.91	-0.61	4.23	4.26
Libya	8 669.74	0.00	2.58	23 086.07		1.13	656.67	8.34		-1.33	6.20	7.27
Liechtenstein		-	0.30					17.23		1.47	0.04	12.23
Lithuania		-	0.03	24 318.47	2.50	5.18	3 466.99	23.87	1.57	0.76	2.99	12.47
Luxembourg		-	0.42	92 432.76	2.50	2.26	5 788.66	21.98	3.77	1.39	0.54	11.86
Macedonia, FYR		0.95	0.05	11 937.77	4.29	7.07	3 410.67	5.89	-0.95	-0.34	2.08	9.27
Madagascar	15 972.31	2.52	0.00	1 381.77	35.13	5.05	3 313.60	1.54	0.65	-0.62	22.69	6.06
Malawi	62 225.83	6.91	0.04	1 055.67	22.46	-3.87	1 924.39	1.42	2.89	-0.02	16.36	4.31
Malaysia		1.06	0.30	22 959.85	3.23	1.29	3 779.30	2.07	1.52	0.11	29.42	9.99
Maldives		0.04	-	11 299.31	9.47	3.01	2 328.67	1.41	0.19	0.08	0.39	5.54
Mali	62 214.87	3.41	0.61	1 865.66	6.06	8.88	1 489.93	5.47	5.19	-1.21	16.27	2.11
Malta		-	1.72	30 758.94	2.50	1.76	4 723.70	6.31		1.12	0.42	10.27
Marshall Islands		6.54	-	3 578.53				3.48	8.12	1.06	0.05	
Mauritania	23 067.84	5.42	1.51	3 475.68	7.06	15.81	1 103.26	2.75	2.80	-0.91	3.89	4.01
Mauritius		0.00	-	17 399.67	5.11	-10.09	4 034.16	2.18	2.74	0.87	1.26	8.63
Mexico		0.64	0.00	16 133.49	4.49	1.05	3 435.54	2.69	1.73	-0.73	121.62	8.37
Micronesia, Fed. Sts.		16.10	-	3 314.37		4.41	1 530.50	4.08	1.79	1.12	0.10	9.69
Moldova		0.09	0.01	4 360.54	10.63	39.69	2 651.76	10.44	5.30	-0.22	3.56	11.50
Mongolia		8.37	0.00	9 819.16	19.64	10.05	1 475.03	18.24	7.20	0.64	2.84	9.77
Montenegro		0.23	1.66	14 574.12	2.50	9.43	3 432.54	15.45	2.53	0.45	0.62	11.20
Morocco	125.24	0.34	0.01	6 853.63	4.60	27.56	1 483.33	3.20	4.96	-0.40	33.60	4.60
Mozambique	20 542.25	1.66	0.02	1 014.17	28.44	-1.23	816.99	1.41	3.47	-0.05	26.11	3.30
Myanmar	34 487.39	0.78	0.60	4 354.66	15.99	-0.00	3 733.81	0.73	1.62	-1.08	51.27	4.43
Namibia	319.70	12.78	0.17	9,109.74	33.46	4.14	512.94	27.69	1.92	0.84	2.30	6.44
Nauru		-	1.38	9,437.68				5.49		0.96	0.01	
Nepal	39,943.77	2.95	0.21	2,131.73	9.16	3.29	2,503.36	1.12	2.62	-1.21	27.84	3.69
Netherlands		-	0.48	45,808.82	2.50	3.47	8,569.16	9.53	1.12	1.02	16.78	11.86
New Zealand		1.77	0.04	33,577.80	2.50	0.47	7,537.90	20.66	2.37	1.37	4.46	12.29
Norway		0.00	0.90	62,937.69	2.50	3.33	3,827.76	23.26	1.77	1.26	5.04	12.61
Nepal	39,943.77	2.95	0.21	2,131.73	9.16	3.29	2,503.36	1.12	2.62	- 1.21	27.84	3.69
Nauru		-	1.38	9,437.68				5.49		0.96	0.01	
New Zealand		1.77	0.04	33,577.80	2.50	0.47	7,537.90	20.66	2.37	1.37	4.46	12.29
Japan		0.13	0.00	36,592.37	2.49	0.08	6 052.57	7.48	- 3.40	0.98	127.55	11.99
Kazakhstan		0.06	0.01	21 982.36	2.74	10.42	1 121.50	7.68	4.01	0.02	16.93	11.56
Kenya	199 102.99	3.90	1.54	2 647.45	21.66	0.31	1 559.84	1.26	4.05	- 1.27	44.28	6.21

Country	Food assistance expenditures (thousand USD)	Share of population affected by natural disasters (%)	Share of population uprooted (%)	GDP per capita, PPP (constant 2011 international $)	Prevalence of undernourishment (%)	Cereal yield growth rate (%)	Cereal yield (kg per hectare)	Road density (km/1000 people)	Food absorption capacity growth rate (%)	Political stability (score)	Population (millions)	Mean years of schooling (years)
Nicaragua	6,331.23	1.77	0.00	4,515.22	19.07	3.32	2,045.99	2.66	1.61	-0.25	5.91	6.24
Niger	121,477.51	11.09	0.46	854.59	10.89	3.39	443.39	2.75		-1.12	18.15	1.56
Nigeria	7,823.88	0.68	0.39	5,364.29	6.76	2.73	1,459.81	0.59	4.54	-2.03	169.83	5.63
Norway		0.00	0.90	62,937.69	2.50	3.33	3,827.76	23.26	1.77	1.26	5.04	12.61
Oman		0.02	0.00	42 638.19	5.54	21.39	7 542.94	10.36	4.55	0.64	3.62	8.00
Pakistan	224 029.42	2.67	1.46	4 483.33	20.80	0.12	2 699.94	0.46	2.11	-2.60	179.94	4.87
Palau		0.75	0.01	13 183.95				13.35	-2.29	1.10	0.02	12.20
Palestine, State of	61 529.12	0.28	-	2 611.43		2.93	1 670.73	4.30	-3.71	-1.99	4.12	8.70
Panama	6.11	0.22	0.45	18 290.02	11.37	3.67	2 246.97	2.86	-0.98	0.08	3.81	9.56
Papua New Guinea	950.94	4.50	0.13	2 300.74		2.88	4 362.47	1.51	3.90	-0.59	7.51	4.16
Paraguay	667.44	4.52	0.00	7 860.51	12.21	6.80	3 139.00	7.96	6.85	-0.48	6.42	7.86
Peru	750.81	0.93	0.00	10 934.13	9.53	2.13	3 973.80	2.68	2.18	-0.72	30.37	8.83
Philippines	30 594.22	11.79	0.09	6 197.68	13.89	1.34	3 399.64	1.37	0.77	-1.24	97.71	9.20
Poland		0.03	0.04	23 499.32	2.50	4.09	3 614.54	12.87	0.08	0.91	38.04	11.80
Portugal		0.01	0.01	26 475.15	2.50	4.02	3 879.93	13.73	-0.45	0.81	10.47	8.29
Qatar		-	0.00	122 289.93		1.43	5 856.96	3.91	7.50	1.10	2.14	9.31
Republic of South Sudan[vi]	356 792.88	10.46	8.43	2 658.34		37.16	903.90	2.29		-1.96	10.98	4.80
Romania		0.02	0.01	19 115.18	2.50	21.48	3 384.01	7.77	1.89	0.20	20.03	10.69
Russian Federation	62.05	0.04	0.09	24 044.74	2.50	4.40	2 187.79	11.41	1.87	-0.91	143.45	11.96
Rwanda	17 355.39	0.03	0.75	1 527.70	36.06	10.89	1 898.46	0.78	5.33	-0.21	10.94	3.66
Samoa		1.22	-	5 570.98	3.21			8.60	-0.39	1.02	0.19	10.17
Sao Tome and Principe	485.20	-	-	2 775.49	14.36	0.05	1 954.57	2.97	2.13	0.12	0.19	5.16
Saudi Arabia		0.01	0.00	48 595.49	5.81	-3.75	5 035.77	3.90	3.15	-0.44	29.50	9.26
Senegal	19 126.96	1.92	0.12	2 220.53	12.40	8.96	1 132.86	1.55	4.61	-0.21	13.94	2.59
Serbia		0.34	-	13 065.46	5.86	11.21	4 814.87	6.35	1.07	-0.13	7.19	10.57
Seychelles		1.06	-	23 544.16				4.24	-0.56	0.72	0.09	8.74
Sierra Leone	21 637.62	0.12	0.07	1 384.72	26.74	5.70	1 663.94	2.14	3.63	-0.19	6.85	3.19
Singapore		0.03	0.00	76 003.19				0.90	3.12	1.29	5.32	11.39
Slovak Republic		0.00	0.01	26 551.89	3.90	11.07	4 658.91	13.58	4.22	0.96	5.41	11.94
Slovenia		0.39	0.01	28 612.03	2.50	4.27	5 696.74	16.19	1.07	0.94	2.06	11.94
Solomon Islands		3.45	0.00	1 956.76	12.23	-6.64	2 135.66	1.62		0.37	0.56	5.20
Somalia	154 094.52	13.02	10.19			14.98	704.33	10.73		-2.80	12.98	
South Africa		0.70	0.14	12 254.72	3.97	9.57	4 257.79	5.07	-0.12	-0.09	52.98	9.91
Spain		0.01	0.01	31 960.08	2.50	-0.46	3 376.91	13.88	1.27	0.02	46.56	9.61
Sri Lanka	18 420.68	5.57	0.68	9 889.05	24.36	0.46	3 731.53	1.32	3.39	-0.56	20.54	10.84
St. Kitts and Nevis		-	0.00	22 663.36					-2.73	0.85	0.05	8.17
St. Lucia		3.63	0.00	10 720.47	17.16				-3.82	0.83	0.17	9.06
St. Vincent and the Grenadines		5.57	-	10 222.99	6.31	11.97	21 459.19		1.20	0.87	0.11	8.46
Sudan	321 662.38	1.79	6.21	3 934.27	25.75	0.55	568.96	1.10	3.85	-2.40	36.50	3.30
Suriname		-	0.00	14 563.87	8.16	0.63	4 293.34	11.79	6.06	0.17	0.54	8.04
Swaziland	3 668.47	4.58	0.05	7 635.39	22.07	11.71	1 205.51	5.51	1.29	-0.36	1.26	6.59
Sweden		-	1.29	43 805.22	2.50	1.59	4 999.27	26.57	-0.05	1.09	9.58	12.10
Switzerland		0.00	0.72	55 993.84	2.50	1.04	6 360.04	16.30	-0.43	1.34	8.05	13.33
Syrian Arab Republic	222 043.51	0.00	21.18			2.20	1 399.73	3.00		-2.17	19.91	6.07

Country	Food assistance expenditures (thousand USD)	Share of population affected by natural disasters (%)	Share of population uprooted (%)	GDP per capita, PPP (constant 2011 international $)	Prevalence of undernourishment (%)	Cereal yield growth rate (%)	Cereal yield (kg per hectare)	Road density (km/1000 people)	Food absorption capacity growth rate (%)	Political stability (score)	Population (millions)	Mean years of schooling (years)
Tajikistan	9 926.91	0.14	0.03	2 381.90	34.26	5.50	2 873.61	1.63	7.29	-0.98	8.09	10.40
Tanzania, United Republic of	29 893.34	0.37	0.28	2 290.74	32.81	4.32	1 413.34	1.37	3.19	-0.18	49.97	5.37
Thailand		8.25	0.16	14 328.17	8.99	0.44	3 111.90	2.82	0.42	-1.17	67.94	7.61
Timor-Leste	3 936.39	1.20	0.00	1 979.34	29.03	14.70	2 352.16	2.50	0.98		1.17	4.40
Togo	606.06	0.22	0.25	1 277.30	17.27	0.56	1 165.23	1.46	1.53	-0.23	6.96	4.47
Tonga		0.58	0.00	5 069.16				8.60	0.98	0.79	0.11	10.94
Trinidad and Tobago		-	0.00	31 039.50	7.56	-2.98	1 583.57	5.75	-2.69	0.12	1.34	10.84
Tunisia	1 209.40	0.00	0.01	10 498.65	4.70	4.31	1 615.93	4.18	3.65	-0.60	10.96	6.84
Turkey	28 996.51	0.02	1.27	20 724.99	2.50	2.84	2 860.49	4.35	3.39	-1.24	75.28	7.47
Turkmenistan		-	0.00	12 606.04	5.20	1.12	2 437.17	3.26		0.18	5.32	9.90
Tuvalu		5.24	-	3 219.76				3.75	-0.08	1.35	0.01	
Uganda	61 875.31	0.36	1.07	1 627.85	33.73	4.73	2 028.04	1.09	2.45	-0.89	37.01	5.41
Ukraine	6 339.24	0.04	1.18	7 952.91	2.50	13.36	3 508.50	7.55	3.62	-0.89	45.52	11.30
United Arab Emirates		-	0.01	62 085.48	5.04	3.00	51 856.44	3.82	-0.69	0.80	8.75	9.24
United Kingdom		0.02	0.26	37 206.19	2.50	2.53	6 989.93	8.09	0.61	0.39	63.94	13.13
United States		3.33	0.09	50 892.83	2.50	2.42	6 932.56	35.34	3.26	0.55	315.07	13.07
Uruguay		0.16	0.01	18 542.73	2.53	0.05	4 074.59	12.20	2.00	0.90	3.40	8.46
Uzbekistan	34.02	-	0.00	4 959.04	7.57	1.39	4 641.74	2.10	6.65	-0.54	29.95	11.47
Vanuatu	485.82	11.59	0.00	2 897.29	6.30	1.61	579.81	6.28	3.79	0.95	0.25	6.74
Venezuela, RB		0.07	0.64	17 184.86	6.17	2.53	3 614.11	2.13	-0.53	-1.07	30.09	9.14
Vietnam		2.16	0.00	5 060.88	12.47	2.04	5 286.06	0.75	2.42	0.17	89.32	7.69
Yemen	137 040.17	0.10	3.94	3 619.49	25.74	-0.61	1 012.07	0.86	-3.54	-2.52	25.26	2.84
Zambia	7 667.69	0.60	0.24	3 460.29	48.24	3.34	2 498.31	1.94	-0.12	0.40	14.97	6.73
Zimbabwe	62 149.15	5.07	0.18	1 727.84	36.87	3.54	569.84	2.74	6.26	-0.83	14.92	7.51

TABLE D: Country rankings by identified risk factor

Country	Share of population affected by natural disasters	Share of population uprooted	Political stability	GDP per capita	Prevalence of undernourishment	Road density	Cereal yield	Mean years of schooling
Afghanistan	117	176	188	165	141	125	113	171
Albania	125	54	71	92	71	67	31	74
Algeria	72	127	167	79	66	109	128	113
Andorra	1	1	6			72		63
Angola	69	102	124	118	121	149	165	152
Antigua and Barbuda	1	61	30	58	150	50	130	83
Argentina	122	73	94	59	53	48	40	70
Armenia	132	146	108	110	62	66	87	39
Australia	96	116	29	17	1	5	108	3
Austria	53	152	9	15	1	4	14	41
Azerbaijan	1	181	136	64	1	119	96	44
Bahamas, The	128	52	26	53	105	41	8	49
Bahrain	1	87	164	16		122		79
Bangladesh	143	114	171	145	127	188	41	148
Barbados	1	28	11	69	65	70	88	56
Belarus	106	79	89	62	1	27	75	25
Belgium	1	130	48	21	1	46	4	38
Belize	145	65	90	109	83	30	67	57
Benin	102	56	86	160	106	174	141	174
Bhutan	1	1	33	112		113	85	177
Bolivia, Plurinational State of	162	70	120	117	139	54	117	103
Bosnia and Herzegovina	178	175	118	96	1	49	63	90
Botswana	87	108	19	68	143	20	175	84
Brazil	168	55	113	71	1	93	38	116
Brunei Darussalam	1	1	13	4	47	100	159	88
Bulgaria	75	115	91	66	55	47	45	51
Burkina Faso	175	120	144	171	136	148	151	187
Burundi	86	163	173	182		178	149	179
Cambodia	167	34	95	142	129	139	80	159
Cameroon	123	166	149	146	94	141	126	139
Canada	100	138	14	19	1	7	59	6
Cape Verde	107	1	54	119	118	87	176	158
Central African Republic	119	187	186	184	167	80	131	166
Chad	1	177	169	158	158	144	162	184
Chile	153	77	67	52	54	62	16	67
China	150	88	134	81	104	184	20	117
Colombia	104	188	166	82	92	123	62	118
Comoros	131	1	114	173		173	144	156
Congo	64	162	130	122	153	132	163	131
Congo, The Democratic Republic of the	99	178	182	183		134	164	134
Costa Rica	116	134	57	75	76	79	68	93
Cote d'Ivoire	1	145	159	143	124	156	106	154
Croatia	90	84	60	54	1	21	26	45
Cuba	120	51	62		1	75	89	32
Cyprus	1	140	61	35	68	23	138	33
Czech Republic	164	92	23	36	1	24	27	16

Country	Share of population affected by natural disasters	Share of population uprooted	Political stability	GDP per capita	Prevalence of undernourishment	Road density	Cereal yield	Mean years of schooling
Denmark	1	136	34	13	1	15	15	7
Djibouti	1	173	128	144	123	128	116	167
Dominica	184	1	16	98	81	36	125	107
Dominican Republic	88	66	77	83	115	121	54	115
Ecuador	147	154	101	91	111	96	81	102
Egypt	49	128	176	100	63	177	11	122
El Salvador	165	38	96	111	113	152	93	129
Equatorial Guinea	1	1	110	34		114		145
Eritrea			147				169	169
Estonia	1	74	51	39	48	3	74	11
Ethiopia	160	148	174	172	154	179	104	183
Fiji	152	40	70	105	64	90	101	59
Finland	1	126	10	23	1	2	65	47
France	61	137	73	25	1	18	10	37
Gabon	1	100	81	63	89	126	129	104
Gambia	136	144	99	169	107	145	161	176
Georgia	124	182	125	102	88	32	107	19
Germany	59	131	41	18	1	19	9	4
Ghana	98	101	97	134	87	155	121	123
Greece	113	109	112	47	1	25	48	58
Grenada	1	31	55	86	144	63	157	96
Guatemala	158	41	141	113	128	167	112	141
Guinea	103	103	148	177	130	118	150	182
Guinea-Bissau	1	143	143	174	147	146	143	180
Guyana	177	43	115	115	100	82	32	98
Haiti	161	24	140	167	166	142	154	150
Honduras	151	150	132	132	126	151	123	136
Hungary	114	93	49	46	1	34	33	24
Iceland	1	95	8	20	1	1		22
India	179	83	161	123	122	185	86	137
Indonesia	112	46	133	99	91	183	29	110
Iran, Islamic Republic of	109	165	160	67	75	140	120	92
Iraq	85	186	184	73	148	162	103	128
Ireland	1	112	32	10	1	12	7	20
Israel	176	142	163	31	1	84	50	8
Italy	63	117	66	28	1	44	24	55
Jamaica	134	36	87	106	101	110	147	76
Japan	91	48	24	26	1	57	19	13
Jordan	1	184	137	103	57	106	132	65
Kazakhstan	71	57	105	48	1	61	155	34
Kenya	140	164	170	149	135	168	124	132
Kiribati	126	1	31	164	51	88		112
Korea, Democratic People's Republic of	190	1	155		163	164	51	
Korea, Rep.	50	49	79	29	1	147	17	18
Kuwait	1	85	93	5	1	127	3	120

Country	Share of population affected by natural disasters	Share of population uprooted	Political stability	GDP per capita	Prevalence of undernourishment	Road density	Cereal yield	Mean years of schooling
Liberia	89	161	139	181	162	124	145	161
Libya	67	179	181			55	166	119
Liechtenstein	1	133	2			26		14
Lithuania	1	94	44	40	1	9	57	10
Luxembourg	1	125	3	2	1	16	21	28
Macedonia, FYR	146	98	109	85	60	69	77	77
Madagascar	121	26	135	175	161	150	70	133
Malawi	186	96	98	178	142	170	119	162
Malaysia	155	135	78	45	49	135	56	64
Maldives	1	1	68	87	98	161	99	138
Mali	94	158	178	163	70	76	133	185
Malta	1	170	17	30	1	74	36	43
Marshall Islands	166	1	28	135		98		
Mauritania	83	171	145	137	80	116	146	165
Mauritius	57	1	40	60	73	136	72	85
Mexico	95	47	146	65	61	115	71	99
Micronesia, Fed. Sts.	183	1	21	140		86	127	73
Moldova	1	76	111	130	96	45	100	31
Mongolia	181	30	53	90	134	17	135	71
Namibia	189	104	46	101	155	11	172	127
Nauru	1	174	50	88		83		
Nepal	174	113	157	155	97	171	92	168
Netherlands	1	141	22	12	1	60	5	30
New Zealand	97	91	1	27	1	14	6	12
Nicaragua	157	59	103	128	133	117	109	130
Niger	170	151	168	180	108	133	174	186
Nigeria	78	149	180	120	90	186	142	140
Norway	1	160	12	7	1	13	60	9
Oman	81	60	56	22	78	51	39	106
Pakistan	137	167	187	131	137	187	91	151
Palau	1	53	27	78		37		15
Palestine, State of	129	1	179	151		97	115	89
Panama	73	139	82	55	103	111	102	68
Papua New Guinea	182	110	127	152		154	42	164
Paraguay	156	50	117	104	112	56	79	105
Peru	133	58	138	89	93	112	49	87
Philippines	187	107	152	116	119	160	66	81
Poland	54	97	37	44	1	38	55	29
Portugal	70	69	43	41	1	31	46	91
Qatar	1	63	18	1		89	25	69
Republic of South Sudan[vi]	142	189	185	161		137	160	155
Romania	68	78	84	56	1	59	73	53
Russian Federation	92	111	153	43	1	42	105	26
Rwanda	65	156	107	168	160	181	111	170
Samoa	1	1	15	121	50	53		61
Sao Tome and Principe	1	1	83	147	117	104	110	146

Country	Share of population affected by natural disasters	Share of population uprooted	Political stability	GDP per capita	Prevalence of undernourishment	Road density	Cereal yield	Mean years of schooling
Saudi Arabia	55	42	129	11	69	94	37	75
Senegal	144	106	102	156	110	157	152	181
Serbia	118	1	85	80	79	65	30	54
Seychelles	154	1	59	42		91		82
Sierra Leone	108	89	104	170	151	129	122	175
Singapore	1	25	7	3		176		36
Slovak Republic	1	82	25	38	52	39	34	21
Slovenia	130	81	35	37	1	28	22	23
Solomon Islands	173	32	64	159	116	153	118	147
Somalia	188	185	188			43	158	
South Africa	141	122	106	84	59	78	44	62
Spain	52	80	80	33	1	33	76	72
Sri Lanka	169	124	119	94	140	163	61	50
St. Kitts and Nevis	1	35	52	49				100
St. Lucia	163	45	42	95	131			86
St. Vincent and the Grenadines	171	1	38	97	82		2	95
Sudan	139	183	183	133	145	172	171	172
Suriname	1	27	75	70	95	40	43	101
Swaziland	66	99	131	108	138	77	148	125
Sweden	1	168	20	14	1	8	28	17
Switzerland	51	153	4	8	1	29	18	1
Syrian Arab Republic	62	191	191			103	140	142
Tajikistan	105	90	156	153	156	158	83	60
Tanzania, United Republic of	76	129	122	154	157	165	136	143
Thailand	149	121	162	72	99	107	82	108
Timor-Leste	84	1		157	152	120	97	163
Togo	58	132	116	176	114	159	153	160
Tonga	138	39	39	127		52		46
Trinidad and Tobago	1	62	76	32	77	68	137	48
Tunisia	1	68	154	93	67	85	134	121
Turkey	60	172	172	50	1	81	84	111
Turkmenistan	1	37	92	76	74	105	90	66
Tuvalu	185	1	5	139		92		
Uganda	110	159	150	166	159	169	114	144
Ukraine	56	169	175	107	1	58	58	42
United Arab Emirates	1	64	45	6	58	95	1	80
United Kingdom	79	123	65	24	1	64	13	2
United States	74	105	58	9	1	6	12	5
Uruguay	115	72	36	57	1	35	52	97
Uzbekistan	1	33	123	125	84	130	35	27
Vanuatu	191	29	47	148	85	71	170	126
Venezuela, RB	82	147	158	61	102	131	53	78
Vietnam	148	1	88	124	109	182	23	109
Yemen	111	180	190	138	146	175	156	178
Zambia	80	118	74	136	165	143	94	124
Zimbabwe	180	119	142	162	164	108	168	114

Endnotes

[i] Please refer to the Technical Annex for a full description of the Heckman two-step estimator used to implement this analytical approach.

[ii] Please refer to the Technical Annex for a detailed presentation of the econometric results.

[iii] Please refer to the Technical Annex for the country rankings.

[iv] APR = Asia and Pacific – Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Korea DPR, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Vanuatu.

ECA = Eastern and Central Africa – Burundi, Djibouti, Ethiopia, Kenya, Republic of South Sudan, Rwanda, Somalia, Uganda.

LAC = Latin America and the Caribbean – Bolivia, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay, Peru.

MENA = Middle East and North Africa – Albania, Algeria, Armenia, Egypt, Greece, Iran, Iraq, Jordan, Kyrgyzstan, Lebanon, Libya, Morocco, Palestinian Territories, Sudan, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Ukraine, Yemen.

SA = Southern Africa – Republic of the Congo, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe.

WA = West Africa – Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, Togo.

[v] Low-income = Afghanistan, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of Congo, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Haiti, Korea DPR, Liberia, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Togo, Uganda, Tanzania, Zimbabwe.

Low-middle-income = Armenia, Bangladesh, Bhutan, Bolivia, Cambodia, Cameroon, Cabo Verde, Republic of Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Ghana, Guatemala, Honduras, India, Indonesia, Kenya, Kyrgyzstan, Laos, Lesotho, Mauritania, Morocco, Myanmar, Nicaragua, Nigeria, Pakistan, Palestinian Territories, Philippines, São Tomé and Principe, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Tajikistan, Timor-Leste, Tunisia, Ukraine, Vanuatu, Yemen, Zambia.

Upper-middle-income = Fiji, Albania, Algeria, Azerbaijan, Bosnia and Herzegovina, Colombia, Cuba, Dominican Republic, Ecuador, Georgia, Iran, Iraq, Jordan, Lebanon, Libya, Namibia, Paraguay, Peru, Turkey.

High-income = Greece.

[vi] Country averages for the Republic of South Sudan are computed over the period 2011–2016.

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Cover photo: In Umerkot in Pakistan many families can feed their children thanks to WFP's blockchain technology, which makes cash-based transfers more secure and efficient.

WFP/Farman Ali