



OXFAM MEDIA BRIEFING

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## Hot and hungry – how to stop climate change derailing the fight against hunger

### SUMMARY

Hunger is not and need never be inevitable. However climate change threatens to put back the fight to eradicate it by decades – and our global food system is woefully unprepared to cope with the challenge.

Next week the Intergovernmental Panel on Climate Change will publish new evidence showing that the impact of climate change on global hunger will hit harder and sooner than previously thought.

In the face of this challenge, Oxfam analyses how well the world's food system is prepared for the impacts of climate change. We assess ten key factors that influence a country's ability to feed its people in a warming world – these include the quality of weather monitoring systems, social safety nets, agricultural research and adaptation finance.

Across all ten areas we found a serious gap between what is happening and what is needed to protect our food systems. These gaps in preparedness are driven by poverty, inequality and lack of political will. While many countries – both rich and poor – are inadequately prepared for the impact of climate change on food, it is the world's poorest and most food insecure countries that are generally the least prepared for and most susceptible to harmful climate change. No country's food system will be unaffected by worsening climate change.

There is still time to fix the problem. What countries do today to prepare for climate change – and the degree to which the poorest countries are supported – will, to a large extent, determine how many people go hungry over the next two decades. And how far and fast countries cut their emissions will determine whether our food systems can continue to support us in the second half of the century.

Oxfam is calling on governments, business and publics across the globe to take action to stop climate change making people hungry.

### HOW WILL CLIMATE CHANGE AFFECT WHAT WE EAT?

Climate change is already affecting what, when and how much people eat around the world, as well as where they live and what they do for a living.

*There could be 25 million more malnourished children under the age of 5 in 2050, compared with a world without climate change – that's the equivalent of all the children under 5 in the US and Canada combined.<sup>1</sup>*

Already this year there have been a number of record-breaking weather events around the globe which have badly affected agriculture and the availability and affordability of food. In Brazil, the worst drought in a decade has ruined crops in the country's breadbasket region – including the valuable coffee harvest, causing the price of coffee to shoot up by 50 percent.<sup>2</sup> In California the worst drought in over 100 years is hitting the state's agricultural industry, which produces nearly half of all the vegetables, fruits and nuts grown in the US.<sup>3</sup> And Australia has opened the year with a record heat wave and drought hitting farmers hard.<sup>4</sup>

These extreme weather events are in line with what scientists have been telling us to expect from a warming climate.

On 31 March 2014 the Intergovernmental Panel on Climate Change (IPCC), which represents the views of the global scientific community, will publish its Fifth Assessment Report on Climate Impacts, Vulnerability and Adaptation. Leaked copies of the report indicate that the impact of climate change on global hunger will be worse than previously reported, and severe impacts will be felt much sooner – in the next 20–30 years in the poorest countries.<sup>5</sup>

### **Fishing wiped out in the Philippines**

Typhoon Haiyan – the strongest storm to ever make landfall – hit the Philippines in November 2013 leaving a path of death and devastation in its wake.

The Philippines' once-thriving fishing industry has been decimated; 20,000 fishing households have been affected. Many fisherfolk have lost their boats and rely on food aid to survive. The typhoon destroyed mangroves and coral reefs, which are important breeding grounds for fish and shellfish, and fish stocks are substantially lower than they were before the typhoon. In an effort to improve their catch, an increasing number of people have turned to illegal practices such as dynamite fishing and the use of fine nets – activities that will further undermine fish stocks.

Mario Waniwan (23) lives in Barangay Batang, Eastern Samar, and used to make a living from fishing and collecting mud crabs from the mangroves.

*'I can't fish, my boat was destroyed and all my crab fishing equipment was washed away. The mangroves are totally washed out, so there are no crabs any more. It will be three to five years before the mangroves grow back and can be occupied by sea creatures.*

*'I'm married and have a ten-month-old son, Marvin. We ate three meals a day before the typhoon ... Now, there is no more fish, no more meat, and no more money. I have no other income so if the food aid stops we will have nothing to help us. I'm very worried.'*

Climate change could make extreme weather events such as Typhoon Haiyan more common in the future.

### **Food production**

In its last report, published in 2007, the IPCC painted a mixed picture regarding the impact of climate change on global crop production. It said that negative effects in some parts of the world could potentially be offset by positive effects elsewhere.<sup>6</sup> This year it is expected to warn that negative impacts will outweigh any positive effects – with net global agricultural yields predicted to decrease by up to two percent per decade. Crucially, these decreases will take place within the context of persisting hunger and a rapidly rising global population, where demand for food is expected to increase by 14 percent per decade.<sup>7</sup>

The impacts of extreme weather events on food production and consumption are well-documented. For example, extreme floods in Pakistan in 2010 destroyed an estimated two million hectares of crops, killed 40 percent of the livestock in affected areas, and delayed the planting of winter crops, causing the price of basic foods such as rice and wheat to rocket.<sup>8</sup> As a consequence, an estimated eight million people reported eating less food and less nutritious food over an extended period of time.

However it is not only extreme weather events that threaten global food security. More marginal shifts, including seemingly small increases in temperature and changes in rainfall patterns, are already having major impacts on people's ability to provide food for their families.

### **Shifting seasons and hunger in Central America**

Millions of poor people across Central America are facing hunger and destitution as a result of shifting patterns of rainfall and rising temperatures.

In Guatemala, the total amount of rainfall is increasing, but there is significantly less rain during critical times in the crop cycle, and this is taking a heavy toll on harvests. In the last two years small-scale producers have lost 80 percent of their maize crops because of drought.

High temperatures combined with heavy rains and dry periods have also given rise to the coffee rust plague, which has infected 70 percent of coffee plantations. It is estimated that at least 22 percent of the coffee crop has been lost during 2013–14, with smallholder farmers among the worst affected. Poor agricultural labourers will also be hit hard – an estimated 200,000 temporary agricultural jobs will be lost as a result of the coffee rust.

The loss of crops and employment means people are struggling to feed their families. In 2013 there was an estimated 30 percent decrease in consumption of maize and beans – the staple foods in Guatemala – while the incidence of acute malnutrition increased by 23 percent in 2013, having already risen almost 25 percent in 2012 compared with the previous year.

### **Food prices**

Other expected IPCC findings include higher and more volatile food prices as a result of climate change.

Over the last six years there have been three global food price spikes in 2008, 2010 and 2012 – closely associated with supply shocks driven in part by extreme weather. Oxfam research predicts that food prices could double by 2030, with half of this rise driven by climate change.<sup>9</sup> A study by International Food Policy Research Institute finds similar magnitudes of price increases due to climate change. They estimate that, as a result, calorie availability in 2050 will be lower than in 2000 throughout the developing world – effectively putting the fight against hunger back by several decades.<sup>10</sup> Extreme weather events will cause prices to spike further on top of this.<sup>11</sup>

Oxfam and the Institute of Development Studies have documented the impact of high and volatile food prices on people's lives across 10 developing countries. We found that people employ a number of coping strategies including working longer hours; cutting back on more costly and preferred foods – particularly protein-rich meat and fish – and buying cheaper and less nutritious food; shopping in bulk for discounts; growing, gathering, and processing their own food; shopping in small quantities to manage daily incomes; borrowing, begging, stealing; cutting down on portions, cutting out meals and going hungry.<sup>12</sup>

Rising food prices are not just a problem in the developing world. The cost of food in the UK has risen by 30.5 percent in the past five years<sup>13</sup> and has exacerbated other pressures

– such as unemployment, low wages and the removal of social protection – making it harder for people to feed themselves. This led to a tripling of food bank usage in 2013.<sup>14</sup>

## **Threshold for adaptation**

We are already seeing the impacts of climate change on food and hunger, and can expect serious consequences for the food security of millions of people if global temperatures are allowed to rise by about 1.5 degrees, the warming target supported by more than 100 poor countries. In its forthcoming report, the IPCC is expected to highlight a global temperature threshold of three to four degrees, beyond which there will be little we can do to avoid severe damage to food production in many areas of the world. Above this threshold we could face runaway food crises. We are currently on track to cross this threshold in the second half of this century.

## **WORLD UNPREPARED FOR CLIMATE IMPACTS ON FOOD**

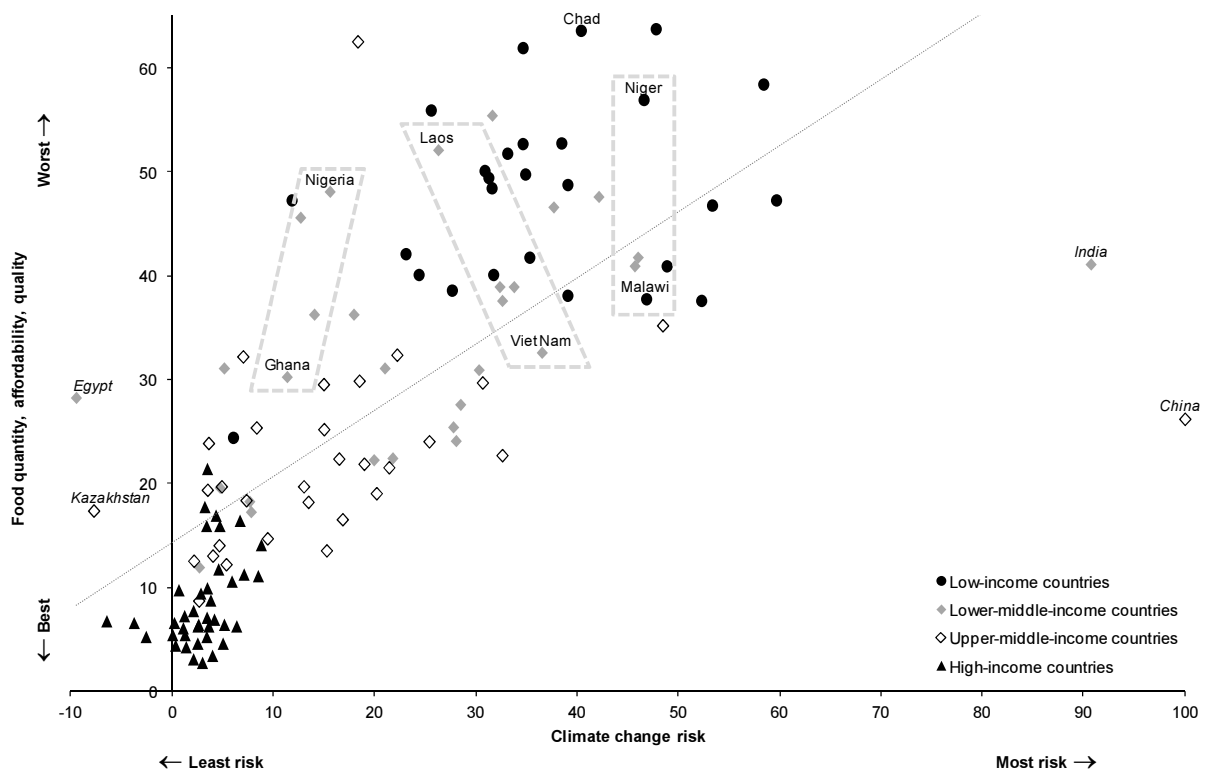
Oxfam assessed the extent to which our global food system is prepared for the impacts of climate change by looking at 10 areas of national and global food and climate policy. There are many important determinants of hunger, including income levels, demographic trends and conflict, which are not included here. Similarly, tackling the impact of climate change on food will require action across a much broader range of policies and practices than just these 10 areas; indeed, climate change should be mainstreamed across all food policy. However, Oxfam's experience and the wider academic literature suggest these 10 factors will have a major influence on whether countries are fit to feed themselves in a warming world.

While our results show a great deal of variability in preparedness between and within countries, the global picture is of a food system that is dangerously unprepared for the impacts of climate change. It indicates that many countries – rich and poor – are unprepared for climate impacts on food, but it is the poorest and most food insecure countries that are almost always the furthest behind in these important areas of food policy and practice.

The 10 key policy and practice areas – or gaps – are outlined below. We have allocated each a score out of 10 to indicate the size of the global adaptation gap in that area.

Additional new analysis by Oxfam demonstrates that countries currently experiencing high levels of food insecurity also face the greatest risk of climate change impacts (see figure below<sup>15</sup>). However, it also shows that some countries such as Ghana, Viet Nam and Malawi are bucking this trend – enjoying far higher levels of food security than countries such as Nigeria, Laos and Niger, which have comparable levels of income and face comparable magnitudes of climate change risk. A key difference is that Ghana, Viet Nam and Malawi have already taken action on some of the 10 key policy and practice measures we highlight. These examples, discussed in more detail in the box below, illustrate that hunger is still not inevitable. For the next two decades, how well countries adapt to and prepare for climate change impacts on food, and the degree to which the poorest countries are supported in doing so, will determine to a large extent whether and where people will go hungry.

## Food insecurity and climate change risks



### Bucking the trend

The climate change impacts which are already locked in do not make hunger inevitable if the right action is taken – as illustrated by countries that appear to be bucking the trend of food insecurity and climate risk.

- Ghana and Nigeria are both lower-middle-income countries in West Africa facing comparable levels of climate risk. Yet Ghana consistently outscores Nigeria on key food and climate adaptation policy measures, including many of those assessed in this briefing, such as social protection coverage, public spending on agricultural research and development, and weather station density. Though many challenges remain, Ghana enjoys far higher levels of food security and is better placed to tackle growing climate risks.
- In East Asia, Viet Nam and Laos are both lower-middle-income countries facing comparable levels of climate risk. While Viet Nam benefits from higher quality agricultural land and other ecological advantages, it also consistently outscores Laos on measures such as social protection, crop irrigation and access to clean water, helping it achieve better than average food security. Laos faces worse than average food security challenges.
- Malawi outperforms most other sub-Saharan African countries on food security indicators. Compared with Niger, Malawi scores higher on key measures such as social protection coverage, crop irrigation, overall public investment in agriculture, and spending on agricultural research and development.

While few countries are adequately prepared for increasing levels of climate risk, these countries seem to show that the right policies and measures can make a vital difference to food security in a warming world.

# THE 10 GAPS

## Scoring the gaps

For each of the 10 areas, we defined a benchmark of what a world prepared to tackle climate change impacts on food might look like. We then assessed relevant global or national-level data to determine how far short we are falling of the benchmark in each area, and used a grading scale to convert this into a score out of 10. For example, in the area of adaptation finance, we defined the benchmark as food insecure countries receiving 100 percent of their adaptation finance needs. The score is based on a sample of 40 food insecure countries. We calculated the average amount these countries received in adaptation finance in recent years and the average amount of estimated adaptation finance needs over the same period. The final score is the average proportion of finance received compared with need. For more detail on how each score was calculated, please see the annex.

## 1. Adaptation finance – score: <1/10

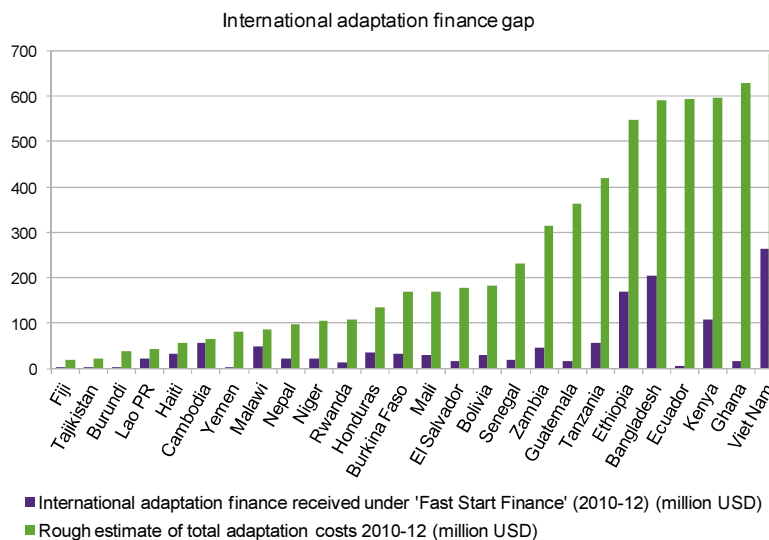
Under the UN Framework Convention on Climate Change (UNFCCC), developed countries are legally obliged to help poor countries adapt to a changing climate.

At the Copenhagen summit in 2009, world leaders promised to provide \$100bn per year by 2020 to help poor countries adapt to a changing climate and reduce their emissions (mitigation). They also committed to providing \$30bn of 'Fast Start Finance' between 2010 and 2012, balanced between adaptation and mitigation.

Fast Start Finance has not been balanced – adaptation initiatives have received no more than 20 percent of funds at best.<sup>16</sup> But even 50 percent would have been far too low to meet estimated needs, calculated to be at least \$100bn per year for adaptation alone – this is equivalent to just five percent of the wealth of the world's top 100 billionaires.<sup>17</sup>

The gap between the paltry sums provided to each country under Fast Start and a conservative estimate of national adaptation needs are shown in the graph. The countries looked at in this study received on average just two percent of their estimated adaptation finance needs.<sup>18</sup> The quality of adaptation finance is also an issue – for example, far too little adaptation support reaches women food producers.

The struggle to cover rising adaptation costs can be seen in rich countries too, for example in recent debates in the UK over spending on flood defences.



## UK floods

In early 2014, more than 5,000 properties and thousands of hectares of farmland across England and Wales were submerged beneath floodwaters after the wettest winter since records began in 1776. The floods – which the UK Meteorological Office suggested could be linked to climate change – have prompted a political storm over spending on flood defenses in rural areas, amid warnings that more frequent extreme floods will undermine food security in a country that already imports 30 percent of its produce. It is estimated that 58 percent of England’s most productive farmland lies within a floodplain.<sup>19</sup>

Liz Crew farms a 12-acre smallholding on the Somerset Levels – one of the worst affected areas.

*‘We have worked our whole lives to build up our livelihood, and now the thought that our whole life’s work could be for nothing is devastating. We won’t receive any compensation for the flooding to our land or the loss of income, as our insurance policy only kicks in if the house is uninhabitable.*

*‘UK agriculture is not prepared. Farmers know that floods are likely in winter – that’s why they build their cattle sheds on higher ground – but they don’t then expect the sheds to flood.*

*‘We need to reduce emissions. We have to adapt. My fear is that farmers will have to give up farming on the Somerset Levels.’*

## 2. Social protection – score: 3/10

The poorest people spend the highest proportion of their income on food and are worst affected when food crises hit.

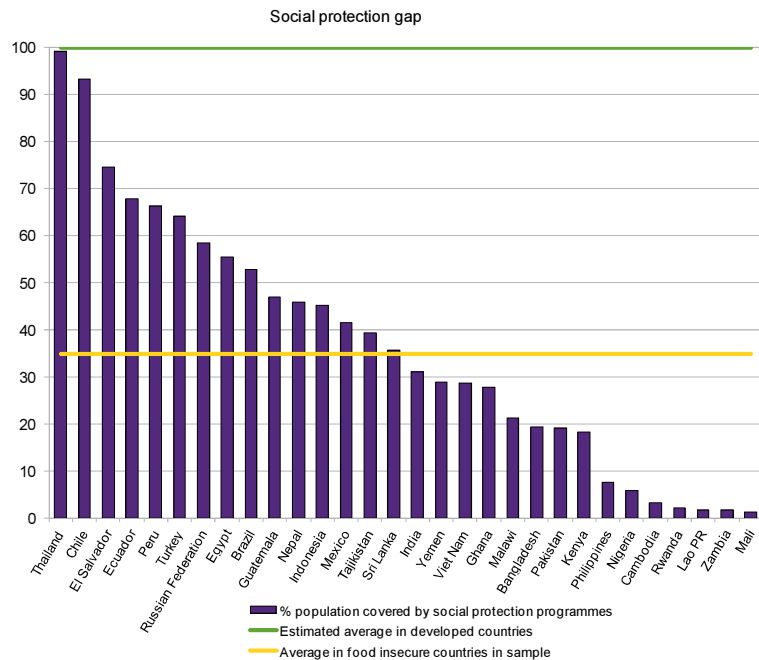
Social protection programmes – including school feeding, cash transfers and employment guarantee schemes – are a proven way of ensuring access to food, keeping children in school and preventing people from having to sell off vital assets such as livestock.

Examples include Brazil’s ‘Bolsa Familia’ initiative and India’s National Rural Employment Guarantee Act.

The Indian scheme guarantees 100 days of employment per

year for people in 200 of the country’s poorest rural districts, doing work which often helps increase the district’s resilience to climate change – for example, strengthening embankments or de-silting irrigation channels.<sup>20</sup>

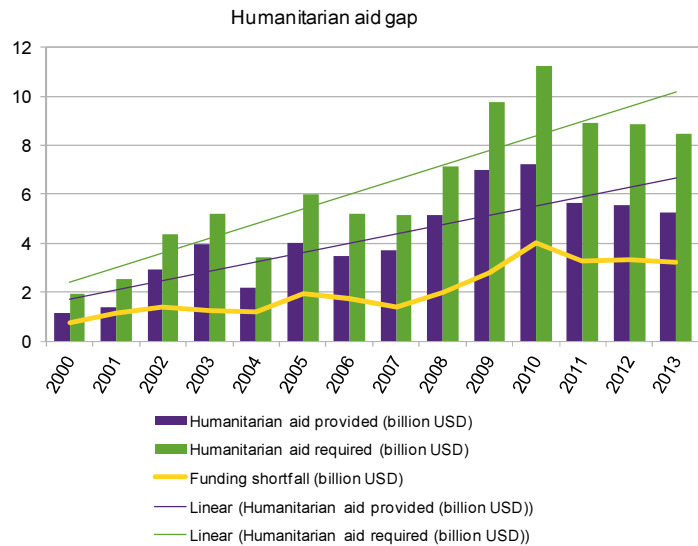
While most industrialized countries ensure that the majority of their population is covered by some form of social protection, globally just 20 percent of people have adequate social protection.<sup>21</sup> In many poor countries, such as Zambia, Mali and Laos, coverage is less than five percent. However, coverage is notably higher in poor countries that are bucking the trend of food insecurity and climate risk, for example in Malawi, Ghana and Viet Nam, where coverage reaches 21 percent, 28 percent and 29 percent respectively.<sup>22</sup>



### 3. Food crisis aid – score: 6/10

Humanitarian aid is the last line of defence for people facing climate impacts on hunger.

Each year the UN appeals for aid to help people in humanitarian emergencies. On average, over the past decade, 66 percent of the funds requested have been provided. However the cost of humanitarian aid is sharply increasing and the gap between the funds requested and those committed is steadily widening – the annual humanitarian funding shortfall has approximately trebled since 2001.<sup>23</sup>

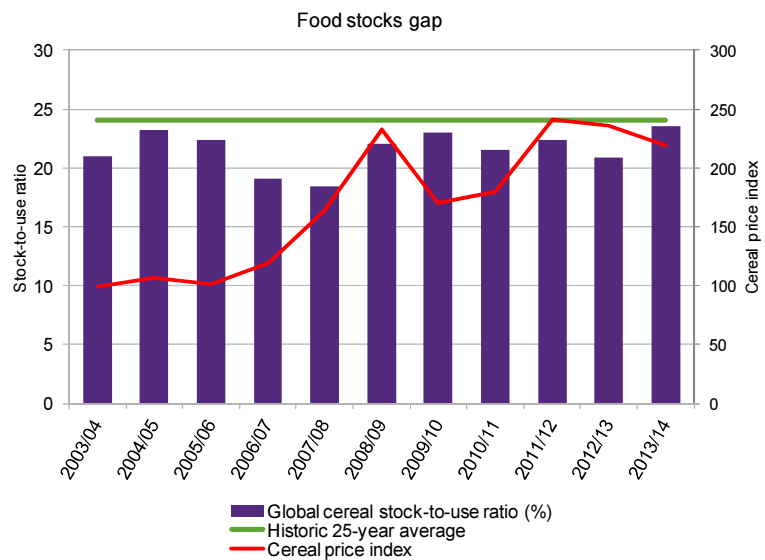


Climate change means more extreme weather events in the years ahead, placing an ever-greater burden on an increasingly overstretched system.

### 4. Food stocks – score: 5/10

Food stocks are a crucial buffer against hunger in the event of erratic harvests and food price spikes driven by extreme weather events.

But in recent years the ratio of food stocks to food consumption has fallen to levels which are very low by historic standards – each year in the past decade the stock-to-use ratio has fallen below the long-term 25-year average, with the lowest ratios coinciding with significant world food price spikes, as in 2007–8.<sup>24</sup>



This decline in the stocks-to-use ratio is in part due to shocks to production from extreme weather, the diversion of crops to meet demand for biofuels, and the lack of attention paid to adequate public and private stockholding. For developing countries, rising food prices have made investing in building food reserves much more challenging.

A world facing increasing production disruptions and food price instability due to climate change needs a bigger buffer than it has at present. One way to address this is for developing countries to build their own local, national or regional public reserves. According to the UN Food and Agricultural Organization, 35 countries released public stocks during the 2007–8 crisis.<sup>25</sup> In India, a massive purchase of rice and wheat in 2008 enabled the government to release sufficient stocks into the market to stabilize prices and prevent many thousands of people from sliding into hunger.<sup>26</sup>



## 5. Gender – score: 5/10

Women make up 43 percent of the agricultural workforce in developing countries and play a vital role in food production and preparation around the globe.<sup>27</sup> As a result, the impact of climate change on food is felt particularly sharply by women.

We know that adaptation carried out with women in mind results in improved yields and greater food security, as well as reducing workloads for women and their families. Rural women have a wealth of knowledge about seeds, crops, water and land management, and are well-positioned to develop strategies to adapt to climate change and reduce its impacts on their communities and livelihoods. Women give us our best chance of producing enough good food in a warming world. But many things conspire against their efforts to do so.

For example, less than five percent of women in West Asia and North Africa own land.<sup>28</sup> This means they don't have an incentive to invest in their land and can't make choices about how it is farmed.<sup>29</sup> Women are also shut out from vital weather information, including early warning systems about extreme weather that may affect their crops, livestock and often their lives. A survey of communities in 15 developing countries found that, on average, only 43 percent of women received information about extreme weather events because warning information tends to be transmitted by men to men in public spaces, and is rarely communicated to the rest of the family.<sup>30</sup>

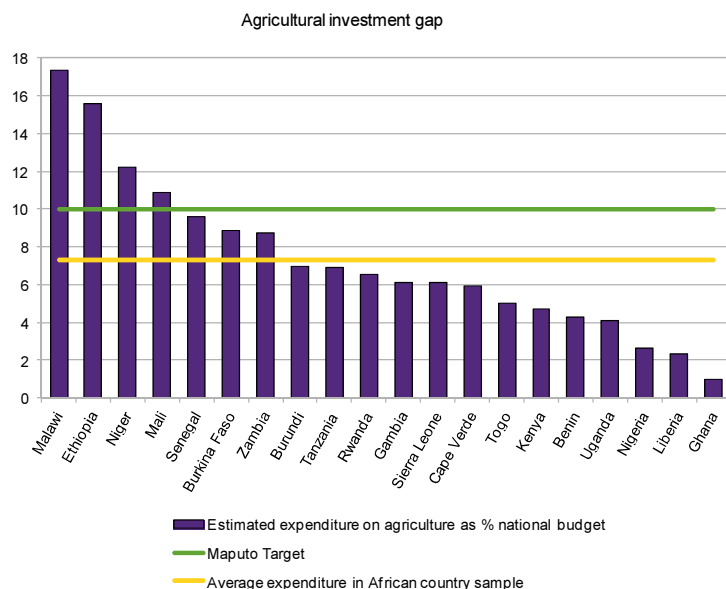
## 6. Public agricultural investment – score: 7/10

Up to 80 percent of hungry people in the world are small-scale food producers and others whose livelihoods depend on farming and natural resources. This makes them especially vulnerable to climate impacts.<sup>31</sup> Adequate levels of public investment in agriculture are vital to ensure they receive the support needed to build their resilience.

Official Development Assistance to agriculture has been slashed during the last 30 years, falling from around 43 percent in the late 1980s to around seven percent today.<sup>32</sup> In 2003, African leaders committed to increase their spending on agriculture to 10 percent of their national budgets. A decade later, just four out of 20 countries included in this study are meeting that target.

Just as important is what agricultural budgets are spent on. There is a great deal of evidence to suggest that investing in women smallholders, agricultural research and development, rural development, and in improved access to extension services such as training and credit can all make a vital difference in the fight against hunger in a changing climate.

Responsible private investment in agricultural adaptation is also vital. The private sector, especially the food and drink industry, must ensure that the smallholder producers in their supply chains receive the support they need to adapt.

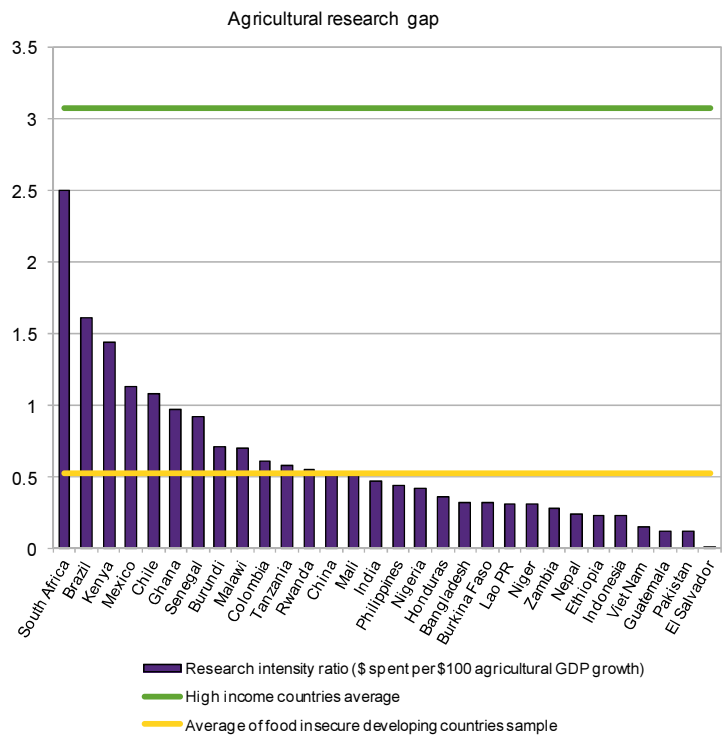


## 7. Agricultural research gap – score: 2/10

Investing in agricultural research and development (R&D) is vital for climate proofing agriculture.

Global seed diversity has declined by 75 percent in the last 100 years,<sup>33</sup> depriving communities of native varieties that may be better suited to changing local weather patterns. The development of new and rediscovery of old seed varieties adapted to changing weather and growing conditions is therefore crucial.

Yet public investment in agricultural R&D lags behind in the countries that need it most. For every \$100 of agricultural output, developed countries spend \$2.16 on public agricultural R&D, whereas developing countries spend just \$0.55 on average. Countries that are bucking the food and climate trend, such as Malawi and Ghana, are investing more in agricultural research.<sup>34</sup>



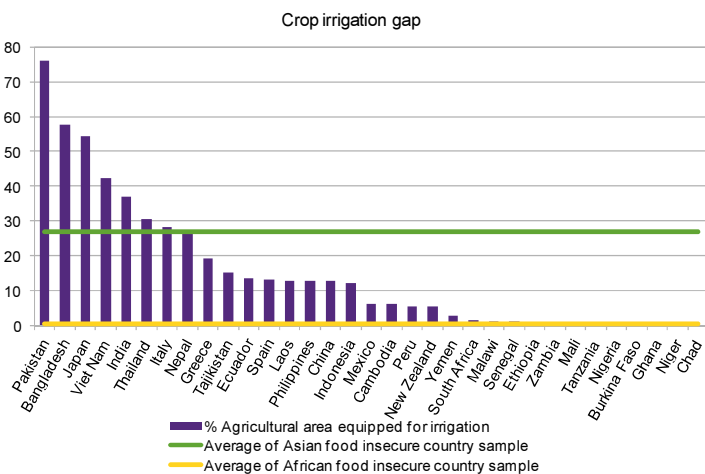
But it's not just a case of how much money is available – it's also about how it is spent. R&D is most effective in improving food security when it is carried out with the involvement of smallholder producers, including women, and where it builds on traditional knowledge to tackle problems such as the spread of pests and disease, water management and soil conservation, or lack of seed diversity.

## 8. Crop irrigation gap – score: <1/10

Over 80 percent of worldwide agriculture and 95 per cent of African agriculture is rain-fed, and at the mercy of changing rainfall patterns and intensity.<sup>35</sup> In a warming world, where seasons are less predictable, access to responsible, sustainable irrigation<sup>36</sup> is critical, especially in hot and dry regions.

In California, which is currently suffering the worst drought in more than 100 years, irrigation covers over 80 percent of arable land.<sup>37</sup>

However, much of the irrigation is dedicated to large-scale industrial farming in areas where water is scarce, draining water resources across large swaths of the western US. The countries of southern Europe are poorly equipped for the hotter and drier climate that lies ahead, with just 16 percent of their land irrigated. However it is African countries that are most disadvantaged – in Niger, Burkina Faso and Chad, where farmers are confronting cyclical droughts, irrigation covers less than one percent of arable land. Indeed, Africa



faces a significant irrigation deficit compared with Asian countries.<sup>38</sup> In many developing countries, the irrigation that does exist is dedicated to big industrial farms at the expense of community water and small-scale irrigation.

Alongside irrigation for crops, other infrastructure gaps hold many countries back in the fight against hunger in a warming world, including provision of clean drinking water (women in sub-Saharan Africa collectively spend 40 billion hours every year collecting water<sup>39</sup>), storage facilities for crops and good roads to connect smallholder farmers better to markets.

### **Greening the Sahel: A lesson in adaptation**

Farmers in California and Australia who are struggling to deal with the impacts of extreme drought may learn some useful lessons on innovative approaches to adaptation from their counterparts in the Sahel. Over the past three decades, hundreds of thousands of smallholder farmers in Niger and Burkina Faso have transformed large swaths of the Sahel's arid landscape into productive agricultural land – improving the food security of three million people.

They achieved this by ingeniously modifying traditional agroforestry, water and soil-management practices. For example, in Burkina Faso farmers sow crops such as sorghum and millet in pits lined with manure and surrounded by stone embankments. The pits concentrate nutrients and water precisely where they are needed, reduce soil erosion during the rainy season and retain water for longer, which helps crops survive dry periods. These simple, low-cost practices have helped rehabilitate between 200,000 and 300,000 hectares of land and produce an additional 80,000 tonnes of food per year.<sup>40</sup>

## **9. Crop insurance gap – score: 2/10**

Insurance can make a huge difference to farmers' ability to cope with climate change related shocks by providing compensation to cover losses, improve credit availability and ensure a more regular income. In Bolivia, Oxfam helped the government to set up a national agricultural insurance scheme to increase the resilience of small-scale producers. To date, 60,000 people have accessed agricultural insurance and 90,000 hectares of crops have been protected.

The majority of farmers across the globe, however, are not covered by crop insurance. While 91 percent of farmers in the US have crop insurance, this compares with 50 percent in Australia, 15 percent in India, 10 percent in China and just one percent or less in Malawi and most low-income countries.<sup>41</sup> The inequities in coverage are thrown into stark relief in the wake of extreme weather events such as the recent super typhoon Haiyan in the Philippines and the 2012 droughts in the US and Russia. The table below shows the proportion of reported total crop losses in each of those events that were insured, and therefore for which farmers received a measure of compensation.

<b>Extreme weather event</b>	<b>Crop losses (\$m)</b>	<b>Insured crop losses (\$m)</b>	<b>Share of total crop losses insured (%)</b>
2012 US drought <sup>42</sup>	20,000	15,000	75
2012 Russia drought <sup>43</sup>	600	170	28.33
Typhoon Haiyan <sup>44</sup>	110	6.8	6.18

## Paying for drought in the US and Russia in 2012

The 2012 drought in Russia was extremely hard for farmers. The government provided compensation, but it was not enough or arrived too late. Some farmers were told they were not eligible for compensation at all. As a result, many went bankrupt.<sup>45</sup> The Russian government has plans to create additional financial reserves – in the region of \$500m – to address negative climate impacts on farmers, and is increasing subsidies for family farms and young farmers.

*'At the end of the day people insure cars and properties. Farmers have a very risky business, and they more than anyone need some kind of guarantee.'*

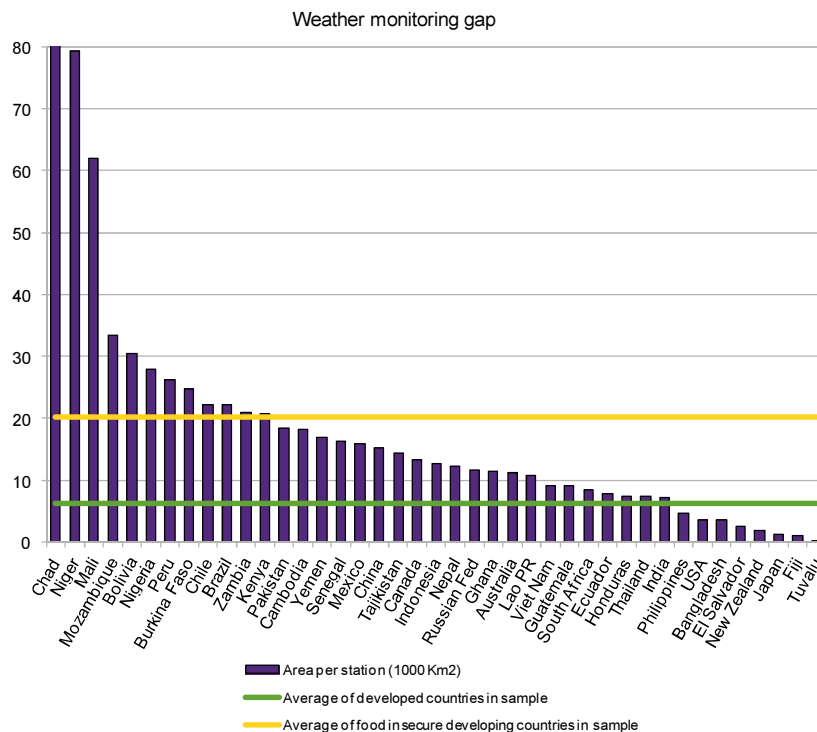
Russian farmer

In contrast, the 2012 drought in the US saw record pay-outs of \$15bn to farmers, mostly producers of corn, soybeans and wheat.<sup>46</sup> Insurance policies are sold by private companies but heavily subsidised by taxpayers to the tune of \$1.3bn a year.<sup>47</sup> Because insurance is recognized as critical to managing risk in a changing climate, big commodity groups successfully lobbied for higher government subsidies in the 2014 US farm bill. The bill significantly boosts crop insurance subsidies – almost eliminating risk for big commodity growers, but not for many other farmers.

## 10. Weather monitoring gap – score: 3/10

Providing good weather data is an important way of helping farmers to cope with a changing climate. In Thailand and Zimbabwe, Oxfam is investing in projects to improve weather forecasting and give farmers more certainty about when, and what, to plant and harvest.

Yet the concentration of weather stations varies hugely around the world. Ironically, countries which are most vulnerable to climate change impacts on food, have the lowest concentration of weather stations.



In California, there is a weather station every 2,000km<sup>2</sup>, whereas in Chad there is a weather station only every 80,000km<sup>2</sup> – an area roughly the size of Austria.<sup>48</sup> The potential distance between a farmer and a weather station in Chad is so great that the information provided could be for a completely different type of climate from the one the farm is in. It's like looking up the weather in Munich to decide whether to wear a coat in Rome.<sup>49</sup>

# MIND THE GAP

We analysed 10 key factors that have an important influence on what we eat in a warming climate.

# 43%

of the agricultural workforce in developing countries are women, yet women are often denied what they need to adapt, like the right to own land or access weather information.

Source: Oxfam 2014

# 80%

of agriculture worldwide and 95% in Africa is rain-fed, putting it at the mercy of changing rainfall patterns and intensity.

Source: Oxfam 2014

# 2%

of what developing countries need is all they are getting from rich countries to adapt to climate change. The total need - around \$100bn per year - is just 5% of the wealth of the world's richest 100 people.

Source: Oxfam 2014



Global seed diversity declined by 75% in the last 100 years - depriving farmers of crop varieties better suited to changing weather patterns.

Source: Oxfam 2014

# 91%

of US farmers have crop insurance. Compared to only 15% in India, 10% in China and just 1% or less in the poorest countries. So, if a farmer's crops fail...

Source: Oxfam 2014

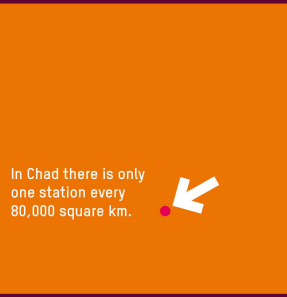
**Weather stations** give farmers vital information about climatic changes.

This helps farmers to plan better and avoid crop failure.



In California, there is one station every 2,000 square km.

Source: Oxfam 2014



In Chad there is only one station every 80,000 square km.



# 2

Of 20 African countries who committed to spend 10% of their budgets on agriculture, only 4 have met the target.

Source: Oxfam 2014



World grain reserves are at historically low levels. If extreme weather events hit, prices can skyrocket, triggering major food crises.

Source: Oxfam 2014

# NEED & REALITY

The gap between humanitarian aid poor people need and the amount they get has tripled since 2001. Climate change will only make this gap bigger.

Source: Oxfam 2014

# 5%

or less of the populations in Mali, Zambia and Laos, have social protection (such as school meals, access to medicines or employment schemes). So when climate change pushes food prices up, most people have no safety net.

Source: Oxfam 2014

## LIMITS TO ADAPTATION

While governments have agreed to limit global warming to two degrees, and more than 100 of the most vulnerable countries maintain that a 1.5 degree limit is needed, we are not currently on track to meet either. Perhaps the gravest gap we face in fighting hunger in a warming world, therefore, is the emissions gap between projected greenhouse gas levels in 2020 and the levels needed to keep the 1.5 degree target within reach.<sup>50</sup>

In its forthcoming report the IPCC is expected to warn that that beyond three to four degrees of warming, food production will no longer be possible across large areas of the globe – even with adaptation.<sup>51</sup> If insufficient action is taken to cut greenhouse gas emissions, the IPCC predicts we will reach this temperature threshold in the second half of this century.<sup>52</sup>

Even today, irreparable and unavoidable loss and damage to agricultural land and fisheries are already taking place. For example, changes in rainfall patterns, salt-water intrusion and loss of coastal land due to inundation are already having a significant impact on agriculture in the Pacific Islands. In Kiribati, the community of Tebunginako has already been forced to relocate because of seawater intrusion. The milkfish that once fed the entire village are long gone, and important crops such as coconut and taro are fatally overdosing on salt. Each year, villagers need to head further inland to find fresh food and water, but with Kiribati's 33 coral atolls and islands standing an average of just two metres above sea level, there is only so far they can go.<sup>53</sup>

Kiribati's experience is a foretaste of much worse to come if temperatures continue to rise. In Asia, sea-level rise and saltwater intrusion threaten farming in major deltas, potentially affecting some 3.5 to 5 million people. The Mekong Delta in Viet Nam, for example, accounts for around 50 percent of the country's agricultural production and is at severe risk of saltwater intrusion. It has been estimated that a sea-level rise of 30cm, which could occur as early as 2040, could result in the loss of about 12 percent of crop production.<sup>54</sup>

Declining rainfall and rising temperatures are also undermining the ability of farmers to feed their families and provide food for local markets. Countries such as Djibouti, Somalia and parts of Mali, Niger and Kenya already receive less than 290mm of precipitation a year. This is below levels sufficient for sustainable rain-fed agriculture, and yields are already failing to keep pace with population growth.<sup>55</sup> The IPCC estimates that some 75 million hectares of land that is currently suitable for rain-fed agriculture will be lost in sub-Saharan Africa by 2080.<sup>56</sup>

Elsewhere, areas of prime agricultural land across the Mediterranean, southern Europe and the Midwestern US are also expected to suffer as soaring temperatures and droughts make farming of some crops impossible.<sup>57</sup>

It is clear that if we are to ensure that we, our children, and families around the world have enough to eat, urgent and ambitious emissions reductions are needed now alongside a massive increase in support for adaptation.

## Reaching the limits of adaptation in Zimbabwe

Gutu District in the south-east of Zimbabwe has always been a dry and dusty place, but over the past decade the rainy season has become even more erratic. Harvest after harvest has withered away and died, and more people have been going hungry.

The 60-hectare Ruti irrigation project was developed by Oxfam, local government and the community to provide an alternative, *reliable* source of water. The project allocated 0.25 hectares of land each to 270 families and gave them access to irrigation water in rotation. Water flows from a nearby dam down a 3km pipeline and canal system to each plot of land. The system is gravity-fed, which keeps costs down. The results have been remarkable; people are able to grow three crops a year instead of one, food security and nutrition have improved markedly and the income of the very poorest participants has almost tripled.

Ipaishe Masvingise, a 49-year-old widow, said:

*'Our land was fertile and we used to get good harvests but then the weather changed. The rain is really erratic. You work and work but get nothing back if there's no water.'*

*'Now we have plots in the irrigation scheme we have got our lives back and can harvest much more. We can be farmers again. It gives me more than enough food and I can sell the grain to pay for fees, medical bills, pay for help in the fields and even support my extended family who don't have their own land.'*

However, there are limits to what adaptation projects such as this can achieve in the face of extreme weather events. The drought in 2013 was so severe that the dam water levels fell to below 25 percent capacity and there was not enough water pressure to properly feed the irrigation scheme. The water authority took the decision to reserve what water there was for the big sugar estates downstream. The drought was followed by unusually torrential rains, which filled the dam but also tumbled boulders against the pipeline, cracking it and once again reducing the water pressure.

# HOW DO WE STOP CLIMATE CHANGE MAKING PEOPLE HUNGRY?

Despite the mounting threat of climate change, hunger is not inevitable. Oxfam is calling for the following urgent action by governments, business and individuals to stop climate change making people hungry.

## **Build people's resilience to hunger and climate change**

- Enshrine the legal right to food in national law and company policies.
- Protect access to food for all by addressing the gaps in humanitarian aid in food crises, ensuring comprehensive coverage of social protection programmes and rebuilding food buffer stocks.
- Support small-scale food producers by increasing public and private investment, ensuring small-scale farmers and especially women have access to land, water and seeds, tackling infrastructure crises such as crop irrigation and storage, extending crop insurance, and strengthening weather data collection and dissemination.
- Ensure that national adaptation policies are consistent with the right to food.

## **Slash greenhouse gas emissions**

- Governments to commit to fair and deep cuts in emissions to stay below 1.5 degrees of warming.
- Cut emissions from food and beverage sector supply chains.
- Shift finance away from fossil fuels and into low carbon development, and scale up renewable energy access for the poorest people.

## **Secure international agreements that tackle climate change and hunger**

- Enhance efforts to achieve a fair, ambitious and legally binding climate change agreement in 2015.
- Deliver on promises of climate finance of \$100bn a year for the poorest countries by 2020, with much more going to adaptation, and prepare for new commitments for the post-2020 period.
- Support a target of zero hunger by 2025 in the post-2015 framework.

## **Take action into our own hands**

- Insist that governments and companies act to stop climate change making people hungry, at [www.oxfam.org/foodclimatejustice](http://www.oxfam.org/foodclimatejustice)
- Make choices about the way we live our lives, including cutting food waste, reducing meat consumption and asking our favourite food brands to act responsibly.



# ANNEX

The raw data used to score the gaps and inform the graphs is available for download from <http://oxf.am/iwb>

## Calculating the scores

For each area we identified a benchmark of what a world that is well-prepared to tackle climate change impacts on food might look like. We then assessed relevant national- or global-level data, and compared them with this benchmark according to a grading scale to give a score out of 10. Where national-level data were relevant, we took the average of a sample of the most relevant countries for which data are available, using the most recent year of available data. Where samples of food insecure countries are relevant, we define food insecure countries in this specific context as countries with a score above 20 on the Oxfam food index. Where global-level data were relevant, we took the average of the global data over the past decade. The specific methodologies for each area are described below.

**1. Adaptation finance:** we defined the benchmark of preparedness as food insecure countries receiving 100 percent of their adaptation finance needs from countries providing international adaptation finance. To calculate the score, we took the average of adaptation finance provided to a sample of 40 food insecure countries for which data are available during the 'Fast Start Finance' period 2010–12, as a proportion of each country's (conservatively) estimated adaptation finance needs. The grading scale used is as follows: 10 percent of adaptation finance needs provided = 1/10; 20 percent of adaptation finance needs provided = 2/10 and so on.

**2. Social protection:** we defined the benchmark of preparedness as food insecure countries ensuring 100 percent of their populations are covered by social protection. To calculate the score, we took the average coverage of a sample of 35 food insecure countries for which data is available. The grading scale used is as follows: 10 percent of population covered = 1/10; 20 percent of population covered = 2/10 and so on.

**3. Humanitarian aid in food crises:** we defined the benchmark of preparedness as the international community providing 100 percent of requested humanitarian aid each year. To calculate the score in this area, we took the average of humanitarian aid provided as a proportion of the level requested each year over the past decade. The grading scale used is as follows: 10 percent of needs met = 1/10; 20 percent of needs met = 2/10 and so on.

**4. Food stocks:** we defined the benchmark of preparedness as the long-term 25-year average of global annual stock-to-use ratios (24 percent). To calculate the score, we took the average stocks-to-use ratio over the past 10 years. The grading scale used is as follows: 10-year average stock-to-use ratio of 18 percent (the low level reached during the 2008 food price crisis) = 1/10; stock-to-use ratio of 19 percent = 1.6/10; ratio of 20 percent = 3.3/10; ratio of 21 percent = 5/10 and so on.

**5. Gender inequality:** we defined the benchmark of preparedness as a score indicating perfect gender equality in the UNDP Gender Inequality Index. To calculate the score, we took the average score of 61 food insecure developing countries for which data are available. The grading scale used is as follows: highest GII score meaning perfect equality (i.e. a score of 0) = 10/10, lowest GII score (1) = 1/10 and so on.

**6. Agricultural investment:** we defined the benchmark of preparedness as the target set by African governments to spend 10 percent of their national budgets on agriculture. To calculate the score, we took the average proportion of national budgets spent on agriculture in 20 food insecure African countries for which data are available. The grading scale used is as follows: one percent of national budget spent on agriculture = 1/10; two percent of national budget spent on agriculture = 2/10 and so on.

**7. Agricultural R&D:** we defined the benchmark of preparedness as the average research intensity of agricultural GDP in developed countries (that is, the amount of money spent on agricultural R&D in developed countries per unit of agricultural GDP). To calculate the score, we took the average research intensity of a sample of 28 food insecure developing countries for which data are available as a proportion of the average research intensity in high-income countries. The grading scale used is as follows: 10 percent of the high-income average = 1/10; 20 percent of the high income average = 2/10 and so on.

**8. Crop irrigation:** we defined the benchmark of preparedness as the average irrigation coverage in 16 food insecure Asian countries for which data are available, since Asia has the highest irrigation coverage in the world. To calculate the score, we took the average coverage in a sample of 33 food insecure African countries for which data are available as a proportion of the Asian countries' benchmark. The grading scale used is as follows: 10 percent of Asian average = 1/10; 20 percent of Asian average = 2/10 and so on.

**9. Crop insurance:** we defined the benchmark of preparedness as the average proportion of farmers insured in developed countries. To calculate the score, we took the average proportion of farmers insured in developing countries for which data are available as a proportion of the average proportion of farmers insured in developed

countries. The grading scale used is as follows: 10 percent of the developed country benchmark = 1/10; 20 percent of the developed country benchmark = 2/10 and so on.

**10. Weather monitoring:** we defined the benchmark of preparedness as the average distance between weather stations in developed countries. To calculate the score, we took the average distance between weather stations in a sample of 31 food insecure developing countries for which data are available, and compared it with the average distance between weather stations in a sample of five developed countries. We divided one by each average (since the lower the distance between weather stations the better), and calculated the result for developing countries as a proportion of the result for developed countries. The grading scale used is as follows: 10 percent of the developed country benchmark = 1/10; 20 percent of the developed country benchmark = 2/10 and so on.

## NOTES

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- 2 <http://www.theguardian.com/world/2014/feb/25/brazil-drought-threatens-coffee-crops>
- 3 New York Times, 01/02/2014, <http://www.nytimes.com/2014/02/02/us/severe-drought-has-us-west-fearing-worst.html?action=click&module=Search&region=searchResults%230&version=&url=http%3A%2F%2Fquery.nytimes.com%2Fsearch%2Fsite%2Fsearch%2F%3Faction%3Dclick%26region%3DMasthead%26pgtype%3DHomepage%26module%3DSearchSubmit%26contentCollection%3DHomepage%26t%3Dqry426%23%2F500+drought+california+13/02/2014>, <http://www.nytimes.com/2014/02/14/us/california-seeing-brown-where-green-used-to-be.html?action=click&module=Search&region=searchResults%230&version=&url=http%3A%2F%2Fquery.nytimes.com%2Fsearch%2Fsite%2Fsearch%2F%3Faction%3Dclick%26region%3DMasthead%26pgtype%3DHomepage%26module%3DSearchSubmit%26contentCollection%3DHomepage%26t%3Dqry426%23%2F500+drought+california>
- 4 Australia Bureau of Meteorology.
- 5 Guardian, 07/11/2013, <http://www.theguardian.com/environment/world-on-a-plate/2013/nov/07/climate-change-environment-food-security-ipcc-emissions-united-nations-global-warming>
- 6 IPCC AR4 said: 'Globally, the potential for food production is projected to increase with increases in local average temperature over a range of 1–3°C, but above this it is projected to decrease.'  
[http://www.ipcc.ch/publications\\_and\\_data/ar4/wg2/en/spmssp-c-3-food-fibre.html](http://www.ipcc.ch/publications_and_data/ar4/wg2/en/spmssp-c-3-food-fibre.html) AR5 is expected to estimate negative impacts on yields of major crops in both tropical and temperate regions with median impacts of 0-2% per decade likely from the 2030s onwards.
- 7 Guardian, 07/11/2013, op. cit.
- 8 <http://www.oxfam.org/en/pressroom/pressrelease/2010-11-11/oxfam-blasts-third-talk-fest-pakistan-seven-million-without-shelter>
- 9 R. Bailey (2011) 'Growing a Better Future: Food justice in a resource-constrained world', Oxfam, May 2011, <http://www.oxfam.org/en/grow/reports/growing-better-future>
- 10 <http://www.ifpri.org/sites/default/files/publications/pr21.pdf>
- 11 Extreme Weather, Extreme Prices: The costs of feeding a warming world, Oxfam, September 2012, <http://policy-practice.oxfam.org.uk/publications/extreme-weather-extreme-prices-the-costs-of-feeding-a-warming-world-241131>
- 12 Squeezed: Living with volatile food prices, Oxfam 2013 <http://policy-practice.oxfam.org.uk/blog/2013/05/squeezed-living-with-volatile-food-prices>
- 13 <http://www.theguardian.com/commentisfree/2014/mar/03/lent-food-hunger-fasting-britain>
- 14 Tripling in foodbank usage sparks Trussell Trust to call for an inquiry, Trussell Trust, 16/10/2013, <http://www.trusselltrust.org/foodbank-numbers-triple>
- 15 The graph shows the correlation between Oxfam's Good Enough To Eat Index (<http://www.oxfam.org/en/grow/pressroom/pressrelease/2014-01-15/dutch-beat-french-and-swiss-top-oxfams-new-global-food-table>) and the Centre for Global Development's Climate Vulnerability Index (<http://www.cgdev.org/publication/quantifying-vulnerability-climate-change-implications-adaptation-assistance-working>). For the former, we have used the indicators for food availability, affordability and quality, as the indicators for healthy eating are not linked to climate change. For the latter, we have used the indicators for climate drivers, consisting of countries' risks to weather-related disasters, sea-level rise and reduced agricultural productivity. Changes in extreme weather risks are considered for the period from 2008 to 2015, and risks associated with storm surges and agricultural productivity loss from 2008 to 2050.
- China and India appear as outliers on the graph largely because of their large populations and large size. The three variables of climate risk are each re-scaled and weighted by group size relative to national population. Because China and India have such large total populations relative to their coastal and rural populations, the extreme weather indicator assumes a larger share of their scores, and on this indicator China and India are ranked first and second respectively – largely because they cover such a large land area and will therefore be increasingly exposed to multiple climatic events.
- 16 <http://www.oxfam.org/sites/www.oxfam.org/files/oxfam-media-advisory-climate-fiscal-cliff-doha-25nov2012.pdf>
- 17 The wealth of the richest 100 billionaires amounts to approximately \$2.1 trillion, <http://www.bloomberg.com/news/2013-11-05/world-s-richest-add-200-billion-as-global-markets-surge.html>
- 18 See technical annex.
- 19 <http://www.theguardian.com/environment/2014/feb/08/severe-floods-threaten-food-security-climate-change>

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20 Social protection for food security, CFS, June 2012, [http://www.fao.org/fileadmin/user\\_upload/hlpe/hlpe\\_documents/HLPE\\_Reports/HLPE-Report-4-Social\\_protection\\_for\\_food\\_security-June\\_2012.pdf](http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-4-Social_protection_for_food_security-June_2012.pdf)

21 <http://www.ilo.org/global/about-the-ilo/decent-work-agenda/social-protection/lang-en/index.htm>

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23 See technical annex.

24 See technical annex.

25 [http://www.iatp.org/files/2012\\_07\\_13\\_IATP\\_GrainReservesReader.pdf](http://www.iatp.org/files/2012_07_13_IATP_GrainReservesReader.pdf)

26 <http://www.oxfam.org/sites/www.oxfam.org/files/bn-preparing-thin-cows-food-reserves-210611-en.pdf>

27 <http://www.fao.org/docrep/013/am307e/am307e00.pdf>

28 <http://www.fao.org/gender/landrights/home/en/>

29 The State of Food and Agriculture 2010-2011 (SOFA), FAO, 2011, <http://www.fao.org/docrep/013/i2050e/i2050e.pdf>

30 CGIAR Climate Change, Agriculture and Food Security Baseline Survey Data at <http://ccafs.cgiar.org/resources/baseline-surveys#UybqoVdVwU> and IFAD (Investing in Rural People). "The gender advantage". <http://www.ifad.org/climate/resources/advantage/gender.pdf>

31 FAO calculates that around half of the world's hungry people are from smallholder farming communities, surviving off marginal lands prone to natural disasters like drought or flood. Another 20 percent belong to landless families dependent on farming and about 10 percent live in communities whose livelihoods depend on herding, fishing or forest resources. <http://www.wfp.org/hunger/who-are>

32 <http://www.wider.unu.edu/stc/repec/pdfs/wp2013/WP2013-014.pdf>

33 <http://www.fao.org/docrep/007/y5609e/y5609e02.htm>

34 See technical annex.

35 <http://www.fao.org/ag/save-and-grow/en/5/index.html>

36 Responsible, sustainable irrigation includes sustainable resources management and agricultural practices that respect the environment and water resources.

37 <http://home.windstream.net/bsundquist1/ir3.html>

38 See technical annex.

39 <http://www.undp.org/content/undp/en/home/librarypage/hdr/human-development-report-2006/>

40 <http://www.ifpri.org/sites/default/files/publications/oc64ch07.pdf>

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42 <http://www.artemis.bm/blog/2013/03/14/drought-will-become-one-of-the-most-destructive-natural-catastrophes-munich-re/>

43 <http://www.oxfam.org/sites/www.oxfam.org/files/cs-russia-drought-adaptation-270913-en.pdf> NB figures given are for government compensation rather than private insurance pay-outs. In 2010, Russia insured only 13% of its cultivated land (8 million hectares out of a total of 63 million). The Russian government is currently proposing to increase this figure to 40% in 2012: <http://www.mapfre.com/mapfre/docs/html/revistas/trebol/n61/pdf/Articulo2-en.pdf>

44 Crop damage: [http://www.fao.org/giews/english/shortnews/Philippines\\_11\\_2013.pdf](http://www.fao.org/giews/english/shortnews/Philippines_11_2013.pdf) and insured losses: <http://www.businessinsurance.com/article/20131216/NEWS09/131219897>

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46 <http://www.bloomberg.com/news/2013-01-25/munich-re-says-world-crop-insurance-costs-top-record-on-drought.html>

47 <http://www.businessweek.com/ap/2012-09-13/crop-insurance-losses-begin-to-mount-amid-drought>

48 See technical annex.

49 <http://www.freemaptools.com/area-calculator.htm>

50 <http://www.unep.org/pdf/UNEPemissionsGapReport2013.pdf>

51 Turn down the heat: why a 4°C warmer world must be avoided, The World Bank, November 2012, [http://climatechange.worldbank.org/sites/default/files/Turn\\_Down\\_the\\_heat\\_Why\\_a\\_4\\_degree\\_centrigrade\\_warmer\\_world\\_must\\_be\\_avoided.pdf](http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf)

52 [http://www.climatechange2013.org/images/report/WG1AR5\\_SPM\\_FINAL.pdf](http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf)

53 <http://www.climate.gov.ki/>

54 [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/06/14/000333037\\_20130614104709/Rendered/PDF/784220WP0Engli0D0CONF0to0June019090.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/06/14/000333037_20130614104709/Rendered/PDF/784220WP0Engli0D0CONF0to0June019090.pdf)

55 R. Bailey (2013), Managing Famine Risk: Linking Early Warning to Early Action, A Chatham House Report, London: Royal Institute for International Affairs

56 UN Food and Agriculture Organization (2011), Climate Change, Water and Food Security, Rome: UN Food and Agriculture Organization, p.3.

57 [http://www.int-res.com/articles/cr\\_oa/c044p083.pdf](http://www.int-res.com/articles/cr_oa/c044p083.pdf) ; [http://www.ucsusa.org/assets/documents/global\\_warming/climate-change-minnesota.pdf](http://www.ucsusa.org/assets/documents/global_warming/climate-change-minnesota.pdf)

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