

# El Niño and Cereal Production Shortfalls

## Policies for Resilience and Food Security in 2016 and Beyond

Paul Dorosh, Adam Kennedy, and Maximo Torero

The current El Niño episode may be among the strongest on record (Earth Institute 2015). Past El Niño episodes have caused rainfall and temperature fluctuations leading to agricultural production shortfalls, higher food prices (Brunner 2002), and disease outbreaks (Linthicum et al. 1999) that adversely affected food and nutrition security in various regions worldwide. Rapidly rising food prices are particularly harmful for poor consumers who spend as much as 50 to 70 percent of income on food (Von Braun et al. 2008; Heady and Fan 2008; Torero 2011). This year again, serious localized production shortfalls have occurred or are expected, creating an urgent need for policy actions to ensure adequate food supply and food mobility from surplus to deficit regions. Although global cereal production is not expected to decline significantly, complacency is not warranted: The situation calls for careful monitoring of production and prices, promotion of transparent international and domestic trade policies, and expanded coverage of safety nets and nutrition programs for the households most severely affected, all while working toward long-term improvements in resilience and agricultural production.

### EL NIÑO'S EFFECT ON PRODUCTION AND MARKETS

El Niño is a periodic weather pattern caused by a fluctuation in sea surface temperature across the equatorial Pacific Ocean.<sup>1</sup> This warmer water modifies the overlying atmosphere, which affects weather conditions in many parts of the world. El Niño conditions are currently present but are likely to abate during late northern hemisphere spring or early summer 2016 (CPC 2016).

Most regions suffering negative impacts from El Niño are experiencing reduced rainfall, which may delay planting, impact crop maturation, or reduce the viability of pasture lands (USDA FAS 2016). However, the effects of El Niño vary considerably (Cashin, Mohaddes, and Raissi 2015), and some regions may experience weather that is actually more favorable for agricultural production. Moreover, the agricultural impact of El Niño-related shocks depends largely on the timing, duration, and strength of the El Niño. Also, the economic and welfare impacts depend on the

domestic food, trade, and safety-net policies of major exporters and importers.

Temporary production setbacks from this year's El Niño event are occurring in the context of positive long-term trends in global food production (Table 1). Global trends in cereals production have shown sustained increases and, over the last three years, have led to a build-up of global food reserves.<sup>2</sup> So while total cereal production is projected to be 1.3 percent lower than last year, it is still 2.2 percent above the three-year average, and this year's shortfall could be covered by stocks.<sup>3</sup> However, negative localized impacts across the world could be quite significant in the absence of market linkages and trade openness, as has been the case for previous El Niño events (Dilley 2000) and other weather-related shocks (Brown and Kshirsagar 2015).

Global commodity prices are at the lowest level since 2010 (Figure 1). However, the degree to which global prices are transmitted to small developing country markets, and conversely the degree to which production shortfalls in the countries hardest hit by El Niño will affect global markets, will both vary depending on countries' trade policies, the volume of commodities traded, and domestic stocks. For example, for Latin America, global price transmission for maize is quite weak both because the preferred maize is white (an imperfect substitute for yellow maize traded on international markets) and many countries have price control policies (Robles and Torero 2010). The evidence for Africa south of the Sahara is mixed and depends on the commodity and subregion; most studies suggest that international prices will have a muted effect on domestic markets because of weak integration with international markets (Minot 2011; Ceballos et al. 2015). Low global prices therefore may not fully moderate price hikes in developing regions negatively affected by El Niño, but policy choices—such as maintaining open borders and transparent trade policies—can help to minimize local price increases.<sup>4</sup>

### REGIONAL OUTLOOKS

In East Africa, eastern Ethiopia is experiencing its worst drought in over 30 years. Nationally, net cereal production from the main

**TABLE 1 Cereal production in selected regions (million metric tons)**

Region	2012/13	2013/14	2014/15	2015/16*	% change 2012/13 – 2014/15 (average) to 2015/16
World	2,267.0	2,474.9	2,501.1	2,467.5	2.2
SSA	121.4	123.1	124.9	117.2	-4.8
Central Africa	7.5	6.7	6.7	6.9	-1.4
East Africa	38.1	38.9	42.1	40.0	0.8
Southern Africa	28.5	31.1	29.5	23.7	-20.2
West Africa	47.3	46.4	46.5	46.6	-0.4
North Africa	32.2	36.2	32.6	36.5	8.6
East Asia	495.0	508.9	512.3	526.2	4.1
South Asia	324.7	332.4	333.4	318.8	-3.4
Southeast Asia	144.8	148.0	146.5	145.2	-0.8
Europe	292.0	318.3	343.6	323.2	1.7
Central America & Caribbean	6.5	6.8	6.3	6.5	-0.7
Middle East	57.9	65.9	55.5	66.0	10.5
North America	436.9	533.1	527.2	517.3	3.7
South America	169.9	168.0	173.9	167.5	-1.8
Others	185.8	234.2	244.9	242.9	9.6
Stocks	449.8	511.5	558.7	565.6	11.6

Source: USDA FAS (2016).

Note: \* = forecasted estimates; SSA = Africa south of the Sahara. Stock data are based on an aggregate of differing local marketing years and should not be construed as representing world stock levels at a fixed point in time.

harvest may fall by 14.1 percent (3.3 million metric tons) relative to the 2014/2015 harvest (FAO 2015a). Households in regions hit particularly hard, including the eastern highlands and pastoralist areas, are expected to suffer severe crop and livestock losses leaving about 10.2 million people, approximately 10 percent of Ethiopia's population, in need of food assistance (UNOCHA 2015). However, most of the western part of the country has enjoyed adequate rainfall and relatively normal harvests, as have some neighboring countries. Despite the drought, current market prices for maize remain nearly 25 percent below the three-year average, reflecting the government's long-term investments in boosting productivity (FAO 2016).

Crop production in Southern Africa is also forecast to decline by approximately 20 percent below the three-year average, with the main effects on white maize. White maize is a regional food crop, and the Republic of South Africa is a key exporter to the region. During El Niño events of the 1980s and 1990s, maize production in South Africa fell by as much as 40 to 60 percent. Currently prices in South Africa have increased but are still below their long-term seasonal averages. The declining value of the rand due to the economic slowdown in China, South Africa's primary trading partner, will make imports more expensive and hurt poor consumers. Other countries in the region, such as Zimbabwe and Malawi, are also predicted to see significant declines in production, although exports from Zambia are helping to smooth consumption and moderate price increases.

El Niño-related drought has stressed irrigation reserves and delayed planting in northwestern India, while the southeast has received heavy rains. The highest temperatures on record for India in December were recorded in 2015. These conditions are forecast to reduce cereal yields by approximately 10 million metric tons (mmt) or about 3 percent of national production (Selvaraju 2003). That said, India is estimated to hold nearly 50 mmt of cereal stocks, and other countries in the region—Pakistan and Bangladesh—are experiencing more favorable weather conditions for agriculture (FAO 2015a).

World rice markets may yet be influenced by El Niño-related production shocks in Southeast Asia as they have in the past (Chen et al. 2008). The rice market is thin and volatility is high (Timmer 2009). Only 8.5 percent (40 mmt) of total rice production (470 mmt) is traded and prices can surge quickly during a food crisis, whether induced by production shocks or perceived shortages (Timmer 2010). Past El Niño events have reduced rice production in many major rice-producing countries including Indonesia (Naylor et al. 2001) and the Philippines (Roberts et al. 2009). These countries, along with Thailand, are suffering drier-than-average conditions. Both Indonesia and the Philippines have allowed domestic rice prices to rise far above import parity, with serious adverse implications for poor households. However, China, the world's largest producer, has had another bumper harvest as a result of favorable weather and government production incentives.<sup>5</sup>

In Central America, drought is already affecting approximately 3.5 million people; in Haiti, low agricultural yields and a sharp rise in food prices have left as many as 560,000 people in need of food aid (UNOCHA 2016). Below average rainfall is expected to reduce production of red beans and maize, affecting subsistence farmers in El Salvador, Honduras, and Nicaragua, and Honduras may lose 80 percent of its maize crop.<sup>6</sup> In coffee-growing regions of Guatemala, drought during 2015 has been blamed for an increase in malnutrition-related deaths (FEWS NET 2016). On the other hand, Mexico, by far the region's largest maize producer, is forecast to increase cereal production by about 7 percent over last year. This should create a boon for the region, even as cereal production is projected to decline in El Salvador and Guatemala by approximately 14 and 5 percent, respectively (FAO 2015a).

## SHORT-TERM AND LONG-TERM POLICY MEASURES

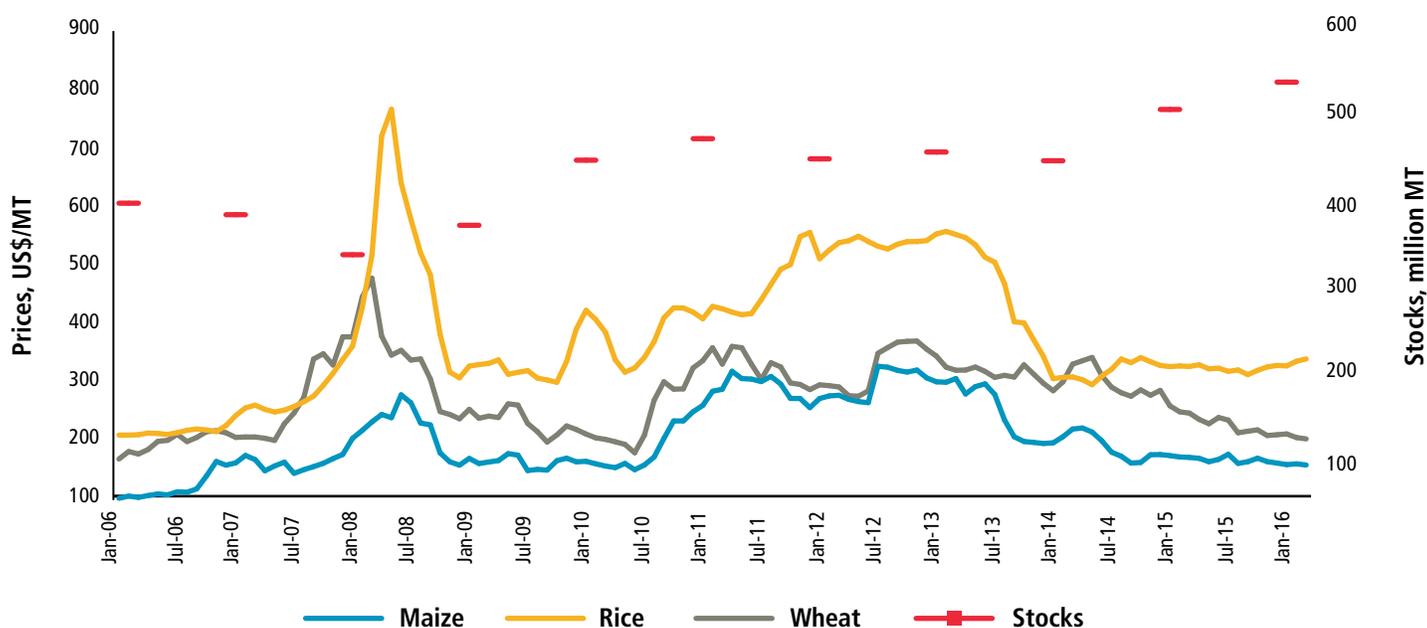
El Niño-induced drought has led to decreases in production in several developing regions, putting the food and nutrition security of the most vulnerable at risk. With few assets to cope with these shocks, many already food-insecure segments of the population will need immediate assistance. Targeted safety net programs should be created where they do not exist and scaled up where they are already in place. One successful model is Ethiopia's Productive Safety Net Programme, which combines food and cash transfers to Ethiopia's poorest and most food-insecure households with a work requirement for able-bodied recipients.

Similarly, countries like Mexico and Peru have developed contingent funds for natural disasters that significantly increase resilience to El Niño. Mexico has catastrophic insurance in place, primarily for smallholders, which covers 22.2 million hectares and has helped to transfer a significant portion of risk to insurance companies. Such government-supported mechanisms should be expanded, particularly for regions that routinely experience shocks such as pastoral areas of the Horn of Africa. Where these programs cannot be mobilized quickly, other emergency relief channels will be needed. These can be bolstered by ensuring that accurate information on prices, market availability, and acute malnutrition flows freely, which will allow the private sector, government, and donors to improve supplies and conduct relief efforts to reach households in need. Early warning systems and coordinated communication efforts improved drought preparedness in Southern Africa during the 1997/1998 El Niño (Dilley 2000). However, many countries still need to fully develop early warning systems.

In addition to expansion of safety nets and emergency relief to households, several other key policy measures can prevent or minimize the adverse effects of El Niño on food security at the national and household levels:

First, many of the negative impacts of El Niño are limited to particular regions within countries, with neighboring areas experiencing normal or increased rainfall. To allow grain to flow freely from surplus to deficit areas, countries must avoid restrictions on domestic trade (Webb and von Braun 1994).

**FIGURE 1** Global cereal prices and stocks



**Source:** Prices: USDA FAS (2016); Stocks: FAO International Commodity Prices Database, accessed April 7, 2016, <http://www.fao.org/giews/pricetool>.

**Note:** Maize = US No. 2, Yellow, US Gulf; Wheat = US No. 2, Hard Red Winter ord. prot. US fob Gulf; Rice = White broken, Thai, A1 Super fob Bangkok. Stocks are based on annual crop year (January 2010 corresponds to 2009/2010 crop year and so on). MT = metric tons.

Second, global prices remain low, and private-sector imports that add to domestic supplies at no cost to the government should be permitted and facilitated, especially in countries such as Ethiopia, the Philippines, and Indonesia where the import parity price is lower than the domestic price. International trade can be encouraged by streamlining customs procedures, removing foreign exchange and import licensing restrictions, reducing tariffs, and maintaining transparent trade policy and regular communication with private traders. Bangladesh successfully implemented this price stabilization strategy following major production shortfalls (Dorosh 2001). In addition, while export restrictions such as bans can boost domestic supplies in some cases, they can also increase volatility (Anderson and Nelgen 2012; Kalkuhl et al. 2016) and, in exporting countries with many small producers, lead to lower incomes for poor farmers and discourage production (Diao and Kennedy 2016).

Third, countries can manage policies on grain stocks in ways that calm domestic markets and avoid destabilizing international markets. Small timely and transparent interventions in domestic markets through public stock sales can also calm markets and help to prevent panic purchases and stock-buildups by private households and traders, thus reducing the need for much larger interventions later (Dorosh and Rashid 2013). Private stock holding by farmers, traders, and millers should be encouraged, and “anti-hoarding” laws should be avoided. However, management of public grain stocks and related policies for price stabilization is complex, involving trade-offs such as the costs of storage relative to expected costs of imports, and should aim for realistic rather than expansive objectives (Galtier 2014; Wright 2010).

Fourth, in the medium term, investments in agricultural research and extension can help boost domestic food production and have been shown to have high returns (Thirtle, Lin, and Piesse 2003). Climate change requires agricultural systems to adapt to both varying weather patterns and more frequent and severe shocks; research and extension investments can make farmers better prepared. Likewise, rural infrastructure such as roads, electricity, communication networks, and storage facilities can improve markets and incomes by increasing information flows and decreasing transportation and marketing costs. These investments can also promote more resilient livelihoods. In Ethiopia, sustained

public investment in agriculture technology and infrastructure has substantially improved the country’s ability to cope with food security shocks and sharply reduced the risk of famine since the mid-1980s (Dorosh and Rashid 2012).

The effects of El Niño on domestic production are already apparent in Eastern and Southern Africa, Central America, and South and Southeast Asia, and there is already an acute need for expanded safety net and nutrition interventions in some areas. In addition to providing emergency relief for vulnerable households, countries must increase access to information on production and prices, promote domestic and international market flows, and use domestic stocks and sales of public imports in a timely and transparent manner. In the medium- to long-run, promoting efficient domestic production through investments in infrastructure and agricultural technology makes the food system more resilient and reduces the likelihood of future weather and climate shocks posing major threats to food security.

## NOTES

- 1 El Niño weather patterns have been observed for many years; some evidence suggests that climate change may increase their frequency and severity (Cai et al. 2014).
- 2 See an overview of stocks and their relationship to El Niño at <http://www.foodsecurityportal.org/el-ni%C3%B1o-and-outlook-2016>.
- 3 Note that the recent build-up of global cereal stocks is partially due to stock accumulation in China as the government tried to prevent domestic prices from falling to insulate farmers from lower international prices. Global rice and corn stocks, without China, have declined, whereas global wheat stocks, without China, have increased.
- 4 Note that some of the global price trends, and their reflection in domestic prices, are induced by global supply-demand conditions unrelated to El Niño effects.
- 5 China generally experiences increased rainfall during El Niño events which could improve production, but it rarely coincides with the growing season (Deng et al. 2010).
- 6 See <http://www.foodsecurityportal.org/el-niño-driving-abnormal-weather-patterns-food-security-concerns-worldwide>.

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**Paul Dorosh** (p.dorosh@cgiar.org) is division director of the Development Strategy and Governance Division of the International Food Policy Research Institute (IFPRI), Washington, DC. **Adam Kennedy** (a.kennedy@cgiar.org) is a senior program manager in the Development Strategy and Governance Division of IFPRI, Washington, DC. **Maximo Torero** (m.torero@cgiar.org) is division director of the Markets, Trade, and Institutions Division of IFPRI, Washington, DC.

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2033 K Street, NW, Washington, DC 20006-1002 USA | T. +1-202-862-5600 | F. +1-202-467-4439 | Email: [ifpri@cgiar.org](mailto:ifpri@cgiar.org) | [www.ifpri.org](http://www.ifpri.org)

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