



# A MARKET PERFORMANCE ANALYSIS IN MOZAMBIQUE

*Rapid Market Assessment in Tete and Gaza Provinces*



**World Food  
Programme**

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# A MARKET PERFORMANCE ANALYSIS IN MOZAMBIQUE

*Rapid Market Assessment in Tete and Gaza Provinces*

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food security analysis

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The views in this report and any errors and omissions are those of the authors.

## ACRONYMS

ALPS	Alert for Prices Spikes
ARIMAX	Auto Regressive Integrated Moving Average with Explanatory variable model
CBT	Cash Based Transfer
FDI	Foreign Direct Investments
FFA	Food for Assets
GDP	Gross Domestic Product
IMF	International Monetary Fund
INE	<i>Instituto Nacional de Estatística</i>
IPC	Integrated Food Security Phase Classification
LES	Linear Exponential Smoothing
MIC	Mozambican Ministry of Industry and Commerce
MPD/DNEAP	<i>Ministério da Planificação e Desenvolvimento. Direcção Nacional de Estudos e Análise de Políticas</i>
MPI	Market Performance Index
mVAM	Mobile Vulnerability Analysis and Mapping
NDVI	Normalized Difference Vegetation Index
POS	Point of Sale
RMSE	Root Mean Squared Error
SADC	Southern African Development Community
SES	Simple Exponential Smoothing
SETSAN	<i>Secretariado Técnico de Segurança Alimentar e Nutricional</i>
SIMA	<i>Sistema de Informação de Mercados Agrícolas</i>
WFP	World Food Programme

## EXECUTIVE SUMMARY

Following the drought caused by *El Niño* 2015/16, more than 23 million people in southern Africa are deemed to be food insecure, an estimated 1.5 million of whom live in Mozambique. A WFP Level-3 (corporate) emergency response was activated in June 2016 to provide surge support for the countries affected.

The WFP Mozambique country office requested support to carry out a market assessment to provide recommendations on the most appropriate assistance for the lean season 2016/17. With low crop production estimates in many provinces, the main objective of the market assessment was to identify whether local markets would be able to absorb extra demand without negatively affecting market food supplies and prices in Gaza and Tete provinces.

The main findings of the assessment are as follows:

**An uneven harvest has been forecasted nationwide – largely poor in Gaza province, and mixed in Tete province.**

The harvest has been a failure in most of the south and in many parts of central Mozambique; however, it has been good in other areas, so the production outlook is quite mixed. Nationally, maize production is only 7 percent lower than the last five-year average, and total cereal estimates are actually 20 percent higher. According to the Food Balance Sheets, final stocks<sup>1</sup> are expected to be 728,000 mt for cereals, but there will be a 55,000 mt shortfall for maize. Excluding trade flows with other countries, the national maize deficit of 120,000 mt is entirely situated in the southern region, in the provinces of Inhambane, Gaza and Maputo (316,000 mt). It is only partially offset by production surplus in the northern and central provinces.

Tete province is 54,000 mt short of cereals, which is almost half the total deficit in the central region. Detailed production data was not available in Gaza province, but the body of evidence suggests that the maize harvest was largely a failure.

**Given the regional shortage of maize and the country's difficult economic situation, full reliance on additional maize imports would be challenging.**

To fix its maize shortfall, Mozambique would have to expand its normal import capacity by 26 percent over the course of the commercial year. Most of the deficit would be imported from South Africa, which could be challenging under the current regional constraints: the 55,000 mt needed by Mozambique would be added to the 1.6 million mt required by the thirteen Southern African Development Community (SADC) member states.

The distressed state of the Mozambican economy will make it difficult for the country to tackle the current food insecurity. Dependency on imported goods is creating a widening deficit in the current account, highlighting weak competitiveness and the country's reliance on volatile

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<sup>1</sup> Taking into account carry-over stocks from the previous commercial year, domestic production, consumption requirements, and projected imports and exports.

foreign direct investments. Furthermore, the discovery of huge undisclosed liabilities have undermined the confidence of the main donors.

During the past twelve months, runaway inflation in the order of 20 percent has been fuelled by the relentless depreciation of the national currency and a consequent shortage of US dollars.

**Intra-country trade from surplus provinces will not fill the production gap in deficit areas.**

With a crashing exchange rate, the surplus in bordering markets will most likely attract foreign traders, increasing the competition over the few maize stocks available when the harvest season comes to the end.

The low intensity conflict under way in Sofala, Zambezia and Tete provinces has led to frequent attacks on the main highways, targeting convoys. This hampers the north-to-south movement of goods, so many large traders have sought to mitigate risk by pushing the burden of organizing convoys to deliver food outside the province onto traders in deficit areas, who often lack the financial resources to do so. Restocking is also much less frequent than before.

Profit margins are plummeting for smaller traders, as they face high transportation costs, rising wholesale prices and dwindling demand from customers. By contrast, traders with large financial resources are in a position to make huge profits. In fact, many such traders operating in surplus-producing areas are accumulating maize grain with no intention of releasing the stocks in the short term.

**Trade flows have changed in drought-affected provinces.**

Trade flows in Tete province have been partially affected by the drought, with lower-than-usual volumes being traded. Rural villages in the belt from Angónia to Zumbo are still the main maize suppliers for the whole province via Tete city, while imported goods arrive from Maputo and Beira, making Tete city the market-hub for the province. Some markets in the south and south-west of the province (e.g. Magoe and Mucumbura) rely entirely on trade flows from the district capital, which is a significant change to usual trade flows.

In Gaza province, the change has been marked, as supply sources differ from a typical year. The lack of local produce has side lined intermediary markets, making Xai Xai the main supply source to the rest of the province, especially for remote deficit areas in Massingir and Guijá districts. Most of the maize now comes from Manica, with longer-than-usual supply chains and higher transportation costs. Smaller traders have less access to credit because of an increasing number of defaults.

**Food markets are already under pressure, and additional monitoring is needed to track market functionality over time.**

As part of this assessment, a market performance index was developed to complement the findings of the field visits with quantitative indicators to understand whether markets are suitable for cash-based interventions.

The index builds on a set of indicators including backward- and forward-looking market performance, market potential outreach to complement local production supply, market remoteness and the overall economic context (see Annex II). In June 2016, the main markets in central and southern Mozambique scored between 40 and 80 points – higher values suggest better functioning markets. Markets in Gaza and Tete province were all around 50, confirming the troubled picture painted by the field assessment. The only exception is the district of Angónia in Tete province, which scored 68: this is unsurprising as Angónia is one of Mozambique’s main producer markets.

Overall, the indicators show that the seasonal pattern of maize prices was much shorter this year, with prices relaxing for the harvest season later than usual and resuming their upward trend earlier. More than 90 percent of the markets showed excessive year-on-year changes and high price volatility. Except for Angónia and Maputo, all the monitored markets are likely to experience several alert and crisis episodes in the coming months, according to the WFP Alert for Price Spikes (ALPS)<sup>2</sup> scale.

**Cash-based transfers (CBT) would not be recommendable in the coming months in most rural areas.**

It would be difficult to plan cash-based transfers (CBT) in rural communities in Gaza and Tete provinces because of structural constraints such as the distance of the few operating markets from WFP beneficiaries, poor road infrastructure, the weak financial capacity of smaller traders and the low potential of local shops to meet WFP food selection/diversity requirements.

Other factors that would hamper the use of CBT include the escalation of insecurity along main trade routes, the scarcity of local food, trader competition over fewer stocks and the inflationary pressure of food prices.

Running market-based interventions under these conditions could compromise several of the advantages of using cash solutions, including the freedom of beneficiaries to choose food items in sufficient amounts and diversity to meet their nutritional requirements.

A small pilot project could, however, be explored in specific rural communities close to urban settings and well developed markets in the whereabouts of Tete and Angónia. The objective of the pilot would be to return ground-truth information of the opportunities and structural challenges of CBT programming in rural Mozambique. This would be paramount from 2017/18 onwards, should the current contextual constraints that affect market functioning relax and WFP opt to reach an increasing number of beneficiaries through market-based interventions.

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<sup>2</sup> The Alert for Price Spikes (ALPS) is a [WFP indicator](#) that monitors the extent to which a local food commodity market experiences unusually high food price levels. Four categories characterize the situation in the market based on the projected extent of the price increases: normal, stress, alert and crisis.

**Linking up with large food traders could be a way to reach out to remote rural areas.**

Only large traders have the financial and logistical capacity to offset the constraints in the purchase and transportation of food stocks that have been affecting traders in Gaza and Tete provinces.

Contracting large traders under the business-to-business approach<sup>3</sup> therefore seems to be the best CBT option, if WFP can leverage the profit margins that bigger wholesalers can still make. These traders will have the prospect of expanding their retail network to rural communities in return for a commitment to ensuring an adequate choice of food at accessible prices for beneficiaries.

**Market-based food assistance could support affected urban populations.**

Although most of the food-insecure population is in rural areas, the urban poor are likely to need food assistance even earlier, as they fully rely on markets. In such cases, CBT interventions are endorsed by the mission.



WFP / Oscar Maria Caccavale

Point of collection in Mucumbura

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<sup>3</sup> This is a WFP approach of contracting larger retailers, wholesalers, or traders, with the express requirement that they sub-contract distribution through small local retailers in the beneficiaries' localities.

## I. INTRODUCTION

The 2015/16 maize harvest in most southern African countries has been seriously affected by *El Niño*-induced drought. Regionally, maize production fell 10 percent from the previous agricultural year and 15 percent compared to the five-year average. Except for surpluses in Zambia (0.8 million mt) and Tanzania (1.2 million mt), nearly all countries in the region recorded national maize deficits that amount to a 5.1 million mt supply gap (FEWS NET, 2016; SADC, June 2016).

The Southern African Development Community (SADC) launched a humanitarian appeal for the region in June 2016, highlighting that maize is required for 23 million people in emergency conditions. The WFP L3 corporate emergency response was then activated.

Mozambique has been badly affected by the drought, with 1.5 million people facing acute food insecurity as of 22 June 2016. The population in need of food assistance is expected to increase to nearly 2 million people by the end of the lean season in March 2017 (*ibid.*).

As part of its work to face this emergency, WFP Mozambique Country Office is considering adding cash-based transfer (CBT) programmes to its toolkit of activities, specifically in Tete and Gaza provinces.

A supporting team from Rome Headquarters and the Johannesburg Regional Bureau was asked to conduct a rapid market assessment in these two provinces, with three specific aims: 1) provide a market assessment report with recommendations on the feasibility of CBT in the two provinces; 2) set up a call centre to monitor market prices and other high-frequency indicators; and 3) draft a Market Performance Index (MPI) to track evolving conditions that might make a market conducive to CBT.

The market assessment team met stakeholders in Maputo (including government authorities, donors, international organizations and NGOs) and visited 20 markets between 19 and 28 June 2016. The team conducted 132 interviews with traders, market chiefs and local authorities, at the following locations: 11 markets in Tete province (Angónia and the rural market of Doume; Tete city; Magoe; Mucumbura; Fingoe and the rural markets of Calira, Catcombwe, Muze and Zambue; and Zumbo), 8 markets in Gaza province (Xai Xai; Chokwe and the rural market of 25 Setembro; Chibuto; Macia; Guijá; Massingir and the rural market in Cubo village) and 1 market in Sofala province (Beira).

In addition to the market field visits, a call centre was set up with an operator contacting 115 traders every week as an initial three-month pilot project under the mVAM initiative.<sup>4</sup> The

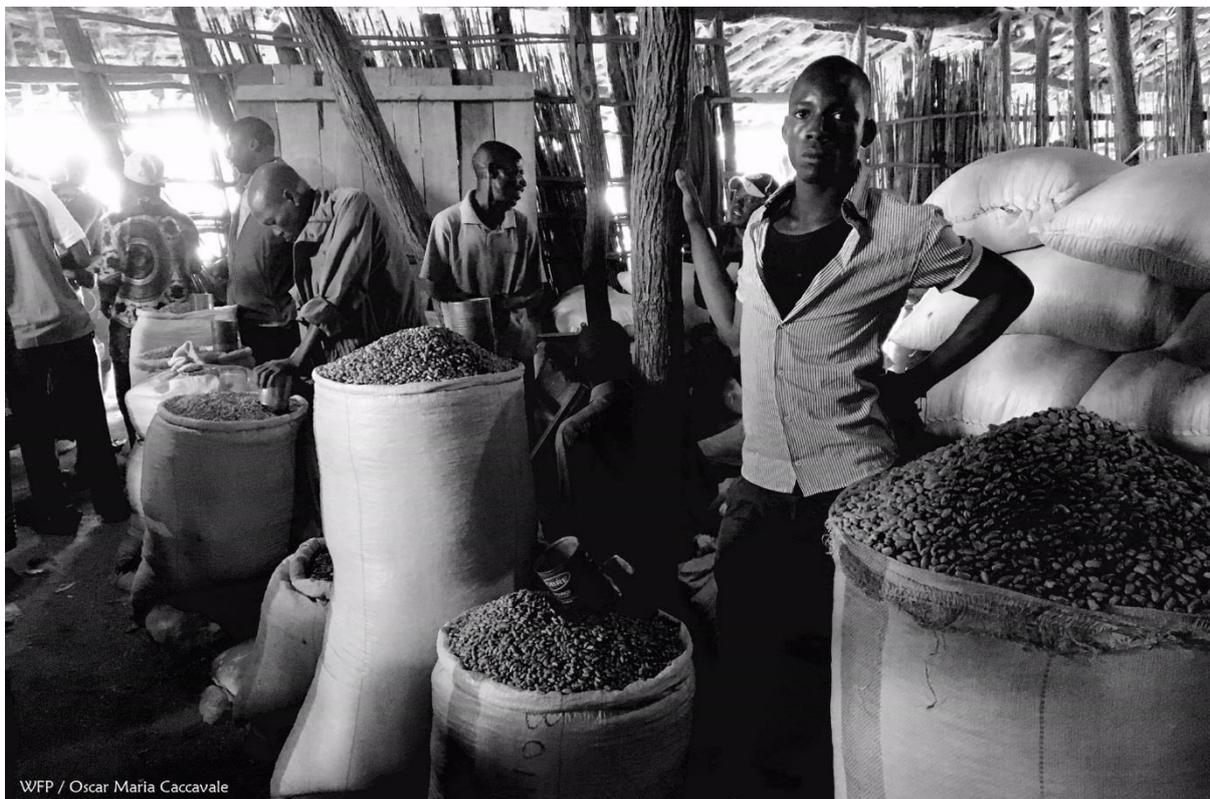
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<sup>4</sup> For more information, see [http://vam.wfp.org/sites/mvam\\_monitoring](http://vam.wfp.org/sites/mvam_monitoring)

telephone questionnaire includes one-off<sup>5</sup> and weekly questions<sup>6</sup> for traders and is designed to provide a set of indicators to assess the 'health' of different markets.<sup>7</sup>

Finally, high frequency indicators of market performance – including monthly retail prices in the main markets collected under the national price monitoring system called *Sistema de Informação de Mercados Agrícolas* (SIMA), exchange rates between the Mozambican metical and the US dollar and headline inflation rates – were combined and weighted with low frequency indicators (i.e. per capita maize and cereal production and demand by district and household average distance from markets) to design an MPI that will monitor the functionality of specific markets.

The rest of this paper is organized as follows: section II analyses the context in which CBT programmes might be designed; section III maps the maize supply chain from a surplus location, describing trade flows in the assessed provinces and giving an overview of the markets visited; section IV presents the indicators and the preliminary results of the MPI; section V provides concluding remarks; and section VI details programme recommendations on CBT in Tete and Gaza provinces.



Traders in Tete city market

<sup>5</sup> One-off questions include the following: main trading activity, main sources of supply and frequency of restocking.

<sup>6</sup> Weekly questions include the following: selling prices of maize grain, maize meal, imported rice, cooking oil and pulses; buying prices of maize grain; stock shortages; concerns about running out of stocks; and change in credit requests from customers.

<sup>7</sup> mVAM Market Bulletin available at [http://vam.wfp.org/sites/mvam\\_monitoring/mozambique.html](http://vam.wfp.org/sites/mvam_monitoring/mozambique.html)

## II. CONTEXT

### 1. Food security and availability outlook

The number of people currently in need of food assistance in Mozambique is by far the highest in the last 13 years (Figure 1). According to the Technical Secretariat for Food and Nutrition Security (SETSAN), 1.5 million people are in need of food assistance, ten times more than during the same period last year.<sup>8</sup> An additional 400,000 people are likely to face food insecurity by the end of the lean season, between September 2016 and March 2017.<sup>9</sup> The worst-hit provinces are Sofala, Gaza, Tete and Inhambane, where over 10 percent of the population is at risk (Table 1).

Figure 1 - Food insecurity estimates

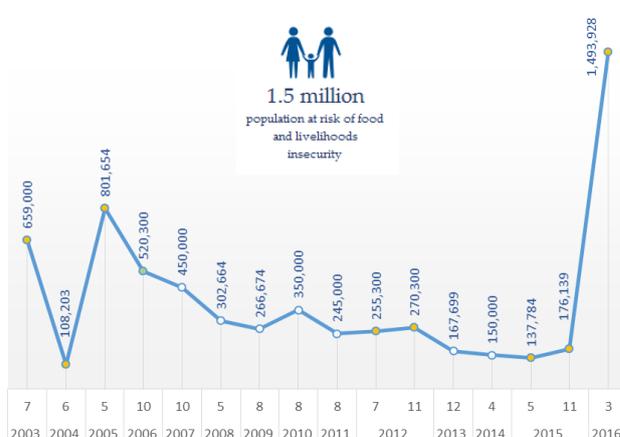


Table 1 - Food insecurity and poverty by province

Province	Population 2016	Food insecure (May 2016)	Share of food insecure	Poverty headcount (2008-09)
Cabo Delgado	1,923,264			37%
Gaza	1,442,094	202,282	14%	63%
Inhambane	1,523,635	157,388	10%	58%
Manica	2,001,896	92,484	5%	55%
Maputo	1,782,380	123,960	7%	68%
Maputo city	1,257,453			36%
Nampula	5,130,037			55%
Niassa	1,722,148			32%
Sofala	2,099,152	329,022	16%	58%
Tete	2,618,913	334,413	13%	42%
Zambezia	4,922,651	254,379	5%	71%
<b>Total</b>	<b>26,423,623</b>	<b>1,493,928</b>	<b>6%</b>	<b>55%</b>

Source: Ministry of Agriculture, SETSAN, *Instituto Nacional de Estatística* and *Direcção Nacional de Estudos e Análise de Políticas do Ministério de Planificação e Desenvolvimento* (MPD/DNEAP). The coloured circles on the graph represent the main driver of food insecurity for that year: drought (yellow), flooding (white) or a combination of drought and flooding (green)

Around 70 percent of Mozambicans are farmers, heavily reliant on subsistence agriculture (INE, 2008). Their livelihoods have been particularly affected by the recent drought and dry spells in parts of the central and southern regions of the country. A SETSAN emergency food security assessment conducted in February 2016 in the six drought-affected provinces found that 95 percent of households had no food stocks; the majority of households (55–82 percent) do not expect to harvest either because of crop failure or because they did not plant; in addition, 90 percent of households have no seeds to plant for their next planting season.

In terms of the districts visited during this assessment, over 60 percent of the land in Cahora Bassa (Tete province), Guijá and Massingir (Gaza province) was affected by the drought (Map 1). A significant portion of the remaining land in Gaza was hit as well but to a lower extent (between 30 and 60 percent). In total, 2 million people in rural areas were affected, rendering almost 11 percent of the rural population food insecure (SADC, June 2016, p. 5).

<sup>8</sup> May 2015 estimates.

<sup>9</sup> IPC Phase 3 and IPC Phase 4.

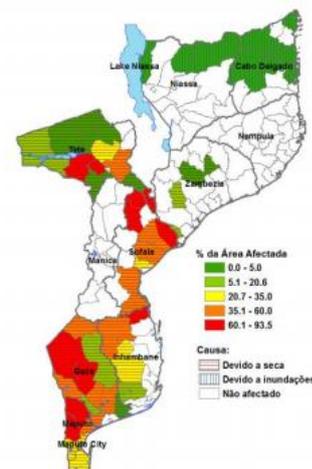
When compared to their medium-run (12-year) average, both rainfall and vegetation growth – as measured through the Normalized Difference Vegetation Index (NDVI)<sup>10</sup> – were extraordinarily poor throughout the season in Maputo and Gaza provinces, and to a lesser extent in Manica, Sofala and Inhambane. Dry spells also affected Tete province, mostly in January and February 2016, and Zambezia province during the last quarter of 2015 (see Figure 9 in Annex I).<sup>11</sup>

The harvest has therefore been a failure in most of the south and in many parts of the central region but good in other areas, making for a mixed picture. In fact, national maize production was 1,795 thousand mt, only 4 percent lower than the previous commercial year (down 7 percent from the last five-year average), and total cereal production is actually 23 percent higher than last year.<sup>12</sup>

According to the projected Regional Balance Sheets<sup>13</sup> for the commercial year 2016 (April 2015 – March 2016), the overall deficit<sup>14</sup> is 120,000 mt for maize and 245,000 mt for cereals. Carryover maize stocks from the commercial year 2015 constitute 18 percent of total maize supply (384,000 mt). Taking into account expected imports and exports,<sup>15</sup> the final stocks are expected to be 728,000 mt for cereals, with a maize shortfall of 55,000 mt.

The maize deficit (316,000 mt) is found entirely in the southern provinces of Inhambane, Gaza and Maputo, and it amounts to 52.6 kg per capita<sup>16</sup> in a year. Surplus production in the other two regions of the country – 125,000 mt in the central provinces (i.e. Tete, Manica, Sofala and Zambezia) and 71,000 mt in the northern provinces (i.e. Cabo Delgado, Niassa and Nampula) – can only partially offset this imbalance.

Map 1 - Drought and flood-affected areas



Source: [Mozambique: Drought](#). Office of the Resident Coordinator, Situation Report No. 4. June 2016

<sup>10</sup> The NDVI is a geographical indicator that measures the density of vegetation in a given patch of land by comparing visible and near-infrared light bands reflected by live vegetation and bare soils.

<sup>11</sup> Rainfall and NDVI plots from [http://dataviz.vam.wfp.org/Agroclimatic\\_Charts#](http://dataviz.vam.wfp.org/Agroclimatic_Charts#)

<sup>12</sup> According to the Mozambican Ministry of Industry and Commerce (MIC) figures, 1,795 thousand mt in 2015/16 compared to 1,877 thousand mt in 2014/15. The breakdown by region is as follows: 1,170 thousand mt in central Mozambique, 515 thousand mt in the north, and 110 thousand mt in the south.

<sup>13</sup> Source for the Food Balance Sheets is MIC.

<sup>14</sup> Measured as the difference between initial stocks and production estimates on one side, and consumption needs (human consumption, industrial and feed, seeds and losses) on the other, taking into account projected population growth.

<sup>15</sup> Estimated as a percentage of total maize supplies: imports are estimated at 8 percent and exports, at 5 percent.

<sup>16</sup> Based on projected population of 6,005,562.

Tete province is 54,000 mt short of cereals (Direcção Provincial da Agricultura e Segurança Alimentar Tete, 2016, p. 20), which is almost 50 percent of the total deficit in the central region.<sup>17</sup> Despite being a rural area, only five<sup>18</sup> out of fifteen districts reported a surplus. Detailed production data was not available in Gaza province, but a body of evidence including the regional projected production from the food balance sheets, the share of drought-affected land, the below-average NDVI of the past years and the field assessment findings suggest that the maize harvest was largely a failure.

Even though the harvest in the north of the country was relatively good, the surplus is unlikely to flow automatically to the rest of the country for a number of reasons, including the normal trade flows to Tete and Gaza (see pages 11 and 17), and increasing insecurity in part of the central region.

Imports could have been a viable solution to the shortfall. However, almost all neighbouring countries have suffered similar cereal production shortfalls, creating sustained deficits that are hampering regional trade. To a limited extent, the only exception to this is Zambia,<sup>19</sup> but the country has put in place export restrictions on maize.

When placed in the context of statistics from previous years, the current maize import requirement seems substantial and challenging to achieve. In 2014, Mozambique imported 7 percent of South Africa's total maize exports, 4 percent of Zambia's maize exports, and 12 percent of Malawi's maize exports.<sup>20</sup> Normally, the bulk of Mozambique's imported maize comes from South Africa (COSACA, 2016), which was the source of 85 percent of the value of Mozambique's total (formal) imports between 2010 and 2014. Zambia follows with 7 percent of total imports, bouncing between 1 and 18 percent depending on the year, while Malawi provides less than 4 percent (Figure 2).

To fix its maize shortfall, Mozambique would have to expand its normal import capacity by 26 percent in the course of the commercial year; in fact, if we assume that the 2010–14 import shares reported above are good-enough proxies to estimate the amount of formal imports in metric tons by country,<sup>21</sup> then an additional 47,000 mt would be required from South Africa and 4,000 mt from Zambia (Table 2), which is hard to envisage under the current regional situation. These additional import requirements would be part of the 1.588 million mt of maize required by the thirteen SADC member states for 23 million people in emergency

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<sup>17</sup> Specifically, -107,000 mt.

<sup>18</sup> Angónia, Macanga, Marara, Tsangano and Zumbu. These five districts represent 39 percent of the population living in Tete province.

<sup>19</sup> Source: Overview of the Food Insecurity and Vulnerability in the SADC Region 2016, SADC Vulnerability Assessments Dissemination Forum. 9–10 June 2016, Pretoria, South Africa. Preliminary cereal balance sheets do not include some countries, such as Tanzania.

<sup>20</sup> Source: Observatory for Economic Complexity.

<sup>21</sup> Without taking into account the different quality of maize, not to mention the different import parity price.

conditions, including 324,000 mt in Malawi, 199,000 mt in South Africa, and 151,000 mt in Zimbabwe (SADC, June 2016, p. 13).<sup>22</sup>

Figure 2 - Value of maize imports by country (%)

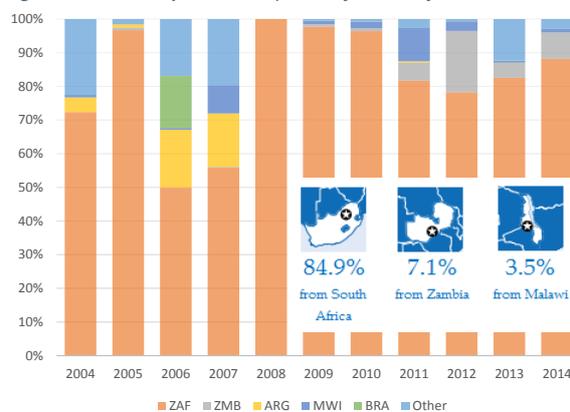


Table 2 - Potential sources of additional imports

Maize imports from	Value of maize imports (average 2010-14)	Commercial year 2016 (thousand of metric tons)	Additional import burden
		<b>Production</b>	<b>Deficit</b>
		<b>209</b>	<b>55</b>
South Africa	85%	177	47
Zambia	7%	15	4
Malawi	4%	7	2
Other countries	5%	9	2
			26%

Source: Observatory for Economic Complexity and Ministry of Industry and Commerce. Author's calculation

## 2. Economic downturn

The complex national and regional food availability situation coincides with a period of domestic economic difficulty in Mozambique.

From 2002 to 2014, the country experienced steady economic growth with real Gross Domestic Product (GDP) increasing yearly in the range of 6.4 to 9.9 percent.<sup>23</sup> Yet since 2015, signs of economic stress have become visible, initially driven by the relentless depreciation of the metical against the US dollar, and then followed by runaway inflation.

At the end of June 2016, around MZN6,050 was needed to buy US\$100, an increase of 61 percent from 2015. There is scarcity of US dollars in the country, and at the time of the assessment, unofficial exchange rates departed from the official rate by US\$5 to US\$10/MZN. This was reported as a serious impediment to food imports by many wholesalers, large producers and processors.

At the same time, headline inflation shot up from a steady 1.5 percent to 20 percent in the space of just 12 months (Figure 3), severely reducing the purchasing power of many households. More than half the population was living below the poverty line in 2008/09 (Table 1), with no significant gains from the previous survey in 2002/03 in terms of poverty headcount ratio (+0.6%) or inequality<sup>24</sup> (MPD/DNEAP, 2010, p. 28 and 62) and despite nominal GDP having almost doubled in the time between the two surveys. Although these figures need to be updated, it is unlikely that any major improvements have occurred since the 2008/09 survey, particularly considering the combined effect of poor food availability and

<sup>22</sup> Note that the estimates for Mozambique differ in the humanitarian appeal (140,000 mt) and the projected Food Balance Sheet (120,000 mt).

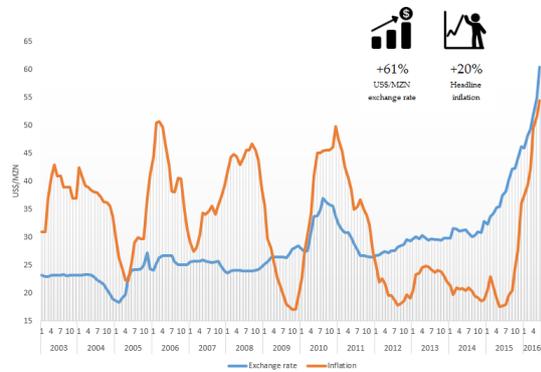
<sup>23</sup> Source: The World Bank, World Development Indicators 2016.

<sup>24</sup> The Gini coefficient moved from 0.145 in 2002/03 to 0.414 in 2008/09.

rising inflation. In fact, a more recent study found that inequality in rural Mozambique was increasingly rapidly (Silva, 2013).

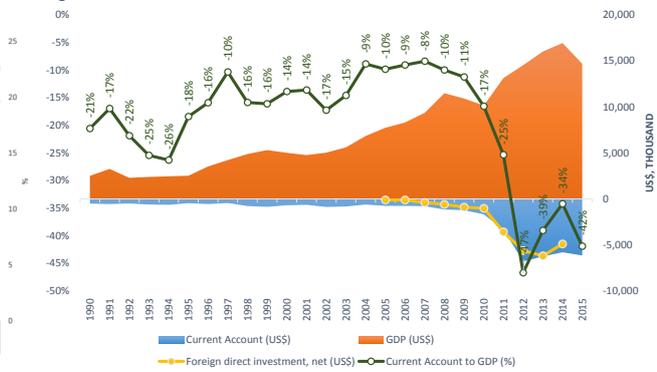
Mozambique’s competitiveness is under extreme stress. The widening current account<sup>25</sup> deficit implies that the country is increasingly dependent on imported goods and financial capital from abroad, pushing down the current account to GDP ratio from -11 to -42 percent over the last six years (Figure 4). Attracted by the discovery of massive natural resources, foreign direct investments (FDI) increased steeply from 2011 onwards and have ultimately funded this deficit. Even so, FDI have been quite volatile in the last four years, mostly because of delays in the final investment decisions for liquefied natural gas, together with a slow-down of the coal sector, which is struggling with low prices, export logistics difficulties and infrastructure building delays (Almeida Santos, Roffarello, & Filipe, 2016; Vines, Thompson, & Jensen, 2015).

Figure 3 - Exchange rate and inflation (2003–2016)



Source: Trading Economics and *Instituto Nacional de Estatística*

Figure 4 - GDP, current account and FDI



Source: Trading Economics (1990–2005) and *Banco de Moçambique* (2006–2015) for the current account; The World Bank, World Development Indicators 2016 (GDP and FDI, 1990–2014) and Economist Intelligence Unit (GDP, 2015)

The discovery of over US\$1 billion of undisclosed liabilities undermined investors’ confidence in the government and triggered a temporary freeze of direct contributions to the state budget from some of the main donors, including the IMF and the World Bank group. As noted by the IMF, “foreign aid has played a crucial role in supporting Mozambique’s public investment and development projects, financing about one-third of the budget” (IMF, 2014).

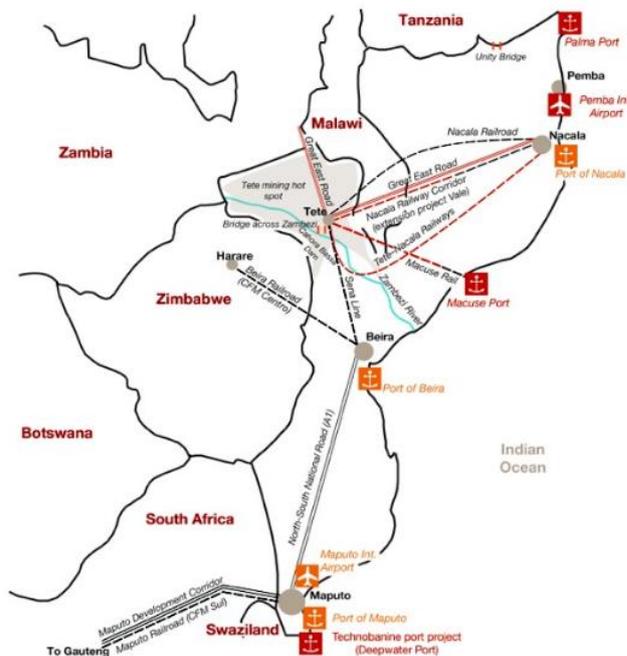
Another critical factor for business is the increasing political instability in some districts of central Mozambique. “Decades-old political tensions, widespread poverty, contested relocations of communities around coastal developments, industrial developments, and

<sup>25</sup> The current account covers all transactions (other than those in financial items) that involve economic values and occur between resident and non-resident entities. It also covers offsets to current economic values provided or acquired without a *quid pro quo*. Specifically, the major classifications are goods and services, income, and current transfers. If the current account is positive, the country is a net lender to the rest of the world, while if it is negative, the country is a net borrower. Therefore, the current account provides a useful indication of a country’s level of international competitiveness. The current account makes up the country’s Balance of Payments, together with the capital and financial account.

mining and agricultural megaprojects” – including massive land-grabbing plans – all build a fertile ground for political instability (Vines, Thompson, & Jensen, 2015).

This instability, coupled with the limited logistics infrastructure, naturally affects the movement of goods in the country. There are three main ports and trade corridors in Mozambique. According to a recent regional supply chain assessment, the port of Nacala serves portions of northern Mozambique through a limited road network, also serving Malawi by rail, and even Zambia.

Map 2 - Mozambique infrastructures



Source: PWC available at <http://www.pwc.com/gx/en/industries/transportation-logistics/publications/africa-infrastructure-investment/mozambique.html>

country's main highways, mainly targeting convoys. From a market functioning perspective, the movement of goods north-south via Sofala is becoming a major issue. Many traders, particularly in Gaza and Sofala, have expressed concern about the security of the major trading flows. Some of them have already put mitigation measures in place to limit the risk. For example, since transportation represents a significant share of the final price paid by customers, this cost (and the associated risk) is now being pushed away from main suppliers and onto other traders who operate in deficit areas.

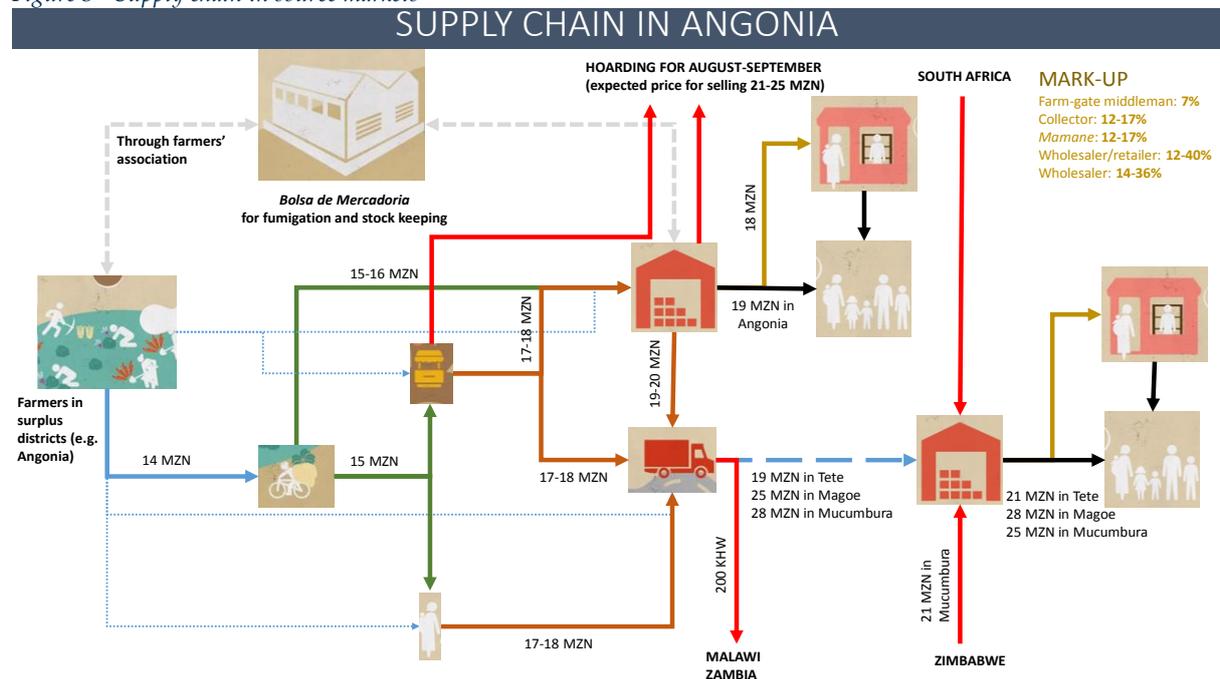
### III. MARKET STRUCTURE AND CONDUCT

#### 1. Supply chain

The supply chain in Tete province is organized as illustrated in Figure 5, where maize grains flow from farmers in Domue to the market hub in Tete city via Angónia, eventually to be delivered to other markets in the rest of the province and further away to Beira and Maputo.

Figure 5 reports market-specific price information collected during the assessment, but the actors involved in the supply chain are very much the same in other source markets.

Figure 5 - Supply chain in source markets



Source: WFP market assessment. Reported prices are for 1 kg of maize

From left to right, the different actors involved are as follows: farmers, farm-gate middlemen, collectors, wholesalers, transporter, retailers and households. Whenever transporters are involved, the supply chain expands accordingly, but these additional intermediary economic agents perform similar activities.

The blue lines show that almost all the actors of the supply chain purchase directly from farmers. Yet, most commonly middlemen go and buy at the farm-gate using their own means of transportation (most likely bike or ox-cart) to then re-sell to traders who operate in the communities. These traders purchase maize grain, cowpeas and other beans along the streets and are usually equipped with a weighing scale/system. Whenever they accumulate enough metric tons, they organize transport or make use of trucks that in their round trips have unutilized volume capacity. They usually dispatch the commodities either over a short range to other traders in Angónia and Tete, or further away, mainly to markets in Gaza and Maputo (see orange lines in Figure 5). In many cases, informal traders involved in this business outside the province are women called *mamans*. Wholesalers in Angónia often run their own collection points or have their own middlemen networks; in both cases, the payment level for each metric ton is agreed in advance according to the market information available each day. This basically implies that these traders can expand their profit margins by squeezing the farm-gate price as much as possible. Naturally, all these actors can increase their profits whenever they are able to bypass one or more steps in the supply chain. Farmers can sell directly to the collection points in Angónia, thus skipping the middlemen, or straight to transporters, thus avoiding most of the local supply chain actors.

Wholesalers operating in Angónia are the main actors in the supply chain. Their outreach depends on their size, meaning that they can sell to retailers locally, to wholesalers in Tete city or to transporters.

At the time of the assessment, farm-gate middlemen were purchasing 1 kg of maize at MZN14 from farmers in Domue and selling it at the collection points for MZN15. Wholesalers were then buying at a price between MZN17 and MZN19 to eventually sell to transporters or retailers.

Reportedly, most of the wholesalers in Angónia were hoarding maize grains in their warehouses, with no intention of releasing the stocks in the very short term. Depending on their financial capacities to buy, wholesalers were planning to release their stocks not before autumn 2016. As retail prices in June 2016 were extraordinarily high compared to previous harvest seasons (+139% in Tete and +106% in Angónia),<sup>26</sup> this will mean staggering profits for the few large traders who have the financial solidity to wait a few months.

Table 3 shows the retail mark-up<sup>27</sup> for the different trader categories, taking into account actual and forecasted prices.<sup>28</sup> The profit margins vary considerably: farm-gate middlemen have a 7 percent mark-up, while expected gross profits for collectors and *mamanas* range between 13 to 18 percent, if we assume that they sell all their stocks without accumulating for the next month.

Conversely, wholesalers and transporters who can wait to release their stocks until the maize price is above MZN25 could have a mark-up in the order of 26 to 39 percent,<sup>29</sup> if they sell everything before the end of 2016. For those who can wait until the beginning of 2017, the retail mark-up will likely jump to 50 percent, suggesting significant profit margins even when all additional costs are factored into the profit and loss statement.<sup>30</sup>

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<sup>26</sup> According to SIMA, the monthly average prices for 1 kg of maize grain were MZN22.29 in Tete (up from MZN9.33 in June 2015) and MZN17.14 in Angónia (up from MZN8.34 in June 2015).

<sup>27</sup> The retail mark-up is the difference between retail and wholesale prices. It can broadly be considered as a loose proxy for trader's profits. It is calculated as follows:  $(P_{sell} - P_{buy})/P_{sell} * 100$ .

<sup>28</sup> See page 24 for details on the forecasting methodology.

<sup>29</sup> Author's estimations based on forecasted retail prices in Tete city market.

<sup>30</sup> Note that we have only estimated the cost of purchasing maize grain (i.e. the buy price) and not all the costs associated with selling. For this reason, actual profits will be much lower than the price mark-up.

Table 3 - Price mark-ups

			Buying price in Angonia from						
			Farmers	Farm-gate middlemen	Collectors / Mamas		Wholesalers / Transporters (Tete)		
			14	15	16	17	18	19	
Month	Price in MZN								
Selling price in Tete (retail)	2016m6	22.3	<i>Actual</i>		7%	13%	18%	19%	15%
	2016m7	23.9	<i>Forecasted</i>					25%	21%
	2016m8	25.8	<i>Forecasted</i>					30%	26%
	2016m9	26.5	<i>Forecasted</i>					32%	28%
	2016m10	25.9	<i>Forecasted</i>					30%	27%
	2016m11	27.7	<i>Forecasted</i>					35%	31%
	2016m12	29.3	<i>Forecasted</i>					39%	35%
	2017m1	33.2	<i>Forecasted</i>					46%	43%
	2017m2	36.0	<i>Forecasted</i>					50%	47%
	2017m3	39.0	<i>Forecasted</i>					54%	51%
2017m4	34.5	<i>Forecasted</i>					48%	45%	

Source: SIMA for actual selling price in Tete, and WFP market assessment for buying prices in Angónia. Author's calculation

## 2. Tete province

### Trade flows

Trade flows in Tete province have been partially affected by the drought, with lower-than-usual volumes being traded.<sup>31</sup> Villages in the belt from Angónia to Zumbo remain the main maize suppliers for the whole province via Tete city. Local and imported food transits the market-hub for further distribution within the province and outside (Map 3).

The flow goes in two directions. Maize meal from South Africa and oil from Maputo, Manica and Beira are transported to Tete city and eventually to the rest of the province. Conversely, local maize grain from north-western districts of Angónia, Macanga, Marara, Tsangano and Zumbu is taken to markets in Beira and Maputo, or to deficit districts in the south and south-west of the province (e.g. Magoe and Mucumbura). The current importance of commercial flows to Magoe and Mucumbura is a significant change to usual trade flows. In fact, drought-induced crop failures have severely affected the self-sufficiency of these rural districts, with local produce running short just after the harvest. In a typical year, farmland in the district of Magoe provides enough maize for nearby local markets; this year, over 90 percent of local market supplies have to be sourced from Tete city, making restocking less frequent and more expensive because of poor road conditions and long travel times. Marginal maize quantities come from informal trade with Zimbabwe, slightly relaxing local prices.

<sup>31</sup> See also Table 7 in the Annex I for a price comparison between June 2016 and June 2015.

Map 3 - Trade flows in Tete province



Source: WFP market assessment

Tete province borders with three countries: Malawi, Zambia and Zimbabwe. These borders are porous and allow for informal trade flows. In particular, it is common for Malawian traders to pursue price arbitrage opportunities in Angónia depending on price differentials. Reportedly, traders in Malawi have a bigger storage capacity, possibly leading to increased competition over the little maize stock available in the markets of Angónia and Tete city when the harvest season comes to an end. Many key informants expect that farmers will find themselves forced to cash in their crops

in the very short run, thus selling maize to Malawi in the immediate post-harvest period but with the prospect of running out of stocks quickly and being obliged to buy back at higher prices once the lean season kicks in.

Across from Angónia near the border with Zambia, cross-border trade is typically the main income source for remote villages in Zumbo district, as extremely poor road conditions make trade marginal with nearby surplus areas (e.g. Zambue and Muze) and Tete city. Reportedly, informal trade across the Zambezi River to Lusaka is the preferred supply source for maize meal, even after the Zambian Government has introduced export restrictions in response to the drought.

Insecurity is becoming an increasing concern for traders in Tete city transporting supplies to and from Maputo via Manica because of the likelihood of attacks along the main routes. Reportedly, an increasing number of main suppliers are progressively distancing themselves from transport risks, leaving it to others to organize convoys to deliver food outside the province or halving the frequency of restocking.

However, insecurity is perceived as a minor threat for intra-provincial trade, and large-scale traders still have an interest in expanding their businesses, reaching out to secondary markets in southern districts by providing their logistics capacity to deliver goods, should business opportunities materialize.

## Markets assessed

### Angónia and Domue

**Overview:** Despite 2016 maize production being half that of 2015, Angónia remains the major supply source in Tete province.

Cross-border outflows to Malawi are likely to increase competition over available supplies in the coming months, especially because of Malawi's poor harvest. To discourage supply outflows, the Government of Mozambique activated a *Bolsa de Mercadoria* in 2015, offering a storage capacity of up to 5,000 mt as well as cleaning and fumigation services to improve the quality of local maize. However, the plant is not running at full capacity as the storage space rental is too expensive for local producers. Informal cross-border trade often appears a more attractive option for small-scale farmers, who prefer to place their products quickly as they are often in need of immediate cash.

**Market functionality:** Trading within the district is very active and large quantities of maize supplies flow weekly from producing areas (e.g. Domue) to warehouses in Angónia. Specifically, at the time of the assessment the three bigger wholesalers in the market were accumulating 1,000 mt each (Table 6 in Annex I). Small wholesalers in the town's central market bought an additional 1,000 mt in total.

Even though demand for other commodities has remained stable, demand for maize has increased as several producers have switched from maize to tobacco following government incentives in the hope of higher returns. Credit requests from customers have also increased along with maize prices and are expected to peak in December, during the lean season.

### Tete

**Overview:** The province capital used to be a fairly rich town. The coal and mineral extraction industry (i.e. tourmaline, garnet and iron) triggered the development of logistics and financial services for national and foreign industries. In addition, the production plant near the Cahora Bassa dam sells electricity to South Africa, another important sector for the local economy. The town's vibrant economy catalyses almost 90 percent of formal business activities in the province,<sup>32</sup> on top of a huge informal sector. However, economic growth was halted by the stagnation of the coal sector, coupled with insecurity along the north-south trade route and currency depreciation.

**Market functionality:** Four main supermarkets are currently active in Tete city. They liaise with their branches in Maputo for imported goods (e.g. rice, maize meal and vegetable oil) and with branches in other provinces for local maize and beans. The depreciation of the metical is a binding constraint for restocking, in terms of both increasing prices and the shortage of US dollars.

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<sup>32</sup> Source: *Ministry of Industry and Commerce*, data as at 5 April 2016. In total, 2,794 businesses are registered in the whole province – 1,534 retailers, 373 wholesalers and 887 service providers.

Big wholesalers in Tete city rely on an inter-provincial network of points of collection and sale, representing the main suppliers in the region: reportedly, 1,200 mt of food reaches Tete city each week from production areas in the north or for redistribution to other districts.

Specialized small wholesalers/retailers in the central market do not normally own trucks for transportation and are reliant on bigger wholesalers. As such, they are not able to increase supply on short notice.

All the interviewed traders reported that demand from households had fallen by roughly one third compared to last year because of soaring food prices. Conversely, requests for credit and delayed repayment have increased.

### **Magoe**

**Overview:** Magoe is a district capital, 255 km away from its main supply source – Tete city – and 45 km from the border with Zimbabwe. In a typical year, local farmers provide one fourth of total maize supplies in Magoe market; half is sourced from Tete city and the remainder from Zimbabwe. Today this market depends entirely on the province capital for stock replenishment; some informal cross-border trade accounts for less than 10 percent of the total restocking. Magoe hosts a small market with 12 small retailers and 3 bigger retailers. Over the past year, traders who specialized in the sale of local maize have run out of business, occasionally shifting their activities to non-food items.

**Market functionality:** Stock replenishment is being hampered by inflation. A lack of adequate price information has meant traders are not fully aware of the changes that have occurred to food prices since their last restocking trip, so they end up buying smaller quantities each time because they often do not carry enough cash with them. Bigger retailers own trucks and go to their suppliers in Tete city markets, also serving smaller traders who do not have the logistics and financial means to restock on their own.

Traded volumes from Tete city have decreased by 25 percent from last year, with only 120 mt of food delivered each month. A further 60 mt of food a month no longer reaches Magoe market following the introduction of export restrictions in Zimbabwe. Interviewed traders said that bigger wholesalers might increase supplies back to normal levels should prices stabilize, but smaller traders would lack the financial capacity to increase supplies at short notice. However, sluggish demand caused by reduced household income from farming would need to be addressed at the same time.

There are no banks in Magoe. The closest bank is in Cahora Bassa, involving transport costs of MZN300, nearly 11 percent of a minimum monthly salary. Supposedly, five POS are available in the market and small traders also use mobile money transfers.

### **Mucumbura**

**Overview:** Mucumbura is a village on the border with Zimbabwe, nearly one hour's drive on a dirt road from Magoe and a six or seven-hour drive from Tete city. Road conditions are

extremely poor and the travel time from Mucumbura to Magoe can increase to up to five hours during the rainy season.

With favourable weather conditions, households in Mucumbura grow their own food, and the market at its full capacity can also meet the demand of nearby villages, but this is not the case this year. Farmers in Mucumbura are now increasingly reliant on markets to meet their maize and sesame seed requirements. There are 15 main retailers in the two markets of Mucumbura, in addition to several petty traders.

**Market functionality:** The market generally stocks around 120 mt of food, 90 mt of which belongs to just three traders. Each of these traders restocks every week using their own trucks<sup>33</sup> in Tete city, but also renting part of the transport capacity to smaller traders at a lump sum rate of MZN400. Since the round trip takes at least one day, the overall monthly food volume in the market is roughly 1,600 mt. Stock replenishment time can increase to several days during the rainy season, when the road is impassable.

Interviewed traders mentioned that they would not be able to increase supply at short notice because of distance and time constraints. At the time of the assessment, maize grain was very scarce in the market with only three 20 kg bags from Zimbabwe.<sup>34</sup> According to key informants, this marginal informal trade helps relax local maize prices, which would be 30 percent higher if maize was only sourced from Tete city.

There are no banks in Mucumbura. Mobile money transfers seem to be too costly for households and retailers, as payments are charged at 10 percent of the total amount.

### **Fingoe and rural markets**

**Overview:** Fingoe is the capital of Maravia district. According to the Ministry of Agriculture, Maravia recorded surplus production this year. Producers interviewed during the field visits confirmed that production was higher than in 2015. To evaluate the state of maize production in the district, the assessment team travelled to the villages of Catchombwe and Calira, as well as those in the Capangula area. They estimated that more than 3,000 mt of maize is being stocked in non-hermetic silos of about 10 to 20 mt each.

Fingoe is far from these producing areas, and it is a seven-hour drive from Tete city, mostly on dirt roads. The market is therefore very marginal, with fewer than 20 petty-trade retailers and just 2 relatively bigger shops.

**Market functionality:** Traders in the market have limited or no storage facilities. Particularly, a lack of water and electricity in the marketplace restricts traders' capacity to store food properly.

At the time of the assessment, no maize was found in the market as households mostly buy it directly from surrounding producing areas, which they reach using bikes or after a walk of

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<sup>33</sup> These traders own two or three trucks with an average capacity of 10 mt.

<sup>34</sup> Informal maize traders first have to sell their stocks before embarking in a restocking trip, which can take them a few days out in the Zimbabwean farmland.

several hours. Imported goods are sourced in Tete city by a few retailers, whenever funds are sufficient to rent a truck and cover transportation costs. Generally, 10 to 20 bags of rice are brought into the market each week.

Unlike other assessed locations, key informants reported that there has been no reduction in the number of customers using the market over the past year. Rather, traders said that sales were following their usual trend, generally increasing in June in line with the tobacco harvest.<sup>35</sup> Traders foresee that sales will decline drastically after the end of the harvest season, when household income will fall, shrinking purchasing power and increasing the number of people vulnerable to high food prices.

### Zumbo

**Overview:** Zumbo district is located to the far south-west of Tete, where the Zambezi River marks the border with Zimbabwe and Zambia. The three administrative points of the district – Muze, Zambue and Zumbo – normally produce and deliver surplus volumes for Tete city markets along a 500 km route, mostly on dirt roads.

*El Niño* has had a limited impact on maize yields in the district: in fact, production in Zambue and Muze was higher than last year. At the time of the assessment, producers along the main road to Maravia were in the process of stocking nearly 5,000 mt with the expectation of boosting their profits as producer prices are likely to rise after the summer.

By contrast, maize production failed in Zumbo, and the population is increasingly reliant on other activities to generate income, including fishing and charcoal production. This market is very remote from the rest of the district, counting on informal cross-border trade across the river despite maize meal export restrictions imposed by Zambia. The marketplace in Zumbo is marginal; few vendors with very small capacity mostly aggregate along the road to sell negligible amounts of vegetables and non-food items. Small quantities of some foods can be also found in the few small shops in the village.

**Market functionality:** Just one supplier caters for most of the community, bringing 18 mt of maize meal each month from Lusaka. A further 45 mt of other foods including vegetable oil, rice and beans are purchased in Tete city markets. The full capacity of the market is 20 to 25 mt for maize meal and up to 65 mt for the other products. There are no carry-over stocks as all volumes procured are sold within the month to avoid wasting supplies. Nevertheless, stock capacity for maize could increase up to 10,000 mt, following the imminent implementation of a government procurement project that will provide financial support to traders to help them purchase maize and build stocks.

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<sup>35</sup> Tobacco production is the main livelihood in the Fingoe area, thus buffering households in the village against high food prices.

No maize grain was found in the market, despite the proximity to surplus production areas. Traders blamed this on high competition that brings most maize supplies elsewhere.

### 3. Gaza and Sofala provinces

#### *Trade flows*

In a typical year, Gaza province tends to be largely self-sufficient in basic agricultural products, making surpluses of maize and cowpeas that are sold in Maputo and in the northern provinces.

Main local producers' markets are Chigubo, Guijá and Mabalane. These markets link with intermediate markets such as Mandlakazi, Chokwe, Chicualacuala, Chibuto and Xai Xai, which in turn link with external wholesale markets, such as Maputo. Xai Xai finds itself on the main north-south route in Mozambique (the EN1 highway) and acts as a key trading hub for the province, connecting the provinces of Gaza, Sofala, Manica and Zambezia. Thanks to its strategic position, in good production years Chokwe trades larger volumes of produce than Xai Xai, when large food supplies move to its market from surplus areas bound for the deficit areas in the north of the province. Chibuto is an example of a secondary intermediary market, collecting and storing minor quantities of local produce (mostly maize and beans) for sale to surrounding deficit zones.

The drought has seriously affected food production in Gaza province, changing the direction of trade flows (Map 4).<sup>36</sup> At the time of the assessment, there was little trade from producing areas in Gaza, and just small quantities of local rice and cowpeas were being sourced from Xai Xai. Instead, traders have started to bring imported food from Maputo, maize from Manica, Sofala, Inhambane and Tete provinces, and butter beans from Niassa and Lichinga provinces.

The change of supply sources has altered the relative importance of intermediary markets compared to a typical year, making Xai Xai the main supply source to the rest of the province, especially for remote deficit areas in Massingir and Guijá districts.

Chibuto is also becoming more important as a local market hub slightly off the EN1 highway, serving deficit areas of Gazato and Manjacaze districts. As a result of reduced harvests in Gaza, Chokwe is now playing a very much reduced role, with inverse trade flows moving inwards rather than outwards as it is usually the case.

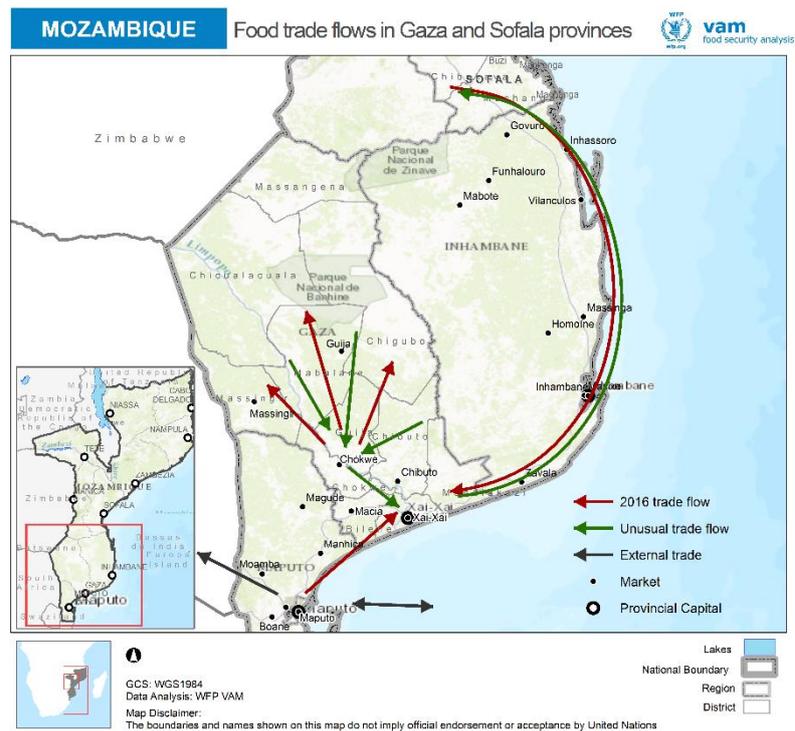
The change in trade flows evolved relatively quickly. In fact, "drought-disrupted domestic maize production, coupled with business-constraining insecurity in central provinces, means that a significant portion of the actors mapped in COSACA's market assessment of March 2016 have lost or will lose much of the business they count on to sustain their enterprises" (COSACA, 2016).<sup>37</sup>

<sup>36</sup> See also Table 8 in Annex I for price comparison between June 2016 and June 2015.

<sup>37</sup> COSACA is a consortium of international non-governmental organizations consisting of Save the Children, Concern, CARE International and Oxfam.

Supply sources and destinations have also altered in Sofala province. Located in the central region of Mozambique, Sofala is one of the main hubs for the whole country. Located on the main trade route between northern and southern Mozambique, in a typical year the province acts as an intermediate market for north-south flows of food. Large amounts of food are imported and exported through Beira, making its port<sup>38</sup> the second most important entry point after Maputo. Beira port is a key entry/exit point for international trade as well as

Map 4 - Trade flows in Gaza and Sofala provinces



Source: WFP market assessment

a strategic intermediate market along the main trade route that connects the northern and southern provinces of Mozambique. Another trade corridor departs from Beira port westbound to northern Zimbabwe, Zambia and Malawi, usually the cheapest corridor for these countries (WFP, 2016).

Marketable surpluses of maize, wheat and beans are usually sold in central areas (i.e. Manica and Tete) and – to a limited extent – in northern regions (e.g. Nampula and Zambezia). Over a typical year, only 30 percent of locally grown produce is consumed within the province.

Soaring food prices and shortages of US dollars have prompted traders in Beira to change their business strategy, shifting away from progressively more expensive imports to increased procurement of cheaper locally grown goods.

Since trucks have frequently been attacked on main highways, transport companies have started employing patrol units for their convoys. As in Tete and Gaza, suppliers in Sofala no longer guarantee the delivery of goods but ask traders to buy directly from their warehouses.

<sup>38</sup> There are covered and uncovered warehouses with a total surface area of over 27,000 m<sup>2</sup>. The port is not usually congested, even though its access is limited by tides as the depth alongside is just over 9 metres (WFP, 2016).

## Markets assessed

### Xai Xai

**Overview:** This district is usually an important rice producer,<sup>39</sup> as well as having a vegetable oil distillery and bottling plant. However, many local and external rice producers did not plant in the 2015/16 season because the drought reduced the amount of rainwater from the river available to irrigate the rice fields. The increasing water salinity caused by the river's proximity to the sea reduced the quality of rice fields to below the standards for agricultural use. Limited electrical power infrastructure also hampered the use of freshwater wells to irrigate the land.

Out of the six food markets in Xai Xai town, only one – *mercado Limpopo* – supplies locally produced maize grain and beans at wholesale and retail level. Four registered wholesalers and more 50 informal retailers operate in this market.

**Market functionality:** Overall, the four wholesalers and the informal retailers in the *Limpopo* market trade nearly 1,000 mt of maize (maize grains and maize meal), 2,000 mt of imported rice and 500 mt of vegetable oil each month. Bean trade amounts to just 50 mt, as formal wholesalers leave it to informal local traders (mainly women traders) with limited transport capacity to take on the liability of bringing in supplies from Sofala and Manica, provinces affected by insecurity.

The average monthly storage capacity of a wholesaler is about 200 mt of maize meal, 100 mt of rice and 150 mt of wheat flour. Reportedly, maize grain is not always in stock as traders cannot afford to restock because of high prices. Traders reported that volumes sold had fallen by 20 percent in the past two months, with wholesalers reporting a 2 to 3 percent drop in profit margins during the same period. Traders said that even though the number of customers was the same, demand had shrunk because of a lack of purchasing power and lack of maize in local markets.

A lack of purchasing power was reported in most of the markets assessed. This is in line with other recent assessments conducted in the province. For example, one report stated that “the supply and demand of food is not the primary challenge to current food security in Mozambique; it’s the lack of purchasing power which is currently undermining the efforts of the poor and very poor households’ dependent on markets in Gaza and Inhambane provinces” (COSACA, 2016).

### Chokwe and 25 Setembro

**Overview:** Chokwe town is surrounded by fields serviced with the largest irrigation scheme in Mozambique. Chokwe’s central market gathers high volumes of supplies both from local yields – mostly rice, vegetables and beans – and from neighbouring districts.

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<sup>39</sup> For instance, a Chinese company and a local investor with shares in an Indian company have acquired large plots of land for rice production in Xai Xai district.

Fifteen wholesalers and 90 retailers are registered, highlighting the market's potential when in full capacity. Nevertheless, at the time of the assessment, only two or three wholesalers and no retail shops were selling maize because of irregular supplies from the district. Only small informal traders were found to sell small quantities of loose grain in cans<sup>40</sup> from one or two 50 kg bags.

The assessment team also visited the village of 25 Setembro, a 45-minute drive from Chokwe town in a very dry area. The village was selected because of its food insecurity and the high probability that the local population will require some form of food assistance in the 2016/17 lean season. The village market has around 100 huts, but it is serviced by just three small retail shops.

**Market functionality:** Trade volumes in Chokwe town have been affected by the 2015/16 crop failures, with increasingly irregular supplies and food prices rising rapidly from previous years. Consumption patterns have also changed and demand for maize from other provinces or from South Africa – including maize meal as a substitute when grain is scarce in the market – is higher than last year as local produce is less available and more expensive.

The food that arrives in 25 Setembro village is entirely sourced in Chokwe town. Food transportation is expensive (MZN50 per 50 kg bag of maize) and instead traders may use public transport called *chapas*, reducing the stock capacity in the village. The fall in sales is severe if compared with 2015, as households – especially those who sell charcoal for a living – can no longer afford to buy the same quantities of food at higher prices. Reportedly, sales volumes have halved compared to 2015, even though the client base is the same. Maize meal monthly volumes per trader shrank from 30–40 bags of 50 kg in June 2015 to just one 50 kg bag between January and June 2016 because of price hikes. Other traders have attempted to diversify their inventory by including non-food items to cope with falling food sales. Profit margin losses were quantified at 75 percent from last year, causing some businesses to close. Requests for credit have increased compared to the norm, with some customers unable to repay the credit.

Chokwe town is well serviced with banks, but 25 Setembro has no financial institutions. Mobile network reception also varied. In Chokwe town, Vodacom was reported be the best network provider in terms of reception; in 25 Setembro, Movitel was the only provider available.

## Chibuto

**Overview:** Chibuto district usually produces enough beans and maize grain to meet its own demand and sell some surplus to other provinces. It is also an important area for livestock rearing in Gaza province. The central market in Chibuto town is very busy, with 150 maize grain traders and more than 500 petty traders selling many kinds of goods. Many of them are

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<sup>40</sup> The cans hold between 0.5 and 1 litre.

households who have opted for trade as an alternative income source to farming. Nevertheless, only two main wholesalers trade maize grains and beans.

**Market functionality:** The market was well supplied in terms of volumes and food variety. However, interviewed traders warned that food availability was diminishing by the day. Cow peas were grown locally, the local rice on sale was from Xai Xai district, and imported food and cooking oil came from Maputo. Most of the maize came from Manica and other provinces,<sup>41</sup> with longer-than-usual supply chains and higher transportation costs. Bigger traders can buy up to 300 bags of 50 kg during a single restocking trip, while around 10 maize and beans traders may take three to four trips to achieve a maximum capacity of between 150 and 300 bags per month. Smaller traders can only store 10 to 20 bags at a time. Traders are also feeling the effects of the sharp currency depreciation for imported rice and cooking oil; reportedly, the average food stocks for a large trader may have fallen from 700 to 50 mt.

As in the other markets of the province, sales volumes had fallen dramatically in Chibuto, even though the number of customers stayed the same.

### Macia

**Overview:** The central market *Quinto Congresso* is the main market in Bilene district, as traders from other provinces have to pass through Macia using the EN1 highway. There are four wholesalers in town, and around 30 informal traders in the main market dealing with maize grain and cowpeas from Tete, Zambezia, Manica and Inhambane. These are complemented with another 36 traders of maize meal, imported rice and cooking oil.

**Market functionality:** Prices are higher than usual, as in many other markets in Gaza province. Insecurity has curtailed the number of transporters from Beira, reducing the availability of some highly consumed rice brands. Overall, high food prices have cut sales by half, with fewer customers in the market buying smaller quantities, thus further reducing profit margins and causing some shops to close. Maize grain availability is expected to improve over the coming two months, with supplies arriving from the lowlands of Majole.

In Macia there are several bank branches (BIM, BCI and Barclays), money exchange shops and MPesa. In terms of mobile networks, Movitel works the best, followed by Vodacom and MCEL.

### Guijá

**Overview:** Guijá is a drought-prone, food-insecure district, located on the other side of the Limpopo River from Chokwe town. WFP Food for Assets (FFA) food assistance in partnership with the Lutheran World Federation is underway in the district. Restricted cash distributions by COSACA are also ongoing, involving something similar to a market fair with medium-

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<sup>41</sup> Muxungue and Mtendere in Sofala province, Massinga in Inhambane province and Angónia in Tete province.

sized traders from the district selling predefined quantities of selected food in exchange for vouchers.<sup>42</sup>

**Market functionality:** Maize grain comes from central and northern provinces via Chokwe, and butter beans arrive from Lichinga in Niassa province. Imported food is from Maputo or via intermediaries from South Africa. Interviewed traders in Guijá said the market is likely to face supply constraints in the coming six months.

The client base for wholesalers and retailers has shrunk because of rising food prices. Retailers said the number of customers and the volumes being purchased had fallen by 30 percent compared to a typical year. A lack of purchasing power has pushed up the demand for credit as well as the credit default rates. Reportedly, only 60 percent of customers who received credit have been able to pay back their loans.

The progressive fall in sales is damaging the financial base of active traders, who were seeing a 25 percent decrease in their profits.

### Massingir and Cubo village

**Overview:** Massingir district is in a food-insecure and drought-prone area along the South African Kruger Park border. It is poorly connected to neighbouring districts. The remoteness of the district means food prices are generally higher compared to the rest of the province, thus the additional burden on food prices triggered by the poor maize harvest calls for food assistance interventions. The Mozambican Government used to provide food assistance in the district and has now requested WFP to continue providing assistance to the affected population. Before the current drought, Massingir was being considered for CBT food assistance. Reportedly, there are 20 registered shops selling food in the district, with 3 wholesalers in Massingir town.

The assessment team also visited the food-insecure village of Cubo, 17 km (a 30-minute drive) from Massingir town along the Massingir Dam on the Rio dos Elefantes.

**Market functionality:** Wholesalers in Cubo and Massingir town buy food stocks in Chokwe, a three-hour drive from Massingir town. Wholesalers with private means of transport tend to restock once a month, with nearly 1 mt of different commodities.<sup>43</sup> Imported rice is becoming less and less available because of high and unpredictable prices, the traders' lack of liquidity to restock, and customers' reduced purchasing power.

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<sup>42</sup> Reportedly, there were initially four traders selected for the COSACA voucher programme in this location. However, only two remained at the time of the assessment, as the others could not afford the upfront costs of purchasing food. Each of the remaining traders now covers his own operation area without competition, thereby dramatically reducing the risks associated with this business. They sell food parcels made up of 25 kg of maize meal, 10 kg of rice, 2 litres of cooking oil, 2 kg of sugar, 2 kg of beans, 1 kg of salt and 2 stock cubes per voucher.

<sup>43</sup> Reported to be fifteen 50 kg sacks of maize meal, butter beans in 50 kg sacks and 20 to 60 litres of vegetable oil.

Some households have shifted to buying in bulk to try and mitigate the negative effect of continuous inflation, thus ensuring they will have food in the coming months. Customers are also consuming fewer imported goods, such as vegetable oil. By contrast, livestock prices have started to fall because of oversupply, and meat prices are below average.

## Beira

**Overview:** Even though WFP is not planning any interventions in Sofala, the assessment team visited Beira to examine production levels, trade flows and possible constraints to food trade with neighbouring provinces, particularly with Gaza.

In a typical year, Sofala province produces maize, wheat, rice and beans for local consumption and trade with other provinces. The 2015/16 drought has severely reduced the maize supply in the region, generating consistent losses for investors in the milling industry and for economic actors involved in the supply chain.<sup>44</sup>

**Market functionality:** Traders have increased their demand for credit in order to remain in business. However, wholesalers are no longer able to ensure credit to traders in their network because more of them are defaulting on their loans. One interviewed wholesaler said his network had shrunk from 84 retailers in 2015 to 12 in 2016, as smaller traders can no longer afford to stay in the business.

Rapid depreciation of the metical against the US dollar has forced wholesalers to change their business strategy to procure mostly local food in order to mitigate the impact of higher import prices and shortages of US dollars. The availability of palm and vegetable oil is dropping fast because of the limited supply of imported raw oil. Local produce is also tight, and maize stocks are anticipated to be in short supply within the next three months.

Insecurity is also a growing concern as frequent attacks along highways force transport companies to deliver food in convoys, placing an additional burden on transport costs. This is pushing traders to deliver food less frequently to other districts or provinces, transferring onto buyers the costs and risks associated with food transportation.

Households using the market have changed their purchasing patterns to cope with rapidly rising food prices. Interviewed traders mentioned that customers who have cash prefer to buy in bulk to buffer against inflation, while those with liquidity problems are buying smaller volumes. They said that most of the food traded in Beira is now consumed in town.

## IV. MARKET PERFORMANCE INDEX

A Market Performance Index (MPI) was designed to support the findings of the field visits with quantitative indicators. The aim is to have a better understanding of the evolving conditions that might make a market more or less conducive for CBT. The index needs to be

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<sup>44</sup> Apparently, one of the leading milling companies in central Mozambique (based in Manica) planned to buy 50,000 mt from the local market, but managed to find just 10,000 mt because of the drought. This has affected its entire network of wholesalers and traders.

flexible enough to incorporate high frequency information from price monitoring systems and low frequency indicators from other sources. The proposed index is in its *beta* version; it may require further testing and validation to evaluate its performance under different circumstances and settings. It may need to be fine-tuned to be applicable to other countries.

We designed the index taking into account the following dimensions:

- I. **Backward-looking market performance indicators**,<sup>45</sup> based on maize prices collected between July 2015 and June 2016. Specifically, the indicators are:
  - a. Price levels as at June 2016;
  - b. Count of month-on-month price increases ('bulls') and decreases ('bears'); these are measures of price trends that adjust slowly to new price information;
  - c. Count of excessive year-on-year price changes, where 'excessive' refers to a price change that is two standard deviations off a rolling period of twelve months; this is a measure of abnormal price levels, taking into account the ongoing trend; and
  - d. Count of excessive month-on-month changes in the coefficient of variation,<sup>46</sup> where 'excessive' refers to an increase above 5 percent of the coefficient of variation calculated in a rolling period of twelve months; this is a measure of price volatility strongly sensitive to abrupt price changes and does not take into account the price trend.
- II. **Forward-looking market performance indicators**, based on forecasted prices between July 2016 and June 2017 and WFP Alert for price Spikes (ALPS) stress phases. This approach monitors the extent to which a local food market will experience unusually high food price levels, classifying markets into a normal, stress, alert and crisis phases. Specifically, the indicators are:
  - a. Count of forecasted stress phase;
  - b. Count of forecasted alert phases; and
  - c. Count of forecasted crisis phases.
- III. **Market potential outreach**, given by per capita surplus or deficit. It is measured as the difference between local production and human consumption by district. This is a proxy of the needs that a market would have to fulfil to meet the caloric intake requirements of the corresponding population according to the national Food Balance Sheets<sup>47</sup> for a) maize grains and b) all cereals.

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<sup>45</sup> Backward-looking market-performance indicators can be expanded in the future to explore market integration features (e.g. Granger causality analysis, Threshold Vector Autoregressive models, or simple price correlations).

<sup>46</sup> The coefficient of variation is a standard measure of volatility given by the ratio between the standard deviation and the mean.

<sup>47</sup> This is 80 percent of the daily caloric intake of a 2,232 Kcal diet that one person should consume in cereals and tubers, converted into national consumption needs according to the population estimates for 2016.

- IV. **Market remoteness**, defined as the percentage of people living three hours' walking distance<sup>48</sup> from the closest main market in the district and from the market hub in the province.
- V. **Economic context**, a measure of the correlation that retail prices show with exchange rates and inflation.<sup>49</sup>

Each indicator  $i$  is combined in the MPI following the methodology described in Annex II, using a weight that was arbitrarily assigned based on each indicator's relative importance to the broader index and its robustness. The highest weighting factor was assigned to the count of crisis episodes in the next year according to the ALPS scale, followed by the price level, year-on-year price changes, price volatility and cereal surplus/deficit indicators.

The MPI returns higher values for markets with better performance indicators, which suggest a more conducive environment for CBT. If excessive indicators are not flagged and markets are not forecasted to be in alert or crisis, the index tends to go above 80. Conversely, when it drops below 40, the market is performing poorly.<sup>50</sup> Given that 'market functioning'<sup>51</sup> is a grey-scale concept rather than a black-or-white dichotomy, the values found between 40 and 80 classify markets performing with lower to higher degrees of efficiency.<sup>52</sup>

The MPI is designed in such a way that it performs both between-market comparisons, adjusting the performance of one market compared to the others; and within-market comparisons, where a single market can be assessed on a monthly (or weekly) basis to keep track of the changes over time.

The MPI can also be used to identify which dimensions are faring worst, thereby indicating the intervention areas that require the most assistance/support and ultimately also guiding decision-making on the most appropriate intervention modality to use for the specific market.

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<sup>48</sup> This threshold was set so that the round trip would not exceed half a day.

<sup>49</sup> We acknowledge the large limitation of using the coefficient of variations instead of causality measures, hence the low weighting factor applied.

<sup>50</sup> "When markets are inefficient and poorly-functioning... competition is low (relatively few buyers or sellers), with some agents having undue influence on the market and on prices especially; inputs, credit and insurance are not easily available; government interventions create disincentives for actors to make rational market decisions; access to reliable market information is unequal between and amongst producers, traders and consumers; transportation and storage are inadequate or prohibitively expensive; commodity prices are not correlated and price differentials between markets are greater than differences in transaction costs; commodity prices are volatile, beyond seasonal norms; and commodity movements from market-to-market are not fully responsive to supply and demand, except at high transaction costs" (WFP, 2011).

<sup>51</sup> "Markets function when: the features that influence the behaviour of buyers and sellers are stable and predictable; interactions between sellers, and between sellers and buyers are transparent; and supplies are sufficient, regular and predictable at affordable, stable and predictable prices to meet the effective demand of households" (WFP, 2011).

<sup>52</sup> These thresholds need further validation with different settings and over time.

The remaining part of this section describes how each indicator<sup>53</sup> performed in the case of Mozambique, as well as the index as an aggregate.

## 1. Market performance

### *Backward-looking indicators*

This section gives an overview of maize price development from July 2015 to June 2016, comparing it against July 2014 to June 2015. The second part provides a forward-looking perspective essential when evaluating the pros and cons of introducing CBT in a country.

Table 4 shows the performance indicators described above (i.e. I.b, I.c, I.d) by month, as a share of all monitored markets in Mozambique. The right pane gives a completely different picture from a market performance perspective when compared to the previous year. Figure 6 is a visual representation of the table.

The monthly price comparison shows a significant discrepancy in February 2016, when maize prices decreased in 17 percent of the monitored markets, compared to 80 percent of markets in February 2015. Similarly, maize prices started to increase suddenly in 80 percent of the markets in June 2016, while in the previous year the increase was staggered. The yearly change indicator departed from the previous year significantly, with up to 93 percent of the markets showing excessive changes in June 2016, compared to a maximum of 8 percent recorded over the previous year (in April 2015). Also, the coefficient of variation indicator detects big anomalies from October 2015 to March 2016, with 11 to 50 percent of markets showing excessive price volatility, which is completely off track if compared to the year before.

*Table 4 - Maize grain price statistics (2015/16 vs. 2014/15)*

2014 - 2015						2015 - 2016					
month	count of markets with price obs.	m/m price increases (bulls)	m/m price decreases (bears)	excessive y/y change	excessive cv change	month	count of markets with price obs.	m/m price increases (bulls)	m/m price decreases (bears)	excessive y/y change	excessive cv change
2014m7	25	40%	28%	0%	0%	2015m7	19	74%	26%	21%	0%
2014m8	25	48%	28%	4%	4%	2015m8	19	84%	0%	11%	0%
2014m9	25	64%	12%	0%	4%	2015m9	19	84%	0%	21%	0%
2014m10	25	60%	24%	0%	0%	2015m10	19	95%	0%	42%	21%
2014m11	25	68%	8%	0%	0%	2015m11	19	68%	21%	53%	11%
2014m12	25	64%	20%	0%	0%	2015m12	19	95%	5%	63%	21%
2015m1	25	80%	8%	4%	8%	2016m1	18	83%	11%	72%	50%
2015m2	25	8%	80%	0%	0%	2016m2	18	72%	17%	89%	44%
2015m3	25	80%	16%	4%	4%	2016m3	18	67%	33%	78%	39%
2015m4	25	52%	48%	8%	4%	2016m4	16	19%	75%	56%	0%
2015m5	25	16%	76%	4%	0%	2016m5	13	0%	85%	62%	0%
2015m6	19	53%	42%	5%	0%	2016m6	15	80%	20%	93%	0%

Source: SIMA. Author's calculation

<sup>53</sup> Except the 'market potential outreach' and 'economic context' set of indicators, which were discussed in Section II.

Figure 6 - Backward-looking indicators at glance



Source: SIMA. Author's calculation

These numbers are explained not just by the *El Niño*-related drought but also by the economic context. On average, one US dollar was worth MZN32.9 during the first period, but was worth MZN47 in 2015/16. Similarly, the average inflation rate moved from 2.3 in 2014/15 to 10 percent in 2015/16.

### Forward-looking indicators

Backward-looking analysis should be complemented by an understanding of likely future market performance patterns. We applied our forecasting procedures to actual prices to analyse where and when market pressure signals may be triggered in the near future, using ALPS.<sup>54</sup>

We forecasted the prices of maize for the main markets in Mozambique for the coming twelve months testing a full class of ARIMAX ( $p, d, q$ ) models, where  $p$  is the autoregressive term (AR),  $d$  is the number of non-seasonal differences, namely the differences needed to make the series integrated (I); and  $q$  is the moving average term (MA). All the possible combinations were tested with  $p$  and  $q$  ranging between 0 and 4, and  $d$  between 0 and 2, using the exchange rate and inflation as exogenous variables (X).<sup>55</sup> We also tested price forecasts using specific time-series smoothers, namely the Simple Exponential Smoothing (SES) and the Linear Exponential Smoothing (LES).<sup>56</sup> The former takes into account the full set of past observations allowing a higher weight to the more recent ones, and is thus responsive to changes occurring in the recent past. The latter not only takes into account the varying mean but it also estimates a

<sup>54</sup> WFP, [Calculation and Use of the Alert for price Spikes \(ALPS\) Indicator](#), 2014.

<sup>55</sup> We ran the methodology in two steps: in the first we forecasted the exchange rate and the consumer price index (hence inflation). In the second, we used these forecasts to predict maize prices.

<sup>56</sup> Both smoothers were adjusted with seasonal indices to bring in the seasonal component.

trend that changes over time. Since the LES method tracks the overall pattern but may not be good after a few periods as the trend dominates the forecasts, we also included the Seasonal Holt-Winters smoother, which embeds the seasonal pattern in the model in addition to the level and trend components.<sup>57</sup> The model with the lowest Root Mean Square Error (RMSE)<sup>58</sup> was selected for each monitored market.<sup>59</sup>

Figure 7 plots prices for two markets in Tete province (Tete city and Angónia), two in Gaza province (Xai Xai and Chokwe), one in Sofala province (Beira), and Maputo. They all show similar patterns, with significant price increases from autumn 2015 onwards.

Except for Angónia and Maputo, all these markets are likely to experience several months of alert and crisis episodes in the near future. This is concerning for different reasons: household purchasing power will be further eroded; farmers – who will rely on markets for longer than usual – will be at risk of food insecurity once their stocks run out; urban dwellers vulnerable to poverty will probably need food assistance even earlier than rural households; traders will face sluggish demand because of crisis prices, jeopardizing their business, particularly in remote markets; and any CBT transfer values would need to be flexible enough to take into account increasing prices and be adjusted once, if not twice, a month.



Transporters in Tete city market

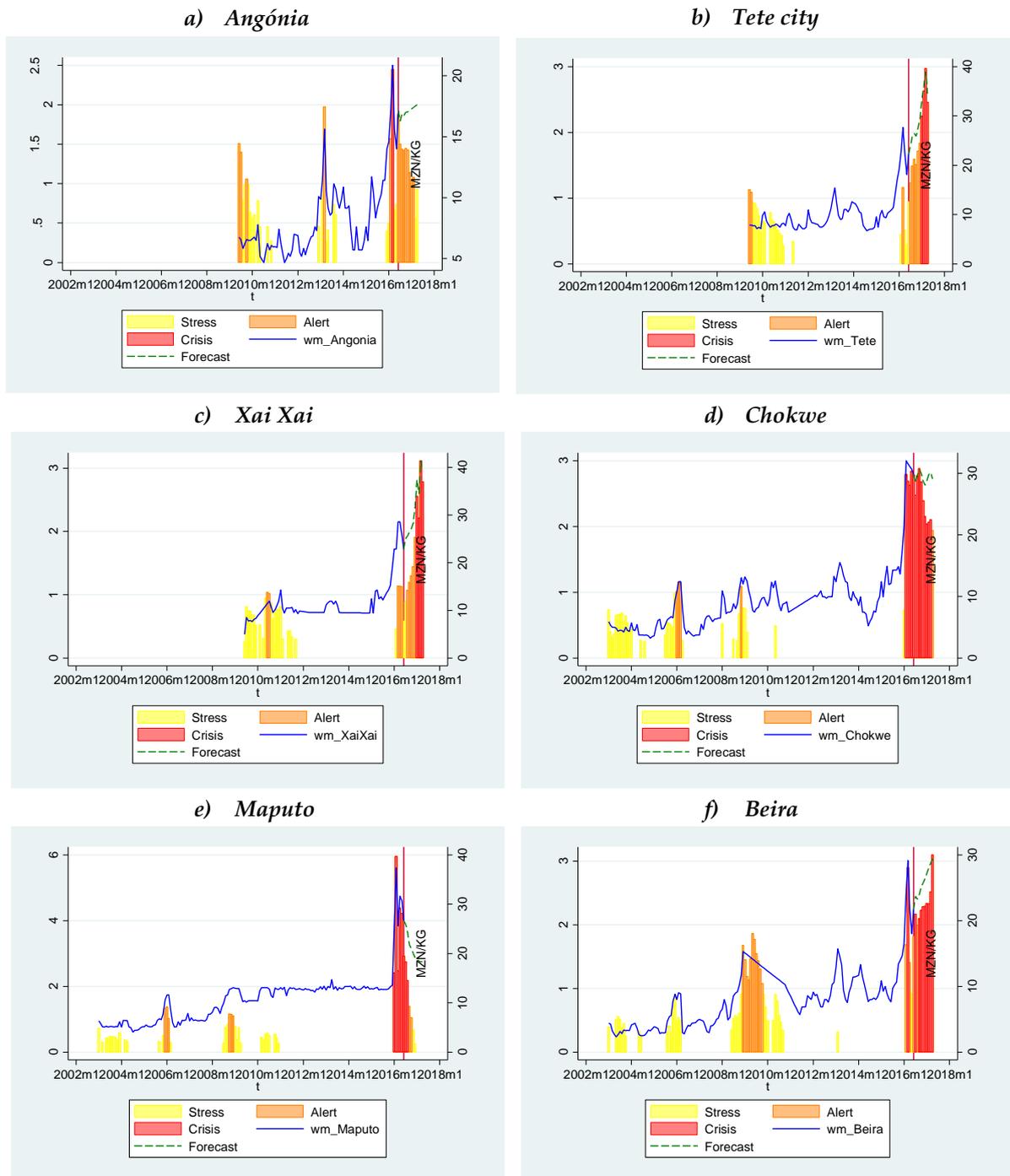
<sup>57</sup> The major limitations are i) the trend can still damp the model, ii) missing values need to be estimated, and iii) the outliers strongly affect the forecasting.

<sup>58</sup> The RMSE shows the size of the 'typical' error and it is measured in the same unit as the original data. Given the squaring process, it places a greater penalty on large forecast errors. It allows comparison between models whose errors are measured in the same units.

<sup>59</sup> We acknowledge the limitation derived from running a Stata® routine with all these methods instead of doing more in-depth market-specific price analyses.

Figure 7 - White maize price forecasts and ALPS

ALPS scale:  Stress  $0.25 \leq ALPS < 1$   Alert  $1 \leq ALPS < 2$   Crisis  $ALPS \geq 2$



Source: SIMA. Author's calculation for forecasted prices between 2016m7 and 2017m6

## 2. Market remoteness

Many households in rural Mozambique do not have a decent food market close to their village. The remoteness of several locations means that if the humanitarian community seeks to assist rural people with CBT programmes, it will be paramount to consider not only market

functionality but also the existence of a market in the first place. Otherwise, programmes would have to establish a viable operational alternative to running market-based interventions in places where current circumstances (including poor infrastructure) have not sustained the development of markets so far.

Bringing traders to a place where a market does not exist depends on the appetite of vendors to move food there, as traders normally pursue price differences across locations and time to make profits. When there is poor market integration, this price arbitrage is more likely to happen when the price difference between two markets is greater than the transaction costs of transporting the food. In Mozambique, these costs “were found to be higher in distant markets and in markets connected by poor roads” (Alemu & Biacuna, 2006). Two scenarios are therefore likely:

1. The additional demand from CBT stimulates the development of some sort of market, where traders might find it attractive to sell commodities if they can set the price to reflect transaction costs; or
2. The programme reduces transaction costs, capping prices and reducing the risks of doing business in a remote area. This can be achieved by securing sales volumes and stock management to the detriment of normal competition between traders, and eventually losing some of the expected benefits of running CBT (e.g. beneficiary choice).

Neither scenario is very sustainable in the long run if the constraints that prevented a market from developing are not addressed.

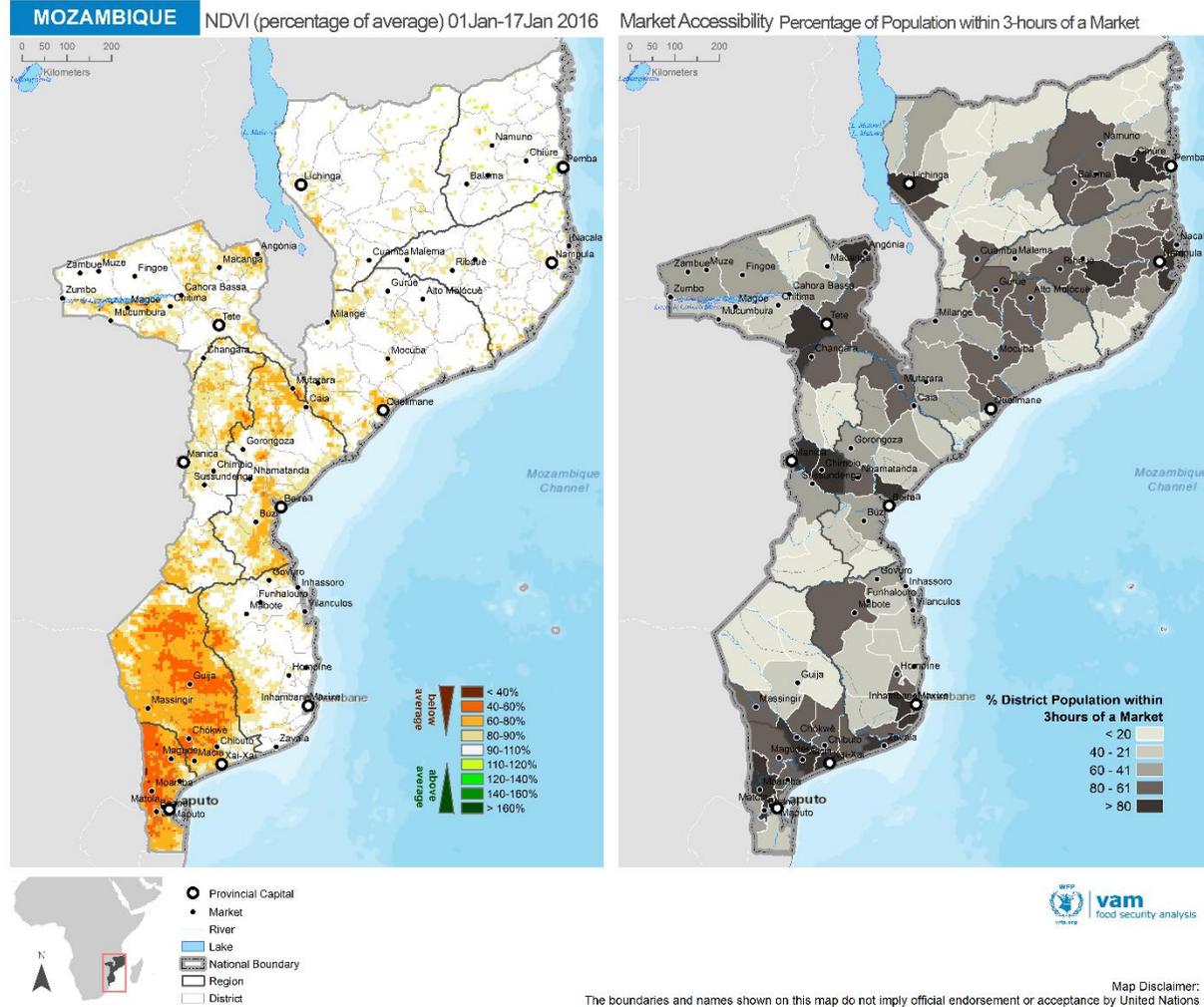
Map 5 (right pane) shows the share of people living within a three-hour walk of selected markets,<sup>60</sup> while the left pane shows vegetation growth at the beginning of 2016. In many parts of the Gaza province, the two maps overlay perfectly – very bad vegetation growth is coupled with poor market accessibility. This is also the case in the southwest of Tete province, especially in Mucumbura district.

In both cases, it seems appropriate to consider market accessibility as a key factor in building the MPI. In fact, with so many households who depend to varying degrees on the food they manage to produce, the left pane suggests locations where a higher reliance on markets is likely in the light of the poor harvest. On the other hand, the right pane offers a picture of the extent to which these households have physical access to the market. The longer the distance to reach a market, the higher the opportunity and transport costs for households, not to mention their exposure to insecurity along the road.

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<sup>60</sup> This is based on estimated travel time (see Map 6 and Map 7 in the Annex I).

Map 5 - NDVI and market accessibility



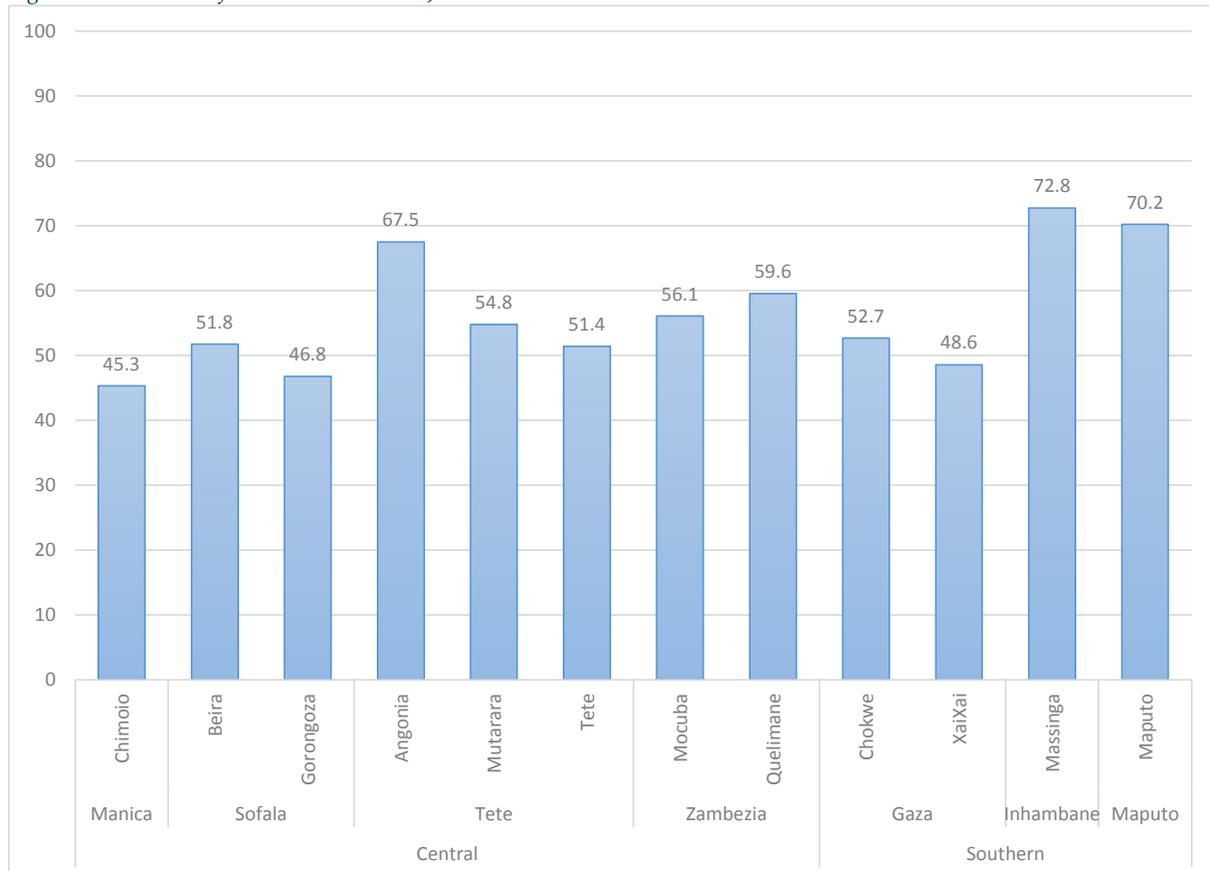
Source: WFP

### 3. Index as at June 2016

Figure 8 shows the MPI for the main markets for which data was available for June 2016. The index ranges from 45 to 73. The lowest performing markets – both scoring below 50 – are Chimoio and Gorongosa; the latter is a key maize production market for. Relatively high performing markets are Maputo and Massingao, with scores above 70.

Of the two provinces examined in the assessment, the surplus market of Angónia has the best score (67.5). Chokwe, Tete and Xai Xai remain between 49 and 53.

Figure 8 - Market Performance Index as at June 2016



Source: WFP. Author's calculation

Table 5 shows at glance the results for June 2016. Xai Xai has experienced seven months of maize price increases in the past year, with ten excessive year-on-year changes, nine forecasted ALPS alert or crisis phases (five alert and four crisis), and a maize deficit. Similarly, Chokwe could have nine ALPS crisis phases in the next 12 months, not to mention a maize deficit and the highest maize price recorded in the monitored markets in June 2016. The market remoteness indicator is poor for both Xai Xai and Chokwe. Tete city's relatively poor score is mostly the result of ALPS forecasts and almost one year of price increases.

Proper validation and sensitivity analysis of the index would mean running the estimates in the coming months to understand the trends and thresholds. Since the indicator was designed around the markets being monitored by SIMA, mVAM data could be explored to capture rural markets as well. For these markets, price levels could be captured in the index immediately, while monthly price increases and decreases could be incorporated once the time-series reaches an adequate length. Concerns over food shortages and depleted stocks can also be factored in to the indicator. In fact, according to the data collected in July 2016, maize grain was mentioned to be in short supply by 67 percent of the respondents in Gaza (mostly in Chibuto and Chokwe districts) and 29 percent in Tete (mainly in Magoe). Traders also reported short supplies of cowpeas, followed by cooking oil, imported rice and maize meal.

Table 5 - Market Performance Index console

Region	Province	Market	month	Maize price	Backward-looking performance				Forward-looking performance			Production - human consumption		Economic context		Demand	MARKET PERFORMANCE INDEX	
				levels	m/m price increases (bulls)	m/m price decreases (bears)	excessive y/y change (> 2 s.d.)	excessive m/m cv change (>5%)	ALPS stress	ALPS alert	ALPS crisis	maize surplus/deficit	all cereals surplus/deficit	exchange rate correlation with prices	inflation correlation with prices	distance from mkts (% of people)		
Central	Manica	Chimoio	2016m6	22.9	11	1	7	3	1	2	7	11,511	2,737	0.208	0.019	0.211	45.3	
		Sofala	Beira	2016m6	21.7	10	2	6	2	0	1	9	16,380	3,895	0.208	0.095	0.317	51.8
	Tete	Gorongosa	2016m6	20.4	9	3	9	4	3	2	1	5,837	1,388	0.234	0.128	0.437	46.8	
		Angonia	2016m6	17.1	9	2	7	1	2	8	0	13,848	3,293	0.055	0.421	0.091	67.5	
	Zambezia	Mutarara	2016m6	23.9	7	2	7	2	0	7	3	10,085	2,398	0.100	0.070	0.375	54.8	
		Tete	2016m6	22.3	10	2	5	3	0	6	4	7,846	1,866	0.002	0.261	0.292	51.4	
	Southern	Gaza	Mocuba	2016m6	23.1	8	3	6	2	0	4	6	14,017	3,333	0.032	0.328	0.331	56.1
			Quelimane	2016m6	19.4	9	2	7	2	5	2	0	8,714	2,072	0.130	0.630	0.457	59.6
		Chokwe	2016m6	29.8	5	5	6	2	0	1	9	- 9,758	8,135	0.021	0.242	0.067	52.7	
		XaiXai	2016m6	22.9	7	3	10	2	1	5	4	- 6,102	5,088	0.480	0.266	0.074	48.6	
Maputo	Inhambane	Massinga	2016m6	19.4	7	4	4	1	4	2	1	- 9,587	7,993	0.223	0.032	0.624	72.8	
	Maputo	Maputo	2016m6	26.6	6	4	4	2	2	2	2	-58,772	49,000	0.020	0.133	0.000	70.2	

Select variable for the index	x	x	x	x	x	x	x	x	x	x	x	x	x
Contribution to the index (+/-)	-	-	+	-	-	-	-	-	-	+	+	-	-
Penalization factor <i>a</i>	1	1	1	1	1	1	1	1	1	1	1	1	1
Penalization factor <i>b</i>	1	1	1	1	1	1	1	1	1	1	1	1	1
Weighting factor <i>w</i> between 1 and 5	3	2	1	3	3	1	2	5	2	3	1	1	1

Source: WFP. Author's calculation. Maize prices are in MZN per kilo; Backward- and forward-looking performance indicators are expressed as the count of months out of the last 12 months/the coming 12 months; production and human consumption indicators are in metric tons; economic context indicators are expressed as correlations spanning from 0 to 1; and the demand indicator is the share of people in the district living a three-hour walking distance from the market

## V. CONCLUDING REMARKS

The 2015/16 *El Niño* seriously compromised the agricultural season in many countries in the southern Africa region. Mozambique was severely hit, with poor production mostly in the southern region and 2 million people at risk of food insecurity. To deliver the most effective food assistance, WFP has an interest in exploring the feasibility of market-based programmes in Tete and Gaza provinces.

The concluding remarks of the market assessment are as follows:

**Local maize from surplus areas in the country may not necessarily ease food availability problems in deficit areas.** Local produce was only scarce in some areas of the country, where food availability in the market was already poor despite the post-harvest season, and where maize grain prices were exceptionally high for the time of the year. It is unclear to what extent national trade flows are able to offset the imbalance between surplus and deficit areas. Normally, domestic maize grain and pulses are traded from north to south along the EN1 highway, while imported goods flow in the opposite direction. Transportation of goods is mainly over land: the three major entry points of Maputo, Beira and Nacala are not competitive because of high costs, while railway lines cut the country horizontally and not vertically.

Beyond the logistics infrastructure, other factors limiting domestic maize trade include insecurity along the main national route, particularly in Sofala province which is reducing the natural flow of commodities, particularly southbound. Domestic trade is also affected by the

substandard quality of local maize grain because of the high risk of infestation and humidity, such that domestic maize is not a perfect substitute for international maize. Finally, porous borders, poor road networks and many production markets that naturally lean towards neighbouring countries create good price arbitrage opportunities for traders to export informally, also taking advantage of the metical depreciation.

**Trade flows have been already affected this year.** The effect of the drought on trade has been huge in Gaza province, but moderate in Tete province. In Gaza, food prices have increased abnormally across the whole province, while the volumes traded have shrunk considerably because of limited supply from local producers and from Maputo. Trade flows have reversed: producers' markets lack supply and Xai Xai is now serving as a market hub to channel food from other provinces rather than from Chokwe as was usual in the past. In Tete, trade flows have remained normal but at lower volumes here and there. Food is being sourced from Angónia and four other districts in the north to Tete city. Informal trade from Zimbabwe and Zambia has helped relax prices in some remote markets close to the borders.

**Whenever traders have financial capacity, they are hoarding maize and are not planning to release their stocks before August/September if not later, with the prospect of boosting their profits.** The farther these traders are from farmers along the supply chain, the more their profits are expected to grow as the lean season kicks in. For smaller traders, their limited financial capacity is a major challenge.

**The assessed markets are very different, and so are their volumes.** Some markets in Tete province are supply markets only and are organized in such a way that traders collect and transport maize elsewhere in the country. Others – like Tete city and Xai Xai – are local market hubs, while some markets in rural areas are remote and marginal. As such, the number of market traders, the number of stock-keeping units and the volumes traded vary a great deal. Reportedly, the actual stocks of one of the three main wholesalers in Angónia were at 1,000 mt, while small-to-medium traders in the same location were storing 250 to 500 mt each. In remote villages there are few – or just one – main traders, with little business capacity (15 to 30 mt each). In Gaza province, the volumes being traded have almost halved compared to the same period last year.

**Markets are under pressure because of the combined effect of drought, increasing insecurity and the worsening economy, with traders already implementing mitigation measures.** Some large traders who normally work with two-week/one-month credit lines reported higher-than-usual rates of default within their network of traders. Others are reducing their business by closing branches or, for small-scale businesses, shutting down completely. For others who deal with imported goods, profit margins have shrunk, as customer purchasing power is already under stress and cannot sustain indefinite price increases. Traders are not only trying to transfer transportation costs and risks to others, but they are also tending to reduce/remove non-vital services including off-loading goods to remain profitable while keeping the same selling price/limiting price increases so as to maintain their selling base (customer numbers and quantities sold). The steep depreciation of the local currency is undermining traders' capacity to plan their stocking strategy, changing

the value of their orders in the space of a few weeks. When possible, in order to minimize this risk, traders are also diversifying their supply sources to procure more produce locally, thereby placing extra demand pressure on the already limited local supply and pushing prices up still further.

**Poor demand is reducing the appetite of traders to do business in remote areas, making imported food – including maize meal, rice and cooking oil – prone to scarcity.** The poor agricultural season has triggered an income and a consumption effect on demand. Farmers who sell less produce and who often bring forward their harvest to the detriment of the yield and the quality of maize will be reliant on markets for longer but with a lower income. To fulfil their immediate need for cash, they will sell their crops as quickly as possible, finding themselves buying food at much higher prices in the course of the season, when their stocks will be exhausted. For households, the high food prices will force them to buy less or to ask for extended credit. Reportedly, other household coping strategies include bulk purchasing to try and offset inflation for a while, and reducing the consumption of imported goods such as vegetable oil. As a result, both the client base and profit margins for traders are falling and are expected to decrease further into 2016.

## VI. RECOMMENDATIONS

All things considered, markets in the province of Gaza, and to a certain extent in Tete, do not appear fully conducive for WFP to supporting CBT this year, for structural and contextual reasons. This is particularly true in rural communities, where the need for direct food assistance seems higher especially as we move into the lean season.

Structural factors often make planning CBT programmes challenging in such areas. Key structural issues are as follows: markets are usually far away from WFP-assisted beneficiaries; local traders have extremely weak financial capacity; shops can barely meet WFP's required food selection/diversity standards, especially regarding nutritional content; few suppliers are price setters, and financial services are seldom present; both road infrastructure and the economy are poor; and households face high transport costs to access the markets.

Contextual factors are currently creating a market environment where CBT would work at substandard levels of efficiency and effectiveness. These factors include the scarcity of local food; traders' competition over fewer stocks; insecurity on the main trade routes; and sharp inflation fuelled by crashing exchange rates.

For market-based interventions in Mozambique, structural constraints may somehow be overcome by programme design, but contextual constraints seem difficult to address.

There are four possible scenarios to consider:

1. Targeted communities are in remote areas, where rural markets exist with few adequate shops;
2. Targeted communities are in remote areas, where rural markets are marginal or non-existent;

3. Targeted communities are in rural areas, at a commuting distance of less than three hours from the nearest active and adequately supplied food market; or
4. Targeted communities are in or close to urban areas.

In the first case, CBT would have to rely on existing shops, either relaxing some of the quality standards usually required by WFP or strengthening their capacity by promoting commercial agreements with wholesalers in larger markets. In such cases, the traders who are not contracted may be at a disadvantage, particularly if the programme imposes prices below the local average.

In the second case, traders would need to be brought in where normal conditions are not conducive to sustaining a market. One viable solution could be creating market fairs, where traders can freely set prices to compensate for the costs incurred, or the programme could cap prices and artificially reduce transaction costs by rewarding traders with secured sale volumes and steady stock management. The former seems to privilege contracted traders more than beneficiaries. The latter essentially calls for commodity-based vouchers, with households assigned to a specific trader, removing most of the potential advantages of CBT. Other alternatives could be to explore the interest of large vendors in expanding their network of local traders, or to use cash vans to serve these communities. In both cases, it is unclear to what extent it would be possible to safeguard beneficiaries' freedom of choice with regard to food items (and/or brands) they buy.

In the third case, beneficiaries' entitlement should be increased to cover transaction costs, including opportunity and transportation costs.

Contracting large traders under the business-to-business approach seems to be the best CBT option, if WFP can leverage the profit margins that bigger wholesalers can still make, with the prospects of strengthening their retail network at a fair price in return for additional guaranteed customers. In fact, only large traders have the financial capacity to offset the structural limitations in the market environment and the contextual limitations that have been affecting traders in Gaza and Tete provinces.

However, time is short for programme design, and it is unlikely that CBT could start before October 2016, when markets will be even more under pressure than at the time of the assessment. Moreover, since Mozambique is prone to extensive flooding and tropical cyclones, a *La Niña* event in 2016/17 is likely and would probably continue to stretch food production and food markets, casting further doubt on the feasibility of CBT for the current season.

Beyond rural communities, the poorest urban dwellers may also be in need of food assistance, most likely earlier than those in rural communities. Given their full reliance on markets in the context of runaway inflation, market-based interventions are recommended for urban areas, should the need arise. A small pilot project could even be run in rural communities close to urban settings and well developed markets, perhaps factoring in the cost of transportation in the transfer value. Possible candidates could be communities in the environs of Tete and Angónia.

Since Mozambique's economy will continue to be under stress in the foreseeable future, we also recommend extending market monitoring in the coming months through the mVAM initiative, covering more rural markets to complement the national monitoring systems, and updating the MPI to build trends and threshold levels which may be used to monitor market functionality and the feasibility of CBT programmes.



WFP / Oscar Maria Caccavale

*Bolsa de Mercadoria in Angónia*

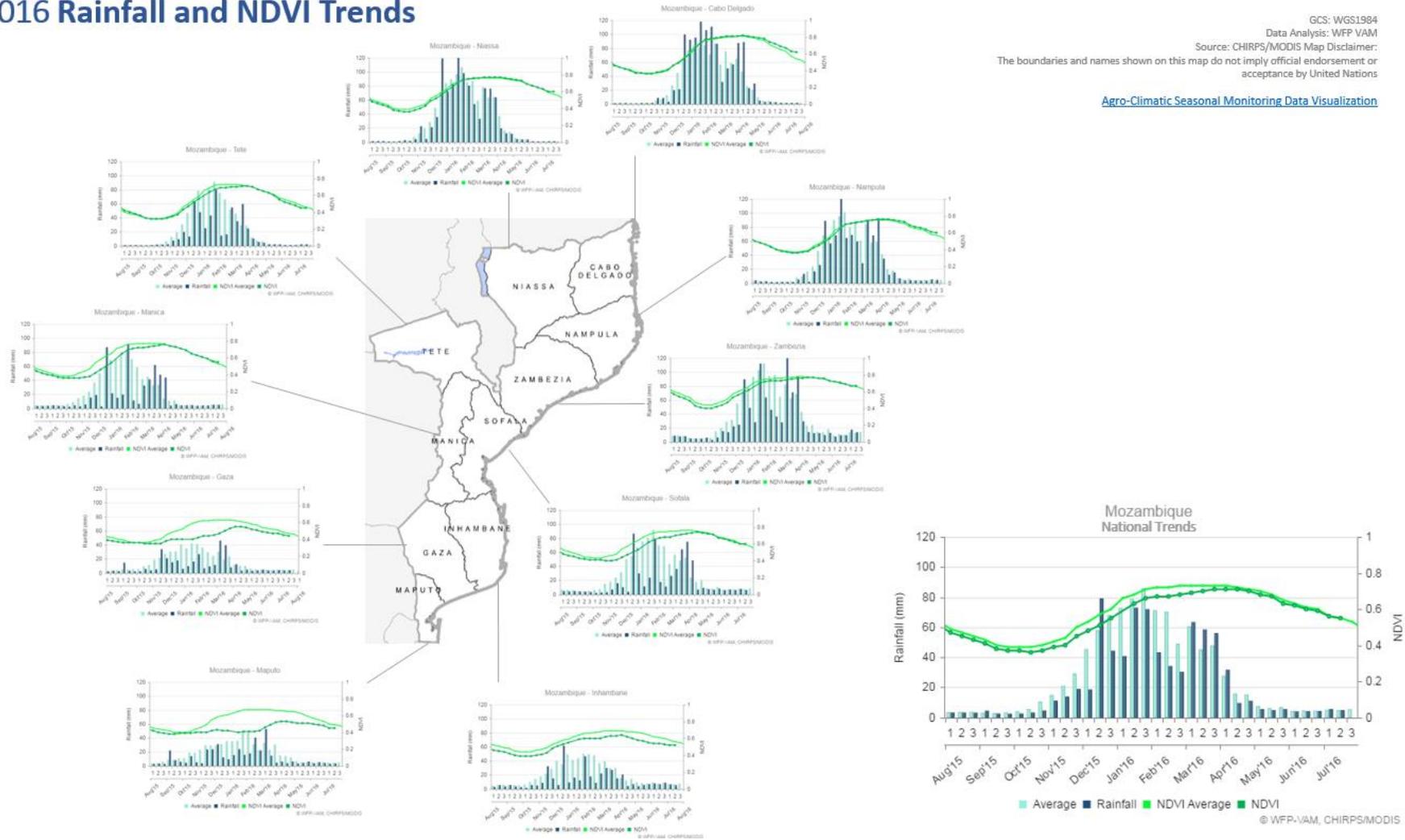
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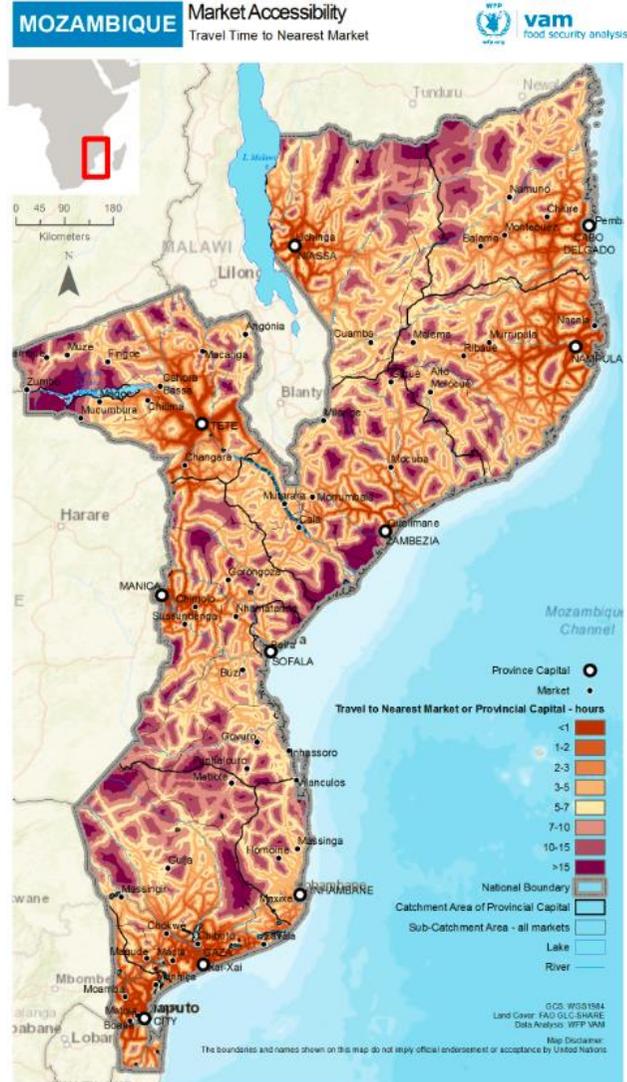
# ANNEX I

Figure 9 - Rainfall and NDVI Trends 2015/16

## 2016 Rainfall and NDVI Trends

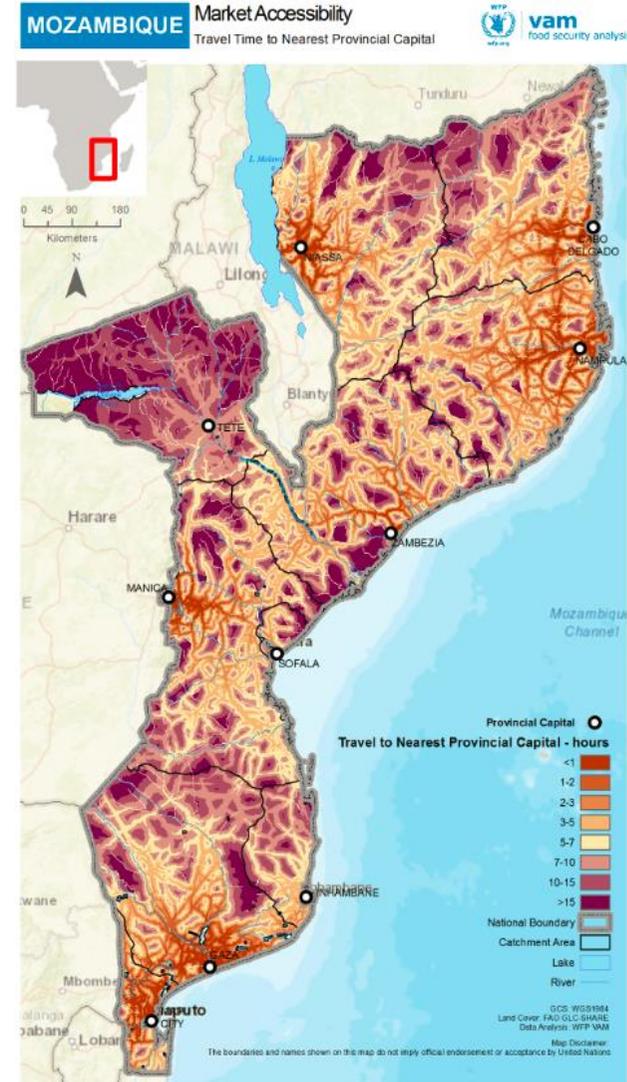


Map 6 - Travel time to nearest market



Source: WFP

Map 7 - Travel time to nearest province capital



Source: WFP

Table 6 - Self-reported traders' actual capacity in Tete province

Market	Main traders	Reported actual capacity per trader
Angonia	3 big	≈ 1,000 mt (maize grain)
	7 medium	≈ 500 mt (maize grain)
	15 small	≈ 250 mt (maize grain)
	1 bolsa de mercaderia	≈ 500 mt (maize grain, 1/10 <sup>th</sup> of total warehouse capacity)
	1 milling industry	N/A
	Collection points	N/A
	Mamas	≈ 60 mt (maize grain)
Tete	10 very small	≈ 16 mt (maize grain)
	4 supermarkets	≈ 16 mt (mixed commodities)
	3 milling industries	≈ 200 mt (maize grain)
	> 100 wholesalers	N/A
Mago	3 very small	≈ 30 mt (maize grain)
Mucumbura	3 very small	≈ 30 mt (maize grain)
Fingoe	0	≈ 0 mt (maize grain)
Calira/Catcombwe	Collection points	≈ 160 units, ≈ 16/17 mt each (maize grain)
Muze/Zambue	Collection points	≈ 250 units, ≈ 16/17 mt each (maize grain)
Zumbo	1 very small	≈ 15 mt (maize meal)

Source: WFP market assessment

Table 7 - Price changes in Tete province

Tete	Retail unit price (MZN/KG or MZN/L)								
	Maize			Maize Meal			Cowpeas		
Assessed Market	2016	2015	change	2016	2015	change	2016	2015	change
Domue				60					
Angonia	19	8	138%	60	35	71%	45	20	125%
Tete City	19	9	111%	58	33	76%		23	
Mucumbura	25			60			65		
Mago	28			60					
Fingoe				60			70		
Zumbo				40			75		

Assessed Market	Beans			Rice			Vegetable oil		
	2016	2015	change	2016	2015	change	2016	2015	change
Domue	90			48			110		
Angonia	65	25	160%	40	30.0	33%	110		68%
Tete city	31	32	-3%	35	37	-5%	86		50%
Mucumbura	63			38			86		
Mago	100			40			90		
Fingoe				44			115		
Zumbo				75			113		

Source: WFP market assessment and SIMA

Table 8 - Price changes in Gaza and Sofala provinces

<b>Gaza and Sofala</b>		Retail unit price (MZN/KG or MZN/L)								
		Maize			Maize Meal			Cowpeas		
<b>Assessed Market</b>	2016	2015	<b>change</b>	2016	2015	<b>change</b>	2016	2015	<b>change</b>	
Xai Xai	23	13	<b>78%</b>	50	35	<b>43%</b>	23	13	<b>78%</b>	
Chokwe	30	12	<b>146%</b>	55	35	<b>57%</b>	30	12	<b>146%</b>	
25 Setembro				43	30	<b>43%</b>				
Chibuto	26	12	<b>117%</b>	32	24	<b>33%</b>	26	12	<b>117%</b>	
Macia										
Gujia	20	14	<b>43%</b>	33	16	<b>106%</b>	20	14	<b>43%</b>	
Massingir										
Cubo				33	26	<b>27%</b>				
Beira				26	24	<b>9%</b>				

		Beans			Rice			Vegetable oil		
<b>Assessed Market</b>	2016	2015	<b>change</b>	2016	2015	<b>change</b>	2016	2015	<b>change</b>	
Xai Xai	90	60	<b>50%</b>	23	13	<b>78%</b>	90	60	<b>50%</b>	
Chokwe	100	50	<b>100%</b>	30	12	<b>146%</b>	100	80	<b>25%</b>	
25 Setembro				45	35	<b>29%</b>	100	35	<b>186%</b>	
Chibuto	95	70	<b>36%</b>	26	12	<b>117%</b>	73	60	<b>21%</b>	
Macia										
Gujia	90	50	<b>80%</b>	20	14	<b>43%</b>	100	70	<b>43%</b>	
Massingir										
Cubo	100	90	<b>11%</b>							
Beira										

Source: WFP market assessment and SIMA



Empty maize grain silo in 25 Setembro village

WFP / Jan Michiels

## ANNEX II

We designed the index taking into account the following dimensions:

- I. **Backward-looking market performance indicators** between July 2015 and June 2016:
  - a. Price levels as at June 2016;
  - b. Count of month-on-month price increases ('bulls') and decreases ('bears');
  - c. Count of excessive year-on-year price changes; and
  - d. Count of excessive month-on-month changes in the coefficient of variation.
- II. **Forward-looking market performance indicators** between July 2016 and June 2017:
  - a. Count of forecasted ALPS stress phases;
  - b. Count of forecasted ALPS alert phases; and
  - c. Count of forecasted ALPS crisis phases.
- III. **Market outreach**, given by per capita surplus or deficit. It is measured as the difference between local production and human consumption.
  - a. Maize grains
  - b. All cereals
- IV. **Market remoteness**, as the percentage of people living three-hours from the closest main market in the district and from the market hub in the province.
- V. **Economic context**, as a measure of the correlation that retail prices show with both exchange rates and inflation.<sup>61</sup>

We can summarize the indicators for the market  $i$  in the MPI using the following steps:<sup>62</sup>

- ✓ Creating a uniformity in the direction of the indicators (i.e. *Contribution to the index* in Table 5), changing the sign to those normally associated with markets under pressure:

$$\dot{X}_i = \begin{cases} X_i, \\ -X_i \end{cases}$$

- ✓ Log transforming and achieving metric homogeneity between variables, taking into account the minimum and second minimum and maximum values to avoid negative values:

$$\tilde{X}_i = \log_{10} \frac{\dot{X}_i + m_{2i} - 2 * m_{1i}}{2 * M_{1i} + M_{2i} - \dot{X}_i}$$

- ✓ Rescaling between 0 and 1:

$$Y_i = \frac{\tilde{X}_i - \text{Min}(\tilde{X}_i)}{\text{Max}(\tilde{X}_i) - \text{Min}(\tilde{X}_i)}$$

- ✓ Applying penalization factors (i.e.  $a$  and  $b$  in Table 5):

$$Y_i - ae^{-bY_i}$$

<sup>61</sup> We acknowledge the strong limitation of using the coefficient of variations instead of causality measures, hence the low weighting factor applied.

<sup>62</sup> The methodology to aggregate the indicators into a multidimensional index was designed according to *WFP, A Global Food Security Index* (forthcoming), where the properties of the different steps are explained in detail.

- ✓ Averaging the rescaled variable according to a weighting factor (i.e.  $w$  in Table 5) spanning between 1 and 5, with  $k$  being the number of indicators composing the index:

$$MSI_i = \frac{\sum_{k=1}^K w_k (Y_i - a e^{-b Y_i})}{\sum_{k=1}^K w_k}$$

Finally, the index is normalized and rescaled between zero and one hundred.



Maize meal shop in Massingir town

