Final report

The effects of the disruption of the pigeon pea export market on household food security and well-being in Mozambique

Alberto da Cruz
Jorrit Oppewal
Mattia Polvanesi

2018

S-MOZ004-MOZ-1

DIRECTED BY

FUNDED BY

Table of Contents

Executive Summary

Pigeon pea production in the countryside of Central and Northern Mozambique has grown exponentially over the past decade, on the back of rising demand from India. The high prices, combined with favorable agronomic characteristics, ensured that the number of farmers cultivating this pulse surpassed 1 million by 2016. However, an additional push by the Indian Government to encourage domestic production through increased minimum support prices, combined with good monsoon rains, resulted in a bumper harvest in 2017. Consequently, the price fell significantly and India decided to impose an import quota in August 2017. The reduced access to the only significant export market for pigeon peas precipitated a price collapse to the Mozambican farmer, from up to MZN 50/kg in 2016 to around MZN 5/kg in 2017.

This document presents the results of a survey that was held among 447 farmers in two districts of Zambézia Province (Milange and Mocuba) and two districts of Nampula Province (Monapo and Mecuburi), to assess the impact of the price collapse on household food security and well-being. The results confirm the importance of the crop, as nearly all farmers (97%) had cultivated it in the 2016-17 season. However, the specific role and importance of pigeon pea differs substantially between the two provinces. Average production per household is much higher in Zambézia (469 kg) than in Nampula (176 kg), and the share of farmers producing more than 500 kg was 22% in Zambézia, against 6% in Nampula. Pigeon pea is an important cash crop for farmers in Zambézia, where 90% rank it amongst their two most important cash crops. Therefore, Zambézia´s farming communities suffered tremendously because of the price collapse, with actual income from the sale of pigeon peas, per household, coming in at MZN 11,000 less than what they would have expected. Although the survey found the food security situation to be acceptable, it was found that many households, particularly in Zambézia, had to resort to negative coping strategies involving the depletion of livelihood assets. The survey results show that farmers in Nampula have a much more diversified cash crop portfolio, and were therefore much less exposed to the negative effects of the pigeon pea price collapse.

A major recommendation, therefore, is that a coordinated effort should be launched to promote diversification to other crops, particularly in those districts that depended most on income from pigeon pea. At the same time, however, the survey also confirms that most farmers are continuing with pigeon pea production. Given its importance, the crop should receive increased attention, on a systematic basis, from various stakeholders, to guarantee its effective inclusion in production statistics and price information systems. Finally, it would be important to promote the domestic consumption of this highly nutritious legume, as it would stimulate food security and at the same time reduce dependence on the volatile Indian market.

1. Background

Mozambique, a low-income food-deficit country with 70 percent of the population depending on subsistence agriculture, has recently emerged as a significant source of Indian pigeon pea imports. In the last decade, production of Pigeon pea (*feijão bóer*) in Mozambique expanded fast, driven by soaring Indian demand and high prices, accompanied by promotion efforts from traders and civil society and donor organizations. The production increase centered on the two poorest and most populous provinces of Zambézia and Nampula, where it has become one of the most important cash crops. Enthusiasm regarding the potential and benefits of pigeon pea cultivation in Mozambique increased further when the Government of Mozambique signed a Memorandum of Understanding with the Indian Government in 2016 regarding the expansion of Mozambican pigeon pea exports.

However, the Indian Government simultaneously worked towards self-sufficiency in pulses, stimulating domestic pigeon pea production. This, combined with a good rainy season, resulted in a bumper harvest in India. As a result, the market price collapsed in early 2017, provoking farmer protests, and in August 2017 the Indian government responded by imposing an import quota of 200,000 tons of pigeon peas, having imported more than 700,000 tons in the previous year. Since India is practically the only importer of pigeon peas, Mozambican traders responded to the import quota by scaling back their buying operations. The context and implications of these developments have been discussed in a report by the International Growth Centre (IGC) (Da Cruz and Oppewal 2017a).

The immediate effect was that the farm-gate price in Mozambique dropped by almost 90%, from more than MZN 40/kg in 2016 to less than MZN 5/kg by October 2017, threatening the income of hundreds of thousands of affected farmers. Moreover, considering the importance of pigeon pea in certain districts, the situation carries the potential of creating spillover effects that could lead to local economic crises. Indeed, according to IGC reports on Mocuba, for instance, in previous years, traders and shop-owners from the district capital would go until the villages in October/November, to sell consumer goods (furniture, bicycles, cell phones, etc.) to the farmers who had just received the money from their pigeon pea harvest. In 2017, however, nothing of the sort seems to have happened (Da Cruz and Oppewal 2017b). Furthermore, the authors allude to the possibility that emerging farmers, who usually contract *ganho-ganho* labour[1] services to increase their cultivated area, will not have the means to do so in preparation of the next agricultural season. This could negatively impact the rural labour market, and

[1] *Ganho-ganho* labour refers to the contracting of seasonal agricultural labour. Generally speaking, emerging farmers with a relatively large area that is impossible to cultivate by exclusively relying on family labour, will contract people from the community, generally from the poorer segments, to help with various agricultural operations on their fields.

lead to a reduction in the overall area under agricultural cultivation. Importantly, the authors noted that the situation in Nampula is completely different, as farmers depended less on income from pigeon pea and had a more diversified crop portfolio.

Poor data availability constitutes a serious constraint for assessing the number of farmers involved and the scale of potential channels of impact in different locations. National data systems do not consistently distinguish between different types of beans and peas, which complicates the analysis. A close examination of Indian import data, however, reveals that, from the 2016 harvest, Mozambique exported more than 170,000 tons of pigeon peas, worth over USD 120 million (Da Cruz and Oppewal 2017a). Combining Indian trade data and data from the various Mozambique Agricultural Surveys (TIA/IAIs), it is estimated that at least 1.2 million Mozambican farmers were involved in pigeon pea cultivation in 2017, producing more than 250,000 tons (idem).

2. Objectives and Methodology

In the context of poor data availability to judge the impact of the pigeon pea price collapse, the World Food Program (WFP) and International Growth Centre (IGC) decided to join forces to gather and analyze additional specific information on the situation. The WFP organized a household survey among 447 households in 4 districts, namely Mecuburi and Monapo in Nampula Province and Milange and Mocuba in Zambezia province. The IGC Mozambique supported the analysis of the results and drafting of the report.

The objective is to examine the scale and severity of the impact resulting from the disruption of the pigeon pea export market on household food security and well-being, attempting to estimate the proportion of affected farmers, the scale of direct and indirect losses in terms of purchasing power and food security. It is hoped that these findings can help inform possible response options[2].

In terms of methodology, this study relies on new survey data, collected between the 19th and 23rd of February 2018 in Nampula and Zambezia provinces, among 447 households,. The districts in Zambezia were selected on the basis of Da Cruz and Oppewal (2017b), referring that Milange and Mocuba seem to be amongst the most affected districts. The two districts of Nampula were selected to provide a possibly contrasting example of dynamics in an area where pigeon pea is also important to farmers, but not dominating the rural economy to the extent seen in Zambezia.. A farmer survey questionnaire was used to collect data from 30 sites in 4 districts of Nampula and Zambezia with a target of 10 households per site.

[2] See Annex for the Terms of Reference

3. Pigeon Pea Farmers and Production in 2017

The overall sample consisted of 447 respondents, 51 percent of whom live in the two selected districts of Nampula province and the other 49 percent in the two selected districts of Zambezia province (see Table 1). In terms of basic characteristics, 85% of the households in the sample are male-headed. The average size of a household is 5.7 in Zambezia and 5.0 in Nampula.

Most importantly for the purpose of this study, 97% of interviewed households produced pigeon pea in the 2016/17 agricultural season. This percentage is above 93% in each of the four districts, and constitutes clear evidence of the importance of this crop in the countryside of Central and Northern Mozambique and validates the concern that the adverse market shock could have significant implications in these areas.

Table 1. Total Sample and Number of Pigeon Pea Producers

Province	District	Total	Produced Pigeon Pea		% producing pigeon pea
			YES	NO	
Nampula	Mecuburi	132	128	4	97.0%
	Monapo	96	96	0	100.0%
	Total	**228**	**224**	**4**	**98.2%**
Zambezia	Milange	127	119	8	93.7%
	Mocuba	92	88	4	95.7%
	Total	**219**	**207**	**12**	**94.5%**
TOTAL		**447**	**431**	**16**	**96.4%**

In the remainder of this document, we only consider the 431 farmers who produced pigeon pea in 2016/17. Percentages will thus refer to the share of pigeon pea farmers, and not the share of all farmers.

Table 2 shows that pigeon pea is a relatively recent crop for many farmers, and appears to have gained ground particularly over the last decade, which coincides with the period in which Indian import demand started accelerating (Da Cruz and Oppewal 2017a). In general, pigeon pea has had a longer tradition of cultivation in Zambezia than in Nampula. Almost 60% of pigeon pea farmers in Nampula have been producing the crop for less than 5 years, while this is the case for 31% of pigeon pea farmers in Zambezia. Approximately one fifth of pigeon pea farmers, on the other hand, have been producing the crop for more than 10 years and this group is larger in Zambezia (26%) than it is in Nampula (17%).

Table 2. Farmers by Number of Years of Pigeon Pea Production

YEARS	Nampula		Zambezia	
	Farmers	%	Farmers	%
1 - 2 years	37	16.5%	21	10.1%
3 - 4 years	97	43.3%	44	21.3%
5 - 6 years	29	12.9%	39	18.8%
7 - 8 years	8	3.6%	24	11.6%
9 - 10 years	15	6.7%	24	11.6%
11 - 15 years	19	8.5%	13	6.3%
16 - 25 years	12	5.4%	28	13.5%
> 25 years	7	3.1%	14	6.8%
Total	**224**	**100%**	**207**	**100%**
Average	**6.5**		**10.0**	
Median Years	**3**		**6**	

Whereas pigeon pea production was practically universal in both provinces, we do find a large difference when examining production volumes (Table 3). The average production per pigeon pea farmer in Zambezia (479 kg) is almost triple the equivalent figure in Nampula (176 kg). Production of a typical Zambezia farmer, the median, is 300 kg, which is almost 4 times the production of a typical pigeon pea farmer in Nampula (80 kg).

Not only do we observe significant differences between the two provinces, but also between the districts. Within Zambezia, average production per farmer is much higher in Milange (617 kg) than in Mocuba (292 kg). In Nampula, meanwhile, average production is particularly low in Monapo district, just below 100 kg per farmer. Thus, while pigeon pea is a relevant crop in all districts, produced by virtually all farmers, its actual importance in local economy and society may vary.

Table 3. Pigeon Pea Production, 2016/17

Percentage of Households Producing Within Indicated Range

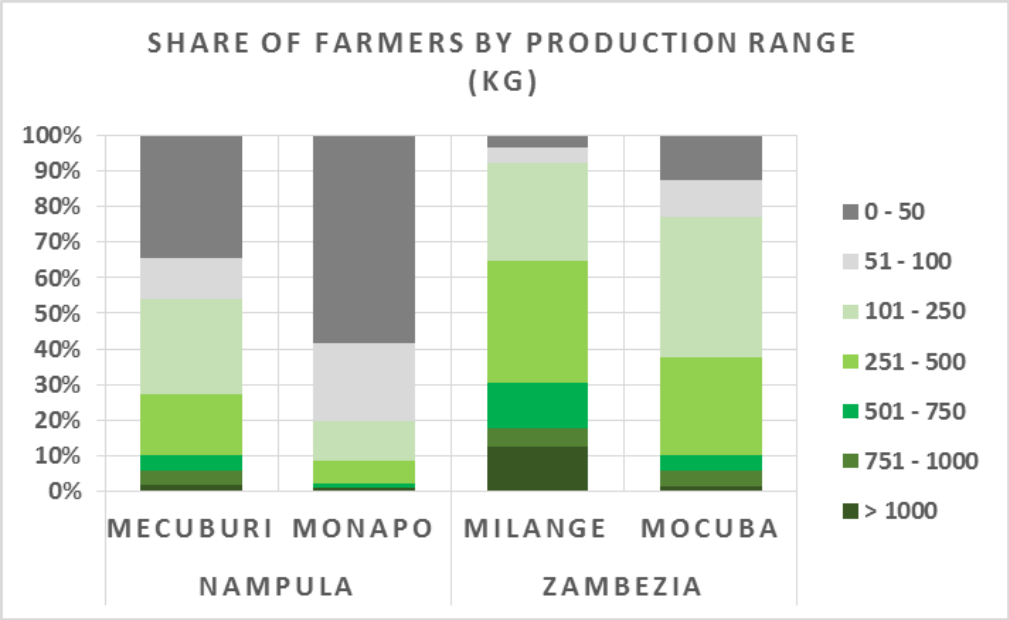
KG	Mecuburi	Monapo	Nampula	Milange	Mocuba	Zambezia
0 - 50	34%	58%	**45%**	3%	13%	**7%**
51 - 100	12%	22%	**16%**	4%	10%	**7%**
101 - 250	27%	11%	**20%**	28%	40%	**33%**
251 - 500	17%	6%	**13%**	34%	27%	**31%**
501 - 750	5%	1%	**3%**	13%	5%	**9%**
751 - 1000	4%	0%	**2%**	5%	5%	**5%**
> 1000	2%	1%	**1%**	13%	1%	**8%**
Total	100%	100%	**100%**	100%	100%	**100%**
Average (kg)	233	99	**176**	617	292	**479**
Median (kg)	150	50	**80**	350	245	**300**

The analysis of the share of pigeon pea farmers per volume range allows us to examine this difference in more detail (see Table 3 and visualized in Figure 1).

It reveals that 61% of Nampula farmers produced less than 100 kg, against 14% in Zambezia, and only 7% in the district of Milange. Meanwhile, the share of farmers that produced more than 500 kg was only 6% in Nampula, but 22% in Zambezia, and as high as 31% in Milange.

These significant differences highlight that pigeon pea occupies a much more important position in the economy of rural Zambezia than is the case in Nampula. This is consistent with observations made by Da Cruz and Oppewal (2017b), regarding the differential impacts of the pigeon pea price collapse in the two provinces.

Figure 1. Share of Farmers by Pigeon Pea Production Range, 2016/17

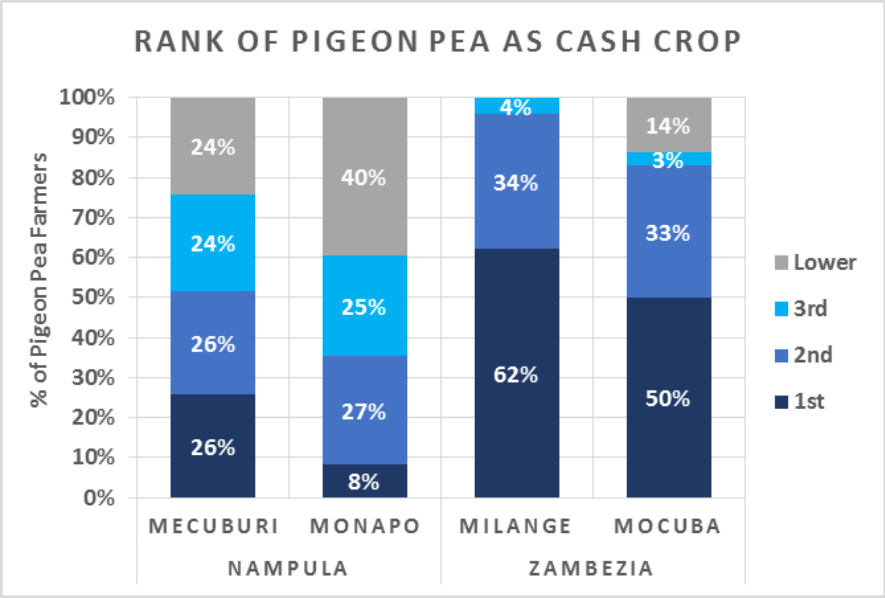


4. Food or Cash

Pigeon pea is highly nutritious and Mozambican farmers produce it both as a food crop and as a cash crop. Although consumption patterns differ significantly across districts, most Mozambican pigeon pea producers do not consume it on a frequent basis.

Even though many farmers have only started producing pigeon pea in the last decade, it has quickly been established as one of the most important cash crops, particularly in Zambezia (see Figure 2), where 90% of all pigeon pea farmers consider it amongst their two most important cash crops.

Figure 2. Importance of Pigeon Pea as a Cash Crop



In Milange, 62% indicate it is their single most important cash crop, which certainly justifies concerns over the local impact of the price collapse on the local economy. In Nampula, the importance of pigeon pea is lower than in Zambezia, yet still 44% indicate pigeon pea as belonging to their two most important cash crops.

Table 4 shows the proportion of pigeon pea farmers that also grew each of a range of other important cash crops in Central and Northern Mozambique. Firstly, it is important to note that 20% of pigeon pea farmers in Zambezia had not grown any of these other cash crops, making them highly dependent on pigeon pea sales for their cash income from farm operations. Although some of these farmers had selected the category of “other” cash crops, this referred mainly to sales of surplus maize or cassava production, which are predominantly produced for household consumption.

Nampula’s pigeon pea farmers appear to have a much more diversified farming portfolio. Only 6% did not grow any of the listed cash crops in addition to their pigeon pea, while

65% had at least two of them. Almost all pigeon pea farmers were also growing peanuts, while other important cash crops included vegetables, cashew, cotton and sesame. In Zambezia, by contrast, only 32% of pigeon pea farmers grew at least two of the other cash crops. The focus group discussions confirm the idea that Nampula has a more diversified agricultural sector. Asked about other important cash crops, sesame was the only one that was highlighted by at least half of the communities in Zambezia, while in Nampula this was the case for sesame, cotton and mung beans.

Before considering the implications of these findings on the impact of the pigeon pea price collapse, it is worth stressing that the numbers refer to what farmers had grown, and not to the fruit of their effort. For instance, Da Cruz and Oppewal (2017b) pointed out that a significant share of Zambezia pigeon pea farmers had also grown sesame, but that the harvest had been miserable due to pests. Sesame is a more sensitive crop than pigeon pea, and very few of the farmers in Zambezia have access to the required pesticides.

Secondly, it is important to note that Table 4 merely refers whether or not a farmer had planted these crops, and does not tell us about their relative importance vis-à-vis pigeon pea. For instance, a household confirming vegetable production may in fact only have a very small amount of vegetables available for sale.

Table 4. Other Cash Crops Produced by Pigeon Pea Farmers, 2016/17

Location	Sesame	Cashew	Cotton	Sunflower	Beans	Tobacco	Vegetables	Peanuts	0 other cash crops	1 other cash crop
Mecuburi	16%	16%	23%	0%	4%	1%	37%	91%	5%	31%
Monapo	41%	16%	16%	1%	2%	0%	42%	91%	7%	26%
Nampula	**26%**	**16%**	**20%**	**0%**	**3%**	**0%**	**39%**	**91%**	**6%**	**29%**
Milange	38%	0%	1%	4%	8%	3%	39%	27%	21%	50%
Mocuba	31%	2%	1%	2%	11%	0%	40%	59%	19%	44%
Zambezia	**35%**	**1%**	**1%**	**3%**	**10%**	**2%**	**39%**	**41%**	**20%**	**48%**

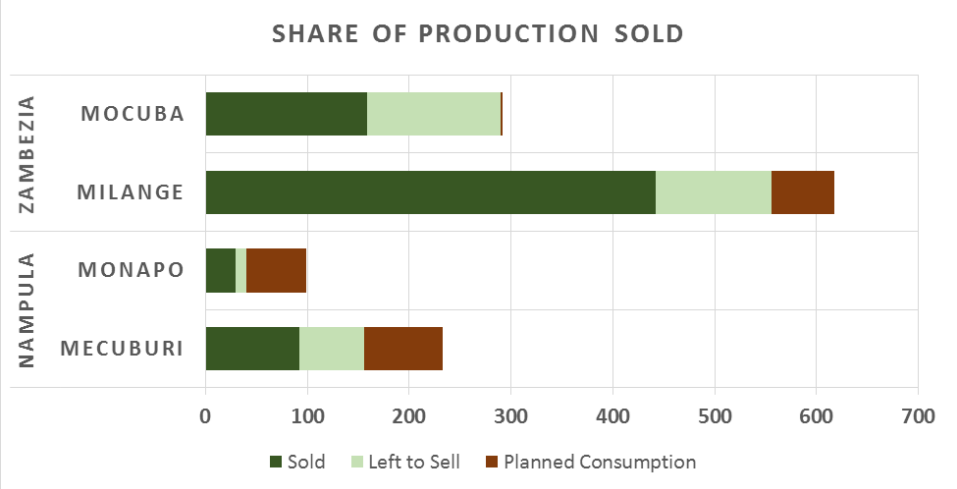
Table 5 confirms that, in both provinces, pigeon pea serves simultaneously as food and cash crop. By starting with total reported production and subtracting the volume actually sold as well as the volume “left to sell”, i.e. the part that farmers would have liked to sell but have not managed to, we get to an estimate of the quantity farmers would have liked to keep for consumption if market conditions had been favorable. In Zambezia, farmers would have kept, on average, just under 40 kg for consumption, corresponding to 8% of production, while farmers in Nampula would have kept almost 70 kg (40% of their production). These figures are in line with estimates that Mozambican farmers keep approximately 1 bag (50 kg) per household for consumption purposes (Da Cruz and Oppewal 2017a).

Table 5. Pigeon Pea Production and Sales per Household, 2016/17

Place	Production (KG)	Sold		Left to Sell		Planned to Consume	
		KG	%	KG	%	KG	%
Mecuburi	232.8	91.9	39%	63.8	27%	77.1	33%
Monapo	99.4	29.3	29%	11.0	11%	59.1	59%
Nampula	**175.6**	**65.0**	**37%**	**41.2**	**23%**	**69.4**	**40%**
Milange	617.3	441.9	72%	113.8	18%	61.6	10%
Mocuba	291.8	159.2	55%	130.7	45%	1.9	1%
Zambezia	**478.9**	**321.7**	**67%**	**121.0**	**25%**	**36.2**	**8%**
Average across all 4 districts	**321.3**	**188.3**	**59%**	**79.5**	**25%**	**53.4**	**17%**

Across all farmers, 83% of production would have been destined for commercialization. However, given the export market disturbance, farmers only managed to sell 59%. As a result, farmers are stuck with large volumes of pigeon pea that they would have liked to sell, corresponding to the light green patches in Figure 3. As a percentage of total production, these volumes vary from 11% in Monapo to 45% in Mocuba. In absolute terms, the involuntarily unsold volumes are particularly high in Zambezia province, with an average of 121 kg per farmer (Table 5). Note that this means that the total volume available for consumption increased from a desired amount of 36 kg per household to a total of more than 155 kg, an increase of more than 300%. Focus group discussion in Zambezia confirmed reports that some farmers had preferred to burn the pigeon pea in the fields, unharvested.

Figure 3. Destination of 2016/17 Pigeon Pea Harvest (in Kilograms)



The much higher pigeon pea availability, particularly in Zambezia, could partially explain the results presented in Table 6, showing that 57% of pigeon pea producers in that province considered it as the most important food crop. If prices had been attractive, and farmers would have sold most of their crop, keeping less than 50 kg for consumption, it is unlikely that so many farmers would have ranked it as their most important food crop.

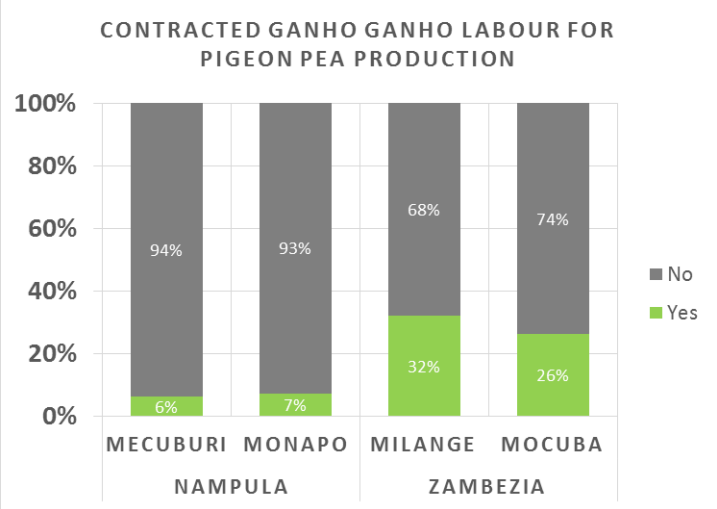
Due to the price collapse, farmers are now consuming much more pigeon pea than they had planned, and much more than in previous years. More than 60% of pigeon pea farmers in Zambezia indicated that they had consumed pigeon pea at least three times during the last week. Results from the focus group discussions suggest that the high level of pigeon pea consumption, particularly in Zambezia, is an anomaly, very much linked to the price collapse, because it was stressed that most members of the community do not traditionally consume large amounts of pigeon pea, and that they produce the crop primarily as a source of financial revenue. In Nampula, meanwhile, only 6% had consumed pigeon at least three times in the preceding week, which may be explained by the fact that so many farmers in Nampula produced a very low amount (Figure 1), possibly having already finished their stock by the time the survey was carried out.

Table 6. Pigeon Pea: Rank as Food Crop

Place	1st	2nd	3rd	lower
Mecuburi	9%	17%	38%	37%
Monapo	1%	7%	28%	64%
Nampula	**5%**	**13%**	**33%**	**48%**
Milange	64%	31%	3%	2%
Mocuba	47%	32%	7%	15%
Zambezia	**57%**	**31%**	**5%**	**7%**

The difference between Nampula and Zambezia in terms of the share and volume of pigeon pea production destined for sale is also apparent in the use of contracted labour during its cultivation. Farmers generally work on their own piece of land, but in Central and Northern Mozambique it is common for the slightly larger and richer farmers to contract smaller farmers to help work their land at critical stages of the productive process. This practice is called *ganho-ganho* (win-win), and is paid for on a daily basis, in cash or food. Hiring additional labour to increase production points at commercial objectives, with the aim of selling at least a part of the harvest. Figure 4 shows that 30% of Zambezia pigeon pea farmers hired in *ganho-ganho* labour in pigeon pea production, while only 7% did so in Nampula. Within Zambezia, larger farmers were indeed more likely to have contracted *ganho-ganho*.

Figure 4. Use of *Ganho-Ganho* Labour in Pigeon Pea Production



As expected, farmers experienced serious difficulties in trying to sell their 2017 harvest. Almost 60% of pigeon pea farmers in Nampula, and more than 85% of those in Zambezia claim they had difficulties due to extremely low prices or the complete absence of buyers.

Table 7. Price at Which Pigeon Pea Was Sold, 2017

Place	Average (MZN)	Median (MZN)
Mecuburi	12.8	10
Monapo	16.9	15
Nampula	**14.6**	**11**
Milange	5.7	5
Mocuba	4.7	5
Zambezia	**5.3**	**5**
Total	**10.1**	**5**

Table 7 confirms that the export disruption led to a price collapse. Whereas the price to the farmer had been close to MZN 50/kg in 2017, the average selling price in Zambezia in 2018 was only MZN 5.3/kg. In Nampula province, and particularly in Monapo district, very few farmers actually sold significant quantities to traders. Most of the selling they did engage in concerned the sale of small quantities of fresh pigeon peas in local markets, fetching a higher price per kilogram. While this could explain part of the difference between prices observed across districts, the difference is of such magnitude (average of MZN 4.7 in Mocuba versus MZN 16.9 in Monapo) that it calls for improved price monitoring and market information systems.

Such efforts are particularly important considering that, currently, very few farmers have access to any external information at all regarding prices. Almost 60% of farmers refer that the trader they sell their pigeon peas to is their main source of price information (Table 8).

Table 8. Sources of Price Information

Place	Neighbours	Company	Trader / Buyer	Radio	Phone	SDAE / Extension Worker	Other
Mecuburi	38%	0%	53%	2%	0%	1%	5%
Monapo	43%	0%	55%	0%	0%	0%	2%
Nampula	**40%**	**0%**	**54%**	**1%**	**0%**	**0%**	**4%**
Milange	2%	0%	70%	0%	0%	0%	29%
Mocuba	1%	2%	53%	6%	0%	1%	36%
Zambezia	**1%**	**1%**	**63%**	**2%**	**0%**	**0%**	**32%**
Total	**22%**	**0%**	**58%**	**2%**	**0%**	**0%**	**17%**

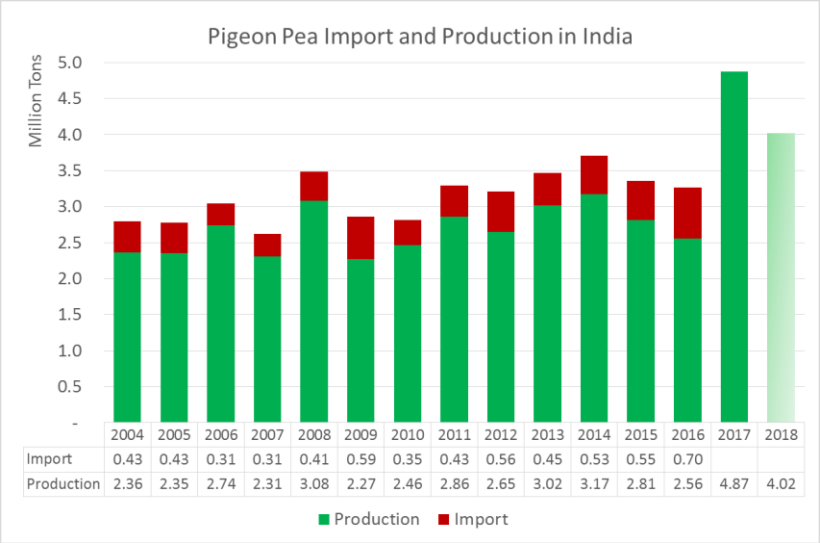
In Nampula, a further 40% get price information from their neighbours. While 32% of farmers in Zambezia reported "other" as a source of price information, it is most likely that this also refers to neighbours or the actual traders.[3] Access to formal external sources of price information is negligible, as 0% get such information via phone or from the local district office or extension worker, while only 2% receive it through radio broadcasts.

The discussion above relates to price information during the pigeon pea selling period. Another relevant dimension of market information, however, is having access to information of global market trends, to form expectations on price dynamics in the future, which could be used as a basis to decide on pigeon pea production at the start of a new agricultural season. The events of 2016 and 2017 showed that very few individuals or organizations in Mozambique have access to this type of market intelligence for the case of pigeon pea (Da Cruz and Oppewal 2017a). In theory, the price collapse could have been anticipated as soon as the first official predictions of an Indian bumper harvest were published by the Indian Ministry of Agriculture in September 2016, which is three months before Mozambican farmers started planting.

For 2018, a similar scenario could be in the making, as the first official estimates of the Indian harvest point at another bumper crop. Although total production will be lower than the 2017 record of 4.8 million tons, the estimated harvest of 4 million tons would still be well above domestic consumption (see Figure 5). Considering that there are still large stocks left over from 2017, it is not likely that prices will recover on the Indian market. Even if current prices of INR 35-40/kg would justify a farmgate price in Mozambique of at least MZN 12/kg, actual prices in Mozambique will depend on India's trade policy decisions. If the import quota is prolonged, farmgate prices in Mozambique could still remain below that level.

[3] According to data collection teams in Zambezia there could have been some confusion regarding the question. It is clear, however, that this "other" does not refer to any external information sources.

Figure 5. Indian Pigeon Pea Production and Import



Source: da Cruz and Oppewal (2017a)

Considering that pigeon pea is, at least in part, a cash crop, one may have expected that Mozambican farmers would have abandoned pigeon pea following the 2017 price collapse, or at least dramatically reduced the area dedicated to this crop.

However, Table 9 shows that this is not the case across the board. In Nampula, 9% of 2016/17 pigeon pea farmers claimed to be no longer producing it, while another 48% reduced the area. In Zambezia, by contrast, where pigeon pea is more important as a cash crop, farmers show no sign of abandoning pigeon pea, as 44% actually increased their pigeon pea area, while another 25% maintain the same area as the previous season. We do not have enough information to say confidently why many farmers in Zambezia are continuing with, or even ramping up, pigeon pea production. Some farmers reported, however, that they expect pigeon pea prices to recover to the high levels of 2015 and 2016. If they had access to market intelligence pointing at the likelihood of continuing low prices in 2018, given Indian market conditions, some may have come to a different decision.

Table 9. Pigeon Pea Cultivation 2017/18, compared to previous season

Location	Stopped Pigeon Pea	Still producing pigeon pea		
		Decreased Area	Same Area	Increased Area
Mecuburi	11%	52%	16%	20%
Monapo	7%	43%	21%	29%
Nampula	**9%**	**48%**	**18%**	**24%**
Milange	4%	20%	29%	46%
Mocuba	5%	36%	18%	41%
Zambezia	**4%**	**27%**	**25%**	**44%**
Total	**7%**	**38%**	**21%**	**34%**

5. Impact of 2017 Pigeon Pea Price Collapse

Loss of income

Based on the above, we would expect the impact of the pigeon pea price collapse to be more severe in Zambezia, because:

i. Prices were lower in Zambezia
ii. Farmers had fewer alternative cash crops, so the relative importance of pigeon pea was higher
iii. Farmers produced much more pigeon pea and had planned for a higher share of their production to be sold.
iv. Farmers had invested more in pigeon pea production, for instance through hiring *ganho-ganho* labour.

In fact, based on the information of Table 5 and Table 7, we can make a rough estimate of the average loss in terms of expected income per household (see Table 10). For the purpose of this exercise, we assume that farmers expected a price of around MZN 30/kg. Comparing their planned sales at this price with actual sales and prices, we observe large differences between the four districts. In Milange, the average household received MZN 14,000 less from the pigeon pea crop than they would have expected, a significant amount in rural Mozambique. In Mocuba, the "lost" value is close to MZN 8,000 per household, while it is just under MZN 3,500 in Mecuburi and only MZN 713 in Monapo. Obviously this exercise is far from perfect. For example, the actual harvest could be different from their initial expectations of production. However, it is useful to provide a rough idea of "lost" income, compared to expectations, and thus of the magnitude of the adverse shock caused by the price collapse.

Table 10. Pigeon Pea Price Collapse and Reduction in Expected Income

Place	A	B	C	D	E	F	G	H
	Sold (KG)	Left to Sell (KG)	Planned to Sell (KG) (A + B)	Expected Price (MZN)	Expected Revenue (MZN) (C x D)	Average Price (MZN)	Actual Revenue (MZN) (A x F)	Difference (MZN) (E - G)
Mecuburi	91.9	63.8	155.7	30.0	4,670	12.8	1,180	3,491
Monapo	29.3	11.0	40.3	30.0	1,208	16.9	495	713
Nampula	**65.0**	**41.2**	**106.2**	**30.0**	**3,187**	**14.6**	**948**	**2,238**
Milange	441.9	113.8	555.7	30.0	16,672	5.7	2,518	14,154
Mocuba	159.2	130.7	289.9	30.0	8,696	4.7	754	7,942
Zambezia	**321.7**	**121.0**	**442.7**	**30.0**	**13,281**	**5.3**	**1,702**	**11,579**

Impact on household food security

The survey aimed at assessing the effect of the price collapse on the purchasing power of farmers' households relying on pigeon pea production, with a focus on food consumption. WFP asked to the same 447 interviewees a set of questions relating to food consumption and coping strategies to provide a deeper understanding of the impact of the pigeon pea price collapse.

The **Food Consumption Score (FCS)** is the standard WFP proxy indicator of household's access to food. It is a composite score measuring dietary diversity, frequency of consumption and relative nutritional importance of different food groups. Calculation of FCS takes into account the number of food groups consumed by a household over a period of seven days (dietary diversity); the number of days a particular food group is consumed (food frequency); and the relative nutritional importance of different food groups. The FCS is used to classify households into three groups: poor, borderline or acceptable food consumption. These food consumption groups aggregate households with similar dietary patterns - in terms of frequency of consumption and diversity - and access to food.

- Poor food consumption: Households that are not consuming staples and vegetables every day and never or very seldom consume protein-rich food such as meat and dairy.
- Borderline food consumption: Households that are consuming staples and vegetables every day, accompanied by oil and pulses a few times a week.
- Acceptable food consumption: Households that are consuming staples and vegetables every day, frequently accompanied by oil and pulses, and occasionally meat, fish and dairy.

The FCS analysis conducted for this report suggests that the majority of households in both provinces had an acceptable food consumption. This is perhaps not surprising, given that favorable climatic conditions translated into high levels of food production. The highest proportion of households with Borderline food consumption stood at 27 percent in Mecuburi district in Nampula province and these were women-headed households. Overall, more women headed households had Borderline food consumption than male-headed households (see **Figure 6**).

Figure 6. Food Consumption Score

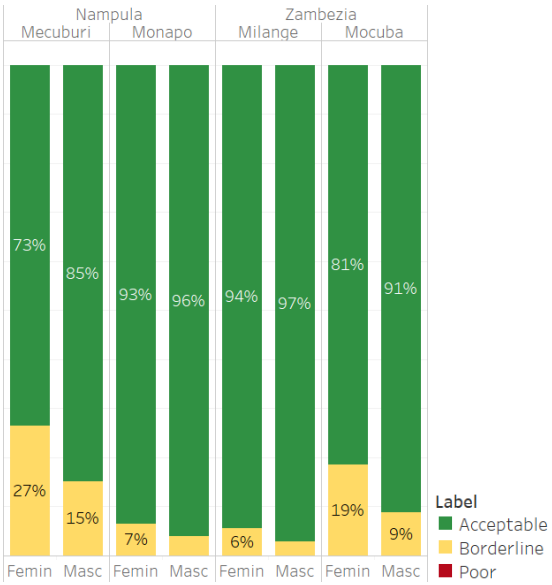
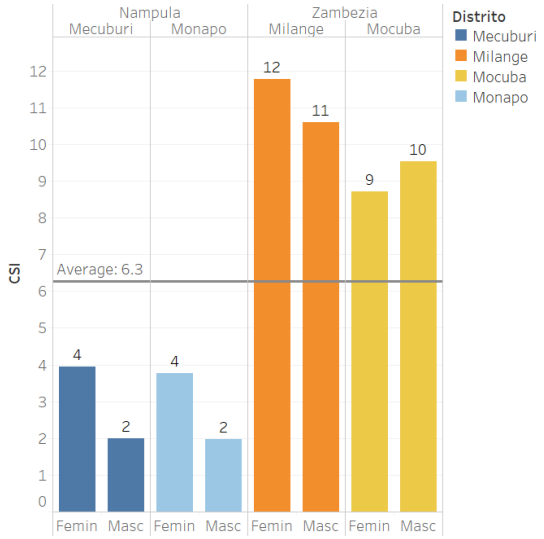


Figure 7. Coping Strategy Index



The **food-based Coping Strategy Index (CSI)** is used to assess the level of stress faced by a household (stress is intended here as the level of hardship faced by a given household translating into specific behavioral responses when confronted with food shortages). The CSI is measured by combining the frequency and severity of the food consumption based strategies households are engaging in.

The use of food-based coping strategies was assessed using a set of five questions, whereby the household was asked whether, because of the pigeon pea price collapse, they had had to use the following coping mechanisms in the last 7 days: (i) eat less expensive and less preferred food, (ii) borrow food or ask for help, (iii) reduce the number of meals, (iv) limit portion sizes, and (v) reduce adult food consumption so that there is more for the children.

Pigeon pea farming households in Zambezia are using these coping mechanisms much more extensively than those in Nampula (Figure 8). In particular, in Zambezia more than 70% resort to less expensive, but less preferred, food. A significant part of this is likely on account of additional pigeon pea consumption, because there is no money to buy other types of food that are more preferred.

Figure 8. Food-Based Coping Strategies Used in Response to Pigeon Pea Price Collapse

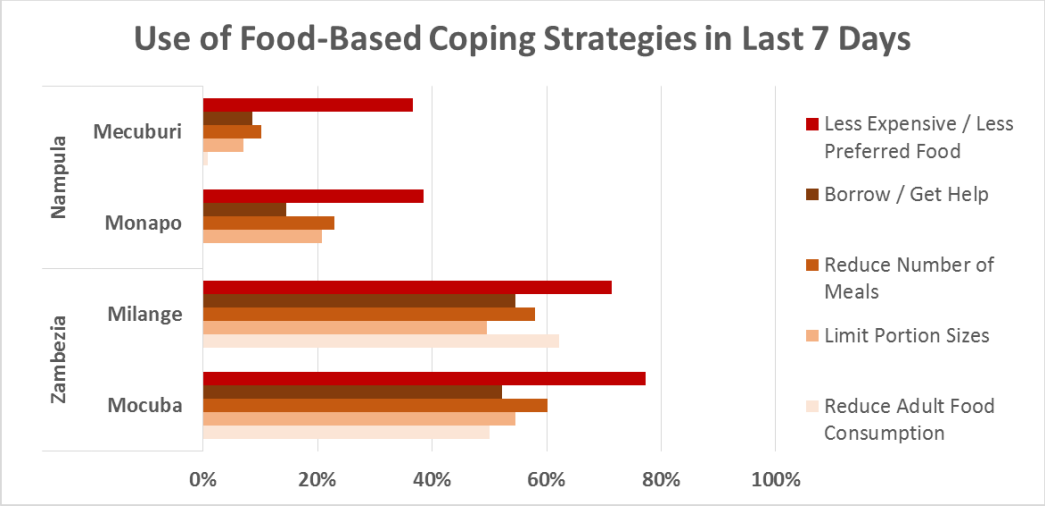
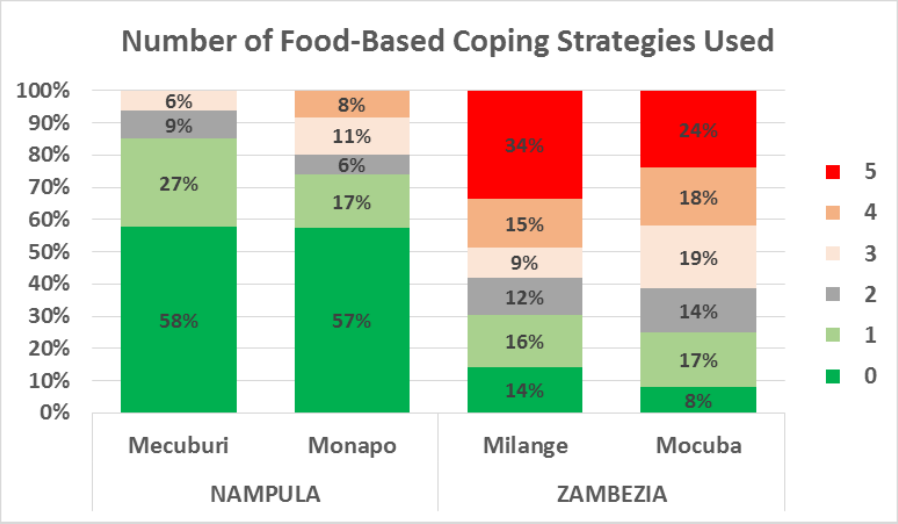


Figure 9 is even more revealing of the stark difference between Nampula and Zambezia, by showing the combined usage of several of these coping mechanisms. While less than 25% of households in Nampula used more than one of these mechanisms in the week before the interview, this was the case for more than 70% of households in Zambezia. Furthermore, close to 30% of households in Zambezia used all five food-based coping strategies, while 0% of households in Nampula used all five.

Figure 9. Number of Food-Based Coping Strategies Used in Last 7 Days



The **livelihoods-based coping strategies** module is used to better understand longer-term coping capacity of households. The module has been adapted to suit

Mozambique's context and poor people's living conditions. Surveyed households were asked whether they resorted, in the last 30 days, to the use of a set of "livelihood-based coping strategies", most of which are not directly food-related (see Table 10). Each strategy is associated with a level of severity (none, stress, crisis or emergency), which is country specific.

- *Stress strategies* indicate a reduced ability to deal with future shocks as the result of a current reduction in resources or increase in debts.
- *Crisis strategies* are often associated with the direct reduction of future productivity.
- *Emergency strategies* also affect future productivity, but are more difficult to reverse or more dramatic in nature than crisis strategies.

Generally, the use of these coping mechanisms is much more widespread in Zambezia, where 88% of pigeon pea farming households resorted to at least one of them, than in Nampula, where the equivalent figure is 60%. Furthermore, a Zambezia pigeon pea farming household employed an average of 3.3 of these mechanisms in the preceding month, against 1 in Nampula.

Crucially, the type of mechanisms employed in Nampula appear to be less intense, with a heavy focus on "spending savings", which is the mildest of the coping mechanisms that were examined. When we take out this particular mechanism, the percentage of Nampula pigeon pea farmers that used at least one other mechanism decreases to 43%, while the figure in Zambezia remains high, at 84% (Table 10).

Taking a closer look at Zambezia, a couple of figures stand out. Firstly, 48% of pigeon pea farmers have been reducing non-food spending, while 52% have reduced adult food consumption. Figure 8 had already shown that 74% of Zambezia farmers have resorted to less preferred food. Although not defined in the question, we know that this refers, in many cases, to pigeon pea consumption, meaning that households have been buying less of other foodstuffs. Putting all these numbers together it becomes plausible that total spending on both food and non-food items has reduced to such an extent that it would have implications for the wider economy in these districts. This is in line with observations made by Da Cruz and Oppewal (2017b) that shop-owners in the district capitals have been directly affected, as they have fewer customers and their turnover has reduced.

Another mechanism that has been widely used in Zambezia is the reduced hiring of *ganho ganho* labour. Considering that this constitutes a crucial component of rural labour markets, the fact that 38% of pigeon pea farmers (corresponding to 36% of all farmers) are reducing it, is a significant development with likely spillover effects on the rural economy.

Other indicators of the level of distress faced by farming households in Zambezia are the share of households that have been selling female animals (46%), selling large animals (29%), selling productive assets (7%), and selling household goods (14%).

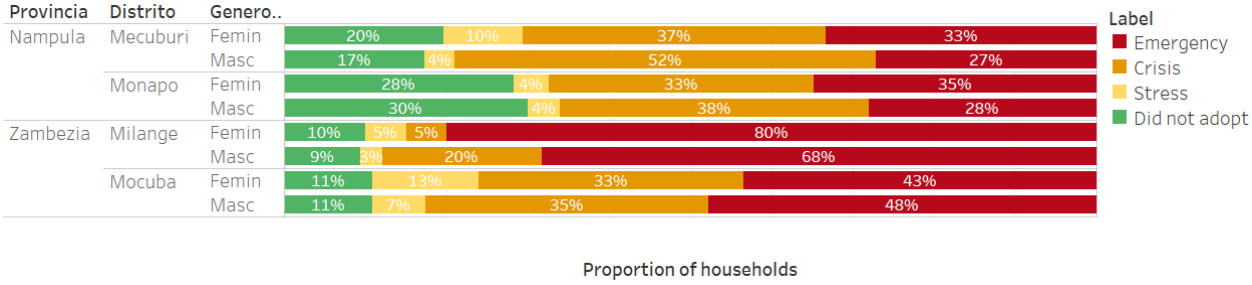
Finally, a worrying figure is that 6% of pigeon pea farmers in Zambezia indicate that the price collapse has led them to take their children from school. In focus group discussions, all communities interviewed in Mocuba indicated that the price decline has affected the schooling of their children in one way or the other.

Table 10. Livelihood-Based Coping Strategies Used in Response to Pigeon Pea Price Collapse in Last 30 Days

Coping Mechanism	Nampula		Nampula	Zambezia		Zambezia	TOTAL
	Mecuburi	Monapo		Milange	Mocuba		
Spend Savings	26%	26%	**26%**	38%	42%	**40%**	32%
Reduce Non-Food Spending	21%	10%	**17%**	51%	44%	**48%**	32%
Sell Female Animals	21%	3%	**13%**	58%	30%	**46%**	29%
Reduce Adult Food Consumption	1%	0%	**0%**	53%	51%	**52%**	25%
Reduce Ganho Ganho	9%	13%	**11%**	39%	38%	**38%**	24%
Borrow Money	14%	4%	**10%**	26%	22%	**24%**	17%
Sell large animals	8%	2%	**5%**	40%	14%	**29%**	17%
Borrow Food	9%	4%	**7%**	19%	19%	**19%**	13%
Sell HH goods	5%	1%	**3%**	20%	6%	**14%**	8%
Sell productive assets	3%	0%	**2%**	9%	5%	**7%**	4%
Take Children From School	2%	0%	**1%**	9%	2%	**6%**	4%
Rent/Sell Land	3%	1%	**2%**	4%	3%	**4%**	3%
Rent/Sell House	2%	1%	**2%**	3%	2%	**2%**	2%
Begging	0%	0%	**0%**	3%	0%	**1%**	1%
Average Number of Strategies	1.2	0.7	**1.0**	3.7	2.8	**3.3**	2.1
At least 1 strategy	66%	52%	**60%**	88%	89%	**88%**	74%
At least 1 strategy, Excluding "Spend Savings"	52%	30%	**43%**	87%	81%	**84%**	63%

Figure 10 uses the responses on the livelihood-based coping strategies to construct an index, showing that a high share of households in Zambezia, particularly in Milange District, find themselves in a situation that could be labeled as “emergency”.

Figure 10. Livelihood-Based Coping Strategies



Certain caveats exist in relation to the interpretation of the results presented in this chapter, primarily the question to what extent the use of the negative coping strategies is actually linked to the pigeon pea price collapse, as other factors could be involved. However, we have good reason to believe that a significant part of the differences

observed between the two provinces can indeed be linked to pigeon pea dynamics. Firstly, respondents were asked about their use of coping strategies as a result of the scenario of low pigeon pea prices. Secondly, looking at the four districts, the use of coping mechanisms is strongly correlated with the absolute value of the estimated loss of income that can be directly attributed to the pigeon pea price collapse (Table 10). Milange, the district with the highest loss estimate, also has the highest use of coping mechanisms. The order of the districts is identical on both indicators, with Milange followed by Mocuba, Mecuburi and finally Monapo. It is worth stressing that the estimates of “lost” income for the Zambezia Districts (MZN 14,154 for Milange and MZN 7,942 for Mocuba) are very high, when we consider that, for the Fourth National Poverty Assessment, the non-food poverty line for Rural Zambezia was set at MZN 4.5 per person per day (MEF 2016). Adjusted for inflation, this would be MZN 5.5 per person per day in 2017, which means that the “lost” income per household in Milange could have guaranteed basic non-food spending for a family of 7 for an entire year.

Comparing food security indicators with past assessments is made problematic by the fact that data were collected in different periods of time. Bearing this caveat in mind, it is possible to refer to the latest national food security assessment undertaken by SETSAN in June 2017. The present survey found that about 2/3 of households in these districts have resorted to some type of extreme negative coping strategies involving depletion of livelihood assets,. When we compare livelihood-based CSI it is evident that indicators have worsened in Zambezia. In particular, in the district of Milange, 80 percent of households headed by women (and 68 per cent of households headed by men) were in emergency phase, significantly higher than the average for Zambezia province in June 2017 (51 per cent).

6. Conclusion and Recommendations

The key findings of the household survey and analysis are:

- Pigeon pea is an important crop in Zambezia and Nampula, produced by approximately 97% of farmers in the districts of Milange, Mocuba, Mecuburi and Monapo.
- The vast majority of farmers have started producing pigeon pea during the last decade.
- Average production per household is much higher in Zambezia, at 469 kg per household, than in Nampula (176 kg). More than 60% of pigeon pea farmers in Nampula produced less than 100 kg, while only 14% of farmers in Zambezia produced below this level. The share of farmers that produced more than 500 kg was 22% in Zambezia, but only 6% in Nampula.
- Pigeon pea is an important cash crop for farmers in Zambezia, where 90% rank pigeon pea amongst their two most important cash crops. The importance as a cash crop is much less visible in Nampula, given that farmers there produce lower volumes and keep more for consumption than farmers in Zambezia.
- The agricultural landscape in Nampula is more diversified than in Zambezia, both at the level of individual farmers and at the level of communities. Whereas the only other significant cash crop in Zambezia appears to be sesame, Nampula farming communities also receive income from cotton, cashew, mung beans, and others.
- The price collapse was more severe in Zambezia, where farmers received an average of MZN 5.3/kg for their pigeon peas.
- Pigeon pea consumption has increased as a result of the price shock, particularly in Zambezia. Whereas farmers sold most of their pigeon pea harvest in previous years, and had planned to do the same this year, the extremely low prices and lack of buyers has driven them to increase consumption.
- Very few farmers have access to external and neutral information on pigeon pea prices, whether through phone, radio or informed individuals in private sector or local government. Instead, they simply hear the price from the trader who comes to buy their crop. Meanwhile, the difference between prices reported in the various districts is larger than would be justified on the basis of distance.
- The average reduction in income from pigeon pea per household, compared to expected income, is very high in Zambezia, at more than MZN 14,000 in Milange and almost MZN 8,000 in Mocuba.
- The Food Consumption Score suggests that the majority of households in both provinces had an acceptable food consumption.
- About 2/3 of households in the two provinces have resorted to some type of negative coping strategies involving depletion of livelihood assets. The districts of Milange and Mocuba in Zambezia have the highest use of both food-based and

livelihood-based coping strategies. The situation seems particularly worrying in Milange where 80 percent of households headed by women (and 68 per cent of households headed by men) adopted ‘emergency’ coping strategies.

Recommendations

- Pigeon pea plays a very important role in rural Zambezia and Nampula, given that almost all farmers produce it. This calls for increased attention to pigeon pea, by all stakeholders, and on a systematic basis. Pigeon pea should be attributed its own category in statistical data, instead of being included in a general “beans” category. Furthermore, pigeon pea should be included in price information systems.
- Farmers in rural Zambezia took a significant hit with the pigeon pea price collapse and their actual income in 2017 was much lower than what they had expected, or than what they had earned in recent years. Furthermore, given the number of severely affected farmers in these districts, it is plausible that there were spillover effects on the local economy. A coordinated effort should be launched to promote diversification to other crops in the worst affected districts, to make the farmers and local economies in general, more resilient to the type of adverse market shock that was verified in 2017. Based on experiences in other parts of the country, the sesame value chain could be strengthened by supporting access to essential inputs. Furthermore, promotion of mung bean, which is almost absent in large parts of Zambezia, could be a low-hanging fruit. It has many similarities to pigeon pea, but has a more diversified international market. Significant mung bean production already exists in Nampula.
- Despite the market shock, pigeon pea is in Mozambique to stay, as most farmers do not show signs of abandoning it. In this context, it is crucial to reduce dependence on the volatile international (or Indian) market, and avoid the type of 2017 price collapse in the future. Domestic consumption of pigeon pea, a highly nutritious legume, should be stimulated, through awareness creation among farming communities in Zambezia, and its inclusion in school-feeding programs.

Bibliography

Da Cruz and Oppewal (2017a). “Análise da Cadeia de Valor de Feijão Bóer em Moçambique: Políticas Públicas e Plano de Acção”. International Growth Centre (IGC) and Ministry of Agriculture and Food Security of Mozambique.

Da Cruz and Oppewal (2017b). “A Socio-Economic Crisis in Rural Mozambique”. International Growth Centre (IGC) Blog Post. Available at: https://www.theigc.org/blog/socio-economic-crisis-rural-mozambique/

MEF (2016). “Pobreza e Bem-Estar em Moçambique: Quarta Avaliação Nacional. Inquérito ao Orçamento Familiar – IOF 2014/15”. Ministério da Economia e Finanças, Maputo, Mozambique.

The International Growth Centre (IGC) aims to promote sustainable growth in developing countries by providing demand-led policy advice based on frontier research.

Find out more about
our work on our website
www.theigc.org

For media or communications
enquiries, please contact
mail@theigc.org

Subscribe to our newsletter
and topic updates
www.theigc.org/newsletter

Follow us on Twitter
@the_igc

Contact us
International Growth Centre,
London School of Economic
and Political Science,
Houghton Street,
London WC2A 2AE

IGC
International
Growth Centre

DIRECTED BY
LSE
UNIVERSITY OF OXFORD

FUNDED BY
UKaid
from the British people

Designed by soapbox.co.uk