When the remedy is worse than the disease: Adjusting survey income data for price differentials, with special reference to Mozambique

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ABSTRACT

In using survey data for money metric analysis of poverty and well-being, it is customary to adjust either the data or the poverty line for spatial prices differentials where data exist to make such adjustment. In developing countries where recorded price differentials between regions or provinces are large, using the remedy of adjusting for price differentials may sometimes lead to very wrong conclusions about the spatial distribution of poverty. This may have severe consequences for policy and may be detrimental to the poor. The paper deals with a specific situation, that of Mozambique, where large price differentials are said to exist between the capital (Maputo City) on the one hand, and the rest of the country. Official data that adjust for this may heavily over-estimate poverty in Maputo City, with consequences for the targeting of poverty. We use an asset index based on Multiple Correspondence Analysis (MCA) to show that the spatial poverty profile derived from the price-adjusted income data exaggerates poverty in Maputo City, and undertake further empirical analysis to show that not adjusting for the estimated spatial price differentials may have given more reliable estimates of well-being, judging by asset holdings.

Keywords: Mozambique, poverty, prices differentials, multiple correspondence analysis
JEL codes: I32

1. Introduction

During the years 2002-2003, the Mozambican *Instituto Nacional de Estatística* (INE) performed the second nationally representative household sample survey on poverty and well-being. Employing the conventional Cost of Basic Needs (CBN) methodology to construct region-specific poverty lines, a group of researchers from the National Directorate of Planning and Budget, the Ministry of Planning and Finance, the Economic Research Bureau, the International Food Policy Research Institute, and Purdue University (2004), hereafter, DNPO et al. (2004), concluded that around 54% of the Mozambican population were below the poverty threshold. Further, and somewhat surprisingly, they argued that Maputo City experienced higher poverty levels than most of the provinces located in the Central and Northern parts of the country.

Ravallion & Bidani (1994) discuss two criteria for setting poverty lines that may be at odds with one another. They argue that when the aim is to inform policy, classifying a household as poor should not depend (say) on the region where that household is living. In other words, if two households located in different provinces are deemed to have exactly the same standard of living, they should be both either poor or non-poor. Otherwise, the poverty profile will be inconsistent. "Consistency requires that the poverty line be fixed in terms of the level of living implied" (Ravallion & Bidani, 1994, p. 76). Another desirable feature for setting poverty lines is that the basic needs bundle should be specific to local perceptions of what constitutes poverty in each group. However, as these authors also argue, too much insistence on respecting the latter criterion – specificity – in setting poverty lines might result in absurd poverty profiles, with implications for policy targeting (Ravallion & Bidani, 1994, p. 77).

Employing the CBN methodology ensures that spatial differences in prices of the goods composing the basic needs bundle are accounted for. It also allows for the fact that households may substitute away from relatively expensive goods to cheaper ones, thus making the basic needs bundle specific to each region. In fact, this method is considered best practice in the field. For instance, Ravallion (1992, p. 74) considers that this is the most common approach used in developing countries. Thus this appears an appropriate method to compare poverty across space and time. Nevertheless, this paper argues that adjusting for local tastes and spatial prices differentials in this manner has in 2003

resulted in an inappropriate poverty profile – judging by asset holdings, housing characteristics and household access to public services – that overstates poverty in Maputo City, notably when compared to those provinces located in the Central and Northern regions of Mozambique.

What follows in the next section is a brief discussion on adjusting poverty lines for differentials across regions and its implication for the measurement of poverty. Then the data used are described in the third section. Section 4 presents money metric (consumption per capita) poverty results using DNPO et al. (2004)'s poverty lines, and the following part explores simple tabulations of some variables of interest for the study. Section 6 investigates the money metric poverty lines used. This is followed by the analysis of poverty making use of a wealth index, in the seventh section. The last section concludes.

Computing the wealth index required information on asset ownership, household access to public services and housing characteristics. Multiple Correspondence Analysis (MCA) is the method used to aggregate the information. This method explores the relationships within a set of categorical variables.

The consumption aggregate is composed of food and non-food items. The food component includes food purchases, home-produced food items, and in-kind food receipts. The non-food consumption expenditures include, among other things, education expenses, imputed rents for owner-occupied housing, and imputed use-value of services derived from owning durable goods.

To arrive at money metric poverty results similar to those of DNPO et al. (2004) this study uses their taste-adjusted and price-adjusted CBN poverty lines and then reproduces their results. A similar national poverty rate is found (54.36%) and roughly also the same provincial poverty ranking. To generate wealth index poverty estimates that are comparable, this study sets the poverty line for the asset index to also be at the 54.36^{th} percentile.

2. Price Adjustment and the Measurement of Poverty

In using survey data for money metric analysis of poverty and well-being, it is customary to adjust for spatial prices differentials where data exist to make such adjustment. In

some studies the living standards indicator is adjusted, while in other cases, the poverty line is adjusted.

In developing countries, consumption expenditure proves to be a better indicator of living standards than income. Surveys at the household level ask detailed questions on type of goods consumed over a certain period of time, their value, quantity consumed and (sometimes) the price paid. However, these surveys might take place at different times of the year, finding different prices for the same good (depending on the agricultural season, for instance, in the case of agricultural products). A typical household might pay double the price for the same quantity of (say) maize grain in the pre-harvest period when compared to the post-harvest season. Comparing the well-being of this household between the two periods may lead one to wrongly conclude that since nominal consumption expenditure on maize was higher before the harvest, the household was better off then. In cases like this, a temporal price index should be developed and used to adjust the nominal consumption expenditure, ensuring that the real well-being of the household is what is being compared.

In poverty analysis, one wishes to compare the welfare level of a person or household to a certain socially accepted minimum absolute consumption threshold. Those who cannot afford to consume above this threshold are defined as poor. Now the analyst is confronted with a double problem, not only to account for temporal differences in the survey period, but also that the poverty line set should reflect the same command over basic consumption needs across different households. The latter is a problem if households face different prices for a similar product depending on their spatial location. In developing countries lacking well developed markets and transportation infrastructure and where transaction costs are high, this often happens.

The Cost of Basic Needs (CBN) method is popular in setting money metric poverty lines (Ravallion, 1992, p. 74). It goes back to the seminal work of Rowntree (1901) who studied poverty in York, England. This method entails selecting a bundle of goods (both food and non-food components) consumed by the poor and thought to be appropriate for satisfying basic consumption needs. Once this bundle is selected, and assuming it is socially accepted, it should be costed to account for price differentials across spatial regions, notably when the poverty profile has a bearing on policy targeting (Ravallion & Bidani, 1994).

Costing the chosen bundle of goods is not straightforward and the method employed might have significant effects on the results found. Often the lack of market prices for some products forces the researcher to use the unit values derived by expenditures divided by the quantity consumed for each product, averaged across households. Due to measurement error and differential quality effects this might very well overstate poverty lines and therefore bias poverty measures upward, as shown by Gibson & Scott (2005, pp. 81-82) for the case of Papua New Guinea.

When commodity market prices are available, researchers often average over local prices, thus using regional prices to adjust for spatial prices differentials. Analysing the case of Rwanda, Muller (2008, p. 43) argues that measured welfare differences between households living in different locations might be greatly affected by inaccurate adjustments made to the data based on price differentials faced by these households. Using data for the rural parts of that country, the author shows that in the presence of price dispersion across households the deflation of consumption by local, rather than regional prices, produces more accurate poverty estimates.

The Food Energy Intake (FEI) method was developed in response to the difficulties surrounding the pricing of goods composing the bundle. It gets around the need for price data. The simplest version of this method calculates the mean consumption expenditure of a group of households whose caloric intake is in the neighbourhood of the stipulated food energy requirements. Modern versions are based on regression analysis. They estimate the empirical relationship between food energy intake and consumption expenditure per person. Inverting this relationship, it is then possible to determine the consumption expenditure at which a person meets a predetermined daily food energy intake to maintain his or her body metabolic rate at rest. While the metabolic rate varies across individuals, inter alia by age, gender, and activity levels, it is common practice to simply assume the required energy intake per person to be 2 100 calories per day, averaging across gender and age groups. The method automatically allows for non-food goods, therefore avoiding the methodological difficulty with computing the non-food component of the bundle, as will be seen in Section 6 below.

Nevertheless, it is quite common that non-food goods are relatively cheaper compared to food in urban than in rural areas. Consequently, at a given level of real expenditures, the effective demand for food goods (and therefore the demand for food energy intake) in urban areas might be lower than in rural areas. In turn, the necessary real

expenditure to attain the food energy caloric requirements will be higher in urban areas, thus suggesting higher poverty lines (and consequently higher poverty rates) there. Similarly, urban jobs normally require less physical activity than rural jobs, suggesting lower caloric requirements for urban residents. Urban individuals thus satisfy the 2 100 caloric "requirements" at a higher level of real expenditures. In sum, the regional difference in the poverty line might not depict the real difference in living standards, thus overestimating poverty in more affluent regions, such as urban ones (Ravallion & Bidani, 1994, pp. 80-81).

Indonesia's Central Bureau of Statistics, making use of the National Socio-economic Survey of 1990, employed the FEI method to set their poverty lines and to construct a poverty profile for this economy. Ravallion & Bidani (1994) used this example to show that the use of the FEI method to set poverty lines resulted in inconsistent poverty comparisons between regions. Their preferred method for setting poverty lines was a refinement of the CBN approach. They anchored the food component to the stipulated food energy requirement, and adjusted the bundle composition in accordance with observed diets of the poor. The non-food component was consistent with the non-food consumption behaviour of those who could just satisfy their basic food needs. By calibrating their method to yield an aggregate poverty rate similar to Indonesia's Central Bureau of Statistics, they found that the FEI method underestimated poverty in the rural areas relative to the urban, whereas Ravallion & Bidani (1994) themselves found the rural parts of Indonesia to be poorer than the urban. While their poverty results were robust to the choice of poverty line, this was not the case for the FEI method. They also found that the overall rank correlation coefficient between provincial poverty levels using the FEI and the CBN was only 0.15, not statistically different from zero, suggesting that the two methods are rank-orthogonal.

3. Data

This paper makes use of the second Mozambican expenditure household survey (IAF) performed during the period July 2002 to June 2003. The survey covered 44 083 individuals distributed over 8 700 households and was based on a stratified random sample designed to be representative at national and provincial level, and by type of area (urban versus rural). The data set contains detailed information on household consumption expenditures on food and non-food goods and on quantities acquired as

well. This information suffices for the construction of the consumption aggregate indicator. Additionally, the survey contains information on household asset ownership, housing characteristics and access to public services (such as electricity and water). This information is useful for the computation of an asset or wealth index. However, there are no questions on assets that are normally owned by rural households, such as donkey or oxcarts, ploughs, tractors or wheelbarrows. This fact might therefore bias the wealth index in favour of urban households, thus overstating poverty in rural areas relative to urban ones. Nevertheless, while some assets such as clocks or sewing machines might be of less importance in rural areas, owning a house with walls and roof of better materials and with access to electricity and water is a type of shelter that any household desires, independently of its location.

4. Money Metric Poverty Profile

This section presents poverty head-count ratios, at the national and provincial levels, making use of consumption per capita as the living standard indicator. The poverty lines used are those adjusted to account for taste and prices differentials across regions, in the manner DNPO et al. (2004) did. Table 4.1 illustrates the money metric poverty profile for Mozambique. At the national level, roughly 54% of the population is below the poverty threshold. At the provincial level, Inhambane in the Southern region is the poorest province, and Sofala in the Centre, the least poor. Further, Maputo City's poverty level is above the national average, with 58% of the population deemed poor. Oddly, Maputo City seems to be poorer than most of the provinces located in the North and Central parts of Mozambique[1] (excluding Cabo Delgado).

The same table illustrates mean consumption per capita at the national level and across provinces. By this measure, Maputo City is significantly better off than the rest of the country. This casts some doubts on the accuracy of the poverty profile that ranks Maputo City below the Northern and Central provinces. Furthermore, capturing food expenditure and prices is often subject to substantial measurement error. In addition, the sample of households interviewed (8 700) may be adequate at the national level to be representative of the 3.8 million households living in Mozambique in 2003, but provincial samples are fairly small. Thus there could be considerable error involved in

[1] The Southern region of Mozambique includes Maputo City, Maputo Province, Gaza and Inhambane. The Central region comprises Manica, Sofala, Tete and Zambézia provinces. Lastly, the Northern region consists of Niassa, Cabo Delgado and Nampula provinces.

measuring provincial poverty lines. Thus, the remaining of this paper builds a case against that poverty profile, by exposing issues that might come out even when best practice methods of poverty measurement are applied.

Table 4.1 – Money metric poverty profile in 2002/03.

	Poverty head-count ratio (P_0)	Sample size		Consumption per capita (MT)
		Individuals	Households	
National	54.36	44 083	8 700	14 482
Provinces				
Niassa	48.60	4 126	816	10 631
Cabo Delgado	62.22	2 848	738	10 877
Nampula	48.78	3 341	756	7 870
Zambézia	46.90	3 449	733	7 865
Tete	57.36	3 546	756	7 968
Manica	41.58	4 767	816	11 103
Sofala	35.66	4 449	795	12 969
Inhambane	83.54	3 507	753	6 701
Gaza	66.51	4 257	786	10 418
Maputo Province	74.62	4 182	828	16 499
Maputo City	57.55	5 611	923	32 060

5. Some Non-Money Metric Indicators

Section G of the questionnaire on general characteristics of the household contains some poverty indicators such as information on households that consumed a typical food item at least once during the seven days prior to the interview. Table 5.1 summarises this information.

A pattern that emerges from Table 5.1 is that Maputo City is, after Tete, one of the areas where the lowest proportion of households consume corn and cassava/sweet potato – foods that are generally considered inferior, that are cheaper, and that contain fewer calories. However, Maputo City has the highest percentage of households consuming the more expensive and calorie rich foods such as meat, milk and eggs. This suggests that households in Maputo City have a taste for caloric-richer foods and the means to acquire them.

Table 5.1 – Percentage of households that consumed the indicated food at least once during the seven days prior to the interview

Province	Meat	Seafood	Cooking oil	Rice	Corn	Cassava/sweet potato	Milk/milk products	Eggs
North								
Niassa								
Cabo Delgado	27.6	64.5	29.6	53.3	88.8	78.2	4.8	9.5
Nampula	27.3	73.6	35.7	33.3	56.8	76.5	3.2	14.7
Centre								
Zambézia	23.1	76.9	25.7	42.1	74.2	82.5	10.3	18.4
Tete	31.9	35.9	44.1	28.6	98.2	23.2	8.3	12.6
Manica	39.7	54.2	83.5	42.9	98.4	40.7	9.4	19.2
Sofala	35.5	76.0	67.8	69.2	89.8	60.0	15.6	20.8
South								
Inhambane	24.1	45.7	32.1	64.0	38.2	62.2	9.0	5.9
Gaza	21.3	49.1	59.5	82.1	73.2	49.1	16.8	9.0
Maputo Province	37.9	74.0	87.8	94.9	62.3	37.6	26.9	24.0
Maputo City	50.3	81.5	91.4	98.9	47.6	33.8	42.5	43.1

A similar pattern emerges with respect to access to education. Figure 5.1 clearly shows that Maputo City has the highest percentage of household heads with at least completed primary education, at 37%. Strikingly, the province with the second highest proportion of household heads that completed primary education – Maputo Province – is more than 10 percentage points below Maputo City. Further, Maputo City is 20 percentage points above the country average (17%), while most of the provinces are below it.

Figure 5.2 illustrates that, compared to the rest of the country, Maputo City has the lowest percentage of household heads with no education and the highest percentage of heads that have completed primary or secondary education. As other data sets confirm (e.g. SACMEQ 2000; DHS 2003), educational resources are concentrated in Maputo City. This suggests a much lower likelihood of households falling into poverty in Maputo City, when compared to the rest of Mozambique.

Figure 5.1 – Education of household head by province.

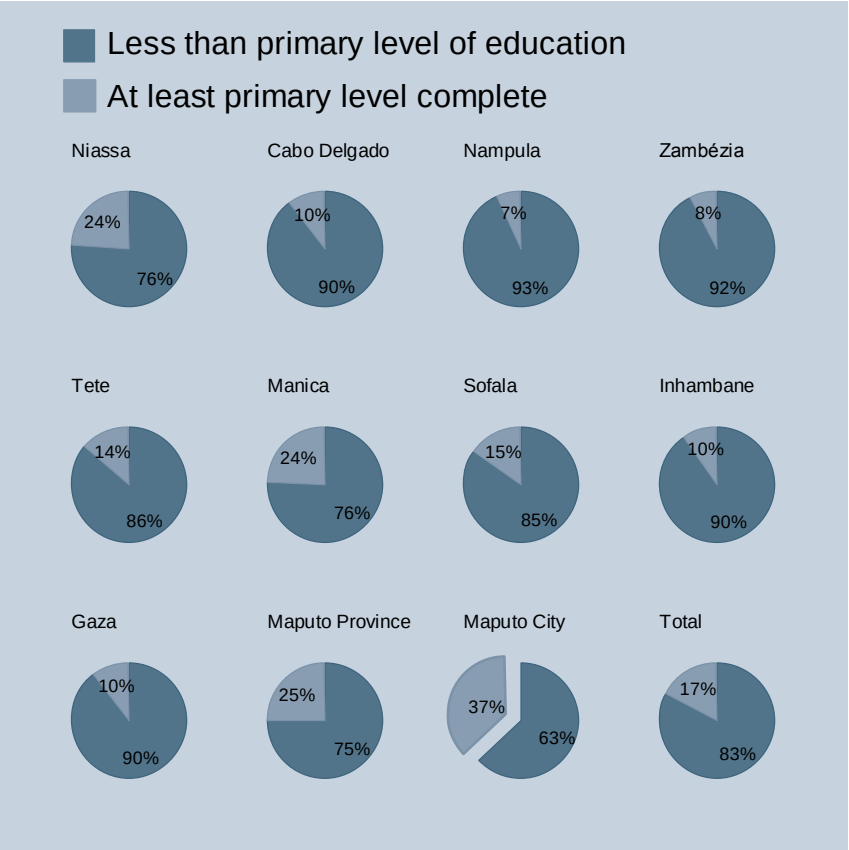
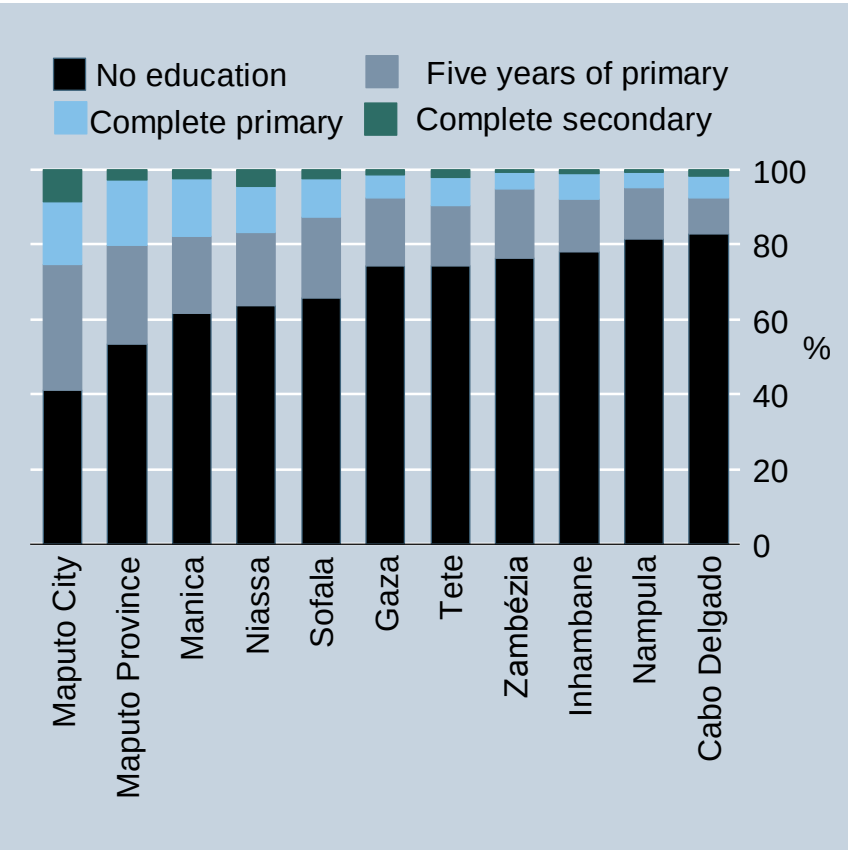


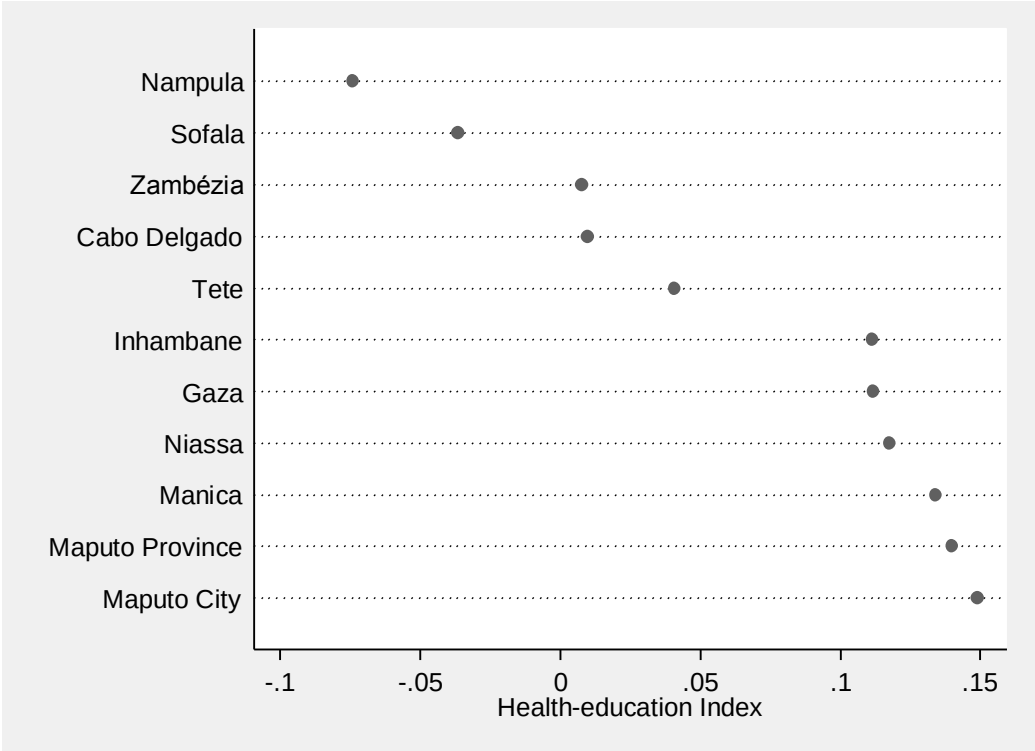
Figure 5.2 – Household heads proportions in the different levels of education.



From the analysis of the survey's health questions, Maputo City is again better off compared to the rest of the provinces. The tabulations indicate that it has both the lowest proportion of persons that became ill during the two weeks prior to the interview and the lowest proportion of individuals consulting medical help in the same period. Fox, Bardasi, & Van den Broeck (2005), using the 2003 Demographic and Health Survey (DHS 2003), found similar results. When compared to other provinces, principally those in the Central and Northern regions, Maputo City has a significantly lower total fertility rate, infant mortality rate, under 5 mortality rate, stunting and wasting[2](Fox, Bardasi, & Van den Broeck, 2005, p. 9). These results provide further evidence that Maputo City is the least poor province of Mozambique.

Using the information on health and education provided by the survey used for this study it is possible to construct a health-education index based on Multiple Correspondence Analysis. Figure 5.3 illustrates this index across provinces. It clearly shows that Maputo City is better off when compared to the rest of the country, and is far better off compared to some provinces, such as Nampula and Sofala, that the DNPO et al. (2004) analysis found to have considerable less headcount poverty than Maputo City.

Figure 5.3 – Health-education index



[2] There stunting is defined as the percentage of children under 5 who are at least 2 standard deviations below the median of the International Reference Population in terms of height-for-age. Wasting is a similar variable but in terms of weight-for-height.

6. Poverty Lines

DNPO et al. (2004) combined the Cost of Basic Needs (CBN) and Food Energy Intake (FEI) methods to construct the poverty lines. They first look at the typical diet of the poor in each of thirteen spatial regions they define. Then they construct food bundles for each spatial domain and calibrate them so as to provide an average of 2 150 calories per person per day.[3] They then go on to cost the bundles at the prices prevailing in each spatial domain, generating thirteen food poverty lines.

Concerning the non-food poverty lines, there is no intuitive minimum non-food consumption threshold that can be used, such as is done with the food energy intake method with regard to food needs. To get around that, the authors follow convention and simply consider how much households around the food poverty line – those that barely satisfy their basic food needs and those that barely do not – spend on non-food items. So, following Ravallion (1994) and Ravallion & Bidani (1994), non-food poverty lines were set by examining the non-food consumption among those households whose total expenditure per capita is approximately equal to the food poverty line, in each spatial domain. They argue that since the non-food consumption of those who can just barely satisfy their food consumption needs displaces essential food consumption, such non-food consumption can itself be considered essential (DNPO et al., 2004, pp. 14-15).

The total poverty line is simply the sum of the food and non-food poverty lines in each spatial region. Table 6.1 shows these poverty thresholds. The total poverty line derived for Maputo City is very high. Figure 6.1 better illustrates this fact in graphical format. The column for the Mozambican capital is more than double those in most Central and Northern parts of the country, and more than three times those in some other regions (Nampula-rural, Sofala and Zambézia-rural).

[3] However, if physical activity levels differ across regions, with individuals living in urban regions engaged in less demanding activities than those living in the rural ones, then urban individuals should require, on average, less food energy intake. This means that the food bundle for (say) Maputo City should have been calibrated to provide a relatively lower number of calories. However, this issue will be ignored for the rest of the analysis.

Figure 6.1 – Poverty lines in 13 spatial domains
Source: Adapted from DNPO et al. (2004).

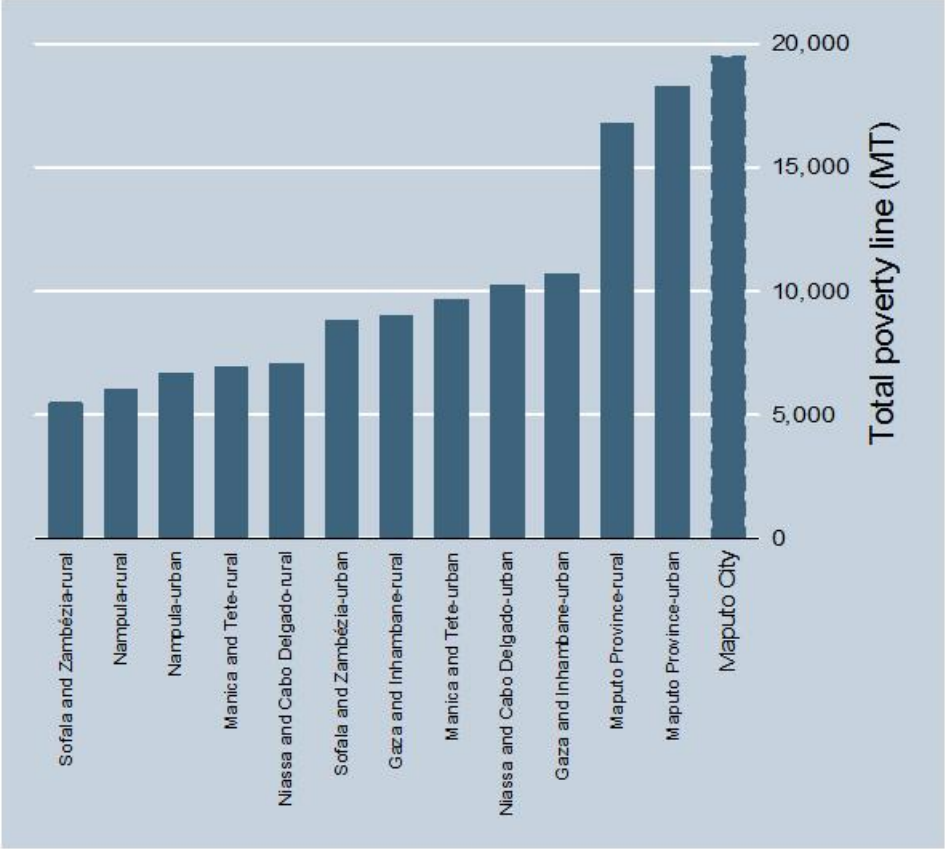


Table 6.1 contains a column showing an implicit food price deflator for each region. This is simply the cost per calorie of the food poverty line, computed by dividing the food poverty line by 2 150, the number of calories required to satisfy average food basic needs in each of the 13 spatial regions. The fact that this price deflator is highest in Maputo City means that the cost of a food calorie is highest there. Further, though the method allows for households opting to substitute towards relatively cheaper foods, it appears that households in Maputo City opt for consuming caloric-expensive food.

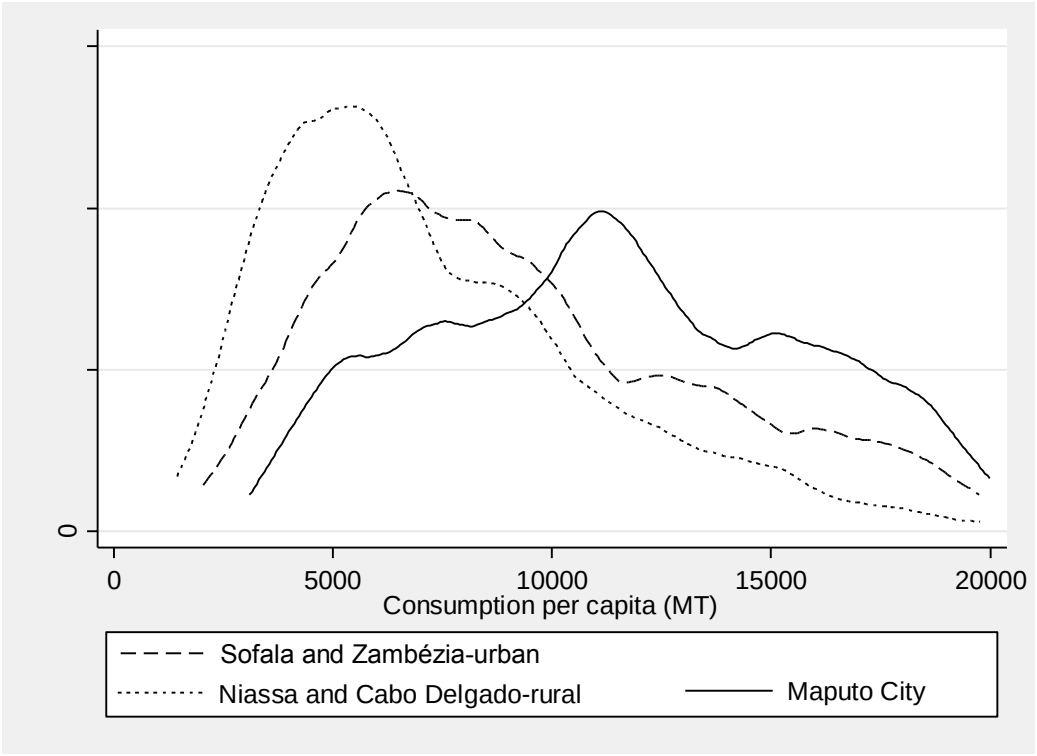
DNPO et al. (2004, pp. 23-24) themselves question whether the peculiar mode of living of the poor in Maputo City, whereby they consume high cost food, is discretionary or forced. If discretionary, the poverty line is probably too high, overstating poverty in Maputo City. They seem to favour the second option, arguing that the need for cash forces household members to work outside the home, whereby they sacrifice low cost meals prepared at home for more expensive processed food. But in contrast to this one may argue that only the more affluent are likely to sacrifice low cost meals at home for processed food; the poor will rather take their homemade food to the workplace. If this is true, then a significantly higher poverty line in Maputo City is not justified.

Lastly, the table shows the mean consumption expenditures per capita by province. In Maputo City, consumption is significantly higher than in the rest of the country. However, Figure 6.2 shows that the bulk of the observations in Maputo City are concentrated around 11 000 MT. For (say) rural Niassa and Cabo Delgado and urban Sofala and Zambézia the observations are concentrated around 5 000 MT and 6 000 MT, respectively. The representative household individual in the latter regions spends roughly half as much per household member as a representative household in Maputo City.

Table 6.1 – Poverty lines, implicit food price deflator and consumption per capita by 13 spatial regions Notes; MT – Meticais
Source: DNPO et al. (2004).

Spatial Regions	**Food poverty lines** (MT per person per day)	**Non-food poverty lines** (MT per person per day)	**Total poverty lines** (MT per person per day)	**Implicit food price deflator** (MT per calorie)	**Mean consumption per capita** (MT per person per day)
North					
Niassa and Cabo Delgado-rural	5 434	1 665	7 099	2.53	7 980
Niassa and Cabo Delgado-urban	7 540	2 690	10 230	3.51	21 189
Nampula-rural	4 471	1 501	5 972	2.08	6 592
Nampula-urban	4 853	1 807	6 660	2.26	9 762
Centre					
Sofala and Zambézia-rural	4 155	1 318	5 473	1.93	7 654
Sofala and Zambézia-urban	6 591	2 183	8 774	3.07	16 598
Manica and Tete-rural	5 629	1 304	6 933	2.62	8 212
Manica and Tete-urban	7 145	2 545	9 690	3.32	13 106
South					
Gaza and Inhambane-rural	6 614	2 394	9 008	3.08	7 283
Gaza and Inhambane-urban	7 264	3 457	10 721	3.38	12 456
Maputo Province-rural	11 801	4 963	16 764	5.49	10 552
Maputo Province-urban	11 898	6 398	18 296	5.53	20 214
Maputo City	12 224	7 291	19 515	5.69	32 060

Figure 6.2 – Kernel density curves of per capita consumption for selected regions



7. Using a Wealth Index for poverty comparisons

To aggregate the information on household holdings of assets, household access to public services and household housing characteristics, this paper uses Multiple Correspondence Analysis (MCA). The method explores the relationships within a set of categorical variables to generate an asset or wealth index, a dimension-reducing indicator that ranks households by their long-run socio-economic status.

The computation of a wealth index based on MCA involves four steps (Booysen et al. 2007, p. 1115, quoting Asselin (2002, p. 14)): i) Construction of the indicator matrix that shows the asset ownership by each household (e.g. whether or not a particular household owns a radio, a bicycle, etc., or whether it has a house with certain predefined characteristics); ii) calculation of the household profile with respect to the categories of asset ownership; iii) applying MCA to the indicator matrix, therefore providing the first dimension's set of column weights; and iv) applying weights to the households' profiles, thereby generating the following MCA wealth index:

$$MCA_i = R_{i1}W_1 + R_{i2}W_2 + R_{i3}W_3 + \cdots + R_{iz}W_z, \qquad (1)$$

where MCA_i is the ith household's wealth index score, R_{iz} is the response of household i to category z, and W_z is the first dimension MCA weight applied to category z.

Figure 7.1 and Figure 7.2 show graphically the poverty head-count ratios by province, employing consumption per capita and the wealth index, respectively. Figure 7.1 is simply a reproduction of Table 4.1 in map format. It is included in this section just for comparison purposes. When consumption per capita is employed, the national poverty rate is 54.36%. Therefore, to permit comparisons of poverty profiles with the money metric results, the poverty line was also set at the 54.36th percentile for the wealth index, to generate poverty estimates that are comparable.

Figure 7.1 – Poverty profile in 2002/03 using consumption per capita.

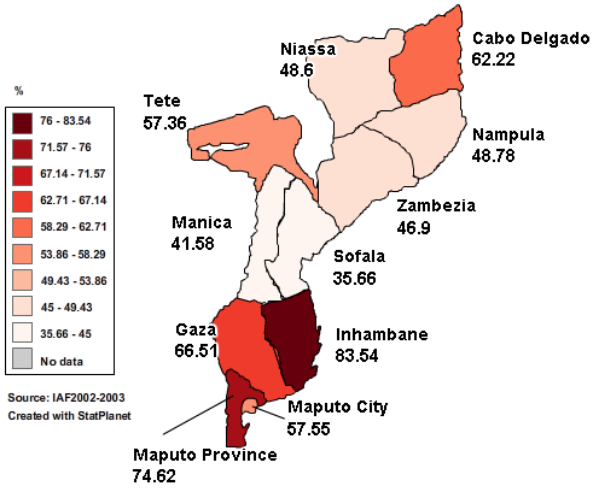
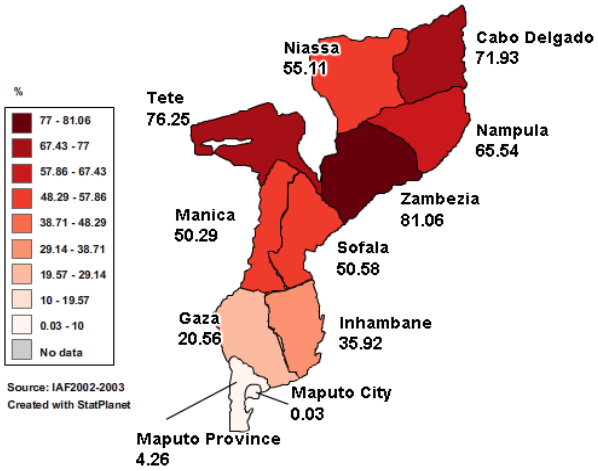


Figure 7.2 – Poverty profile in 2002/03 using the wealth index.



For individual households, the Spearman rank correlation coefficient for all pairs of the consumption aggregate and wealth index is 0.53 and is statistically significant at conventional levels. This means that the consumption aggregate and the wealth index are not independent of each other. Booysen et al. (2008, p. 1118) quote the World Bank (2003) that correlation coefficients at the household level between this type of indices and per capita consumption expenditure usually range between 0.20 and 0.40. Therefore, the Spearman rank correlation coefficient indicates that this particular wealth index might be a particularly good indicator of household socio-economic status as derived from per capita consumption.

In spite of that, after provincial poverty lines were applied, the average values for these variables differ with respect to the provincial poverty ranking. Whereas for the consumption aggregate Maputo City is poorer than most of the Central and Northern provinces (except for Cabo Delgado), the wealth index suggests that Maputo City is actually significantly less poor than the rest of the Mozambican provinces, notable those in the Central and Northern parts. Since consumption per capita was found to be highest

in Maputo City, these strange provincial rankings appear to result from the poverty line used to derive the head-count ratio.

Figure 7.3 shows a scatter plot of provincial poverty head-count ratios using the consumption per capita and the wealth index. One would expect these observations to lie on a diagonal line through the origin, should there be a consistent linear relationship between the poverty rankings derived from the two measures. This is clearly not what one sees in the figure. The four observations above the diagonal correspond, from left to right, to Maputo City, Maputo Province, Gaza, and Inhambane, respectively. For these four provinces, the headcount index of poverty is considerably higher than poverty using the wealth index, even though the "poverty line" for the wealth index was set to give the same level of household poverty at the national level. This supports the contention that the price-adjusted poverty line for Maputo City in particular was set far too high.

Figure 7.3 – Head-count index using the consumption aggregate and the wealth index for the provinces of Mozambique

Leibbrandt & Woolard (2001, pp. 43-45) analyse poverty in South Africa using alternative indicators of living standards, including per capita consumption, household consumption, per capita income, per capita food expenditure, per capita caloric intake, the budget share of food expenditure (food ratio or Engel ratio) and average educational

level of adult household members. They find that in general, most of these living standards indicators (excluding per capita caloric intake and adult educational attainment) give broadly consistent results and are highly correlated.

Thus, it would be interesting to use the Engel ratio to further investigate the surprising poverty profile that comes out of the consumption aggregate. This ratio indicates the relative importance that food has in the total household budget. Its value is expected to change (decline) systematically as living standards rise (Rahman, Matsui, & Ikemoto, 2008, p. 41). Figure 7.4 illustrates a locally weighted regression of the food ratio on consumption per capita. Clearly, as standards of living increase the Engel food ratio tends to decline. Figure 7.5, which shows the Engel ratios by province, is further evidence that living standards in Maputo City are very high compared to the rest of the country.

Figure 7.4 – Locally weighted regression of Engel food ratio on consumption per capita.

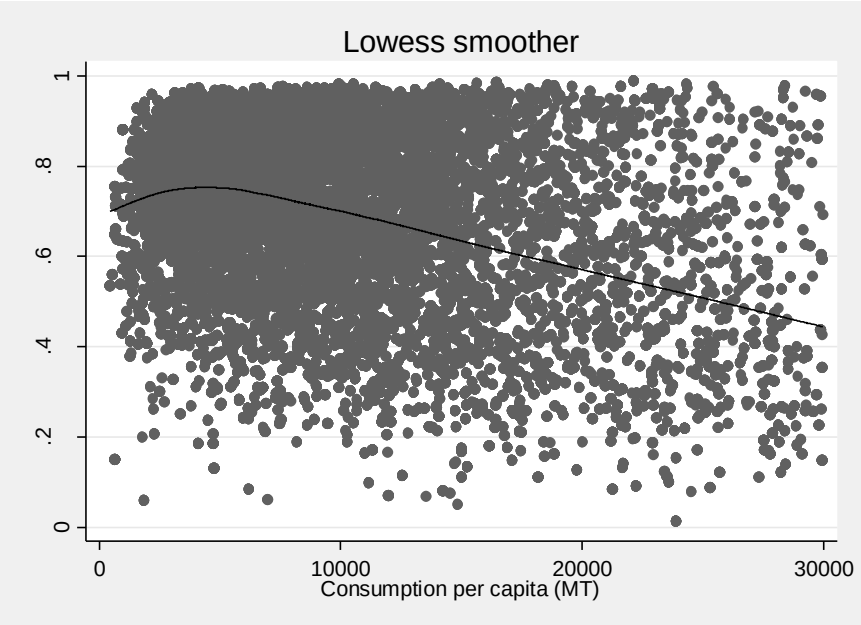
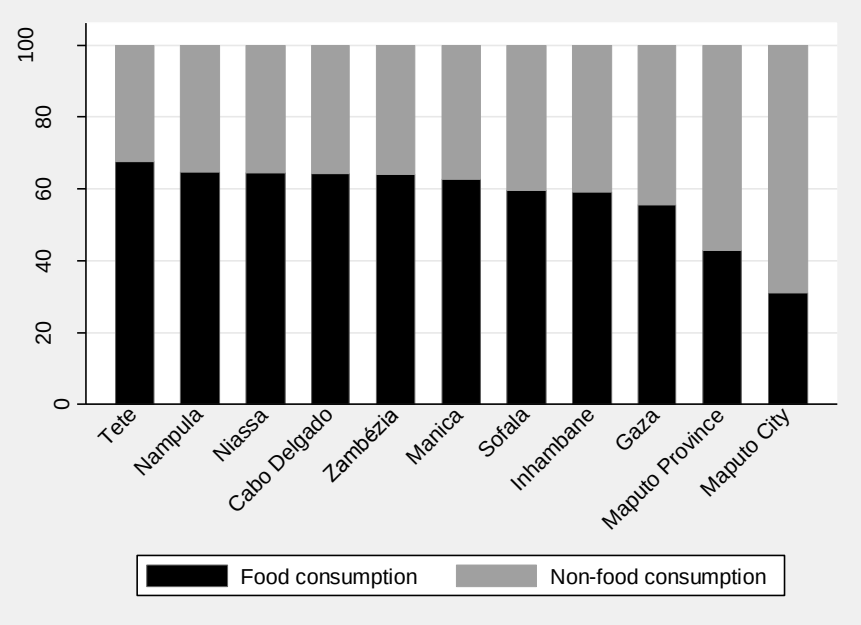


Figure 7.5 – Engel ratios by province.



The Engel ratios are best compared at the poverty line if one wants to determine how living standards at the poverty line compare across provinces, i.e. whether the consistency criterion holds that "the poverty line be fixed in terms of the level of living implied" (Ravallion & Bidani, 1994, p. 76). Figure 7.6 shows that. The vertical lines correspond to the poverty lines for each province and the negatively sloped quadratic regressions lines show the relationship within the provinces concerned between the Engel ratio and per capita consumption. Clearly, at its poverty line Maputo City's food ratio is the lowest when compared to the rest of the country. Put another way, and as is shown in more detail in Table 7.1, while in Maputo City only 47% of the budget is allocated to food purchases, for households living in provinces such as Sofala, Zambézia and the rest of the Central and Northern provinces, at least 74% of the budget is allocated to food. Thus, if the Engel food ratios are a good indicator of how living standards compare across provinces, then people living in Maputo City who are at the DNPO et al. (2004) poverty line have far higher standards of living than those at the poverty line in any other province.

Figure 7.6 – Engel food ratio at the poverty line.
Note: the vertical lines on the x-axis correspond to the poverty line in each province.

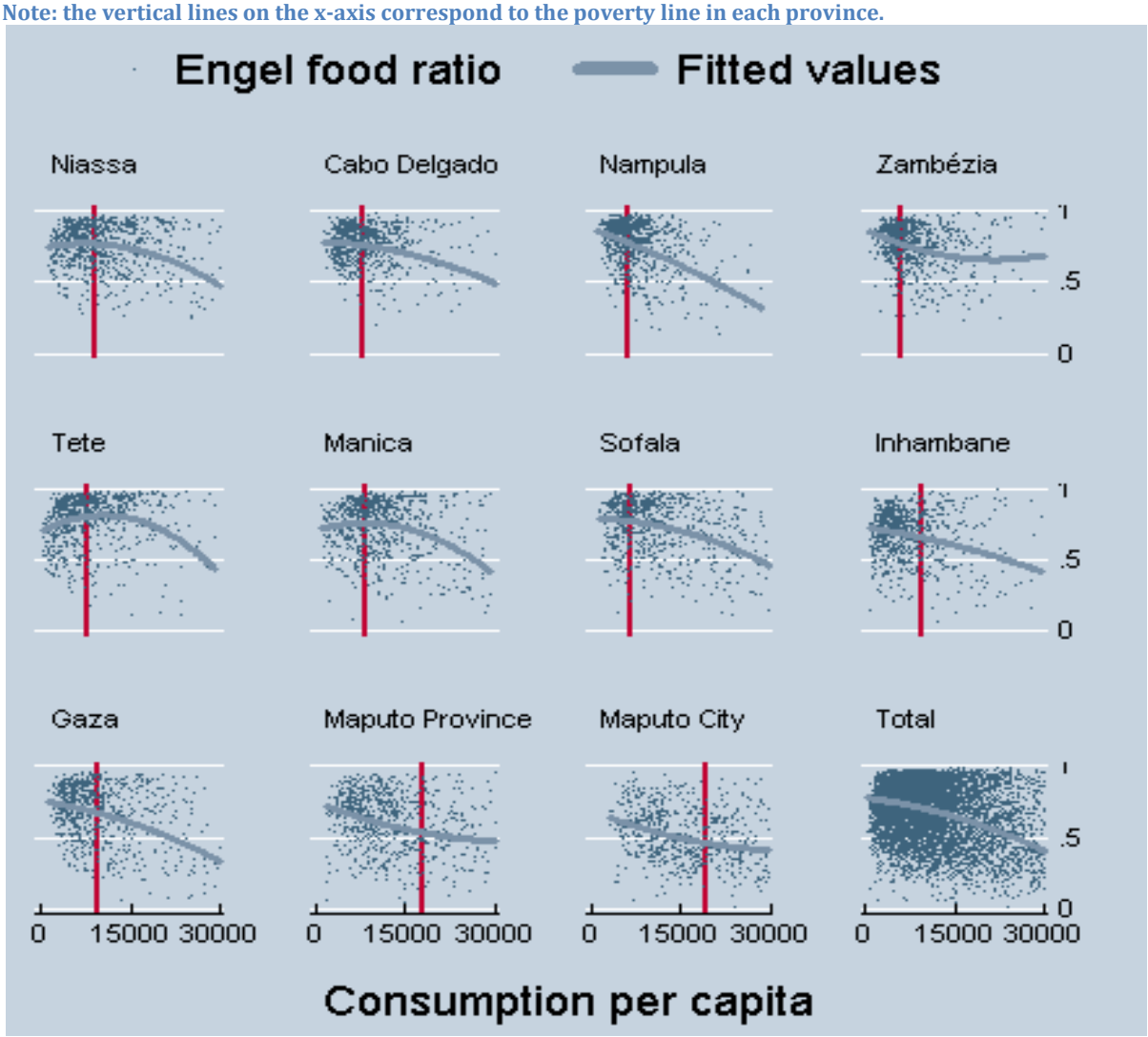


Table 7.1 – Engel food ratio at the poverty line.

Province	Engel food ratio
Niassa	0.75
Cabo Delgado	0.75
Nampula	0.77
Zambézia	0.77
Tete	0.77
Manica	0.74
Sofala	0.76
Inhambane	0.65
Gaza	0.67
Maputo Province	0.55
Maputo City	0.47

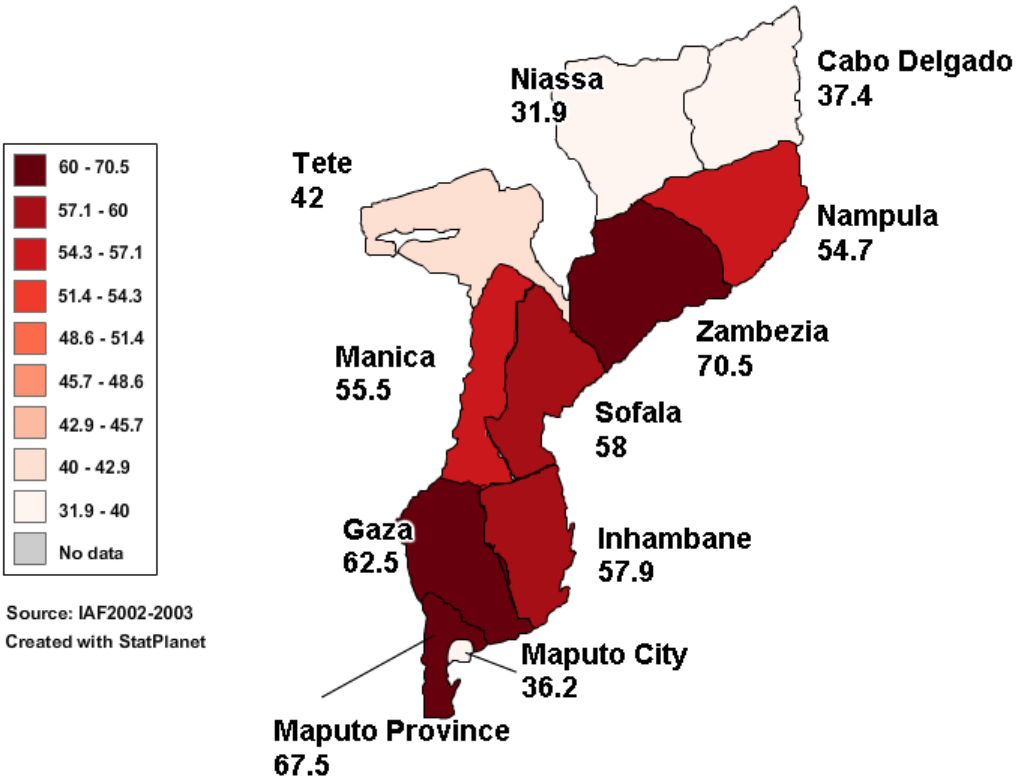
Table 7.2 presents Spearman rank order correlations between the various living standards indicators. The Engel ratio rank correlates strongly with the asset index and moderately with consumption per capita. But as soon as consumption per capita is measured relative to DNPO et al. (2004)'s poverty lines (i.e. when the inverse of the poverty line is effectively used as deflator), the rank order correlation drops significantly. The same thing occurs from the perspective of the asset index. Its rank order correlation with consumption per capita is moderately high, but falls to a very low level when the latter variable is deflated. Thus, adjusting the poverty line for differentials in tastes and prices in the manner that DNPO et al. (2004) did across provinces seems no remedy to the problem of differential prices and tastes across provinces; instead, it seems to lead to perverse results. It reduces the relationship between consumption per capita with both the asset index and the Engel food ratio.

Table 7.2 – Spearman rank order correlations.
Note: *significant at 5% level of significance.

	Engel food ratio	Consumption per capita	Consumption per capita as % poverty line	Asset index
Engel food ratio	1.00			
Consumption per capita	-0.38*	1.00		
Consumption per capita as % poverty line	-0.13*	0.83*	1.00	
Asset index	-0.66*	0.53*	0.17*	1.00

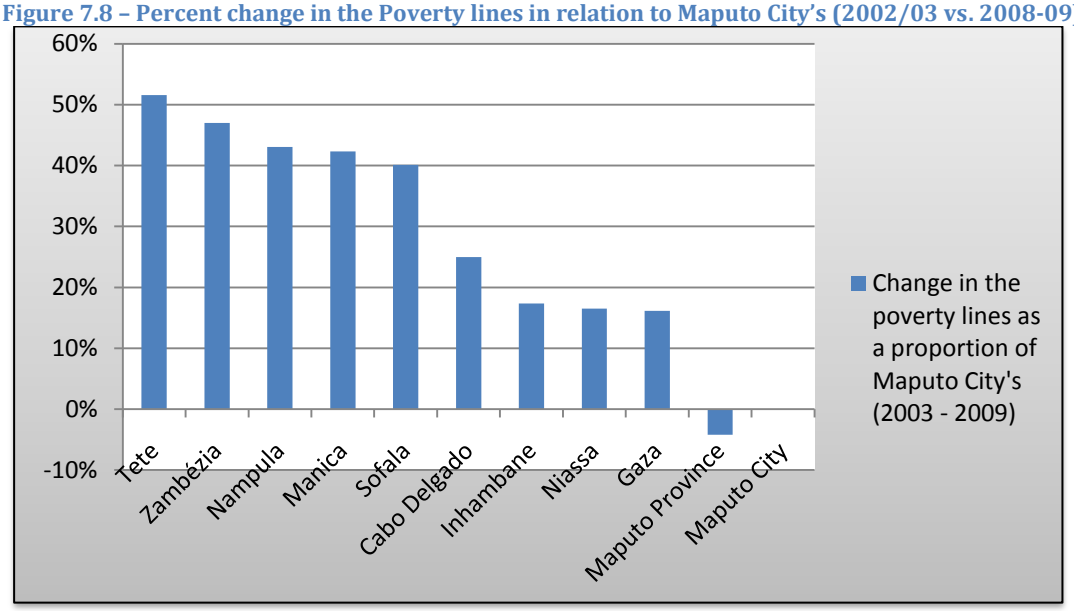
The new third Mozambican household budget survey is not yet available for general use. However, first analyses based on it of poverty in the period between September 2008 and August 2009 were recently released (DNEAP, 2010). This study uses the same methodology as DNPO et al. (2004) to derive taste and price adjusted poverty lines specific to each region. As Figure 7.7 illustrates, contrary to the previous survey's results, Maputo City is now found to be the second least poor province in Mozambique, with only 36% of the population below the poverty threshold. This accords roughly with the position of this study – that Maputo City is the least poor province.

Figure 7.7 – Poverty profile in 2008/09.
Source: adapted from DNEAP (2010).



What is conspicuous in the DNEAP (2010)'s study is that though Maputo City's poverty line is still the highest, the gap with the rest of the country's poverty lines declined significantly. Figure 7.8 illustrates that. It shows that (say) Tete's poverty line as a proportion of Maputo City's increased by more than 50% between the second and the third household budget surveys. For all the provinces except for Maputo Province, the increase was at least 16%. This suggests that there were either dramatic changes in good bundle prices and patterns of food purchases between the two surveys or – the view of this paper – the prices employed to adjust the bundles in 2002-2003, in the manner DNPO et al. (2004) did across provinces, were wrong in the first place.

Figure 7.8 – Percent change in the Poverty lines in relation to Maputo City's (2002/03 vs. 2008-09).

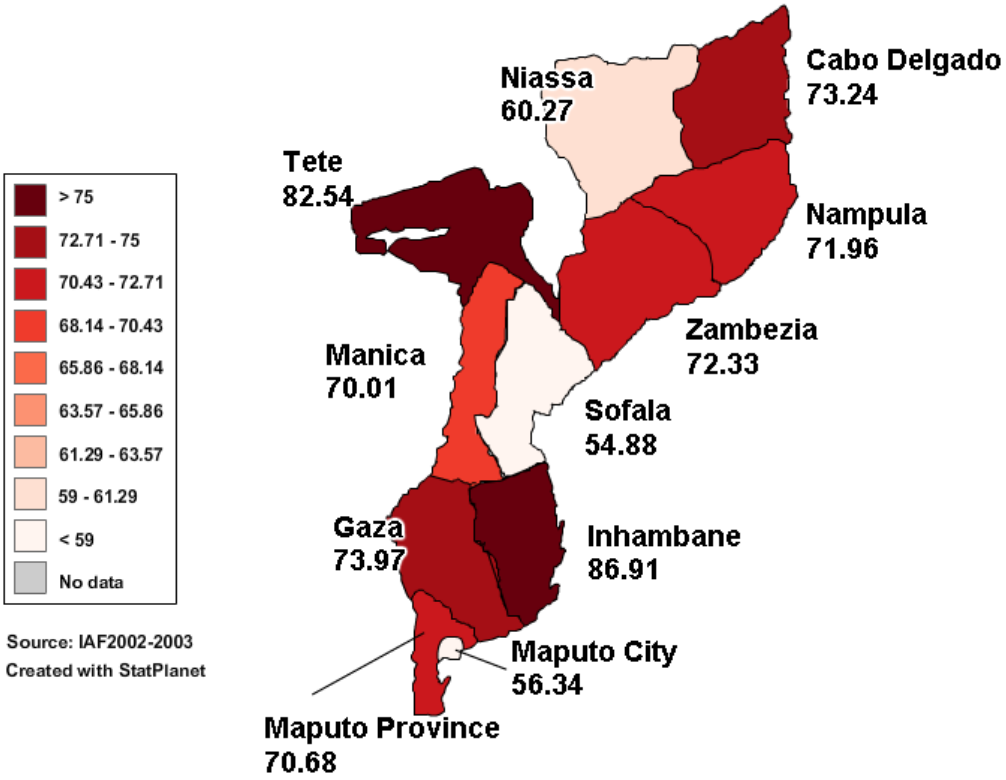


Assuming that the DNEAP (2010)'s poverty lines correspond better to the Mozambican reality in terms of taste and price dispersion across provinces than the poverty lines in the earlier survey, it would be interesting to see how the poverty ranking in 2002/03, using this new poverty lines, compares with the poverty rankings illustrated in Figure 7.1 and Figure 7.2. Put another way, what would the provincial poverty profile in 2002/03 have been if the 2008/09 poverty lines (adjusted for inflation) were used instead of the DNPO et al. (2004)'s poverty lines? Allowing for a general price adjustment[4], the poverty profile in 2002/03 based on 2008/2009 real poverty line would be as illustrated in Figure 7.9. This figure provides further evidence that Maputo City's poverty rate in 2002/03 should have been one of the lowest (though in this particular case it is the second lowest, after Sofala). Moreover, the rank order correlations between consumption per capita and the Engel food ratio, on the one hand, and between consumption per capita and the asset index, on the other, are much stronger when the DNEAP (2010)'s poverty lines are employed to deflate consumption per capita across provinces instead of the provincial poverty lines for the earlier survey analysed here[5].

[4] According to the Mozambican Statistical Office (INE), between 2003 and 2009 the national price level increased by 75%.

[5] As compared to Table 7.2, the real value of the rank order correlations increased (absolutely) to -0.24 and 0.32, respectively.

Figure 7.9 – Poverty profile in 2003 using 2008/09 poverty lines (adjusted for inflation).



8. Conclusion

When the poverty profile has a bearing on policy targeting, living standards across different spatial domains must reflect the same command over basic needs. If there is price dispersion across regions, living standards will not be correctly comparable, unless adjusted for these prices differential. Further, the diet of the poor might also vary significantly across regions. Then, using the same bundle of goods in different regions might well make living standards incomparable across regions. Therefore the method that DNPO et al. (2004) applied to the second Mozambican household expenditure survey would appear appropriate to follow to analyse poverty. In fact, the Cost of Basic Needs (CBN) approach is considered best practice in the field, and large (relative) price differentials are said to exist between the capital (Maputo City) on the one hand and the rest of the country.

Using an asset-based wealth index, based on Multiple Correspondence Analysis (MCA) to aggregate information on household asset ownership, housing characteristics and access to public services, this study argues that the remedy of adjusting for taste and prices differentials across regions might have made things worse in the case of Mozambique in 2003. For the particular case of Mozambique, DNPO et al. (2004) end up overstating

poverty in Maputo City, at least as far as one can determine from other measures of welfare often associated with consumption, with consequences for the targeting of policy. Employing the wealth index, it appears as if Maputo City is significantly less poor than the rest of the country. Analysing other indicators, such as the type of food consumed, education and health information, or the Engel food ratio, leads to similar conclusions. Preliminary published results from the third Mozambican household survey support this conclusion.

While there is not enough information to estimate better poverty lines that consider price and taste differentials for Mozambique in the survey concerned, the evidence presented here raises serious doubts about the accuracy of this method in this particular case, because of the suspiciously large price differentials found between provinces. Though the poverty lines derived accord with what is best practice in such studies, we would argue that in this case the remedy of deriving provincial poverty lines actually led to worse answers than not using provincially differentiated poverty lines.

Does this really matter? Indeed it does. Where surveys are used to inform government policy, as they should, targeting of state interventions often responds to poverty mappings. The poverty map derived from these provincially-differentiated poverty lines and shown in Figure 7.1 would lead to completely perverse targeting that would strengthen rather than reduce the existing urban bias. It is in that sense extremely bad for the poor.

For developing countries generally, there is a lesson here: Beware of simply applying this best practice, if its results are not also confirmed by a simple analysis of other indicators, as shown in this paper. Also, this methodology is dependent on relatively large samples and relatively good measurements of the components of consumption and their prices. The massive shifts in the price ratios in other provinces relative to those in Maputo City between the second and third surveys cast suspicion on the accuracy of such data, particularly as some provincial samples are not very large and capturing of food expenditure and prices is subject to the usual measurement errors.

Finally, the best practice method employed here regarding provincial poverty lines can easily lead to neglect of another best practice, viz. doing thorough sensitivity analysis of the results. The standard way of starting such sensitivity analysis is determining whether there is stochastic poverty dominance, in which case poverty rankings across

provinces would not be sensitive to the choice of poverty line or poverty measure (the headcount ratio P_0, the poverty gap ratio P_1, or the squared poverty gap ratio or poverty severity ratio P_2). Where provincial poverty lines are used, however, such analysis often is neglected because of the confusion in doing it or presenting it to policymakers.

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