

# Consumption Bundle Aggregation in Poverty Measurement: Poverty Dynamics in Uganda

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## Abstract

Official poverty figures in Uganda are flawed by the fact that the underlying poverty lines are based on a single national food basket that was constructed in the early nineties. In this paper, we estimate a new set of poverty lines that accounts for the widely divergent diets throughout the country using the latest available household survey. Using these updated poverty lines, we then look at poverty dynamics using four waves of the Uganda National Panel Survey. We classify households into categories depending on their change in poverty status over time and relate this to characteristics that are likely to change only slowly. This enables us to explore the characteristics of households that, for instance, grow out of poverty and how they differ from households that appear to be trapped in poverty. Our approach generates poverty measures that are more credible from a theoretical point of view and are more in line with what other researchers find.

**JEL:** O12, D31, O55

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## Introduction

During the past few decades, Uganda has experienced substantial economic growth. Since 1986, when the National Resistance Movement (NRM) took over government, real GDP has grown at an annual rate of 6.8 percent, making it one of the fastest growing economies in Africa. This growth has been attributed to the new government that has implemented a far-reaching economic reforms agenda, transforming Uganda into one of the most liberal economies in Sub-Saharan Africa. Indeed, as argued in WorldBank (1993), “with the liberalization of the exchange and trade regime, the abolition of the Industrial Licensing Act, the promulgation of a new investment code, and the gradual liberalization of agricultural pricing and marketing, the government has put in place some of what is thought to be the essential pre-conditions for sustainable economic growth”.

This growth has been accompanied by equally impressive declines in the levels of poverty as reported by the government. While aggregate headcount poverty stood at about 57 percent in the early 1990s, the most recent official estimate puts 19.5 percent of the population below the official poverty line<sup>1</sup>. But despite these successes at the aggregate level, researchers warn that this growth has not been shared equally by the population at large. For instance, marked spatial heterogeneity in baseline poverty and subsequent poverty reductions mean differences in the standard of living between locations are often much higher now than what they used to be.

Apart from the observed heterogeneity in terms of poverty and poverty

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<sup>1</sup>For the most recent official estimate, we take the poverty estimate based on the 2012/13 Uganda National Household Survey (UNHS). The data on which these estimates are based were obtained from the Uganda Bureau of Statistics (UBOS) in August 2014. As is mostly the case with UNHS data obtained from UBOS, the dataset came with a pre-compiled welfare aggregate based on consumption expenditure and a set of official poverty lines. Using the same methods we used to replicate official poverty figures in previous rounds of the UNHS, we estimate national headcount poverty to be 19.5 percent in the UNHS 2012/13. This is slightly lower than official poverty estimates at the time of the UNHS 2012/13 dissemination and reported in the press (22.1 percent).

reduction, the figures itself have been called into question as well. Some argue that the lack of progress on assets accumulation and non-monetary well-being proxies suggest much more modest poverty reductions, raising suspicion about the poverty lines and the welfare indicator used by the government of Uganda (Daniels and Minot, 2014; Kakande, 2010). Some scholars have also been questioning the spatial pattern of poverty as reported in official documents, arguing that a single national food poverty line is likely overstate poverty in some areas, while underestimating poverty in others (Appleton, 2003; Jamal, 1998).

In this paper, we want to update existing knowledge about the state of poverty and its dynamics in Uganda, while at the same time addressing some of the problems with the official figures that have been identified in recent studies. To account for differences in diets in different locations, we will construct different poverty thresholds for different spatial domains using the latest available nationally representative household survey (UNHS2012/13). For each spatial domain, we construct a food basket that produces a certain minimum of calories that reflects the diets of the poorest households in that region. These baskets are then multiplied by prices prevailing in that region to arrive at food poverty lines. An allowance for basic non-food necessities is then added to get a set of Cost of Basic Needs (CBN) poverty lines, one in each spatial domain. We then test these poverty lines to see if they are utility consistent. The idea is that a basic needs bundle in a certain spatial domain A should always be cheaper than a bundle from any other region valued at prices of region A. If a bundle does not satisfy these revealed preference conditions, we use an information theoretic approach to adjust the bundles until they do, as outlined in Arndt and Simler (2010).

While comparing poverty estimates using these new poverty lines to the official estimates is interesting in its own right, we will use the utility consistent poverty lines to look at poverty dynamics using the recently released Uganda National Panel Survey (UNPS). The UNPS is a yearly panel sur-

vey collected by the Uganda Bureau of Statistics (UBOS) supported by the World Bank’s Living Standard Measurement Study (LSMS) project that tracks about 3000 households. We can use the panel nature of this survey to study how many households are chronically poor (defined as always falling below the poverty threshold) and investigate how their characteristics differ from other groups, such as households that successfully escaped poverty. In other words, we will construct a detailed poverty profile that takes dynamic aspects into account, defining groups based on poverty transitions instead of a simple dichotomous poor/non-poor status (Boateng, Ewusi, Kanbur, and McKay, 1992). As for the characteristics we contrast within each group, we confine ourselves to those that change only slowly over time, and we look at the “initial conditions” at the start of the panel. We hope that this can enlighten us on the pre-conditions that need to be in place to be in a particular poverty dynamics group<sup>2</sup>.

The remainder of this paper is structured as follows. We first give an overview of poverty in the past few decades and look at the present official poverty estimates in Uganda. We also present some studies that point to shortcomings in official poverty measurement. In section 3, we briefly explain the reasoning behind the use of spatially disaggregated poverty lines and the role of revealed preferences to test for utility consistency. Section 4 presents the construction of the new set of poverty lines and our poverty estimates based on the UNHS2012/13. Section 5 then looks at poverty dynamics and relates households with differing poverty dynamics to a selection of characteristics. A final section concludes.

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<sup>2</sup>For example, we could check if households that are always below the poverty line we different in terms of their reported ability to cope with adverse shocks at the start of the panel than those that grow out of poverty over the course of the panel.

## Poverty in Uganda - Trends and Controversies

During the nineties, poverty in Uganda decreased substantially, falling by almost 40 percent at the national level. Table 1, taken from Appleton (2003), presents official headcount poverty rates before the year 2000<sup>3</sup>. However, this table also shows significant spatial differences in both levels and changes in poverty. The urban areas and Central region reduce poverty fastest. The Northern region, already starting from high levels of poverty, is relatively unsuccessful in bringing down the number of people living below the poverty line. In addition, studies that exploit the panel nature of the data find that in some regions, poverty is particularly persistent (Deininger and Okidi, 2003). What is also puzzling is the sudden drop between 1997/98 and 1999/00. While it took 5 years for poverty to decrease by 20 percent between 1992 and 1997, it took only 2 years to decrease another 20 percent at the turn of the century. This may be due to inconsistent underlying welfare indicator data, that was obtained from different surveys (the Monitoring Surveys vs the Uganda National Household Survey, see footnote 3).

One controversy which we will also address in this paper refers to the fact that the official poverty estimates are based on poverty lines that are rooted in a single food consumption bundle, derived from 1993/1994 Monitoring Survey data. In particular, a single food basket was identified at the national level with 28 of the most frequently consumed food items by households with less than the median income. The items in this food basket were then converted into caloric equivalents and scaled to generate 3,000 calories

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<sup>3</sup>There is a substantial literature on poverty and its dynamics in the 1990s. This is due to the fact that there is relatively high quality data available for this period. Uganda has been conducting national household surveys since 1992, and has conducted six such surveys before the turn of the millennium. Some of these data sets form a panel. The first data set, the Integrated Household Survey conducted in 1992/93 can be linked to the last survey of the millennium, referred to as the first Uganda National Household Survey (UNHS 1999/00). In between these two surveys, a series four Monitoring Surveys (1993/94 up to 1997/98) have been carried out. More information on these data sets can be found in Lawson, McKay, and Okidi (2006).

Table 1: Official Poverty Headcounts 1992-2000

	1992-3	1993-4	1994-5	1995-6	1997-8	1999-0
national	55.7	51.2	50.2	49.1	44.4	35.1
urban	27.8	21.0	21.5	19.8	16.7	10.1
rural	59.7	55.6	54.3	53.7	48.7	39.0
Central	45.6	34.5	30.3	30.4	27.9	20.1
Eastern	58.5	57.6	65.3	58.4	54.3	37.3
Northern	72.2	69.3	63.5	70.2	59.8	64.8
Western	53.1	53.9	50.9	46.3	42.8	28.0

source: Appleton (2003)

per adult equivalent per day using the WHO estimates for an 18-30 year old male as a reference. Next, a non-food allowance was added. Non-food requirements were estimated as the average non-food expenditure of those households whose total expenditure was around the food poverty line. The non-food allowance does allow for spatial heterogeneity, as separate averages were calculated for urban/rural locations interacted with the four regions (Central, East, North, West), using the method described in Ravallion and Bidani (1994). As far as we know, these poverty lines have since been updated by the official inflation figures each time a new household survey came out.

Appleton (2003) and Jamal (1998) argue that Uganda is unusual in its dietary diversity. Indeed, Uganda has five different staples, matooke, maize, sweet potatoes, cassava, and millet that are more or less important within the diet depending on the region. This may not matter very much if the diets are equally cost effective in obtaining the same level of basic needs as defined in kilo-calories. However, the staple food of choice of a large part of the population, both in the West and the Central region, is matooke, a highly localized staple<sup>4</sup>. Appleton (2003) calculates that, in least in 1993-

<sup>4</sup>Matooke is a variety of starchy banana, commonly referred to as cooking bananas.

1994, Matooke appears to be a very expensive source of calories, compared to what people in for instance the North consume. When Appleton (2003) and Jamal (1998) account for this in their analysis, they come to the conclusion that poverty is more pronounced in the Western region than found in official statistics. Even after correcting for income difference, as regions that consume more expensive calories may do so simply because they have higher incomes, Appleton (2003) comes to the conclusion that the Western region even overtakes the North as the poorest region.

Progress in fighting poverty reported by the government of Uganda and UBOS in the first decade of the new millennium is equally impressive. Table 2 shows that poverty at the national level kept falling during the first decade, shaving another 50 percent off of headcount poverty. At the same time, differential progress in poverty reduction in different regions persists, too. For instance, by 2012/13, poverty is more than eight times higher in the Northern region than in the Central region. In 2002/03, the North was only 2.7 times poorer than the Central Region. The more disaggregated the numbers, the starker the contrasts become. In the North-East, a semi-arid area with low rainfall inhabited by the Karamajong, an agro-pastoralist ethnic group, poverty remains stubbornly high, while in the Central and Western parts of the country, poverty is almost eradicated<sup>5</sup>.

The official poverty figures have been questioned in recent years for being overly optimistic. Daniels and Minot (2014) uses Demographic and Health Survey (DHS) data and methods related to poverty mapping and small area estimation to look at poverty trends across Uganda from 1995 to 2010. They

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<sup>5</sup>Sub-region of North-East includes the districts of Kotido, Moroto, Nakapiripiriti, Katwaki, Amuria, Soroti, Kumi and Kaberamaido; Mid-Northern included Gulu, Kitgum, Pader, Apac, and Lira; West Nile includes Moyo, Adjumani, Yumbe, Arua, Koboko, and Nebbi; Mid-Western includes Masindi, Hoima, Kibaale, Bundibugyo, Kabarole, Kasese, Kyenjojo and Kamwenge; South Western includes Bushenyi, Rukungiri, Kanungu, Kabale, Kisoro, Mbarara, and Ntungamo; Eastern includes Kapchorwa, Mbale, Tororo, Sironko, Paliisa, and Busia; Central 1 includes Kalangala, Masaka, Mpigi, Rakai, Sembabule and Wakiso; Central 2 includes Kayunga, Kiboga, Luwero, Mubende, Mukono and Nakasongola; East Central includes Jinja, Iganga, Kamuli, Bugiri and Mayuge.

Table 2: Official poverty headcounts 2002-2012				
	2002/03	2005/06	2009/10	2012/13
national	38.8	31.1	24.5	19.5
urban	14.4	13.7	9.1	9.6
rural	42.7	34.2	27.2	22.4
Central	22.3	16.4	10.7	5.1
Eastern	46.0	35.9	24.3	24.1
Northern	63.0	60.7	46.2	43.7
Western	32.9	20.5	21.8	7.6
Kampala	4.7	4.4	3.9	0.8
Central 1	22.0	18.8	11.1	3.9
Central 2	30.0	19.7	13.6	7.9
East Central	42.6	32.7	21.4	24.1
Eastern	48.4	39.2	26.5	24.1
Mid-North	57.4	61.1	40.4	35.6
North East	82.8	79.3	75.8	74.5
West Nile	62.8	55.3	39.7	42.0
Mid-West	37.9	23.2	25.3	9.5
South-West	29.0	18.7	18.4	5.8

note: figures are calculated from the respective UNHS (UBOS, 2010b, 2006).



use the 2005/06 UNHS survey to estimate regressions that correlate poverty to a range of household characteristics that also appear in the DHS (four such surveys have been carried out between 1995 and 2009/10). They then use the DHS surveys to predict poverty in each of the DHS survey years. They find that poverty indeed reduced over time, but much slower than official figures suggest. While their national estimate of headcount poverty in 2006 is 33% and thus very close to the official estimate of 2005/6, the rates still stands as 30 percent using the 2009 DHS, about 6 percentage points higher than the 2009/10 UNHS estimate.

This view is shared amongst many publicists and opinion makers in Uganda. Byekwaso (2010) calls officially reported poverty changes “a fiction”. Kakande (2010) admits that qualitative findings on poverty trends suggest there was a decrease in well-being despite the drop in poverty rates. Recently, an unpublished manuscript has been circulating that compares Uganda to other African countries on six non-monetary poverty indicators, such as literacy rates and access to piped water. This admittedly partial analysis also points to a much higher incidence of poverty than officially reported.

## Utility Consistent Poverty Lines using Revealed Preferences

From the above, we learn that one of the main weaknesses of the official poverty measures is the fact that it is based on a poverty line that is constructed using a single food commodity bundle for the entire country. In addition, this food basket was constructed in 1993 and has not been updated since, apart for simple inflation by the consumption price index. However, it is well known that in many instances - for example, if relative prices of basic commodities vary by region (or through time) and preferences permit substitution - the use of a single consumption bundle may yield inconsistent poverty

comparisons (Tarp, Simler, Matusse, Heltberg, and Dava, 2002). While differences in prices in different locations are usually incorporated in poverty measurement by adjusting the welfare indicator to reflect prices used in the construction of the poverty lines (or by adjusting the poverty lines to reflect prices used in the construction of the welfare indicator), it becomes more and more common to also account for spatial heterogeneity in consumption bundles in an effort to increase the *specificity* of poverty lines (e.g. Ravallion and Lokshin, 2006, Mukherjee and Benson, 2003).

While differences in consumption baskets are interesting in its own right, they only become relevant in the context of poverty measurement and analysis, as we relate a welfare indicator to the cost of these basic needs. Indeed, different diets may provide the same basic needs (usually a given amount of kilo-calories per day) at significantly different costs, which complicates poverty comparisons between units (regions, households, individuals,...) with different diets. It is especially in this regard that Uganda is an interesting case. Matooke, the main ingredient in the diet of households in the West may be more or less expensive per energy unit than for example sorghum that is the main staple in the North. As such, it would be misleading to compare the West to the North on the basis of a single food poverty line, even after allowing for spatial price heterogeneity.

But how can we be sure that two different consumption bundles provide the same basic needs? Or, in the language of Ravallion and Bidani (1994), how do we assure *consistency*<sup>6</sup>? Cost of Basic Needs (CBN) poverty lines can be viewed as the expenditure needed to acquire a specific bundle of goods. Different CBN poverty lines will be utility consistent if the underlying bundles of goods are on the Hicksian utility-compensated demand functions and hence yield the same level of utility. In other words, two bundles of goods are consistent if they yield the same utility. As Ravallion and Lokshin (2006)

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<sup>6</sup>A poverty measure is consistent if two individuals at the same welfare level are considered equally poor.

argue, the theory of revealed preferences provides a framework for answering these questions.

The idea uses the rationality assumption that economic agent that derive utility from consumption always prefer consuming more to less. Let us assume that a representative agent living in spatial domain ( $r \in R$ ) derives utility from a set of consumption goods ( $i \in I$ ). We will then instruct each representative consumer in each spatial domain  $r$  to spend a minimum to attain an arbitrary (but constant across spatial domains) level of utility. As such, each individual will spend  $\sum p_{i,r} q_{i,r}$  on a consumption bundle, with  $p_{i,r}$  the price of good  $i$  in spatial domain  $r$  and  $q_{i,r}$  the quantity of good  $i$  in spatial domain  $r$ . Revealed preference conditions will then imply that:

$$\sum p_{i,r} q_{i,r'} \geq \sum p_{i,r'} q_{i,r} \quad \forall r, r' \quad (1)$$

This is so because the representative consumer in spatial domain  $r$  will choose only that bundle that minimizes expenditure. Thus, any other bundle that yields the same level of utility (such as for instance the one chosen by the representative consumer in region  $r'$ ) should be equally or more expensive than the chosen bundle. There can be no bundle that costs less than the chosen one yet yields that same utility, because then the rational consumer should have chosen that one. Or, as in Gibson and Rozelle (2003), if the cost of a bundle from another domain would be cheaper if bought in a specific domain, this means it must have lower utility than the bundle in that specific domain, as otherwise the rational consumer would have picked the bundle from the other domain. The above condition (1) should hold for all possible pairs of spatial domains.

In practice, however, it will be hard to construct a set of poverty lines that meet revealed preference conditions for all possible pairs of spatial domains. One approach, which we will use in this paper, uses a minimum cross-entropy approach to adjust expenditure shares such that they meet revealed preference conditions (Arndt and Simler, 2010). This approach uses

the expenditure shares of the original bundles as prior information (in the form of probabilities that an arbitrarily small amount of money will be devoted to the purchase of the particular good) and the revealed preference conditions as constraints on the values that the parameters can take. The end result will be a set of adjusted expenditure shares that are as closely as possible to the original shares, yet that obey a minimal set of conditions such that the estimated bundles are consistent with some arbitrary unknown preference set.

## A Reassessment of Poverty in Uganda

In this reassessment of poverty in Uganda, we will mainly work with the four waves of the Uganda National Panel Survey (UNPS). The UNPS is a multi-topic panel household survey started by UBOS in 2009/10. However, the 2009/10 sample was essentially a subset of 3,123 households that were interviewed as part of the 2005/06 Uganda National Household Survey (UNHS 2005/06), a nationally representative survey that covered 6,775 households. As such, the first wave of the panel comprises of the UNHS 2005/06 data of this subsample of 3,123 households. After the second wave of 2009/10, the survey was repeated annually. Currently data is available for a third round, covering the 2010/11 agricultural year and a fourth round covering the 2011/12 agricultural year<sup>7</sup>. The UNPS is conducted in two visits in order to better capture agricultural outcomes associated with the two cropping seasons of the country. More information about the UNPS can be found in UBOS (2010a).

For the construction of the utility consistent poverty thresholds elaborated on in the previous section, we will use the 2012/13 Uganda National Household Survey (UNHS 2012/13). Just as the UNHS 2005/06, the UNHS 2012/13 is nationally representative, this time covering 6,888 households. We

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<sup>7</sup>No UNPS survey has been done in 2012/13.

choose this survey because it is the most recent one available, and the construction of utility consistent poverty lines requires a sufficiently large sample, with sufficient observations in each spatial domain. The larger dataset allows us to experiment with different degrees of spatial disaggregation for the domains. It also allows us to define poverty lines at a more disaggregated level than the maximum level of disaggregation for which the UNPS is deemed representative<sup>8</sup>. Our baseline case will look at poverty measures based on a single national poverty line using a single spatial domain, as this would be close to simply updating the current official poverty line. This will then be compared to an analysis based on 6 separate spatial domains (Kampala, Rural Central, Rural East, Rural North, Rural West and Other Urban).

More specifically, following Arndt and Simler (2010), we start by constructing food bundles in each spatial domain. In each domain, a basket of food products that satisfies basic calorie needs is identified using information on the age and sex composition of the households and the recorded consumption patterns of poorer households<sup>9</sup>. The cost of this basket, valued at prices prevailing within each spatial domain, results in a set of food poverty lines, one in each spatial domain. Nonfood poverty lines are obtained by calculating the share of food expenditures for households whose total food and nonfood consumption per capita is near the food poverty line. Total poverty lines are obtained as the sum of the food and the nonfood poverty lines. These poverty lines are then compared, to make sure that they are utility consistent. In particular, we compare the cost of a bundle in one spatial domain to the bundles in the other spatial domains, but evaluated at the price in this spatial domain. As stated above, revealed preferences states that the cost of the bundle in the spatial domain should be smaller or

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<sup>8</sup>The UNPS is only representative up to the regional level. There are four regions in Uganda: Central, East, West and North.

<sup>9</sup>The demographic structure of each region is mapped to an average basic calorie requirement in each region using WHO (1985). The mapping from these basic caloric needs into basic needs consumption bundles is based on FAO (1986).

equal to the bundles chosen in any other spatial domain. If this condition is violated, we use a minimum cross-entropy framework to adjust consumption shares in such a way that revealed preference conditions are satisfied.

It can be instructive to have a closer look at the poverty lines. After all, poverty lines are not only useful to separate the rich from the poor, but also serve as deflators for cost-of-living differences, permitting interpersonal welfare comparisons when the cost of acquiring basic needs varies over time or space (Ravallion, 1998). Table 3 reports the utility consistent poverty lines we estimate using the 2012/13 UNHS based on the six different spatial domains<sup>10</sup>. The cost of living seems to be highest in Central region. The Western region comes in second. This is consistent with the findings of Appleton (2003) and Jamal (1998), and is caused by the low energy content and relative high price of matooke, a staple mostly grown and consumed in the West and Central regions. Households in the East, on the other hand, consume a lot of cassava, mostly in dried/flour form, which is only three times as costly, but more than 8 times as nutritious. While the 2012/13 poverty lines are directly derived from the 2012/13 UNHS, the poverty lines for the other years are simply deflated using the Consumer Price Index. Poverty lines are expressed in Ugandan shillings per person per day.

Let us now look at the evolution of poverty during the recent past. We will present two sets of results. The first set of results, reported in table 4, uses only one spatial domain. In other words, we estimate a single national poverty line based on a single national food basket<sup>11</sup>. We do this because, in a way, this would be the closest to simply updating the official poverty line, that is based on one single national consumption basket. Secondly, we will

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<sup>10</sup>The poverty lines in table 3 are aggregated to different spatial domains for the sake of comparison to official statistics. The underlying poverty lines for the six spatial domains are presented in table 10 in the appendix. It is not possible to directly compare the utility consistent poverty lines we estimate to the official poverty lines, since spatial price differences are not reflected in the poverty lines. Instead, the official poverty measures incorporate spatial price difference by adjusting the welfare indicator.

<sup>11</sup>This national poverty line was estimated to be 1233.42, see table 10 in the appendix.

Table 3: Utility consistent poverty lines based on UNHS 2012/13

	2005/06	2009/10	2010/11	2011/12	2012/13
national	929.34	1338.13	1425.52	1760.93	1860.54
urban	901.93	1298.66	1383.47	1708.99	1805.66
rural	1024.69	1475.43	1571.78	1941.61	2051.44
Central	1048.57	1509.80	1608.40	1986.84	2099.23
Eastern	798.40	1149.59	1224.66	1512.81	1598.39
Northern	914.35	1316.54	1402.52	1732.52	1830.52
Western	975.27	1404.26	1495.96	1847.95	1952.49
Kampala	1262.39	1817.68	1936.38	2392.00	2527.30
Central1	1013.24	1458.94	1554.21	1919.91	2028.51
Central2	1020.24	1469.02	1564.95	1933.17	2042.53
East Central	803.39	1156.78	1232.33	1522.28	1608.39
Eastern	794.83	1144.45	1219.19	1506.05	1591.25
Mid-North	917.31	1320.81	1407.07	1738.14	1836.46
North East	911.04	1311.78	1397.45	1726.26	1823.91
West Nile	910.74	1311.34	1396.98	1725.68	1823.30
Mid-West	975.58	1404.72	1496.45	1848.55	1953.12
South-West	974.96	1403.82	1495.50	1847.38	1951.88

Table 4: Poverty headcounts 2002-2012 using one spatial domain

	2005/06		2009/10		2010/11		2011/12		2012/13	
	P0	contr	P0	contr	P0	contr	P0	contr	P0	contr
national	0.216	1.000	0.200	1.000	0.207	1.000	0.157	1.000	0.136	1.000
rural	0.250	0.965	0.229	0.963	0.232	0.962	0.179	0.951	0.159	0.900
urban	0.046	0.035	0.047	0.037	0.056	0.038	0.045	0.049	0.060	0.100
Central	0.103	0.148	0.082	0.127	0.048	0.059	0.022	0.031	0.024	0.046
Eastern	0.223	0.257	0.200	0.244	0.248	0.321	0.186	0.379	0.165	0.352
Northern	0.488	0.390	0.385	0.346	0.300	0.335	0.286	0.382	0.336	0.512
Western	0.164	0.205	0.212	0.283	0.240	0.285	0.129	0.207	0.051	0.090

present results for an analysis that uses the six spatial domains mentioned above (Kampala, Rural Central, Rural East, Rural North, Rural West and Other Urban). The results are reported in table 5.

Poverty headcounts using one spatial domain as reported in table 4 are much lower than the official headcounts reported in table 2. For instance, the national estimate in 2005/06 is about 10 percentage points lower than the official estimates. However, the reduction in poverty between 2005/06 and 2009/10 (7.4 percent) is much smaller than in the official figures (more than 20 percent). There is a slight increase in poverty in 2010/11, but national headcount poverty falls to about 16 percent in 2011/12<sup>12</sup>. Overall, the reduction in poverty between 2005/06 and 2012/13 was about the same then in the official figures at around 37 percent, most of this coming about in the two last years of the panel. The spatial patterns are the same, as both these and the official estimates are based on a single poverty line.

<sup>12</sup>While part of the increase in 2010/11 is likely caused by the increase in food prices, data problems provide an additional explanation. For instance, simple counts of how many households report consuming a particular commodity point to some severe problems. In 2010/11 only about 300 household report consuming sweet potatoes, while this is around 1400 in the other rounds. For cassava, in 2010/11 only 562 household report consumption, versus again about 1400 in all other rounds of the UNPS.



The national poverty headcounts are much higher than the official ones if we use six spatial domains (table 5). While Daniels and Minot (2014) argue that the original 1993 poverty lines may have increased too little to keep pace with inflation and that differences in the measurement of consumption have may contribute to the underestimation of poverty, we find that consumption bundle aggregation also seems to depress poverty figures. The reductions in poverty also seem more modest than the official ones, with an overall reduction in poverty between 2005/06 and 2012/13 of about one quarter. We also see that the largest reduction the number of people living below the poverty line happened between 2011/12 and 2012/13. However, if we look at the evolution of the poverty gap (as reported in table 11 in the appendix), the largest reduction is between 2010/11 and 2011/12. This suggests quite some mobility below the poverty line between 2010/11 and 2011/12.

If we disaggregate between rural and urban poverty, we see that most of the poverty reduction has been happening in rural areas. Over the years, poverty in rural areas has steadily fallen from almost 50 percent to 36 percent. This is different from what has been happening in urban areas. While between 2005/06 and 2010/11 urban poverty was on the decline, it started rising again afterwards. A marked acceleration in urban poverty between 2011/12 and 2012/13 together with a steady decline in rural poverty reduced the contribution of rural poverty to overall poverty from about 94 percent to 88 percent in 2012/13. The evolution of official figures are in line with our findings, except that we find a much stronger rebound of urban poverty.

Finally, we disaggregate poverty by region. We find that in the Northern region, which is the poorest, poverty has by 15 percent over the entire period. However, the evolution was far from linear. Especially between 2009/10 and 2010/11, there was a strong reduction in poverty. But since then, poverty in the North has been rising again. The tables in the appendix show that, especially in 2012/13, not only headcount poverty, but also the poverty gap and the severity of poverty has been increasing. Official poverty figures report

a reduction of 28 percent between 2005/06 and 2012/13 in headcount poverty, very close to what we find using only one spatial domain (figure 4). The Western region is, just as in the official estimates, the second richest region. However, it is now 55 percent poorer than the richest region. This gap between the Western and Central region is significantly larger than in the official statistics, where poverty rates in the West are 33 percent higher than in the East. Thus, while we do not observe the changes in the rankings observed by Appleton (2003), our results are consistent with the finding that the West is poorer than official figures suggest.

The Central region, already the least poor region at the start of the panel, reduced headcount poverty by half between 2005/06 and 2012/13 according to our estimates using 6 spatial domains. Again, official estimates record higher poverty reductions (almost 70 percent), which is again similar to what we find in our estimates using only one spatial domain. Inequality in poverty headcount has also increased over time. While the North initially contributed 27 percent to overall poverty, this has increased to 37 percent in 2012/2013. The contribution of the East also has increased substantially. And while severity of poverty has reduced in the North, in 2012/13, almost 60 percent of the national severity of poverty measure was contributed by the North. If we disaggregate the 2012/13 data further, we find that most poverty is found in the North East, where over 80 percent of the individuals live in poverty. This is followed by West Nile, a distant second with 60 percent of the population living in poverty.

To summarize, we feel that the poverty measures and the evolution of poverty over time are much more credible, both from a theoretical and empirical point of view. The continued use of outdated poverty lines based on a single food basket is likely to lead to inconsistent poverty estimates, especially in a country where different regions have widely varying diets. Indeed, most of the staples in these diets are effectively non-tradables, deriving their price from local demand and supply conditions. The result is that the cost of

Table 5: Poverty headcounts 2002-2012 using six spatial domains

	2005/06		2009/10		2010/11		2011/12		2012/13	
	P0	contr	P0	contr	P0	contr	P0	contr	P0	contr
national	0.423	1.000	0.381	1.000	0.370	1.000	0.359	1.000	0.315	1.000
rural	0.476	0.938	0.431	0.951	0.413	0.959	0.408	0.943	0.360	0.879
urban	0.158	0.062	0.117	0.049	0.108	0.041	0.121	0.057	0.167	0.121
Central	0.291	0.213	0.231	0.187	0.143	0.098	0.146	0.089	0.149	0.123
Eastern	0.374	0.219	0.295	0.188	0.389	0.282	0.379	0.337	0.355	0.328
Northern	0.670	0.273	0.603	0.285	0.489	0.306	0.529	0.308	0.567	0.374
Western	0.463	0.295	0.485	0.340	0.473	0.314	0.379	0.266	0.231	0.175

basic needs, even though anchored in a single caloric requirement, may vary significantly. We also feel that the poverty levels, as well as the estimated reduction in poverty, are closer to what other researchers have deemed more realistic.

## A Profile Based on Poverty Dynamics

Now that we developed a new set of poverty lines above, in this section, we will use the Uganda National Panel to construct profiles for different categories of household based on the evolution of their poverty status over time. We will start by defining 5 different categories. The first category consist of households that are identified as being poor in all of the four waves of the UNPS. We will refer to these households as the *chronic* poor. Secondly, we will identify the households that were never poor in any of the waves. These households will be grouped in the *non-poor* group. Next, we delineate a group of households that are *escaping* poverty. These are households that are poor in all past waves, but non-poor in all subsequent waves<sup>13</sup>. A fourth

<sup>13</sup>This group comprises households that are poor in 2005/06 and non-poor in all subsequent rounds, those that are poor in 2005/06 and 2009/10 and non-poor in 2010/11

group will then consist of those households that are *falling* into poverty. These are households that are non-poor in all past waves, but poor in all subsequent waves<sup>14</sup>. Finally, there is a rest category, where households are poor in some past waves and/or poor in some subsequent waves. These households, repeatedly moving in and out of poverty, are labeled as *vulnerable* in our analysis.

Looking at poverty transitions using the above typology, we find that only about 257 of the 2195 households that appear in all four waves are poor in each wave. This amounts to only 11.7 percent of the households being chronic poor. However, if we weigh these households by population weights, the number of chronic poor individuals increases to 12.3 percent. This suggests that the chronic poor tend to live in larger households. At the other extreme, we find that 833 households or 37.9 percent of the households are never poor, corresponding to about 35.8 percent when using weights. 387 households have escaped poverty and 198 have fallen into poverty, corresponding to 19.0 and 8.2 percent of the population, respectively. Finally, there is a sizable class of about 520 vulnerable households, or almost a quarter of the population, that moves in or out of poverty, possibly multiple times, over the 4 waves.

We will now relate these four categories of households to various household characteristics, to come up with a profile, similar to poverty profiles in a static analysis of poverty. Since we are interested in the likely causes of poverty transitions (as opposed to the likely consequences of poverty transitions), we will look at characteristics of the household at the first wave of the panel, i.e. in 2005/06. In other words, the profile will help us understand why households have fared differently in terms of poverty status because of a different past. As such, we will also concentrate on characteristics that

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and 2011/12, and those that are poor in 2005/06, 2009/10 and 2010/11 and non-poor in 2011/12.

<sup>14</sup>This group comprises households that are non-poor in 2005/06 and poor in all subsequent rounds, those that are non-poor in 2005/06 and 2009/10 and poor in 2010/11 and 2011/12, and those that are non-poor in 2005/06, 2009/10 and 2010/11 and poor in 2011/12.

change only slowly over time, as opposed to for instance crops cultivated, which may change significantly from year to year. In a way, we want to identify the preconditions at the household level associated with different poverty transition trajectories.

## **Location**

Location and well-being are often found to be correlated. In virtually all cases, poverty is found to be higher in rural areas than in urban. More in general, remote areas tend to be poorer for a myriad of reasons. For instance, one prominent economic reason is that in sparsely populated areas with a thin road network that is often in a bad shape, transaction costs are high, affecting economic activity (Stifel and Minten, 2008). Dercon, Hoddinott, and Woldehanna (2012) find that chronic poverty in Ethiopia is significantly correlated to “remoteness” in terms of distance to town or poor roads. But Bird, McKay, and Shinyekwa (2010) note that agro-ecology; institutional, political and governance failures; service delivery; stigma and exclusion; crime and insecurity; and communication, media and information and communication technologies are all factors that are mediated by remoteness as such likely to contribute to special poverty traps.

We first look at the location of households in the 5 classes in terms of being in urban or rural areas. Of all the chronic poor, 97.7 percent live in rural areas. Of all the non-poor, this is only 71.9 percent. For Uganda as a whole, 86.7 percent reports to be living in rural areas. Going one step further, we look at the three groups by region. This is visualized in the mosaic plot in figure 1. The figure clearly shows that chronic poverty is concentrated in the North. Here, 45.5 percent of all the chronic poor can be found. On the other end, the households that never experienced poverty are disproportionately located in the central region: more than 44 percent of the people that are always above the poverty threshold live there. If one lives in the Eastern region, one has a relatively higher chance of falling

into poverty. People living in the Western region seem to be moving in and out of poverty more than people living in other regions. While the North has a large group of chronic poor, the good news is that the relative share of people escaping poverty is larger than the share that fall into poverty. This is different in the East, where the large share of individuals sliding into poverty happens simultaneously with relatively few people escaping poverty. Finally, it is worth noting that, despite the already high presence of non-poor in the Central region, many poor households have escaped poverty over time and very few households have slipped back into poverty.

As mentioned above, location also affects access to services, such as safe drinking water. Figure 2 provides kernel density plots for time reported to fetch drinking water including waiting time. You can see that respondents cluster their answers around 2 hours and 4 hours. We find that in general, the non-poor need to spend less time fetching water, except maybe for some non-poor that spend about 2 hours. The median for the non-poor is about 50 minutes, as opposed to about 60 minutes for the chronic poor. The respective means are 63 minutes for the non-poor and 77 for the poor. This is also illustrated by the fact that the chronic poor have higher densities at the extreme right of the distribution, for instance around 4 hours or 240 minutes. The vulnerable have a high density around 2 hours.

## **Household demographics**

The size and composition of the household are also variables that often feature in poverty regressions. For instance, many studies find that household size is a good poverty indicator. It is thought that increased competition for a given food stock reduces consumption. However, Lanjouw and Ravallion (1995) argue that the negative correlation disappears as one takes economies of scale in household food consumption into account. In terms of production, a larger household may mean more and cheaper labour is available, but Van Campenhout (2014) finds that especially mothers in larger households devote

Figure 1: Regional Poverty Dynamics

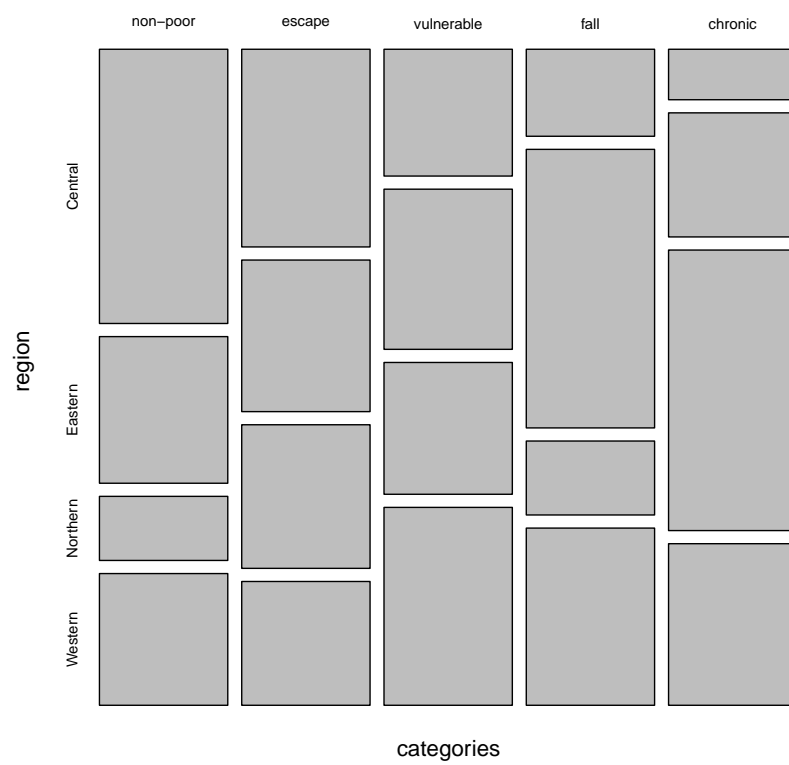
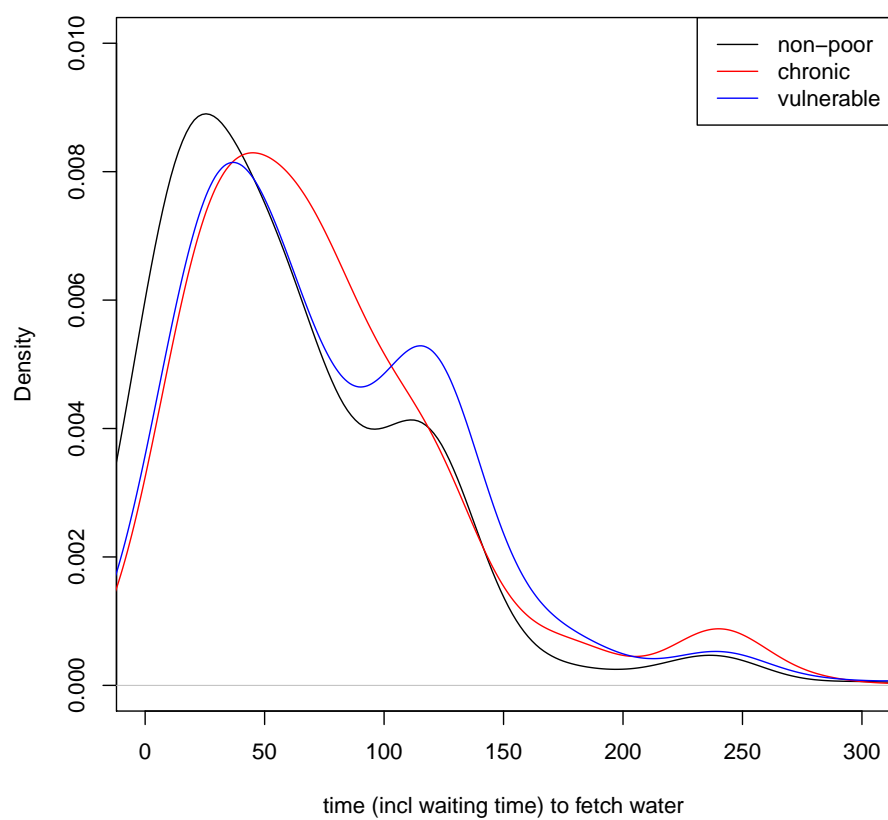


Figure 2: Time to fetch water





a significant amount of time to non-productive activities. This last feature may be captured better when using relating the different types of household in terms of poverty dynamics to dependency ratios.

Female headedness is also often found to be a good predictor of poverty. The underlying reasons should be sought in differences between male headed and female headed households in terms of access to secure land tenure, labour, credit, technology and extension services (eg. Quisumbing and Pandolfelli, 2010). One of the consequences is that female headed households employ less inputs, such as improved seeds and fertilizer, which has been shown to reduce productivity (eg. Udry, Hoddinott, Alderman, and Haddad, 1995). We will also look at marital status as an alternative way to look at gender based agricultural gaps. This will enable us to see if, for instance, widowhood is associated with chronic poverty (van de Walle, 2013).

We find that indeed, chronic poor households are more likely to be headed by a female. In addition, household that were never poor in our panel, as well as households that are escaping poverty over time are more likely to be headed by a male. For the other categories, we do not find big differences between male and female headed households. We also looked at the age of the household head. We find that average age of the household head is around 40 for households that are chronic poor or have been sliding into poverty. Households that have never been poor or that have moved out of poverty are on average about 4 years older.

Figure 3 gives an idea of the distribution household size and child dependency ratios conditional on what poverty dynamics group the households are in. In the left panel (1), we plot boxplots for household size for each of the 5 poverty dynamics classes. In the right panel (2) we do the same for child dependency ratios. For each household we calculate the share of children under the age of 15 within the total household and use this to plot boxplots by poverty dynamics category. We find that higher child dependency is associated with chronic poverty, while the non-poor have the lowest median child

dependency ratio. Looking at both of the charts together, the chronic poor have relatively large households and high dependency ratios. Those that are never poor have small households and low dependency ratios. Households that slide below the poverty threshold and those that are vulnerable have a surprisingly high dependency ratio given the relatively smaller households. These may be households where one of the parents has died, or has left the households. Large households with a high dependency ratio also escape poverty. These may be households that start to benefit from the additional cheap labour provided by children.

For marital status of the household head, respondents could choose out of 5 mutually exclusive types of marriage: married monogamously, married polygamously, divorced, widow/widower and never married. The results are presented as a table of proportions where the rows sum to 1 (table 6). This allows us to judge the fraction of the total in each type of marriage accounted for by each of our poverty transition groups. Thus, although the chronic poor account for only about 12.3 percent of the population, they account for almost 20 percent of individuals living in households where the head has never been married. However, at the same time households where the head is never married are clearly more likely to be non-poor, as are households where the head has divorced. We also see that widowed households are underrepresented in the non-poor segment. In addition, households headed by widows appear to have a hard time keeping consumption smooth, as is evident by the large proportion classified as vulnerable. Divorced household heads have been more successful in moving out of poverty, and are underrepresented in the group of chronic poor households. Polygamously married households have been less successful in escaping poverty. Just as widowed household heads, they seem to have a hard time keeping consumption smooth between the different years.

Figure 3: Household Size and Child Dependency Ratios

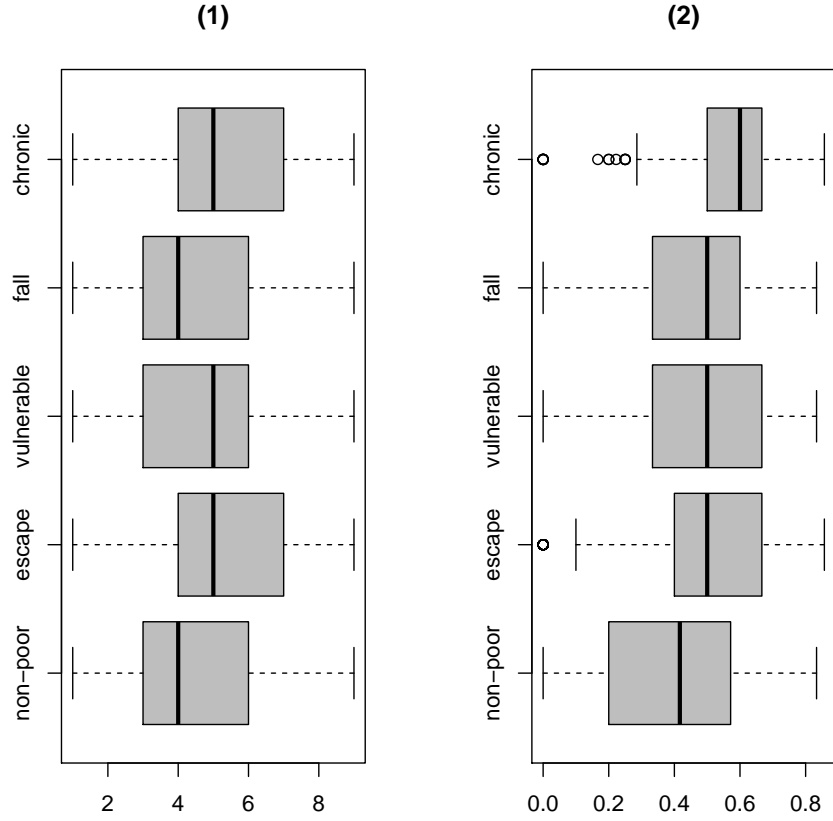


Table 6: Marital status

	Non-poor	escape	vulnerable	fall	chronic
married monogamously	0.367	0.192	0.230	0.086	0.125
married polygamously	0.348	0.152	0.299	0.081	0.119
divorced	0.420	0.238	0.169	0.077	0.096
widowed	0.272	0.246	0.293	0.071	0.118
never married	0.517	0.125	0.139	0.029	0.190
all	0.358	0.190	0.247	0.082	0.123

Table 7: Most important source of earnings

	Non-poor	escape	vulnerable	fall	chronic
subsistence farming	0.257	0.211	0.293	0.089	0.150
commercial farming	0.563	0.160	0.258	0.019	0.000
wage employment	0.513	0.145	0.152	0.094	0.097
non agricultural enterprises	0.535	0.159	0.160	0.060	0.086
property income	0.865	0.035	0.037	0.064	0.000
transfers	0.555	0.207	0.168	0.048	0.021
organizational support	0.172	0.132	0.290	0.057	0.349
all	0.358	0.190	0.247	0.082	0.123

### Activity

Table 7 looks at what households report to be their major source of earnings at the beginning of the panel. While in general 35.8 percent of Ugandans fall in the non-poor category, only 25.7 percent of the Ugandan subsistence farmers is in the non-poor sub-group. It seems the group of vulnerable households is disproportionately represented within the group of subsistence farmers. Subsistence farming is indeed a very risky activity and subsistence farmers have little assets to insure against adverse shocks such as bad weather outcomes or disease. Individuals that are living in households that report to be engaged in commercial farming appear to be more likely to be non-poor. Wage employment also seems to be an activity that is prevalent among the non-poor. But among the wage employed, there is also an over-representation in the group of people that have fallen into poverty.

Ugandans engaged in non-agricultural enterprises are also likely to fall into the non-poor category. The most clear results are for those who mention their main source of income is property, virtually all are non-poor. People that depend on transfers are also non-poor. Transfers are likely to correlate with social capital, hence the lower probability that households fall into the vulnerable group or in the group that falls into poverty. Finally, there was

a significant group of people that reported to be depending on hand-outs. As expected, these are especially the chronic poor or individuals that are vulnerable. It is, however, also interesting to note that 17.2 percent of the individuals that report organizational support as their main source of income are never poor in the 4 wave panel.

## **Education**

In traditional poverty profiles, the education level of the household head is often significant. Indeed, skills are important for the self-employed, and schooled labor is likely to be better rewarded. It is less obvious how schooling affects poverty dynamics in the short run. Lack of education has been linked to intergenerational poverty (Harper, Marcus, and Moore, 2003). Education is also among the initial characteristics associated with chronic poverty in rural communities in Ethiopia (Dercon, Hoddinott, and Woldehanna, 2012).

Table 8 looks at the highest education level reported by the household head. We see that 17.6 percent of all Ugandan household heads have never attended school. However, within the group of individuals in households that have always been poor, the share of households that are headed by someone without formal education is 37 percent. On the other hand, the share of household with heads without schooling in the sub-group of the non-poor is only 7.8 percent. In the second row, we see that the majority of household heads have finished primary education. Primary education also seems insufficient to keep the household permanently out of poverty. Everything above primary education leads to a higher than average chance to be in the non-poor class.

## **Health**

Illness and health shocks have been reported to affect poverty dynamics. For instance, Barrett, Marennya, Mcpeak, Minten, Murithi, Oluoch-Kosura, Place, Randrianarisoa, Rasambainarivo, and Wangila (2006) note that seri-

Table 8: Education of household head

	Non-poor	escape	vulnerable	fall	chronic	all
no schooling	0.078	0.190	0.227	0.142	0.366	0.176
primary	0.425	0.648	0.627	0.642	0.583	0.554
post primary training/certificate	0.085	0.026	0.024	0.032	0.010	0.045
secondary	0.297	0.119	0.114	0.175	0.041	0.177
post secondary training/certificate	0.086	0.016	0.006	0.009	0.000	0.036
above	0.029	0.000	0.002	0.000	0.000	0.011

ous human health shocks causing permanent injury or illness or death were amongst the most frequently cited reasons for households falling into poverty in quantitative data from Madagascar and Kenya. But the bidirectional nature of the poverty relationship between poverty and health may trap households in persistent poverty, as ill-health can be a catalyst for poverty spirals and in turn poverty can create and perpetuate poor health status (Grant, 2005).

Health status is likely to be a function of the distance the nearest health facility. Figure 4 reports on distance to nearest health facility. By health facility we mean either a private clinic, a government or NGO health unit or hospital. There seems to be some pattern in the data. Households that are never poor in any of the waves of our panel reported lowest median distance to health facilities. At the other extreme, we find that households that live in chronic poverty reported highest median distance to health facilities. Distance to health facilities likely reflects location, as we have seen that the chronic poor tend to live in more remote areas.

Figure 5 looks at average days that household heads reported being inactive due to illness in the last six month in the 2005/06 UNPS wave conditional on subsequent poverty transitions. For most of the categories, the number of days lost is on average about 8.5 days. We see that people that have lost relatively few days due to illness are more likely to be in the sub-group that subsequently escapes poverty. On the other hand, the households that

Figure 4: Distance to health infrastructure

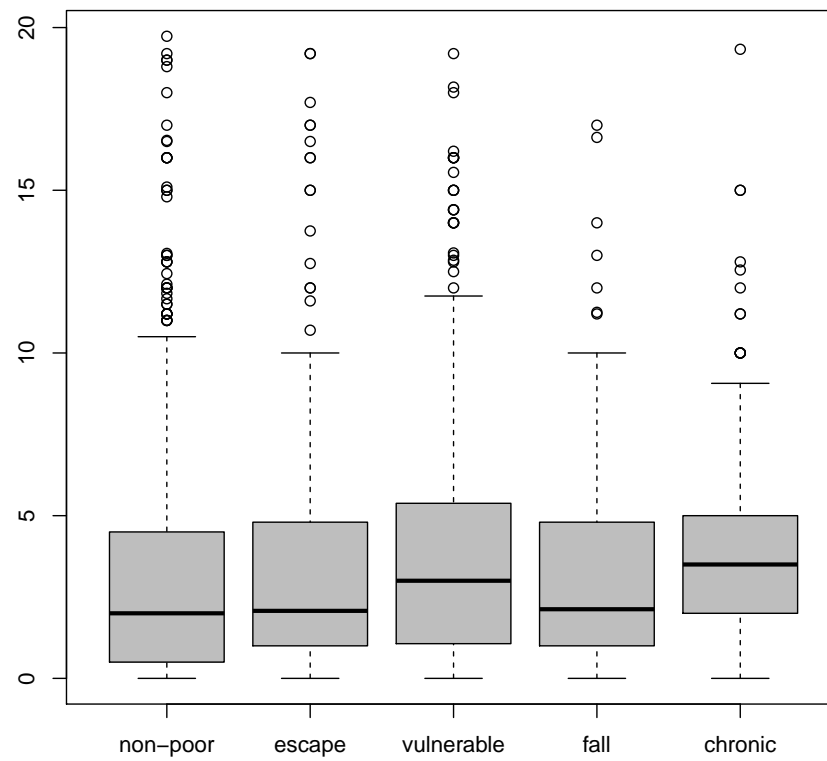
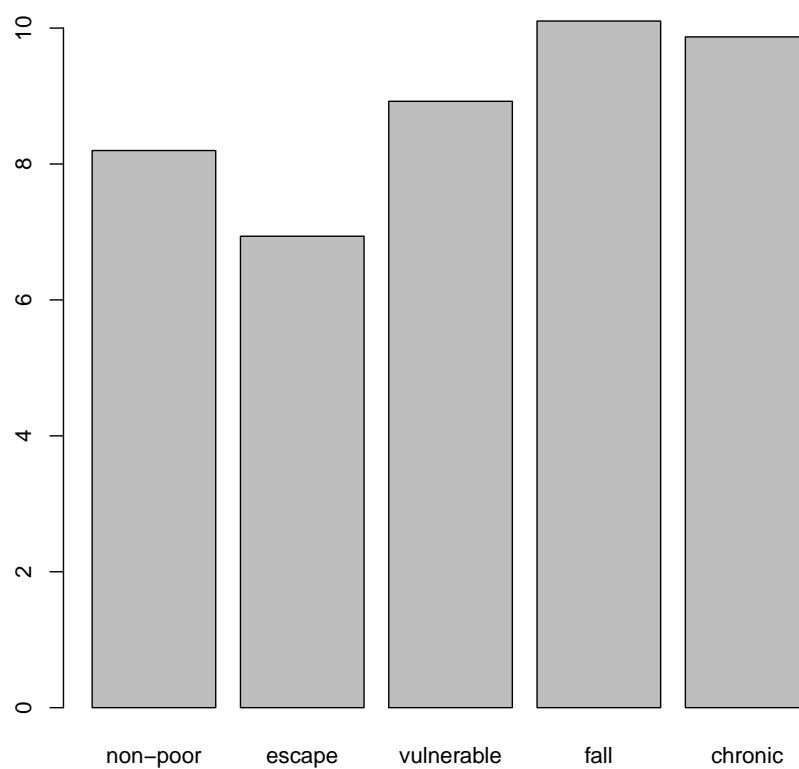


Figure 5: Days inactive



report the highest number of days lost by the household head due to illness are those that are in the sub-group of households that eventually fall into poverty or are living in chronic poverty.

### Shocks and Coping

The poor are known to be more vulnerable to shocks, due to their lower ability to insure (Dercon, 2004). Shocks can have lasting effects if they destroy productive assets, such as when droughts reduce livestock, or health shocks



that destroy human capital. If households are left with too few productive assets to replenish the gap left by shocks, they are likely to fall into an asset based poverty trap (Carter and Barrett, 2006). We also look at how the households deal with shocks ex-post conditional on their wealth dynamics category.

Table 9 look at shocks reported at the onset of the panel. We again report column percentages. Hence, while 35 percent of all shocks are drought related, this increases to almost 40 percent in the group of the chronic poor. Still, drought also features prominently in the group that subsequently escapes poverty. While there is a substantial share of the non-poor that report to have been exposed to drought shocks, the share is about 5 percentage points lower than the overall share that reports drought related shocks. Floods, hailstorms and also pest reports do not seem to differ too much between the different groups.

Bad seed quality is reported more amongst the non-poor than average. This may be because especially farmers that are always above the poverty line are more commercially oriented and buy seeds, instead of recycling seeds. As such, they are also more prone to counterfeit seeds. But probably the most significant result in this table is the disproportionate number of people within chronically poor households that report being affected by civil strife. Poverty that is associated to civil war seems to be very persistent (Goodhand, 2003). The non-poor clearly faced different shocks. They report more than average losses related to robbery and theft. This category also shows up relatively more in the category of households that slide into poverty. The death of a family member is also disproportionately mentioned amongst those that fall into poverty over the period covered by the panel.

Finally, the dotchart in figure 6 shows how the different categories of households reportedly dealt with shocks. The top of the chart shows that the non-poor most often used savings to cope with shocks. This is also reported as a main source of ex-post insurance for a substantial part that have slid into

Table 9: Shocks

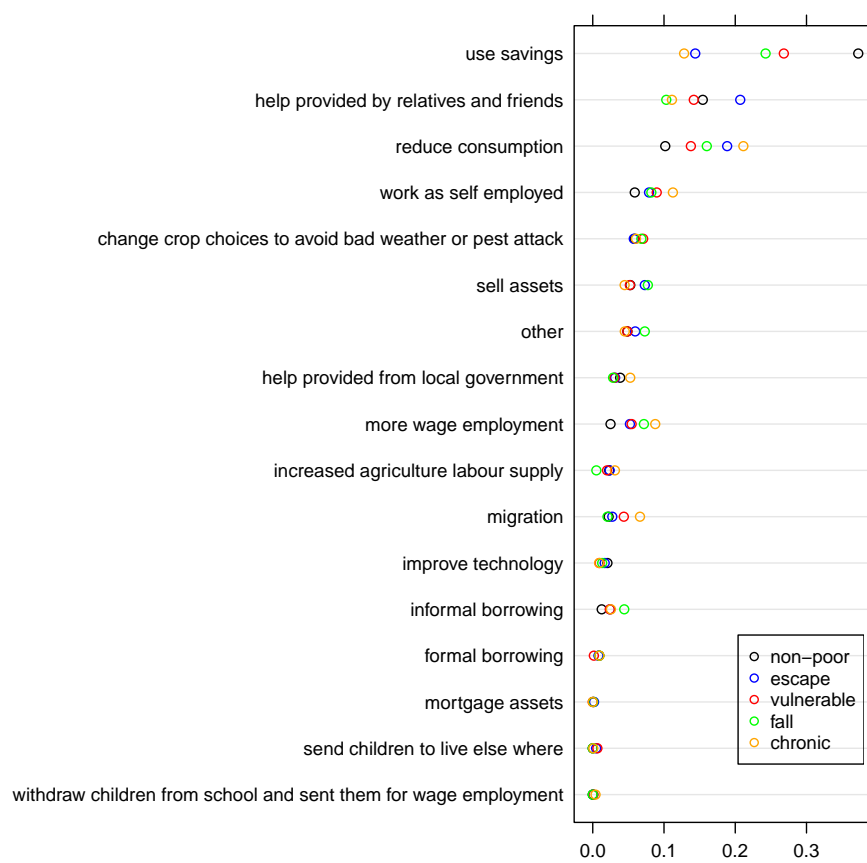
	Non-poor	escape	vulnerable	fall	chronic	all
drought	0.302	0.383	0.369	0.350	0.388	0.350
floods/hailstorm	0.125	0.135	0.136	0.114	0.129	0.129
pest attacks	0.098	0.086	0.084	0.098	0.082	0.090
bad seeds quality	0.035	0.011	0.023	0.021	0.018	0.024
livestock epidemic	0.065	0.067	0.042	0.047	0.061	0.057
fire accident	0.018	0.021	0.036	0.024	0.038	0.027
civil strife	0.037	0.059	0.074	0.051	0.123	0.064
robbery/theft	0.102	0.055	0.075	0.098	0.063	0.081
death of the head of the household	0.022	0.041	0.023	0.028	0.023	0.026
death of other family member	0.139	0.097	0.107	0.123	0.038	0.108
injury from accidents	0.033	0.011	0.010	0.024	0.010	0.019
other	0.024	0.032	0.020	0.021	0.025	0.024

poverty over the course of the panel. The chronic poor deal in a completely different way with shocks. For instance, they can not rely on savings to deal with shocks. Instead, the poor seem to rely on employment and migration, but most of all simply have no choice but to reduce consumption. The graph also shows the importance of social capital to deal with shocks for vulnerable households. There is also some indication that informal borrowing during the first round of our panel is associated to an increase in the chance that households descend into poverty.

## Conclusion

In this paper, we re-assess the evolution of poverty over the past 10 years in Uganda. Official figures suggest substantial poverty reduction, but independent researchers note that the benefits of economic growth have been shared unequally. In addition, casual observation does not correspond to the rosy picture that official figures suggest. Other indicators that define well being in a broader way, such as adult literacy and maternal health, also put Uganda at

Figure 6: Coping with Adverse Shocks



a much lower level than what would correspond to the disseminated poverty levels.

One possible explanation for this divergence lies in the poverty line. The poverty line that is currently in use to estimate official poverty in Uganda has been constructed over a decade ago, using data from a 1993/1994 survey. In addition, this poverty line relies on a single food consumption basket for Uganda, despite the fact that Uganda consists of a diverse set of regions, each with their own diets. These diets are also exceptional in their difference in cost to obtain a certain level of kilo-calories (or utility of that matter). Lumping all regions together and assuming they require the same amounts of each commodity disregards the cultural and agro-climatic diversity that typifies Uganda.

We therefore follow Arndt and Simler (2010), who propose an information-theoretic approach to constructing utility consistent poverty lines. The idea is to construct different poverty lines by spatial (or temporal) domain that yield a minimal amount of kilo-calories given the demographic make-up of the region. These poverty lines are then tested to check if they obey revealed preference conditions. In particular, we check if the food baskets chosen in all other regions are less expensive than the food basket chosen in a particular region. If not, the individual could have chosen a cheaper basket that yields the same utility. This violates the revealed preference condition. We apply an information-theoretic approach that adjusts consumption shares such that this revealed preference condition is satisfied, while keeping the original diets in tact as much as possible.

We feel that the poverty estimates using poverty lines that reflect local diets are more realistic than the official ones. For instance, they are much more consistent to other non-monetary indicators. A case in point is the nutritional status of children. According to the Uganda Demographic Household Survey 2011, height-for-age scores are worst in the West, except for the Karamoja region. Ssewanyana and Kasirye (2010) also finds that the highest rates of

stunting are in the South-West sub-region. This at least indicates that the situation in terms of poverty is less rosy than official figures suggest.

While our analysis shows the situation has improved over time in the North, a disturbingly large proportion of the chronic poor remain. In addition, there is also a substantial proportion of vulnerable household residing in the North. The use of utility consistent poverty lines that are allowed to differ in terms of diet by geographic location also point to substantial poverty in the Western region. The fact that in this region, relatively few households are escaping poverty and relatively more households are falling into poverty needs attention. This is in stark contrast to the Central region, where, despite the already high presence of non-poor, many poor households have escaped poverty over time and very few households have slipped back into poverty.

Turning to household demographics, we find that chronic poor households are more likely to be headed by a female. In addition, household that were never poor in our panel are more likely to be headed by a male. Higher child dependency is associated with chronic poverty, while the non-poor have the lowest median child dependency ratio. Despite the relatively low household size, it now seems that the households that slide below the poverty threshold have a surprisingly high dependency ratio. These may be households where one of the parents has died, or has left the households. We also see that widowed households are underrepresented in the non-poor segment. In addition, households headed by widows appear to have a hard time keeping consumption smooth, as is evident by the large proportion classified as vulnerable. Households where the head is never married are clearly more likely to be non-poor. Divorced household heads have been more successful in moving out of poverty, and they are also more likely to be non-poor. Polygamously married households have been disproportionately sliding into poverty and are also slightly more likely to be chronic poor.

If we look at the main source of income at the start of the panel, we find

a significant group of people that reported to be depending on hand-outs. As expected, these are especially the chronic poor or individuals that fall into poverty. It seems the group of vulnerable households is disproportionately represented within the group of subsistence farmers, underlining the riskiness of rain-fed agriculture. Ugandans engaged in commercial agriculture or non-agricultural enterprises are also likely to fall into the non-poor category.

We then look at education and health. We find that households that live in chronic poverty reported highest median distance to health facilities. Distance to health facilities likely reflects location, as we have seen that the chronic poor tend to live in more remote areas. Another striking feature is long periods of illness (in terms of days lost due to illness) are correlated with sliding into poverty. Primary education of the household head alone also seems insufficient to escape poverty in the long run. Finally, we find some interesting results with respect to shocks and how households subsequently deal with these shocks. While the chronic poor have no other option than to reduce consumption, the non-poor draw on savings. Social networks also seem important for vulnerable households.

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## Appendix

Table 10: Utility Consistent Poverty Lines

	2005/06	2009/10	2010/11	2011/12	2012/13	foodshare
National	616.09	887.09	945.03	1167.38	1233.42	0.72
Kampala	1262.39	1817.68	1936.38	2392.00	2527.30	0.62
Central Rural	1029.78	1482.75	1579.58	1951.24	2061.62	0.68
Eastern Rural	765.61	1102.38	1174.37	1450.68	1532.75	0.71
Northern rural	900.38	1296.43	1381.09	1706.05	1802.56	0.72
Western Rural	973.32	1401.46	1492.99	1844.27	1948.60	0.72
Other Urban	983.16	1415.62	1508.07	1862.90	1968.28	0.69

Table 11: Poverty gap 2002-2012 using six spatial domains

	2005/06		2009/10		2010/11		2011/12		2012/13	
	P1	contr	P1	contr	P1	contr	P1	contr	P1	contr
national	0.143	1.000	0.133	1.000	0.131	1.000	0.106	1.000	0.092	1.000
rural	0.162	0.946	0.151	0.952	0.146	0.959	0.119	0.936	0.104	0.872
urban	0.047	0.054	0.040	0.048	0.039	0.041	0.040	0.064	0.051	0.128
Central	0.092	0.198	0.077	0.177	0.050	0.096	0.031	0.064	0.032	0.092
Eastern	0.101	0.175	0.090	0.165	0.107	0.219	0.092	0.279	0.085	0.270
Northern	0.302	0.364	0.242	0.327	0.197	0.347	0.193	0.381	0.221	0.499
Western	0.139	0.262	0.165	0.331	0.179	0.337	0.116	0.276	0.053	0.139

Table 12: Poverty severity 2002-2012 using six spatial domains

	2005/06		2009/10		2010/11		2011/12		2012/13	
	P2	contr	P2	contr	P2	contr	P2	contr	P2	contr
national	0.066	1.000	0.063	1.000	0.063	1.000	0.046	1.000	0.040	1.000
rural	0.075	0.949	0.072	0.951	0.071	0.962	0.051	0.929	0.045	0.867
urban	0.020	0.051	0.019	0.049	0.017	0.038	0.019	0.071	0.023	0.133
Central	0.041	0.191	0.036	0.174	0.026	0.106	0.010	0.049	0.011	0.075
Eastern	0.037	0.141	0.039	0.148	0.041	0.174	0.035	0.244	0.031	0.227
Northern	0.164	0.430	0.126	0.356	0.100	0.366	0.095	0.434	0.111	0.582
Western	0.058	0.238	0.076	0.322	0.091	0.354	0.049	0.273	0.019	0.116