Analysis of the Mismatch between Tanzania
Household Budget Survey
and National Panel Survey Data
in Poverty & Inequality Levels and Trends

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Abstract

This study carries out a thorough investigation of the potential sources of mismatch in poverty and inequality levels and trends between the Tanzania National Panel Survey and Household Budget Survey. The main findings of the study include the following. First, the difference in poverty levels between the Household Budget Survey and the National Panel Survey is essentially explained by the differences in the methods of estimating the poverty line. Second, the discrepancy in poverty trends can be mainly attributed to the difference in inter-year temporal price deflators, and, to a lesser extent, spatial price deflators. The use of the consumer price index for adjusting consumption variation across years would show a decline in poverty during the past five years for the Household Budget Survey and the National Panel Survey. Third, despite noticeable

differences in the methods of household consumption data collection, the Household Budget Survey and National Panel Survey show close mean household consumption levels in the last rounds, when using the consumer price index to adjust for inter-year price variations. Mean household consumption levels in the Household Budget Survey 2011/12 and National Panel Survey 2010/11 are comparable, and the mean consumption level in the National Panel Survey 2012/13 is around 10 percent higher. The difference is driven by higher levels of aggregate and food consumption by the better-off groups in the National Panel Survey. Fourth, the mismatch in inequality trends and pro-poor growth patterns between the two surveys could not be resolved and is a subject for further analysis.

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I. Background and Main Objectives

The official poverty figures announced by the Government of Tanzania in November 2013 revealed a decline in the basic needs poverty rate from around 34 percent to 28.2 percent between 2007 and 2012—this is the first significant decline the country has experienced during the last 20 years. This reduction in poverty has been confirmed in the recently published Poverty Assessment report for Mainland Tanzania. The report examined the recent trends in poverty and inequality and their determinants and explored the responsiveness of poverty reduction to economic growth using the Household Budget Survey (HBS) collected in 2011/12. The report shows that poverty dropped by approximately 1 percentage point per year between 2007 and 2011/12, and that inequality, measured by the Gini coefficient of real per capita monthly consumption, declined from around 39 to 36 during the same period. The report also found emerging signs of pro-poor growth, despite a persistently high number of people living in poverty.

However, the declining trend in poverty revealed by the HBS data is in contrast to the increasing trend that is observed using the National Panel Survey (NPS) data, which show an increase in poverty from 14.6 percent to 18.1 percent and subsequently to 21.2 percent between 2008/09, 2010/11 and 2012/13. The data also show a slight increase in inequality across the three rounds and do not support the pro-poor growth pattern revealed by HBS data. Although HBS is the official source for official poverty numbers, this mismatch in poverty levels and trends between the two surveys is puzzling.

The NPS is a national level longitudinal survey designed to collect data from the same households over time in an attempt to better track the progress of the National Strategy for Growth and Reduction of Poverty (MKUKUTA), understand the poverty dynamics and evaluate policy impacts. NPS is conducted every two years by the National Bureau of Statistics (NBS). Four waves have been conducted for the periods 2008/09, 2010/11, 2012/13 and 2014/15. While the official poverty numbers are based on HBS data, NPS remains very important for policy analysis of poverty reduction due to the longitudinal nature of the data that makes it a particularly attractive survey for studying poverty dynamics and transitions.

This study aims to carry out a thorough investigation of the potential sources of mismatch in poverty and inequality levels and trends between the NPS and HBS. The investigation will focus on the key candidate sources for the divergence between the two surveys. These include the methodological differences in the construction of the consumption aggregates and the estimation of the poverty lines,

the differences in the evaluation of temporal and spatial deflators, and the consistency of within-household spending and asset ownership trends with poverty trends. While these components will be the main focus of the report, other potential sources of divergence will also be examined, including the differences in survey design, methods of data capture (for example, diary versus recall), the length of the reference period, the number of consumption items and the degree of commodity details.

II. Poverty, Inequality and Distributional Pattern of Growth in HBS and NPS: Actual Situation

This section presents the levels and trends in poverty and inequality estimated using HBS 2007, HBS 2011/12 and the three NPS waves. Differences in the levels of poverty are expected across the surveys due to differences in survey collection methods and the methodological approaches used to measure poverty, i.e., the construction of the consumption aggregates, the price deflators applied, and the poverty line. All these issues are investigated in depth in section III. Meanwhile, this section also examines the differences in the Growth Incidence Curves (GIC) and pro-poor growth patterns between the HBS and NPS surveys.

A. Poverty trends

As shown in Figure 1, the poverty rates estimated using the NPS data are significantly lower than the poverty rates measured using the HBS data. The NPS data also indicate an increasing trend in poverty between 2008 and 2013, while the HBS data reveal a declining trend between 2007 and 2012.

Figure 1: Levels and trends for poverty between HBS and NPS in Tanzania Mainland

Source: HBS 2007 and 2011/12 and NPS 2008/09, 2010/11 and 2012/13.

Discrepancies in poverty incidence and trends are observed at the regional level. As shown in Table 1, the poverty level in the rural areas that was estimated using the NPS data is two times lower than that estimated using the HBS data, while the poverty incidence in urban areas measured using NPS is over three times lower than that estimated using HBS. In addition, HBS suggests a decline in poverty in all regions, while NPS indicates a decline in poverty only in Dar es Salaam (and Zanzibar).

Table 1: Poverty headcount by region (percent)

	HBS		NPS		
	HBS 2007	HBS 2011/12	NPS 2008/09	NPS 2010/11	NPS 2012/13
Tanzania	N/A	N/A	14.8	17.9	20.9
Tanzania Mainland	34.4	28.2	14.6	18.1	21.2
Rural	39.4	33.4	17.2	22.7	26.4
Urban	22.7	21.5	7.7	6.7	8.5
Dar es Salaam	14.1	4.0	1.0	1.4	0.6
Zanzibar	N/A	N/A	20.4	12.4	14.3

Source: HBS 2007 and 2011/12 and NPS 2008/09, 2010/11 and 2012/13.

B. Inequality trends

NPS and HBS data indicate important differences in inequality levels and trends. Although HBS 2007 and NPS 2008/09 show similar inequality levels with a Gini index of real per capita monthly

consumption estimated at around 38, the trend in inequality in subsequent years goes in opposing directions. HBS 2011/12 indicates a decline of inequality to around 36 while NPS 2010/11 suggests a stagnation of inequality and NPS 2012/13 indicates an increase in the Gini index to around 41.

**Figure 2: Levels and trends of inequality in Tanzania Mainland
(Gini index of monthly real consumption per capita)**

Source: HBS 2007 and 2011/12 and NPS 2008/09, 2010/11 and 2012/13.

At the regional level, both NPS and HBS reveal that inequality is higher in Dar es Salaam and secondary cities than in rural areas. HBS data suggest that the distribution of consumption equalized over time in all the regions, with the most substantial improvement occurring in the rural areas, as can be seen from the changing shape of the Lorenz curves in Figure 3. Much of the reduction in inequality seems to have been driven by an increase in the welfare share accruing to the poorest segment of the population, as the consumption share of the poorest quintile grew by more than 16 percent between 2007 and 2011/12, with an increase exceeding 20 percent in the rural areas.

Figure 3: Lorenz Curve and Inequality Coefficients by Region using HBS

In contrast, NPS data suggest a deterioration of the distribution of welfare particularly in the rural areas where inequality seems to have significantly increased between 2008 and 2013. As shown in Figure 4, the increase in inequality seems to have been driven by a deterioration of the consumption share accruing to the poorest population groups, which declined by around 12 percent at the national level and by 11 percent in rural areas. The consumption share of the poor seems however to have improved in the urban sector, particularly in Dar es Salaam where it increased by over 20 percent.

Figure 4: Lorenz Curve and Inequality Coefficients by Region using NPS

	2008/09				2010/11				2012/13			
	Gini	p90/p10	Income shares		Gini	p90/p10	Income shares		Gini	p90/p10	Income shares	
			Low. quintile	Top quintile			Low quintile	Top quintile			Low quintile	Top quintile
Mainland	38.2	5.2	6.9	45.6	38.6	5.4	6.8	46.1	40.8	6.2	6.1	47.4
Rural	31.9	4.1	8.2	40.5	32.7	4.2	8.0	41.0	35.2	4.7	7.3	42.8
Other urban	36.4	5.3	6.6	43.8	36.2	4.9	7.3	43.5	36.1	5.1	6.9	43.3
Dar es Salaam	35.7	5.4	6.7	42.1	33.4	4.5	7.8	41.4	32.7	4.1	8.1	40.9

Source: NPS 2008/09, 2010/11 and 2012/13.

C. Distributional pattern of growth

Using changes in household consumption as the measure of growth, this section examines whether both NPS and HBS support the emerging signs of “pro-poor” growth during the recent years. The Growth Incidence Curve (GIC) for HBS 2007–2011/12, which shows the percent change in average consumption for each percentile of the distribution, is downwardly sloped, indicating higher growth among the poorest (Figure 5). However, the pattern of real consumption growth using HBS differs from that using NPS as indicated by the upwardly sloped GIC for NPS 2008/09–2012/13 which suggests that the richer groups were the main beneficiaries of growth.

Figure 5: Growth Incidence Curves, HBS 2007–2011/12 and NPS 2008/09–2012/13

Source: HBS 2007 and 2011/12.

Source: NPS 2008/09 and 2012/13.

D. Comparison of HBS and NPS density functions

To further explore the differences in expenditures between NPS and HBS, we plot the kernel density functions of consumption expenditure of both surveys in Figure 6.a and Figure 6.b. Figure 6.a compares the kernel density of log real monthly consumption expenditure per adult equivalent of HBS 2007 and NPS 2008/09. The NPS 2008/09 density function is slightly to the right of the HBS 2007 density, indicating relatively higher consumption levels.² Figure 6.b compares HBS 2011/12 density with NPS 2010/11 and NPS 2012/13 densities. There appears to be no significant difference between HBS 2011/12 and NPS 2012/13 densities, but NPS 2010/11 lies significantly to the left, indicating lower welfare levels.

² Consumption levels have not been adjusted by temporal (between years) price differences.

Figure 6: Comparison of Kernel densities of Consumption Expenditure of HBS and NPS

Figure 6.a: Comparison of HBS 2007 and NPS 2008/09

Figure 6.b: Comparison of HBS 2011/12, NPS 2010/11 and NPS 2012/13

Source: HBS 2007 and 2011/12 and NPS 2008/09, 2010/11 and 2012/13.

The differences between the HBS and NPS data sets in poverty and inequality levels and trends as well as in the distributional pattern of growth are puzzling and deserve an in-depth investigation of the sources of such differences. The following sections will explore whether these discrepancies are due to differences in survey methods or to differences in the approaches used for the construction of the consumption aggregates, measurement of the poverty lines or estimation of the price deflators. We start by reviewing the survey methods, focusing on the method of data capture, length of reference period for reporting consumption and the level of commodity details. We then examine the approaches used to estimate poverty and consumption in both surveys and investigate how the estimates vary if the same approach is used in both data sets.

III. Comparison of HBS and NPS Survey Methods

The section reviews the differences between the HBS and NPS data sets in survey characteristics and methods of collecting consumption data.

A. Survey characteristics

Table 2 presents some general characteristics of both surveys including the date and duration of the fieldwork, sample size, and total (weighted) estimated population. The HBS has a large sample size and is restricted to the mainland, while NPS has a smaller sample size but covers the Zanzibar archipelago. However, eliminating Zanzibar from the comparative analysis does not induce significant differences in the results. The sample sizes in both the HBS and NPS are considered large enough to give reasonably precise estimates of poverty at the national level and by geographic domain (rural, other urban, and Dar es Salaam).

All surveys (the two rounds of the HBS and the three rounds of the NPS) relied on the 2002 Population and Housing Census to draw a sample of households (using the National Master Sampling Frame). However, in the HBS 2011/12 and the NPS 2012/13 *ex-post* weight adjustments were conducted based on the 2012 Population and Housing Census.

There appear to be important differences in the total weighted population size between the two surveys. HBS data show an increase of the total population size to from 38.3 million in 2007 to 42.3 million on the mainland in 2011/12 while NPS shows an increase from 35.4 in 2008/09 to 43.3 million in 2010/11 and then to 43.5 million in 2012/13. The 2012 Population and Housing Census showed that Tanzania had a population of 44.9 million, of which 43.6 million were on mainland Tanzania. This puts the HBS figures a little low relative to the estimated population figures from the census.

While the increase of the population of approximately 25 percent shown by the NPS data appears to be an overestimate, adjusting the NPS weights using a linear interpolation of population between the 2002 and 2012 census and re-scaling weights accordingly revealed only slight changes in the NPS poverty and inequality levels and no changes in the trends. This points to the need to further investigate this issue.

Also, there may be concerns about the potential effect of attrition in the panel surveys since non-random attrition can cause the survey samples to become unrepresentative of the general population over time. However, the attrition rates of 3 percent in NPS 2010/11 and 4 percent in NPS 2012/13 are too low to significantly bias poverty and inequality estimates and to affect their trend. It should be noted that the NPS used propensity score matching to address attrition by compensating for the lost households.

The HBS and NPS data were collected over a period of approximately 12 months, which excludes seasonality as a potential source of the mismatch in poverty and inequality indicators. While the survey years are relatively close, the advent of the financial crisis in 2008 might have induced substantial changes in household consumption patterns that may have been captured by NPS 2008/09 and NPS 2010/11, which could explain the increase of poverty between the two rounds.

Table 2: General survey characteristics

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
Survey design					
Field work period					
Start date	2007, month 1	2011, month 10	2008, month 9	2010, month 10	2012, month 10
End date	2007, month 12	2012, month 10	2009, month 10	2011, month 11	2013, month 11
Sample size: number of interviewed households					
Total	10,464	10,186	3,265	3,846	4,901*
Rural	3,273	4,130	1,751	2,053	2,712
Urban	3,735	3,040	480	634	854
Dar es Salaam	3,456	3,016	555	626	746
Zanzibar	0	0	479	533	589
Sample attrition (panel)	n.a.	n.a.	n.a.	3%	4%
Estimated population size					
Estimated population (Mainland)	38,289,599	42,270,137	35,372,530	43,340,580	43,530,654
Estimated population (including Zanzibar)			36,443,894	44,651,722	44,811,420

*The increase in the sample is due to tracking and interviewing household members from split households. About 96 percent of NPS 2010/11 households were successfully found and interviewed in 2012/13.

B. Consumption data collection methods

Table 3 compares the methods of consumption data collection between HBS and NPS. The two surveys diverge in several aspects, which induce fundamental differences in survey design, explained below, that are difficult to adjust *ex-post* and will remain present when comparing the two surveys' results.

Table 3: Comparison of the consumption data collection methods

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
Number of items	193 food items and around 250 non-food items	171 food items and over 300 non-food items	59 food items and 46 non-food items	59 food items and 46 non-food items	66 food items and 52 non-food items
Food products¹					
Capture method	Diary: 28 days	Diary: 28 days	Recall: 7 days	Recall: 7 days	Recall: 7 days
Food consumed outside home	-	Diary: 28 days (an additional diary completed only by adult household members)	Recall: 7 days	Recall: 7 days	Recall: 7 days (asked to all household members)
Valuation of consumption from own production	Using the household's estimate of the monetary value of the total quantity of food consumed	Using the household's estimate of the monetary value of the total quantity of food consumed	-	-	Using prices paid by households that purchased similar food items in the same month and in the same region or stratum
Distinguish between expenditure and consumption	No (hence cannot identify if a food item that was purchased was actually consumed)	Yes	Yes	Yes	Yes
Non-Food Products and Services²					
Clothing and footwear: # questions in recall	3 ³	70	-	-	6
Garments for men	Recall: 12 months	Recall: 12 months	-	-	Recall: 12 months
Garments for women	Recall: 12 months	Recall: 12 months	-	-	Recall: 12 months
Garments for children and babies	Recall: 12 months	Recall: 12 months	-	-	Recall: 12 months
Other articles and clothing accessories (caps, hats, turbans etc.)	-	Recall: 12 months	-	-	
Material/Fabric for clothing	-	Recall: 12 months	-	-	-
Footwear for men	-	Recall: 12 months	-	-	Recall: 12 months
Footwear for women	-	Recall: 12 months	-	-	Recall: 12 months
Footwear for children and babies	-	Recall: 12 months	-	-	Recall: 12 months

Housing and utilities					
# questions in recall	3	52	-	-	-
Actual rent	Recall: 1 month	Recall: 1 month	Recall: 1 month	Recall: 1 month	Recall: 1 month
Rental estimate for non-renters	Recall: 1 month	Recall: 1 month	-	-	Recall: 1 month
Utilities (TANESCO, phone, TV, waste, water, other)	-	Recall: 1 month	Recall: 1 month	Recall: 1 month	Recall: 1 month
Energy for heating/cooking	-	Recall: 3 months	Recall: 1 month	Recall: 1 month	Recall: 1 month
Building maintenance	Recall: 12 months	Recall: 12 months	Recall: 1 month	Recall: 1 month	Recall: 1 month
Housing equipment					
# questions in recall	6	41	-	-	-
Household durables	Recall: 12 months	Recall: 12 months	-	-	-
Furniture and furnishings	Recall: 12 months	Recall: 12 months	Recall: 12 months	Recall: 12 months	Recall: 12 months
Small household appliances	Recall: 12 months	Recall: 3 months	-	-	-
Expenditures on domestic workers	Recall: 12 months	Recall: 1 month	-	-	-
Linen, bed clothes, etc.	Recall: 12 months	-	Recall: 12 months	Recall: 12 months	Recall: 12 months
Health expenditures	Recall: 12 months (Households were asked about medical care costs for women, men and children)		Recall: 4 weeks (health costs lumped together)	Recall: 4 weeks (health costs lumped together)	Recall: 4 weeks (health costs lumped together)
# questions in recall	3	48	-	-	-
Pharmaceutical and other medical products	-	Recall: 1 month	-	-	-
Admissions to clinics, hospitals	-	Recall: 1 month	-	-	-
Out-of-hospital services, treatments	-	Recall: 1 month	-	-	-
Therapeutic appliances	-	Recall: 1 month	-	-	-
Transportation	Recall: 12 months (lump sum transportation costs)		Recall: one week (lump sum transportation costs)	Recall: one week (lump sum transportation costs)	Recall: one week (lump sum transportation costs)
# questions in recall	1	24	1	1	1
New vehicles	-	Recall: 12 months	-	-	-

Second-hand vehicles	-	Recall: 12 months	-	-	-
Vehicle registration	-	Recall: 12 months	-	-	-
Other expenses on vehicles (spare parts, fuel, parking)	-	Recall: 1 month	-	-	-
Public transport (road, railway, air, sea)	-	Recall: 1 month	-	-	-
Communication					
# questions in recall	1	5	2	2	2
Telephone, postage and communication costs ⁴	Recall: 12 months	Recall: 12 months	Recall: 1 month	Recall: 1 month	Recall: 1 month
Recreation and culture					
# questions in recall	1	20	-	-	-
TV/DVD/Hi-Fi/Cassette equipment and books	-	Recall: 12 months	-	-	-
Other leisure (purchases, rentals, entrance fees)	Recall: 12 months	Recall: 3 months	-	-	-
Education expenditures	Recall: 12 months ⁵		Recall: 12 months ⁶	Recall: 12 months ⁶	Recall: 12 months ⁶
# questions in recall	2	27	-	-	-
Education related expenses excluding registration fees	-	Recall: 3 months	-	-	-
Formal registration fees (private schools)	-	Recall: 12 months	-	-	-
Informal registration fees (private schools)	-	Recall: 12 months	-	-	-
Formal registration fees (public schools)	-	Recall: 12 months	-	-	-
Informal registration fees (public schools)	-	Recall: 12 months	-	-	-
Recreation and Culture	Recall: 12 months (lump sum)				
# questions in recall	-	10	-	-	-
Personal trips in Tanzania	-	Recall: 12 months	-	-	-
Business trips in Tanzania	-	Recall: 12 months	-	-	-

Personal trips abroad	-	Recall: 12 months	-	-	-
Business trips abroad	-	Recall: 12 months	-	-	-
Miscellaneous goods and services					
Miscellaneous other	Recall: 12 months	Recall: 1 month	Recall: 12 months	Recall: 12 months	Recall: 12 months
Fees and use charges	Recall: 12 months	Recall: 12 months	Recall: 12 months	Recall: 12 months	Recall: 12 months
Personal care	Recall: 12 months		Recall: 1 month	Recall: 1 month	Recall: 1 month

Notes: Number of households can differ slightly from official NBS publications.

¹ Diaries in the HBS 2007 always started at the beginning of the month, while diaries in the HBS 2011/12 were staggered across the months.

² The HBS 2007 and 2011/12 used the one-month diary (the same one used for food) to collect data on non-food expenditures during the implementation period of the diary. In addition, both surveys also contained a recall section. To avoid duplication of expenditures (under the diary and recall module) an effort was made in both years to exclude non-food items already recorded in the diary from the recall module.

³ In 2007, the questions were respectively phrased as follows: Clothing and footwear for men and boys 15+ years; clothing and footwear for women and girls 15+ years; and clothing for children under 15 years.

⁴ In HBS 2011/12, some communication costs such as landline and mobile phone charges were included under housing utilities. There some confusion in HBS 2007 between communications costs and purchase of communication equipment.

⁵ Households were asked to report the total expenditures for women's education and for men's education.

⁶ Households reported their expenditures on school fees, books and materials, uniforms, transport, extra tuition, other contributions, and the cost of meals.

The main differences between the HBS and NPS in consumption data collection methods can be summarized as follows:

i. "Recall" versus "Diary" method

Both the HBS 2007 and 2011/12 used a 28-day diary to collect data on food consumption. In 2007 the diary was administered for the whole month but at the analytical step this was adjusted to create expense values for 28 days. Diaries in the HBS 2007 always started at the beginning of the month, while diaries in the HBS 2011/12 were staggered across the months. In both surveys, each household member aged five years and above was asked to fill out a 'booklet' to record his/her daily transactions for consumption purposes, including consumption of own-produced items. Enumerators were then instructed to transcribe the data from these booklets into the main diary form (every other day). However, in practice this might not have happened in this manner since enumerators were expected to have worked with one household member every other day to fill in the main diary form directly (rather than transcribing the information from the booklets).

In contrast, the NPS uses a seven-day recall method to collect data on food consumption, asking the head of the household or their spouse to recall how much they consumed of various food items in the past seven days. According to a study by Beegle *et al.* (2012), the diary method produces lower food and total consumption aggregates, higher poverty levels and lower inequality levels, though the

variations reported in the study are not as important as those observed between the HBS and NPS data sets.

Food consumed outside the household is captured in the HBS through an additional diary filled in only by adult household members, while it is collected in the NPS by way of recall of the last seven days asked to all household members. The HBS 2007 does include the data on food consumed outside.

Non-food items were collected using both the diary and recall methods in the HBS, while in the NPS they were collected using the recall method only. To avoid the duplication of expenditures under the diary and recall module in the HBS, an effort was made in both years to exclude non-food items already recorded in the diary from the recall module. In 2011/12, interviewers were asked to carefully check potential duplication between non-food items reported in the recall and those recorded in the diary. Potential duplication was also carefully checked at the analytical stage during the evaluation of the welfare aggregates and poverty estimates. In the HBS 2007, interviewers were asked to “request details of irregular purchases of consumer durables and costs of other services during previous twelve months excluding the survey month”. Excluding the survey months from the recall most likely also intended to reduce double-counting. Potential duplication was also checked at the analytical stage following the same procedure as in 2011/12.

The HBS 2007 used a 12-month recall period for the collection of non-food items with the exception of rent, while the HBS 2011/12 used recall periods of 1, 3 and 12 months depending on the item (see Table 3). The NPS used a 12-month recall for some non-food items and recall periods of 1 and 4 weeks for others such as transportation, health and education. While changes in the recall period can affect the welfare and poverty estimates, the induced variations would not be expected to be as high as those observed above in Section II (see Beegle *et al.*, 2012).

ii. Evaluation of home-produced food

For many Tanzanians, particularly those living in the rural areas, most of their caloric intake comes from food that they produced themselves. The value of own-produced food is difficult to evaluate as its market price cannot be directly observed. Different methods have been suggested in the literature to estimate own-produced food values, each with its many pros and cons. In the HBS, the value of own-produced food is reported directly by the household. Respondents are asked to report a shilling value for all food consumed, whether it is purchased or produced at home. In the NPS, the valuation of own-produced food is based on the prices paid by the household for similar items in the same geographic stratum.

iii. Degree of commodity details

Another key difference between the two surveys arises from the degree of commodity details. The list of non-food items collected in the HBS is more extensive than in the NPS. This is particularly true for HBS 2011/12 where households were provided a very detailed list of the items to be reported in the recall module. For example, HBS 2011/12 solicited information for over 300 non-food items compared to the 52 non-food items solicited in NPS 2012/13.

According to Beegle *et al.* (2012), a more detailed commodity list is expected to lead to higher consumption aggregates and lower poverty levels, but the differences between HBS and NPS poverty measures is contrary to what should be expected as HBS poverty indicators are significantly higher than NPS indicators.

Further, it is worth noting that the HBS survey instruments have improved significantly over time, while there were no substantial changes in survey methods between the NPS waves except for a few additions in the questionnaire for the third round. Great attention is generally devoted to the supervision of the NPS. To ensure strict control over data quality during fieldwork, the NPS survey uses a smaller and more closely supervised group of enumerators. The survey uses mobile teams, each consisting of seven people (1 supervisor, 4 enumerators, 1 data entry operator and 1 driver). These mobile teams spend only a few days in each enumeration area or village. The HBS on the other hand, used locally recruited enumerators who resided in their respective survey areas year-round (i.e. resident enumerators). The HBS 2007 faced some supervision issues, but this problem was adequately addressed in 2011/12. There also have been substantial changes in the HBS design which can be summarized as follows:

Number of items and aggregation: The HBS 2011/12 captured food consumed outside the household which was not captured in the HBS 2007. The HBS 2011/12 also probed for a much larger number of non-food items compared to the HBS 2007. For example, the HBS 2011/12 asked explicitly for expenditures on 70 different clothing items. In contrast, the HBS 2007 only probed for three broad categories of clothing (of males, females and children), though enumerators still recorded item-specific expenditures (using codes provided in a separate manual). The increase in the number of item categories in the HBS 2011/12 was expected to enhance the household's recollection of expenditures and hence to increase measured consumption. However, at the same time, the HBS 2011/12 omitted certain non-food categories that were included in the HBS 2007, which may

counteract the former effect of more non-food consumption being captured by the HBS 2011/12.³ On the other hand, the HBS 2011/12 recall module appears to capture non-food consumption more comprehensively than the HBS 2007 recall module.

Diary-recall reconciliation: Both the HBS 2007 and 2011/12 collected non-food expenditures through the recall module as well as through the consumption diary.⁴ In 2007, the diary and recall module used the same item codes which allowed for comparisons in the reported expenditure for the same item across the recall and diary (though over a different time period). This comparison suggested that neither of the two sources alone captured non-food expenditures comprehensively in 2007. In the HBS 2011/12, item codes in the diary did not correspond to the recall module and the latter grouped some of the items together that were recorded separately in the diary, which made a comparison of expenditures across the two sources more difficult.

Recall periods: The HBS 2007 used a uniform 12-month recall period for all non-food related expenditures with the exception of rent, while the HBS 2011/12 used recall periods of 1, 3 and 12 months depending on the item. As stated above, the changes in the recall period can have effects on measured consumption and poverty.

Survey supervision: There is evidence of improved supervision and survey implementation in the HBS 2011/12 compared to the HBS 2007. In particular, the HBS 2007 diary showed a strong pattern of respondent fatigue over time, as the number of transactions and measured consumption declined over the course of the diary. The HBS 2011/12 does not show such a trend, except for a drop from the first to the second day (see Figure 7), which suggests that efforts to improve the quality of data collection paid off.⁵

³ For instance, the HBS 2011/12 did not ask for expenditures on personal care items, though enumerators could record such expenditures under 'other personal articles' or 'other expenditures' in an aggregated manner. Conversely, the HBS 2007 included 'personal care items' as a separate category and enumerators recorded all expenditures item-by-item.

⁴ This is despite efforts by the NBS to minimize overlap, see the discussion above and the Poverty Assessment for Mainland Tanzania for further details.

⁵ While the HBS 2007 started each diary at the beginning of the month, the HBS 2011/12 staggered the beginning of the diary across the month. This helped disentangle to what effect the pattern in HBS diary consumption was influenced by patterns over the course of the calendar month (e.g. related to pay days) or to enumerator fatigue. There is no strong pattern of declining consumption over the course of the calendar month, which suggests that this was not the reason for the decline in transactions in the HBS 2007.

Figure 7: Transactions by diary day – HBS 2007 and HBS 2011/12

Source: Household Budget Surveys 2007 and 2011/12.

The declining number of transactions and potential effect of under-reporting of consumption captured in the diary in the HBS 2007 has been well documented by Dabalen et al. (forthcoming). The number of transactions, and thus consumption, not only decreases over the course of the diary month, but this decline becomes more severe over the course of the year as one compares month to month transactions (Figure 8), however, there is no evidence of such a trend in HBS 2011/12.

Figure 8: Total Number of Daily Transactions in Mainland Tanzania (in millions)

Source: Dabalen et al. (2014) based on HBS 2007.

Since the decline in poverty between 2007 and 2011/12 using the HBS data may be due to the changes in the survey design, different imputation methods are used to address this issue and check whether the reduction in poverty is a reality. The different prediction approaches supported the decline in poverty between 2007 and 2011/12, although they revealed a slightly lower pace of poverty reduction, suggesting that the improvements of survey methods in the HBS are not the cause of the difference in poverty trends between HBS and NPS data.

C. Comparison of household characteristics and asset ownership

Table 4 compares the main household socio-economic characteristics, asset ownership, and access to basic services between HBS and NPS. The comparison of the household sizes and number of dependents shows lower levels in HBS 2007 and NPS 2012/13 than in the other surveys. This suggests potential problems of under-reporting and non-compliance by the poor and/or changes in sample design.

Both HBS and NPS show similar results and reveal improvements in asset ownership and access to basic services, consistent with a decline in poverty measured using HBS data.⁶

Table 4: Comparison of household characteristics and assets ownership

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
Demographic structure					
Mean adult equivalent of the household	3.8	4.0	4.1	4.1	4.0
Mean household size	4.8	5.0	5.0	5.1	4.9
Number of children (14 years and below)	2.1	2.2	2.3	2.2	2.1
Dependency ratio (%)	43	43	47	44	42
Female-headed households (%)	25	25	26	26	26
Ownership of assets					
Radio (%)	65.6	54.6	64.8	66.2	57.8
Television (%)	8.1	13.8	10.8	14.0	15.6

⁶ Table 4 shows a decline in radio and bicycle ownership which is often largely driven by households' acquisitions of substitute "upgraded" goods, such as televisions or motorbikes. The rise in television and motorbike ownership, coupled with the decline in radio and bicycle ownership, supports the notion that these goods are substitutes. See the Poverty Assessment for mainland Tanzania and Seff et al. (2014) for more details.

Cell phone (%)	24.3	55.8	40.8	58.2	71.2
Bicycle (%)	40.1	34.1	47.8	50.7	46.1
Motorbike (%)	3.1	3.9	2.4	4.8	6.2
Access to basic services					
Education					
Primary net enrolment ratio	84	78	83	80	76
Secondary net enrolment ratio (forms I–IV)	15	29	23	28	29
Access to water, Sanitation and Electricity					
Proportion of households using protected water source in the rainy season	-	69	42	42	45
Proportion of households using protected water source in the dry season*	52	61	43	49	52
Proportion of households with any toilet facility	93	88**	90	87	87
Households with electricity (%)	10	15.7	11.5	13.0	18.5
Economic Activities, Land and Farm Implements					
Percentage of adult persons (15+ years) with household farming as their main occupation	-	74		74	74

* Previous HBS did not distinguish between dry and rainy seasons.

** HBS 2011/12 introduced the use of a show card to demonstrate different types of toilets. This may contribute to the different results.

D. Aggregate consumption

Table 5 compares the consumption aggregates per adult equivalent per month between NPS and HBS, as well as their distribution by quintile. All values are presented in nominal terms, real terms adjusted for the spatial and seasonal differences in the cost of living, and in real terms adjusted for the temporal price variations across survey years. Nominal values: are the weighted averages of consumption per adult equivalent in nominal terms. Real consumption values: are the weighted averages of real consumption per adult equivalent, where real consumption is estimated by adjusting nominal consumption with spatial deflators as well as temporal deflators within each survey year. The deflation uses the Fisher price index calculated from unit values of the survey data to adjust for cost of living differences between stratum (Dar es Salaam, other urban and rural) and quarters (a period of three consecutive months within each survey round). Note, while the adjustment involves a temporal element within the year, henceforth for conciseness, the deflator will be referred to as a “spatial price deflator”. Real consumption, temporally adjusted (survey price indicators): here real consumption is deflated by a temporal price deflator to adjust for inter-year (between survey rounds) price variation. The temporal adjustment allows for comparisons of real values between survey years, where the real consumption values (above) are adjusted by the inter-year Fisher price

index estimated using the surveys' unit values. Real consumption, temporally adjusted (CPI): uses the Consumer Price Index (CPI) instead of the Fisher index to adjust for inter-year price variations.

Both the HBS and NPS used the Fisher price index to adjust for spatial and intra-year differences in the cost of living. In the HBS, separate food and non-food Fisher price indices are estimated based on unit values (value/quantity) from the survey data. The overall (food and non-food) price deflator was computed using the weighted average of food and non-food indices, where the weights were the average budget shares on total nominal food and non-food consumption. Price indicators were calculated by geographic stratum and quarter. The NPS data used a similar method to adjust for spatial and intra-year price differences, but the Fisher price index was based on food unit values only. Table 6 compares the values of the spatial price deflators by survey quarter and strata and shows no significant differences between HBS and NPS indicators. Both surveys show low variations in the spatial deflators across the quarters, but reveal important differences between the geographic regions, with Dar es Salaam being the most expensive area and the rural areas being the least expensive.

A similar approach was used to adjust for inter-year (between survey rounds) price variations, where HBS used a Fisher index based on food and non-food unit values (weighted average of food and non-food Fisher indices) while NPS used a Fisher index based on food unit values only.⁷ The difference between both surveys in the inter-year deflators seems to be important. The Fisher food price index between HBS 2007 and 2011/12 is estimated at 2.15 indicating an increase in food prices by over 100 percent and the Fisher weighted index is estimated at 1.9, revealing a price increase of around 90 percent. The NPS shows a much lower inflation rate with the Fisher food price index estimated at 1.21 between the first two rounds and at 1.34 between the last two rounds (taking NPS 2010/11 as the base year).

To better understand the potential effect of the differences in (survey based) inflation rates on the consumption trends in HBS and NPS, we also use the CPI to adjust for inter-year temporal price variations.

Table 5 presents the average monthly per adult consumption levels as well as their distribution by quintiles. The reference period for calculating average household consumption levels was harmonized to 30.4 days for all surveys rounds.⁸

The base years in the HBS and NPS, when adjusting for inter-year price variations using the survey

⁷ In the HBS, food aggregates were deflated by the Fisher food indicator only.

⁸ The NPS values were recalculated using this new reference period to replace the original 28 days.

prices, are respectively HBS 2011/12 and NPS 2010/11. And the base year in the HBS and NPS, when adjusting for inter-year price variations using the CPI, is HBS 2011/12.

Table 5: Comparison of monthly consumption aggregates in Tanzania Mainland

	HBS			NPS			
	2007	2011/12	Variation %	2008/09	2010/11	2012/13	Variation* %
Mean monthly total consumption per adult equivalent							
Nominal consumption	32,579	63,153	94%	48,262	55,867	77,846	61%
Real consumption	31,578	62,427	98%	49,251	56,578	78,134	59%
Real consumption, temporally adjusted (survey price indicators)	59,997	62,427	4%	60,086	56,578	58,309	-3%
Real consumption, temporally adjusted (CPI), base year HBS 2011/12	52,419	62,427	19%	67,868	65,137	71,536	5%
(a) Distribution by quintile of nominal consumption							
Poorest Quintile	10,826	24,478	126%	16,719	18,871	24,309	45%
2 nd Quintile	17,886	36,621	105%	26,148	30,358	39,769	52%
3 rd Quintile	24,696	48,640	97%	35,506	41,735	56,475	59%
4 th Quintile	34,980	66,722	91%	51,032	59,354	84,592	66%
Richest Quintile	74,557	139,343	87%	111,942	129,285	184,304	65%
(b) Distribution by quintile of real consumption							
Poorest Quintile	10,849	25,191	132%	17,995	20,205	25,346	41%
2 nd Quintile	17,881	37,539	110%	28,079	31,974	41,356	47%
3 rd Quintile	24,526	49,503	102%	37,907	43,679	58,419	54%
4 th Quintile	34,127	66,656	95%	53,197	60,872	86,333	62%
Richest Quintile	70,551	133,283	89%	109,161	126,361	179,594	65%
(c) Distribution by quintile of real consumption adjusted by inter-year price variation (using survey price indicators)							
Poorest Quintile	21,025	25,730	22%	21,953	20,205	18,915	-14%
2 nd Quintile	34,503	38,058	10%	34,256	31,974	30,863	-10%
3 rd Quintile	46,961	49,771	6%	46,247	43,679	43,596	-6%
4 th Quintile	64,615	66,568	3%	64,901	60,872	64,428	-1%
Richest Quintile	132,937	132,048	-1%	133,176	126,361	134,025	1%
(d) Distribution by quintile of real consumption adjusted by inter-year price variation (using the CPI), base year HBS 2011/12 for all surveys							
Poorest Quintile	18,347	25,730	40%	24,797	23,261	23,206	-6%

2 nd Quintile	30,108	38,058	26%	38,693	36,811	37,864	-2%
3 rd Quintile	40,980	49,771	21%	52,237	50,287	53,486	2%
4 th Quintile	56,385	66,568	18%	73,307	70,080	79,042	8%
Richest Quintile	116,005	132,048	14%	150,425	145,476	164,428	9%
Mean monthly real food & non-food consumption per adult equivalent, adjusted by inter-year price variation							
(a) Food expenditure							
<i>Deflator: Fisher food price index (HBS and NPS respectively)</i>	2.15	1		1.22	1	1/1.34	
National	35,972	35,311	-2%	41,290	38,560	42,276	2%
Poorest Quintile	15,257	18,214	19%	16,186	14,862	15,307	-5%
2 nd Quintile	24,484	25,823	5%	25,704	23,671	25,071	-2%
3 rd Quintile	32,127	33,055	3%	34,471	32,074	34,314	0%
4 th Quintile	41,578	40,891	-2%	46,635	43,563	48,500	4%
Richest Quintile	66,440	58,585	-12%	83,474	78,756	88,247	6%
<i>Deflator: CPI, base year HBS 2011/12</i>							
National	27,740	35,311	27%	47,536	44,393	48,671	2%
Poorest Quintile	11,766	18,214	55%	18,635	17,110	17,622	-5%
2 nd Quintile	18,881	25,823	37%	29,592	27,252	28,864	-2%
3 rd Quintile	24,775	33,055	33%	39,686	36,926	39,505	0%
4 th Quintile	32,063	40,891	28%	53,689	50,153	55,837	4%
Richest Quintile	51,236	58,585	14%	96,102	90,670	101,597	6%
(b) Non-food expenditure							
<i>Deflator: Fisher food and non-food price index (HBS) and Fisher food price index (NPS)</i>	1.9	1		1.22	1	1/1.34	
National	28,624	27,183	-5%	17,661	18,016	19,861	12%
Poorest Quintile	7,764	7,553	-3%	2,868	2,797	2,583	-10%
2 nd Quintile	13,192	12,280	-7%	5,466	5,817	5,488	0%
3 rd Quintile	18,959	16,749	-12%	9,134	9,780	9,647	6%
4 th Quintile	28,399	25,749	-9%	16,722	17,862	19,234	15%
Richest Quintile	74,841	73,611	-2%	54,272	53,863	62,436	15%
<i>Deflator: CPI, base year HBS 2011/12</i>							
National	24,978	27,183	9%	20,333	20,741	22,865	12%
Poorest Quintile	6,775	7,553	11%	3,302	3,221	2,974	-10%
2 nd Quintile	11,512	12,280	7%	6,293	6,697	6,318	0%
3 rd Quintile	16,544	16,749	1%	10,516	11,260	11,107	6%
4 th Quintile	24,782	25,749	4%	19,252	20,564	22,143	15%
Richest Quintile	65,309	73,611	13%	62,482	62,011	71,880	15%

Note: All values are in Tanzanian Shillings. * Variation rate between 2008/09 and 2012/13.

The comparison of the nominal mean household consumption values between HBS and NPS shows that consumption levels are higher in the NPS than in the HBS, particularly for the most recent rounds HBS 2011/12 and NPS 2012/13. However, when we look at the distribution by quintiles, we can see that NPS consumption levels are higher than HBS ones only for the better-off groups, especially for the richest 20 percent where the difference exceeds 30 percent, while the consumption levels of the poorest 20 percent are equivalent between the two surveys. The same pattern is observed when comparing real household consumption values (adjusted by the spatial and seasonal deflator). The higher consumption values in the NPS should not be expected given that HBS probes for a larger number of consumption items and includes more commodities (such as clothing, restaurants, etc.). As most of the difference is coming from the significantly higher consumption level of the richest quintiles, we would expect either higher underreporting in the HBS or significant differences in the sampling between the two surveys. This point will be discussed below.

When adjusting for inter-year price variations using the survey price deflators, mean household consumption levels appear to be higher in the HBS 2011/12 than in NPS 2012/13. The difference seems to be due to much lower consumption levels of the poorest quintiles in the NPS than in the HBS. While there is almost no difference between HBS and NPS consumption levels of the richest population groups, the difference seems to be very important for the poorest groups attaining around 40 percent. Also, HBS shows an increase in mean household consumption levels over time, mainly driven by an increase of the consumption of the poorest groups, while NPS shows a decline in mean household consumption levels over time mainly driven by a reduction of the consumption of the poorest quintiles.

As these figures are difficult to compare due to the differences in the inter-year price deflators and base year, we also use the CPI to adjust for inter-year price variations and take HBS 2011/12 as base year for all HBS and NPS rounds. This reduces the discrepancy between HBS and NPS mean household consumption levels and shows a similar upward trend in mean household consumption over time for both surveys. While we continue to observe a larger increase in mean household consumption in the HBS than in the NPS and a larger increase in consumption levels of the better off in the NPS compared to HBS, both surveys now display improvements over time of mean household welfare, particularly for the better-off groups.

The main differences that stand out can be summarized as follows:

- i) There is a decline in aggregate consumption as well as in food consumption between NPS 2008/09 and NPS 2010/11, no matter the inter-year price deflator used. This can be

explained by the advent of the financial crisis and food price hikes in 2008 whose effects may have started to appear after 2009. The decline of food consumption levels while non-food consumption remained stable lends support to this presumption.

- ii) There is a decline in overall consumption between NPS 2010/11 and NPS 2012/13 (using the survey inter-year deflators) for the three poorest quintiles of the population, with the decline being more substantial for the poorest quintile. This decline seems to be driven by a reduction of food consumption accompanied by an even greater reduction of non-food consumption. However, this decline vanishes when the CPI for inter-year price adjustment is used, as we observe an increase in consumption levels of all population groups including for the poorest quintiles even though the improvements remain more substantial for the better-off groups.
- iii) In contrast with NPS, the HBS data show a significant increase of the food and total consumption levels of the poorest segments of the population and a slight reduction of the food consumption levels for the richest group.
- iv) The comparison (between HBS and NPS) of the distribution of consumption across the different quintiles, adjusted by the CPI and taking HBS 2011/12 as base year, shows that total consumption and food consumption are significantly higher in NPS 2008/09 than in HBS 2007 for all population groups, particularly the poorest ones for whom aggregate and food consumption levels are respectively 35 percent and 70 percent higher in NPS 2008/09 than in HBS 2007. Non-food consumption is however around 30 percent higher in the HBS. This could be explained by higher underreporting and fatigue due the 28-day diary in the HBS, and thus underestimation of consumption in the 2007 round. This can be supported by the pattern of respondent fatigue in Figures 7 and 8. The problem seems to be mainly due to underreporting by the poor, as average household sizes and number of dependents in HBS 2007 are slightly lower than in the other HBS and NPS rounds.⁹ The data quality and underreporting problem seems to have improved with the higher supervision in HBS 2011/12. Table 5 shows close mean household consumption levels for HBS 2011/12 and NPS 2010/11 (when adjusted by the CPI and taking HBS 2011/12 as base year), but the mean consumption level in NPS 2012/13 is over 10 percent higher. The difference is driven by higher levels of aggregate and food consumption levels by the upper quintiles. While the consumption levels of the poorest groups are slightly higher in HBS 2011/12 than in the last two rounds of NPS, the aggregate and food consumption levels of the richest groups are

⁹ This is based on the assumption that poor households have larger family size and higher number of dependents.

respectively 20 percent and 60 percent higher in NPS than in HBS. While one could suspect underreporting by the non-poor in HBS 2011/12, this seems implausible when comparing the households' characteristics (household size and number of dependents) between the HBS and NPS last rounds. However, the drop in household size and number of dependents in NPS 2012/13 compared to the previous rounds and the significant increase of the consumption levels of the richest quintiles point to the possibility of sample design/weighting and/or overestimation of consumption by the non-poor in the last NPS round.

- v) To summarize, the divergence between HBS and NPS in the levels and distribution of consumption could be explained by: i) underestimation of consumption by the poor in HBS 2007. This might have led to an overestimation of the rate of poverty reduction in the HBS survey. But the overestimation is not expected to affect the poverty trend and the pro-poor growth pattern given that the different methods to address the data comparability problems confirmed the decline in poverty and the emerging signs of pro-poor growth; ii) changes in sample design or sample weighting in the last NPS round or overestimation of consumption by the non-poor.

The following sections will explore other potential sources of the mismatch between the two surveys.

Table 6: Value of spatial price deflators by survey quarter and strata, HBS and NPS (Fisher price indices)

NPS 2008/09		Oct-Dec 2008	Jan-Mar 2009	Apr-Jun 2009	Jul-Sep 2009
	Dar es Salaam	1.08	1.18	1.20	1.15
	Other urban	1.00	1.04	1.04	1.04
	Rural	0.92	0.86	0.92	0.96
NPS 2010/11		Oct-Dec 2010	Jan-Mar 2011	Apr-Jun 2011	Jul-Sep 2011
	Dar es Salaam	1.05	1.11	1.17	1.18
	Other urban	0.90	0.97	1.06	1.08
	Rural	0.87	0.86	0.98	1.02
NPS 2012/13		Oct-Dec 2012	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013
	Dar es Salaam	1.12	1.17	1.13	1.07
	Other urban	0.99	1.04	1.02	0.93
	Rural	0.95	0.94	1.00	0.93
HBS 2007		Jan-Mar 2007	Apr-Jun 2007	Jul-Sep 2007	Oct-Dec 2007
	Dar es Salaam	1.19	1.18	1.25	1.34
	Other urban	1.04	1.06	1.09	1.10
	Rural	0.94	0.96	0.98	1.04
HBS 2011/12		Oct-Dec 2011	Jan-Mar 2012	Apr-Jun 2012	Jul-Sep 2012
	Dar es Salaam	1.09	1.18	1.22	1.22
	Other urban	1.00	1.03	1.02	1.06
	Rural	0.93	0.94	0.98	0.97

Table 7: Comparison of consumption aggregate methodologies

	HBS 2007	HBS 2011/12	NPS 2008/09	NPS 2010/11	NPS 2012/13
Construction of the consumption aggregate	<ul style="list-style-type: none"> - Food consumption based on the diary (with own produced goods being valued at the estimated monetary values provided by the households) - HBS 2007 did not include food consumed outside the household 		<ul style="list-style-type: none"> - Food consumption based on 7-day recall (with own produced goods being valued at the price market for similar products in the same strata) - Excluded: Rent and housing related expenditures, durable goods (neither expenditures nor use values) and non-consumption expenditures 		
	<ul style="list-style-type: none"> - Non-food consumption from the diary and recall. For each household and item, it is verified whether non-food consumption is reported (i) only in the recall, (ii) only in the diary, or (iii) in both sources - Recall for non-food items was 12 months - Education, health, and communication expenditure added into the consumption aggregate 	<ul style="list-style-type: none"> - Non-food consumption mostly from recall module (except for 10-day diary overlap and few other selected items. See discussion in previous section) - Recall periods of 1, 3 and 12 months depending on the item consumed - Includes: Education, health, and communication expenditure 	Excluded expenditures on clothing and footwear		Collected expenditures on clothing and footwear but excluded it from the reported consumption aggregate
	Education expenses did not come from the Education section where questions were asked for each household member, they come from Form II which had a very detailed section specific for education expenditures, divided into private, public, formal, informal. Unlike the NPS, the structure of the questions was very similar to the other non-food items.		Education expenses were included in household expenditures but they were collected separately (Section C). Information is collected for each household member over 5 years old with a recall period of 12 months (question 14 in 2008/09, question 28 in 2010/11 and 2011/13). Total expenses were calculated by the numerator by adding up individual expenses. Notice that these expenses included some clothing (uniforms) and footwear (shoes).		
	Health expenses did not come from the Health section where questions were asked for each household member. There was a separate section with 15 questions for health expenditures. Unlike the NPS, the structure of the questions was very similar to the other non-food items.		Health expenditures were included in household total expenditures but they were collected separately. The NPS collected information for each household member over 12 years and old (Section D). Some questions referred to the past four weeks, some to the past 12 months (question 13 onwards) but they seemed properly harmonized in the do files. Health expenditures included expenses related to visits to the health practitioner, health treatments, hospitalization and medications.		
	There is a section for vehicle and a separate section for public transport expenses.		Transport expenses included: Public transport (7 days recall), "petrol or diesel", "motor vehicle service, repair, or parts", "bicycle service, repair, or parts" (30 days recall).		
	Communications included telephone landlines, mobile phones, personal computers, satellite decoders.		Communication expenses had a 30-day recall period (Section L). They included: "cellphone vouchers" and "phone, internet and postal services".		

	Recreation and spare time section was much more complete, it solicited information about: sport and camping equipment; swimming pools, gym, tennis courts expenditures; tickets to sporting shows, concerts, theater, museums, etc.; lottery tickets, photographic equipment, musical instruments, amusement items, etc.	Recreation expenditures were collected using a recall period of 12 months (Section M). It included: "sports and hobby equipment, musical instruments, toys" and "film, film processing, camera". There were only two questions in this category and the reported values were low compared to the HBS.
	Detailed questions about the main dwelling expenditures included questions on: electric power; fixed telephones; mobile phones; TV subscriptions; internet subscriptions; water; common expenditures such as lighting cleaning on primary and secondary buildings; gas, charcoal, kerosene, coal, and firewood.	Utility expenses included: matches (7 days recall), electricity, gas, water, charcoal, light bulbs (30 days recall).
	Miscellaneous non-food expenditures included around 25 detailed questions about furniture and furnishing, tools and appliances for household maintenance, small electric household appliances, dishes, utensils and domestic workers.	<ul style="list-style-type: none"> - Household expenses had a 30-day recall period and included: milling fees and grain; household cleaning products (dish soap); wages paid to servants; repairs to household and personal items; carpet, rugs, drapes, curtains; linens, towels, sheets, blankets; mats for sleeping or for drying maize flour; mosquito nets, mattresses; repairs to consumer durables. - Miscellaneous non-food expenditures had a 30-day recall period and included: bar soap (body soap or clothes soap); laundry soap (powder); toothpaste, toothbrush; toilet paper; glycerin, Vaseline and skin creams; other personal products (shampoo, razor); insurance (health or auto); other costs not stated anywhere.
	There is a section on travel, holidays and hotels outside and inside Tanzania and another one on restaurants.	The non-food consumption did NOT include expenses incurred at restaurants (This is different from HBS). However, the NPS collected detailed information on food consumed outside the home (which included full dinner with a 7-day recall period) in Section F.
		Alcohol expenditures included information from the non-food question as well as from Section F (food outside household), which included beer, wine, or hard drinks consumed outside the household in the past 7 days.

E. Food consumption

Table 8 presents average levels of food consumption per adult per month for different sub-groups of food commodities. All values are presented in nominal terms, real terms adjusted for the spatial and seasonal differences in the cost of living, and for inter-year price variations using the CPI and taking HBS 2011/12 and NPS 2010/11 as base periods for HBS and NPS, respectively. The number of food items is much higher in the HBS than in the NPS. The level of consumption expenditure seems to be higher on food items such as meat, milk and cheese, fruits, sugar, and coffee, tea and soft drinks in the NPS than in the HBS. Both surveys show similar trends in consumption on most items, except for bread and cereals, fish, milk, cheese and eggs, and vegetables, with the variations being much more important in the HBS than in the NPS.

Table 8: Comparison of monthly food consumption by sub-group in Tanzania Mainland

	HBS			NPS				
	2007	2011/12	Variation %	2008/09	2010/11	2012/13	Variation 2010/11-2012/13 %	Variation 2008/09-2012/13 %
Food consumption per adult equivalent, monthly								
Food consumption, nominal	16,871	35,322	109%	33,499	37,854	52,620	39%	57%
Food consumption, real	16,731	35,311	111%	34,496	38,560	53,160	38%	54%
Food consumption, real, CPI	27,740	35,311	27%	41,290	38,560	42,276	10%	2%
Number of food products	193	171		57	57	57		
Food groups, monthly per adult equivalent consumption, nominal								
Bread and cereals	6,249	13,502	116%	11,334	11,135	15,787	42%	39%
Meat	1,886	2,721	44%	7,056	6,913	9,501	37%	35%
Fish	1,303	2,403	84%	2,249	2,437	3,345	37%	49%
Milk, cheese and eggs	460	1,144	149%	2,805	2,952	4,738	61%	69%
Oils and fats	914	1,370	50%	1,358	1,602	1,814	13%	34%
Fruit	910	983	8%	4,063	4,313	5,619	30%	38%
Vegetables	3,436	7,086	106%	5,042	5,321	7,327	38%	45%
Sugar, jam, honey & chocolate	984	1,002	2%	1,778	1,956	2,272	16%	28%
Food products n.e.c.	168	255	52%	262	253	255	1%	-3%
Coffee, tea and cocoa	199	153	-23%	344	355	398	12%	16%
Water, soft drinks, juices, etc.	363	226	-38%	2,098	2,363	3,423	45%	63%

Food groups, monthly per adult equivalent consumption, real								
Bread and cereals	6,232	13,653	119%	11,851	11,431	16,070	41%	36%
Meat	1,869	2,701	45%	7,297	7,120	9,650	36%	32%
Fish	1,284	2,418	88%	2,295	2,502	3,396	36%	48%
Milk, cheese and eggs	458	1,165	154%	2,929	3,031	4,828	59%	65%
Oils and fats	900	1,363	51%	1,396	1,629	1,843	13%	32%
Fruit	890	978	10%	4,239	4,465	5,715	28%	35%
Vegetables	3,423	7,143	109%	5,238	5,474	7,464	36%	43%
Sugar, jam, honey & chocolate	967	991	2%	1,821	1,991	2,294	15%	26%
Food products n.e.c.	169	257	52%	273	260	257	-1%	-6%
Coffee, tea and cocoa	193	151	-22%	350	360	402	12%	15%
Water, soft drinks, juices, etc.	346	222	-36%	2,069	2,356	3,358	43%	62%
Food groups, monthly per adult equivalent consumption, real values in prices of the base year (CPI)								
Bread and cereals	10,333	13,653	32%	14,185	11,431	12,780	12%	-10%
Meat	3,099	2,701	-13%	8,734	7,120	7,675	8%	-12%
Fish	2,129	2,418	14%	2,747	2,502	2,700	8%	-2%
Milk, cheese and eggs	759	1,165	53%	3,506	3,031	3,839	27%	10%
Oils and fats	1,492	1,363	-9%	1,671	1,629	1,466	-10%	-12%
Fruit	1,476	978	-34%	5,074	4,465	4,545	2%	-10%
Vegetables	5,675	7,143	26%	6,269	5,474	5,936	8%	-5%
Sugar, jam, honey & chocolate	1,603	991	-38%	2,180	1,991	1,824	-8%	-16%
Food products n.e.c.	280	257	-8%	327	260	205	-21%	-37%
Coffee, tea and cocoa	320	151	-53%	419	360	320	-11%	-24%
Water, soft drinks, juices, etc.	574	222	-61%	2,477	2,356	2,670	13%	8%

Figure 9 presents the shares of food groups in total food consumption. It shows that Tanzanians tend to consume bread and cereals the most, which make up about one-third of food consumption. This is consistent across the HBS and NPS surveys. The second most consumed food group is vegetables for the HBS and meat for the NPS.

Figure 9: Average monthly food consumption shares by food group (percent)

Note: All values are food shares by food group relative to the monthly per adult equivalent food consumption, nominal.
Source: HBS 2007 and 2011/12 and NPS 2008/09, 2010/11 and 2012/13.

F. Non-food consumption

Table 9 shows non-food consumption per adult per month as well as non-food consumption separated by groups of goods and services. All values are presented in nominal terms, real terms, and adjusted for inter-year price variation using the CPI. In general, non-food expenditures are larger in the HBS compared to the NPS. Among the sources of these differences is the fact that the first two waves of NPS did not include “clothing and footwear”. NPS also does not include “restaurants and hotels”. Moreover, it is worth noting that the value of “housing, water, electricity, gas and other fuels” in the HBS 2011/12 is almost 3 times larger than the value in the NPS 2010/11 and that the “recreation and culture” expenses are over 25 times larger in the HBS; however, expenses on education and miscellaneous items are around 3 times larger in the NPS.

Both surveys show similar trends in consumption at the sub-aggregate levels, except for education and miscellaneous expenditures, but with the variations being much larger in the HBS. This can be partly explained by the changes in the survey design in the HBS. It is worth mentioning that when addressing the changes in the HBS design through imputation methods, we still observe a significant increase in the consumption of food and non-food items.

Table 9: Comparison of monthly non-food consumption by sub-group in Tanzania Mainland

	HBS			NPS				
	2007	2011/12	Variation %	2008/09	2010/11	2012/13	Variation 2010/11-2012/13 %	Variation 2008/09-2012/13 %
Non-food consumption per adult equivalent, monthly								
Non-food consumption, nominal	15,707	27,831	77%	14,763	18,010	25,227	40%	71%
Non-food consumption, real	15,942	27,162	70%	14,755	18,016	24,974	39%	69%
Non-food consumption, real, inter-year (CPI)	26,432	27,162	3%	17,661	18,016	19,861	10%	12%
Non-food groups, monthly per adult equivalent consumption, nominal								
Alcohol, tobacco and narcotics	795	305	-62%	1,365	1,566	1,705	9%	25%
Clothing and footwear	3,012	4,234	41%	-	-	-		
Housing, utilities and fuels	2,735	7,827	186%	1,819	2,665	3,711	39%	104%
Household maintenance	1,897	1,224	-35%	1,019	1,118	1,437	29%	41%
Health	646	1,977	206%	2,022	2,131	3,223	51%	59%
Transport	1,629	4,804	195%	2,801	3,498	5,348	53%	91%
Communication	886	3,647	312%	1,896	2,242	3,370	50%	78%
Recreation and culture	822	1,510	84%	50	60	64	7%	29%
Education	688	1,105	61%	2,159	2,907	3,814	31%	77%
Restaurants and hotels	705	351	-50%	-	-	-		
Miscellaneous	1,890	846	-55%	1,632	1,826	2,556	40%	57%
Non-food groups, monthly per adult equivalent consumption, real								
Alcohol, tobacco and narcotics	815	309	-62%	1,411	1,611	1,729	7%	23%
Clothing and footwear	3,064	4,180	36%	-	-	-		
Housing, utilities and fuels	2,783	7,687	176%	1,771	2,603	3,594	38%	103%
Household maintenance	1,932	1,202	-38%	1,041	1,137	1,445	27%	39%
Health	659	1,979	200%	2,082	2,179	3,234	48%	55%
Transport	1,631	4,596	182%	2,765	3,479	5,272	52%	91%
Communication	887	3,517	297%	1,857	2,213	3,329	50%	79%

Recreation and culture	844	1,471	74%	46	60	62	4%	34%
Education	695	1,066	53%	2,134	2,887	3,763	30%	76%
Restaurants and hotels	705	334	-53%	-	-	-		
Miscellaneous	1,928	821	-57%	1,648	1,850	2,546	38%	54%
Non-food groups, monthly per adult equivalent consumption, inter-year deflators (CPI)								
Alcohol, tobacco and narcotics	1,359	309	-77%	1,688	1,611	1,375	-15%	-19%
Clothing and footwear	5,108	4,180	-18%	-	-	-		
Housing, utilities and fuels	4,639	7,687	66%	2,119	2,603	2,858	10%	35%
Household maintenance	3,221	1,202	-63%	1,246	1,137	1,149	1%	-8%
Health	1,099	1,979	80%	2,492	2,179	2,572	18%	3%
Transport	2,719	4,596	69%	3,310	3,479	4,193	21%	27%
Communication	1,479	3,517	138%	2,223	2,213	2,648	20%	19%
Recreation and culture	1,407	1,471	5%	55.32138	59.92502	49.3421	-18%	-11%
Education	1,159	1,066	-8%	2,554	2,887	2,992	4%	17%
Restaurants and hotels	1,175	334	-72%	-	-	-		
Miscellaneous	3,214	821	-74%	1,973	1,850	2,025	9%	3%

IV. Comparison of NPS and HBS Methods for Poverty Line and Poverty Indicators Measurement

This section examines the differences in the measurement of the poverty line and estimation of the poverty indicators between HBS and NPS. It also investigates the potential sources of differences in the inequality indicators. More specifically, the analysis re-evaluates the poverty line of NPS using the methodology of the HBS 2011/12, to separate differences in the poverty indicators resulting from the estimation approach (that can be addressed) and those stemming from the survey methods and that are more difficult to adjust. We also estimate the poverty numbers using the US\$1.90 international poverty line to explore how the levels and trends of poverty compare between the two surveys. We finally examine the potential sources of discrepancy between the two surveys in the consumption distribution patterns for NPS data and decomposition methods.

A. Poverty line estimation

The poverty line in the NPS is not directly comparable with the poverty line in the HBS due to the differences in the consumption measurement methods listed in the above sections as well as differences in the reference period, reference population, measurement of the cost per calorie and

adjustment for inter-year price variations. Most of these differences affect the food line and are explained more in detail below.

i. Food line

Both the NPS 2010/11 and the HBS 2011/12 poverty lines are based on a food basket concept and correspondingly anchored in nutrition. The HBS 2011/12 food poverty line (TZS 26,085.5 per adult per month) is based on the cost of a food basket that delivers 2,200 calories per adult per day. The cost of buying 2,200 calories is derived from the food consumption patterns prevailing in a reference population—the 2nd to 5th decile of the distribution of total consumption per adult equivalent. Consumed quantities are converted into calories using the NBS's calorie conversion factors and valued at national median prices (the same as the reference for the Fisher deflators).¹⁰

The NPS 2010/11 food line (TZS 18,718.7 per adult per 28 days) is based on a similar concept as the HBS, but differs from the latter in the following respects: 1) the reference period: the food line is based on real consumption per adult equivalent per 28 days while in the HBS it is based on 30.4 days; 2) the reference population group: the reference population is the whole population below the median of total household consumption per adult equivalent;¹¹ and 3) the method of evaluation of the cost per calorie: NPS uses the median prices paid by the reference group instead of median national prices to evaluate the food line.¹²

¹⁰ The food line in the HBS 2011/12 is estimated as follows:

$$\text{HBS daily food line} = \frac{\sum_k q_k \cdot p_{0k}}{\sum_{kh} q_{hk} \cdot cal_k} \cdot 2,200$$

where q_k is the total quantity of item k consumed in the reference population, p_{0k} is the national median price of item k , q_{hk} is the quantity of item k consumed by household h , and cal_k is the corresponding caloric conversion factor of each item established by the Tanzania National Bureau of Statistics. Median prices p_{0k} are based on the most frequent unit of consumption for each item, with all units being converted to the most frequent unit when possible. If the household consumed the food item in a unit that does not have a metric conversion to the most frequent unit (e.g. piece to kg) the respective item is dropped.

¹¹ The reference group in the NPS includes the bottom 50 percent of the population ranked in terms of *real* per adult equivalent consumption as opposed to nominal per adult equivalent consumption. Real consumption is obtained by adjusting the nominal consumption according to temporal and spatial cost-of-living differences. Temporal price differences are associated with seasonal differences (quarters), while spatial differences are associated with the location of a household (geographic stratum: Dar es Salaam, other urban, rural, Zanzibar). Consequently, households with the same level of nominal consumption per adult equivalent might have different levels of real consumption if they face different costs of living.

¹² NPS daily food line = $\frac{\sum_k \bar{q}_k \cdot p_k}{\sum_h (q \cdot cal)_h / H} \cdot 2,200$; where p_k is the median price of item k in the reference population, $\bar{q}_k$ is the *average* per adult equivalent consumption of item k , and $(q \cdot cal)_h = \sum_k q_{hk} cal_k$ is the total caloric consumption per adult equivalent by household.

Table 10 shows the food line per month as well as the extreme poverty headcount rates for the base years of the HBS and the NPS, namely HBS 2011/12 and NPS 2010/11. The first column presents the official food line from the HBS 2011/12, estimated at TZS 26,086 per adult per month (30.4 days) and the extreme poverty rate estimated at 9.7 percent. The second column shows in line (a) the original values for the NPS 2010/11 food line and extreme poverty rate, and in lines (b) to (d) the re-estimated values of the food line by adjusting the differences mentioned above individually. Line (e) shows the food line and extreme poverty rates resulting from all the adjustments when they are applied simultaneously.

Table 10: Food poverty estimates in Tanzania Mainland

	HBS	NPS
	2011/12	2010/11
Food line based on 2,200Kcal/day		
(a) Original values	26,086	18,719
% individuals below food line	9.7	9.0
(b) Period of analysis (30.4 days)		20,334
% individuals below food line		9.0
(c) Reference group (20-50%)		19,678
% individuals below food line		10.2
(d) Cost per calorie method		20,626
% individuals below food line		11.7
(e) Total adjustments		22,482
% individuals below food line		11.8

Note: in lines (b) and (e) the reference period for NPS is 30.4 days and in line (a), (c) and (d) the reference period is 28 days.

Line (e) shows that using the HBS method to estimate the NPS food line leads to close values of both lines; however, the proportion of extreme poor population substantially increases to 11.8 percent in the NPS.

ii. Comparison of the food poverty lines across the survey rounds

Table 11 compares food line values across different rounds for the HBS and the NPS. Comparison over time involves adjusting for inter-year variations in the cost of living. This table uses food Fisher price deflators based on survey unit values and the CPI to convert the food line in the base year to prices in the survey year and make it comparable across different rounds. According to the HBS report, food prices have increased by 115 percent between the HBS 2007 and the HBS 2011/12. The

food line in the HBS 2007 is obtained by dividing the HBS 2011/12 line by 2.15. The NPS survey report indicates that food prices increased by 22 percent between the NPS 2008/09 and the NPS 2010/11, and by 34 percent between the NPS 2010/11 and the NPS 2012/13.¹³ The food line in the NPS 2008/09 and in the NPS 2012/13 is obtained by dividing the adjusted NPS 2010/11 food line by 1.22 and by multiplying it by 1.34 respectively. These adjustments show an increase of extreme poverty rates across the different NPS rounds, while the HBS shows a decline in extreme poverty. When the food line is adjusted for inter-year differences in the cost of living using the CPI, extreme poverty initially increases and then stagnates in 2012/13.

Table 11: Food line comparisons in Tanzania Mainland

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
(a) Survey-specific food line in survey year prices	13,502	26,086	17,028	22,482	30,747
% individuals below the food poverty line	16.1	9.7	7.6	11.8	13.8
<i>Adjusting for inter-year variation in cost of living using survey-based deflators</i>					
(b) Base year food line in survey year prices	12,133	26,086	18,428	22,482	30,126
% individuals below the food poverty line	11.7	9.7	9.3	11.8	13.0
Food price index	2.15	1	1.22	1	0.75
<i>Adjusting for inter-year variation in cost of living using the CPI</i>					
(c) Base year food line in survey year prices	15,737	26,086	18,783	22,482	28,271
% individuals below the food poverty line	23.3	9.7	9.6	11.8	10.7
CPI ratio	1.66	1	1.20	1	0.79

iii. Basic needs poverty line

In both surveys, the non-food component of the basic needs poverty line is based on average non-food consumption of households whose total consumption is close to the food poverty line.

In the HBS 2011/12, the households in the reference group are those whose total consumption lies within the interval between the food line and 1.2 times the food line. These households devoted approximately 71.5 percent of their total consumption to food. Scaling up the food poverty line by this ratio delivers the basic needs poverty line of TZS 36,482 per adult per month and a basic needs poverty headcount of 28.2 percent. In the NPS, the original basic needs poverty line was measured by dividing the food line by the average proportion of total expenditures devoted to food for the bottom 25 percent of the population in the total distribution of consumption per adult equivalent.

¹³ See Table 5 in the National Panel Survey 2012/13, pg. 10.

Table 12 presents the basic needs poverty line per month as well as the poverty headcount rates for the base year surveys HBS 2011/12 and NPS 2010/11. The first column presents the official basic poverty line from the HBS 2011/12 and the second column the NPS 2010/12 poverty line and headcount estimates. The first line shows the original NPS 2010/11 poverty line of TZS 23,933 and the basic need poverty headcount of 17.9 percent.¹⁴ The second line of the table presents the NPS 2010/11 basic needs line recalculated using the HBS 2011/12 method. The re-estimated poverty line uses the adjusted food line in Table 10 (TZS 23,371) and the HBS 2011/12 methodology for calculating poverty. The basic needs line is measured by the ratio of the food line and the food share of adults whose total expenditures fall between the food line and 1.2 times above the food line. These adjustments in the food line and the reference group yield a poverty line of TZS 30,052 and a poverty headcount of 24.4 percent for the NPS 2010/11. Despite the remaining differences in the survey designs, using a comparable method for estimating the poverty line leads to a relatively closer poverty line and headcount estimates.

Table 12: Basic needs poverty line in Tanzania Mainland

	HBS	NPS
	2011/12	2010/11
Poverty line		
(a) Original values	36,482	23,933
% individuals below the poverty line	28.2	17.9
(b) New poverty line (harmonized)		29,113
% individuals below the poverty line		24.4

Note: in line (a) the NPS estimates are using the reference period of 28 days and in line (b) the reference period is 30.4 days.

iv. Comparison of the basic needs poverty lines across the survey rounds

Table 13 compares the basic needs poverty line values across the different rounds for the HBS and the NPS and shows their respective poverty headcount rates. Naturally, time comparisons require adjusting real values for cost of living differences over time. This table uses various price deflators to convert statistics from a given survey into values comparable to a different survey.

¹⁴ As the difference between the estimates incorporating Zanzibar and considering Mainland only is marginal, we included Zanzibar in the NPS calculations.

Table 13: Comparison of basic needs poverty estimates across the surveys rounds in Tanzania Mainland

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
(a) Survey-specific poverty line in survey year prices	18,883	36,482	21,660	29,113	38,819
% individuals below the poverty line	33	28.2	15.2	24.4	24.8
(b) Base year poverty line in survey year prices (survey deflators)	19,201	36,482	23,863	29,113	39,012
% individuals below poverty line (survey deflators)	34.4	28.2	20.2	24.4	25.1
(c) Base year poverty line in survey year prices (CPI)	22,004	36,482	24,323	29,113	36,609
% individuals below poverty line (CPI)	42.7	28.2	21.5	24.4	22.4
(d) US\$1.90 poverty line (expressed per month)	58	58	58	58	58
% individuals below the US\$1.90 line	59.9	48.8	48.7	49.9	45.8

Note: the survey price indices in line (b) are respectively 1.9 for the HBS and 1.22 and 1.34 for the NPS.

Line (a) uses the poverty line constructed for each survey round that is unadjusted for inter-year price differences in cost of living. These poverty lines yield an increasing trend in poverty. Line (b) takes the poverty line constructed in the base year and uses the Fisher price indices constructed from survey unit values to adjust for inter-year price variations. While the adjustment of the NPS poverty line seems to have helped attenuate the mismatch in poverty levels between the HBS and NPS, we still observe an upward poverty trend. While the NPS data show an increase from 20.2 percent in 2008/09 to 24.4 percent in 2010/11 and 25.1 percent in 2012/13, the HBS shows a decline in poverty from 34.4 percent to 28.2 percent between 2007 and 2011/12.

In contrast, adjusting the poverty line for inter-year price differences using the CPI rather than the survey unit values appears to partly resolve the discrepancy in poverty trends between the HBS and NPS. In line (c), the NPS indicates an increase in poverty from 21.5 percent in 2008/09 to 24.4 percent in 2010/11 and then a decline to 22.4 percent in 2012/13. We continue however to observe a slight increase in poverty between NPS 2008/09 and NPS 2012/13, while HBS data show a quite significant decline. We also continue to observe a significantly lower level of poverty in NPS 2008/09 compared to HBS 2007.

The comparison of the international poverty rates using the US\$1.90 per capita per day (in 2011 PPP exchange rate) poverty line, in line (d), reveals an overall decline in poverty rates in both the HBS and NPS, even though the HBS shows a much greater decline in poverty and the NPS continues to show a slight increase in poverty between the first two rounds. It is worth noting that the estimation of the international poverty rates follows the Povcalnet method which does not adjust the consumption values for spatial cost of living differences and which seems to partly resolve the mismatch in poverty trends between the two surveys.

Based on these findings, it seems that despite the differences between the HBS and NPS in survey design and methods of consumption data collection, the discrepancies in poverty levels and trends between both surveys are mainly resulting from the differences in: 1) the methods of calculation of food and basic needs poverty lines; 2) the inter-year price deflators; and 3) to a lesser extent, the spatial price deflators.

V. Comparison of Inequality and Distributional Patterns between HBS and NPS

This section compares the inequality indicators between the HBS and NPS surveys and performs the unconditional quantile decomposition to examine the specific household attributes that contribute to the changes of consumption over time in both the HBS and the NPS.

A. Inequality indicators

As stated in the first section, HBS and NPS show different inequality trends, declining in the HBS and increasing across the NPS waves. The adjustments above are relevant for the poverty estimates only and cannot help in addressing the inequality discrepancies.

Table 14 presents a more complete analysis that includes Gini indices of nominal and real per capita household consumption as well as the Palma index. The inequality trend in per capita nominal consumption does not change when measured with the Gini or the Palma index. However, the increasing trend in the NPS from 2008/09 to 2012/13 is more apparent when real values are used.

Table 14: Gini index

	HBS		NPS		
	2007	2011/12	2008/09	2010/11	2012/13
Inequality					

Gini - per capita consumption, nominal	40.3	37.8	40.3	40.2	42.1
Gini - per capita consumption, real	38.5	35.8	38.1	38.4	40.6
Palma - per capita consumption, nominal	1.9	1.7	1.9	1.9	2.1
Palma - per capita consumption, real	1.7	1.5	1.7	1.7	1.9

B. Unconditional quantile decomposition

This section investigates the basic factors that might explain the discrepancy in inequality (and pro-poor growth patterns) between the HBS and NPS surveys by performing the unconditional quantile regression decomposition technique. The method decomposes the changes in consumption over time into two components: one component that is due to improvements in personal characteristics or *endowments* (better education, increased ownership of land and other assets, access to employment opportunities, local infrastructure, and so forth) and one component attributable to changes in the *returns* to those characteristics (returns to education, land productivity, returns to business, and so forth). These components are then further decomposed to identify the specific attributes that contribute to the changes of consumption. The decomposition is applied at each decile group of the consumption distribution to understand the patterns of the changes for the different welfare groups.¹⁵

We start by examining the factors contributing to the variation of consumption between 2007 and 2011/12 using HBS data. The results are reported in Figure 10 and indicate that the increase of poor households' consumption is due mainly to improvements in households' endowments. Returns also improved but to a lesser extent and only for the 20 percent poorest groups.

One can observe from Figure 10 an improvement of households' endowments for all the population groups, but the improvements are more marked for the 30 percent poorest segments.

The increase of the endowments is driven by a significant expansion of asset ownership, mainly transportation and communication means, and to a lesser extent agricultural land. Educational attainment of household heads has improved as well but less significantly. The access to local infrastructure has deteriorated in general, but access to local roads seems to have slightly improved

¹⁵ The decomposition approach is based on the Recentered Influence Function and unconditional quantile regression method proposed by Firpo, Fortin and Lemieux (2009). See Appendix 4 of the Tanzania Mainland Poverty Assessment for more technical details on the approach.

for the poor. The decomposition indicates also a decline of households' engagement in business activities, particularly among the poorest groups.

The improvements of households' endowments were coupled with an increase of the returns to those endowments, but only for the poorest quintile group. Except for the first two deciles, returns appear to have declined over time. But this decline masks divergent trends across the different attributes. As observed from the table in Figure 10, the gains from household businesses, essentially nonfarm activity, increased quite significantly between 2007 and 2011/12 particularly for the three bottom deciles. Returns to land seem also to have improved over time, though less significantly for the poor. The returns to community infrastructure also improved, indicating a higher positive influence of access to local markets and roads on needy households' living standards.

Large household size and number of children seem to be a continuing constraint on household well-being, although their negative impact appears to have diminished somewhat, as is apparent from the positive change in the returns to demographic structure.

However, the observed improvements in the returns to some household attributes have been offset by a significant decline of the returns to assets followed by a decline of returns to education, inducing a loss of returns for the moderate poor and better-off households.

Figure 10: Returns Effect and Endowments Effects over Time, HBS 2007–2011

Education	-0.001	0.003*	0.003**	0.011***
Wage work	0.001	0.002*	0	0
HH business	-0.024***	-0.022***	-0.009***	-0.005
Assets	0.124***	0.114***	0.103***	0.054***
Land	0.006*	0.005*	0.007**	0.011***
Access local markets	-0.005**	-0.004**	-0.002**	-0.002
Access local roads	0.037***	0.052***	0.028***	0.005
Returns	0.072**	-0.120***	-0.106***	-0.119***
Demographic Structure	0.255***	0.064	0.025	0.216***
Education	-0.186***	-0.017	-0.003	0.066*
Wage work	-0.003	0.010	0.001	0.012
HH business	0.123**	0.162***	0.056	0.077
Assets	-0.266***	-0.169***	-0.156***	-0.244***
Land	0.016	0.022**	0.019**	0.035**
Access local markets	0.055***	0.049***	0.021**	0.030*
Access local roads	0.011	0.045***	0.011	-0.022

Note: Extreme poor are population groups in the bottom 10 percent of the distribution; the *poor* are in the third decile; *middle class* are in the fifth decile, and the *richest* are in the top decile.

Source: HBS 2007 and 2011/12.

We also apply the unconditional quantile regression decomposition technique to analyze the factors contributing to the variation of consumption between 2008/09 and 2012/13 using NPS data.

The results are presented in Figure 11. Similar to the HBS data, NPS reveals a quite significant improvement in household endowments over time; however, in contrast to the HBS results, the improvement of endowments is more marked for the richest population groups. We also observe a quite significant deterioration of returns, particularly for the poorest groups, that have offset the endowments' improvements, inducing a decline in total consumption. It is important to note that in this decomposition procedure, consumption is adjusted by the (inter-year) survey price deflators. The use of the CPI for adjusting consumption would have shown a less sharp decline in returns and a slight increase in overall consumption over time; however, the variations across the different deciles would have remained unchanged.

As for HBS, the results in Figure 11 indicate that the increase of the endowments is driven by a significant expansion of asset ownership, mainly transportation and communication means. Educational attainment of household heads has improved as well but to a lesser extent. Access to local markets seems to have improved but only for better-off households. The NPS findings also indicate a potential decline in households' engagement in business activities, but the results are not significant.

As for HBS, NPS data indicate a decline in returns to households' endowments, but contrary to HBS findings, the decline seems more marked for the poorest groups. Here again, this decline masks divergent trends across the different attributes. Returns to education and assets seem to have improved, while returns to access to markets appear to have declined. These results deserve further investigation and confirmation.

Figure 11: Returns Effect and Endowments Effects over Time, NPS 2008/09–2012/13

	Extreme poor	Poor	Middle class	Richest
Total	-0.144**	-0.089**	-0.057**	0.074**
Endowments	0.066**	0.082***	0.145***	0.205***
Demographic Structure	0.014**	0.018***	0.021***	0.041***
Education	0.008**	0.002	0.009**	0.022***
Wage work	-0.06**	-0.037**	-0.024**	-0.026
HH business	-0.062	-0.047*	-0.031	-0.037
Assets	0.112***	0.095***	0.089***	0.056***
Land	-0.001	-0.001	-0.002	0.001
Access local markets	-0.024	-0.012	0.023***	0.081**
Returns	-0.209***	-0.17***	-0.203***	-0.13***
Demographic Structure	-0.03	0.03	-0.147	-0.196
Education	0.12**	-0.072*	0.016	0.025
Wage work	-0.039**	0.001	0.009	-0.005
HH business	-0.181**	0.071	0.105	0.019
Assets	0.064	0.078**	0.028	-0.014
Land	0.007	-0.001	0.006	-0.034**
Access local markets	-0.047	-0.028	0.046**	-0.042

Note: *Extreme poor* are population groups in the bottom 10 percent of the distribution; the *poor* are in the third decile; *middle class* are in the fifth decile, and the *richest* are in the top decile.

Source: NPS 2008/09 and 2012/13.

VI. Some Concluding Remarks

This study attempts to investigate the underlying causes of the mismatch in poverty and inequality levels and trends between the NPS and HBS surveys. The analysis has focused on the key candidates for the divergence between the two surveys. These include the differences in methods of consumption data collection, methodological differences in the construction of the consumption aggregates and estimation of the poverty lines, adjustments for temporal and spatial price variations, and the consistency of within-household spending and asset ownership trends with poverty trends.

The main findings can be summarized as follows:

- I. Despite noticeable differences in the methods of household consumption data collection, both HBS and NPS show close consumption levels when using comparable inter-year price deflators. The comparison of the levels and distribution of consumption between the two surveys, when adjusted by the CPI, shows that total consumption and food consumption are significantly higher in NPS 2008/09 than in HBS 2007 for all population groups, particularly the poorest ones for whom aggregate and food consumption levels are, respectively, 35 percent and 70 percent higher in NPS 2008/09 than in HBS 2007. However, the difference vanishes in the last rounds with mean household consumption levels in HBS 2011/12 and NPS 2010/11 being very close, and the mean consumption level in NPS 2012/13 being around 15 percent higher. The difference is driven by higher levels of aggregate and food consumption by the better-off groups. The consumption levels of the poorest groups are slightly higher in HBS 2011/12 than in the last two rounds of NPS, but the aggregate and food consumption levels of the richest group are, respectively, 25 percent and 70 percent higher in NPS than in HBS. These differences could be explained by underestimation of consumption by the poor in HBS 2007 and sample weighting or overestimation of consumption by the non-poor in NPS 2012/13.
- II. The difference between HBS and NPS poverty levels is essentially explained by the differences in the methods of estimation of the poverty line. When comparable methods for estimating the poverty line are applied to both surveys, the poverty line and headcount estimates are relatively close in magnitude.
- III. The discrepancy in poverty trends can be mainly attributed to the difference in temporal price deflators and, to a lesser extent, spatial price deflators. The use of the CPI for adjusting

consumption variation over time would show a decline in poverty during the last five years for both HBS and NPS. However, the decline in poverty revealed by the HBS data would remain much higher than that observed with the NPS data. Given the greater degree of commodity detail in the consumption module that was added to the HBS 2011/12 questionnaire—which would suggest a better capture of consumption information—it is possible that the HBS under-estimated consumption in 2007 and hence overestimated poverty then and its subsequent decline. Also, the increase in poverty between NPS 2008/09 and NPS 2010/11 continues to be observed and could potentially be explained by the financial crisis and international food price variations.

IV. The mismatch in inequality trends between HBS and NPS could not be resolved. The analysis of the variation of consumption distribution over time using HBS and NPS data shows that both surveys indicate significant improvements in households' endowments over time. However, while HBS reveals that endowments increased faster for the poorest groups, NPS shows that the richest groups experienced higher improvements in their endowments. Also, while HBS shows a slight increase in returns for the poorest groups, NPS reveals a deterioration. This might be partly driven by the inter-year deflator but would need further investigation and confirmation. All these results point to the importance of examining the sampling design.

Based on these findings, we would suggest the following recommendations:

- 1) Enhance closer collaboration inside NBS between the teams working on HBS data and those processing NPS surveys and harmonize the methodologies for the evaluation of the poverty lines and price indicators;
- 2) Attempt as much as possible to harmonize the HBS and NPS design, particularly the methods for household consumption data collection;
- 3) Examine further the sampling procedure and the potential differences resulting from sampling design.
- 4) Further explore the underlying causes of the divergence between both surveys in growth and distributional patterns.

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