

Tanzania National Panel Survey Report

Round 1, 2008-2009



United Republic
of Tanzania



National Bureau
of Statistics

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Introduction

What is the National Panel Survey?

The NPS is a nationally-representative household survey which provides measures of poverty, agricultural yields, and other key development indicators. The NPS is an “integrated” household survey, in that it covers a broad range of topics in the same questionnaire – from education and health to crime, gender-based violence and a range of other sections – to allow analysis of the links between sectors and the determinants of development outcomes.

Current plans are for the NPS to be repeated biennially, i.e., every 2 years. Thus round 2 will begin in late 2010. The term “panel” in the NPS title refers to surveys that return to the same interviewee on multiple occasions over time. The 2008/09 round is the first round of the NPS. However, in future years the NPS will return to all of the households interviewed in 2008/09 to track their outcomes over time.

Objectives

The National Panel Survey (NPS) was designed to meet three principle objectives. The first, overarching goal was to **monitor progress toward the goals set out in the National Strategy for Growth and Poverty Reduction** (aka, the MKUKUTA goals) and other national development objectives (MDG, PAF, etc.). The NPS provides high-quality, annual data on a long list of MKUKUTA indicators that is both nationally representative and comparable

over time. As such, the NPS is intended to provide a key benchmark for tracking progress on poverty reduction and a wide range of other development indicators.¹

The second goal of the NPS is to facilitate better understanding of the determinants of poverty reduction in Tanzania. The NPS will **enable detailed study of poverty dynamics** at two levels. In addition to tracking the evolution of aggregate poverty numbers at the national level in years between Household Budget Surveys, the NPS will enable analysis of the micro-level determinants of poverty reduction at the household level. Panel data will provide the basis for analyzing the causal determinants of income growth, increasing or decreasing yields, improvements in educational achievement, and changes in the quality of public service provision over time by linking changes in these outcomes to household and community characteristics.

A third objective of the NPS is to provide data to **evaluate the impact of specific policies and programs**. With its national coverage and long time frame, the NPS will provide an ideal platform to conduct rigorous impact evaluations of government and non-

¹ In many cases, the NPS provides data on indicators already measured, often on a less frequent basis, in the official sources designated in the MKUKUTA monitoring framework. Readers are referred to the *MKUKUTA Monitoring Management System and Indicator Framework* which lists the official source for each of the indicators measured here.

government development initiatives. To achieve this goal, the NBS will need to work in close collaboration with the relevant line ministries to link administrative data on relevant projects to changes in development outcomes measured in the survey.

Sample design

In order to monitor progress toward the MKUKUTA goals, it was vital that the NPS have a nationally-representative sample design. As such, in 2008/09 the NPS interviewed 3,280 households spanning all regions and all districts of Tanzania, both mainland and Zanzibar.

The sample size of 3,280 households was calculated to be sufficient to produce national estimates of poverty, agricultural production and other key indicators. It will also be possible in the final analysis to produce disaggregated poverty rates for 4 different strata: Dar es Salaam, other urban areas on mainland Tanzania, rural mainland Tanzania,

and Zanzibar. Alternatively, estimates of most key indicators can be produced at the zone level, as used for the Demographic and Health Survey (DHS) reports and other surveys. There are 7 of these zones in total on the mainland: North, Central, Eastern, South, Southern Highlands, West and Lake. As with any survey though, the confidence of the estimates declines as statistics are disaggregated into smaller zones.

Due to the limits of the sample size it is not possible to produce reliable statistics at the regional or district level.

The guiding principle in the choice of sample size, following standard practice for NBS surveys, was to produce estimates with a 95% confidence interval no larger than 5% of the mean for key indicators. In this case, household consumption and maize yields were used as the basis for those calculations.

The NPS was based on a stratified, multi-stage cluster sample design. The principle strata were Mainland versus Zanzibar, and within these, rural versus urban areas, with a special stratum set aside for Dar es Salaam. Within each stratum, clusters were chosen at random, with the probability of selection

proportional to their population size. In urban areas a 'cluster' was defined as a census enumeration area (from the 2002 Population and Housing Census), while in rural areas an entire village was taken as a cluster. This primary motivation for using an entire village in rural areas was for consistency with the HBS 2007 sample which did likewise.

The NPS is based on a nationally representative sample of 3,280 households across 410 clusters. This sample was designed to produce national estimates and to allow disaggregation between Dar es Salaam, other mainland urban areas, mainland rural areas, and Zanzibar. It is not possible to produce regional or district level statistics.

Table 1 shows the break-down of the sample by geographic stratum. Based on the 2002 Population and Housing Census, rural residents comprise roughly 77% of the population, compared with 63% of the NPS sample. The NPS sample gives slighter greater weight to urban areas due to the higher levels of inequality in these areas, and added difficulty in estimating poverty rates and other statistics. Similarly, Zanzibar comprised roughly 3% of the Tanzanian population in the 2002 census, but constitutes nearly 15% of the NPS sample, so as to allow separate

Zanzibar-specific estimates to be presented for most indicators.

Finally, although it has been stressed that the 2008/09 round is the first year of the NPS, the sample design for year 1 was deliberately linked to the 2007 HBS to facilitate comparison between the surveys. On mainland Tanzania, 200 of the 350 in the NPS were drawn from the 2007 HBS sample (this included all 140 rural HBS clusters). Within these 200 HBS clusters, a portion of the (8) households sampled for the NPS were taken from the sample of (24) HBS households in the cluster.²

This design created a panel of approximately 1,200 HBS households – interviewed in both the HBS and NPS – within the total sample of 3,280 NPS households.

Timeline & organization of fieldwork

The first round of the NPS was collected over a 12-month period between October 2008 and September 2009.

Seven mobile survey teams conducted interviews year round, with each team working year round in a specific “work zone” of the country. Note that in order to balance the workload and travel times across teams, these work zones did not correspond perfectly to the administrative zones of the country. (The work zones were divided as follows: North-coast including Arusha, Kilimanjaro, Mara, Manyara and Tanga; Lake zone included Kagera, Kigoma, Mwanza and

² The number of HBS households sampled varied from cluster to cluster, in proportion to the share of the population, as measured through a comprehensive household listing, that had remained stationary in the cluster since the time of the HBS. This was done to ensure that the NPS sample remained nationally representative despite possible non-random attrition of HBS households.

Table 1. National Panel Survey 2008/09 Sample Design

	Clusters	Households
Mainland Total	350	2,800
Dar es Salaam	70	560
Other urban areas	52	416
Rural areas	228	1,824
Zanzibar Total	60	480
Urban areas	30	240
Rural areas	30	240
Tanzania Total	410	3,280

Shinyanga; Central zone including Dodoma, part of Iringa, Morogoro, Singida and Tabora; Southern zone including part of Iringa, Mbeya, Rukwa and Ruvuma; Eastern zone including Lindi, Mtwara, and Pwani; the Dar es Salaam zone and finally a separate zone for Zanzibar.

Within each zone, each district and each region were visited at 3 separate (randomly assigned) points during the year, so as to account for seasonal fluctuations.

The mobile teams spent roughly 4 to 5 days in each cluster (village or urban enumeration area). The first day was devoted to listing the cluster, i.e., compiling a list of the population of households in the cluster from which to draw a sample. The second and third days were devoted to interviews and the fourth to finalize data entry, call backs, etc. Median interview time was approximately 2.5 hours for the household questionnaire and 1.5 hours for the agricultural questionnaire. Considerable additional time was spent on anthropometric measurement of all household members and taking direct GPS measurement of a sub-sample of respondents’ farm plots.

Each mobile team was overseen by a supervisor from NBS and included a driver,

four enumerators, and a data entry operator equipped with a laptop. The data entry operator was responsible for entering all questionnaires using the CsPro software package while in the field, conducting consistency checks of the data and instructing enumerators to re-visit households when problems were flagged by the software. Once entered and validated in CsPro, the electronic data was sent on a weekly basis from the field teams to NBS headquarters by email using 3G modems.

Contents of the survey and outline of this report

The main survey instrument of the NPS was the household questionnaire. This was administered to all households in the sample. General household information – including food consumption and other household expenditure, which is central to poverty measurement – was solicited from the household head or another knowledgeable adult member of the household. In addition, wherever possible, each individual member over 5 years of age was interviewed directly for sections on education, health, labour, and food eaten outside the home.

In addition to the household questionnaire, a separate 46-page agricultural questionnaire was administered to all households with any agricultural activities (including farming, fishing or livestock, or ownership of any *shamba* even if not under cultivation). The agricultural questionnaire included detailed sections on each plot and each crop under cultivation, as well as information on farm assets, extension services, use and marketing

of farm by-products, etc. For a sample of roughly 25% of the farming households, enumerators used GPS devices to directly measure the size of all farming plots.

Finally, apart from the questionnaires administered to households, a separate community questionnaire collected information from village, *kitongoji* and/or *mtaa* leaders. The community questionnaire covered topics including local administration and governance and access to basic services.

Rather than simply tabulating the data from the hundreds of questions asked in these various questionnaires, this report is organized around the monitoring framework

for the MKUKUTA goals. It is hoped that this organization provides a more intuitive presentation of the results that links directly to the national policy dialogue. It is not intended, however, that the NPS report should in anyway supplant existing

MKUKUTA documents or the Tanzania Poverty and Human Development Report. These latter publications draw on data from a wide variety of sources to measure progress on MKUKUTA indicators. The NPS report focuses narrowly on the goals and indicators collected through the NPS, drawing only occasionally on other datasets for the purpose of comparison.

In a number of places, the NPS questionnaires provide extra detail relevant to MKUKUTA progress that goes beyond the specific indicators outlined in the MKUKUTA monitoring framework. In such cases, additional tables and statistics have been presented – in the relevant sections of the

The 2008/09 survey is the first, baseline round of the NPS. The survey is scheduled to be repeated on an annual basis for at least the next 5 years, providing regular, comparable updates on key development indicators.

report – as a way of providing a deeper understanding of the process at work underlying progress on the core indicators. Key examples here are the enormous detail available on smallholder farming activities (presented under Cluster 1), which go far beyond the basic MKUKUTA indicators on technology usage and food production, and the in depth questions in the NPS on gender-based violence (data from which is presented under Cluster 3).

The future of the NPS

The 2008-09 survey is the baseline round of the NPS. Thus it provides a snapshot of development and household welfare in Tanzania at a given point in time. Wherever

possible, this report makes direct comparisons to previous nationally-representative surveys to put the NPS data in context and highlight trends over time. However, due to differences in methodology, there are often limits to the detail and reliability of these comparisons.

Going forward, the NPS is intended to be repeated every two years. Round 2 in 2010-2011 will return to all 3,280 households from round 1 with a nearly identical questionnaire. As a result, in 2011 and every second year afterward, the NPS will provide a detailed and rigorously comparable picture of changes in household welfare and economic activities over time.



Summary of Key Findings

Poverty

The headcount poverty rate measures the percentage of the population living below the national poverty lines. In 2007, Tanzania's food poverty line (or the cost of acquiring enough food for subsistence) was set at T.Sh. 13,098 in Dar es Salaam, T.Sh. 10,875 in other urban areas, and T.Sh. 9,574 in rural areas, while the basic needs poverty line (which includes the cost of other, non-food expenditure) was set at T.Sh. 17,941, T.Sh. 14,896 and T.Sh. 13,114 in these same three strata.

The best available estimates suggest there was virtually zero change in the proportion of Tanzanians living below these poverty line from the 2007 HBS to the 2008/09 NPS.³ The food poverty rate rose marginally from 16.6% nationally to XXX%, while basic needs poverty rose from 33.6% to XXX%. Given the margin of error in the survey, this is consistent with the long term trend of a fall in the national, basic-needs poverty headcount rate of about 0.3% per annum since 1991. Looking at the geographic strata separately, poverty in Dar es Salaam appears unchanged. However, there is evidence of a significant decline in

³ The NPS collects data on household consumption which can be used to measure household welfare and the headcount poverty rate. However, there are key methodological differences from the Household Budget Surveys (HBS), making any direct comparison of consumption data across the two surveys impossible. Instead, this report uses statistical techniques to produce estimates of current consumption that are more comparable to the HBS, based on indicators such as asset ownership, housing amenities, etc., that are collected in identical ways in the two surveys.

poverty in urban areas outside Dar es Salaam (from a basic needs poverty rate of 24.1% down to XXX%), and a small increase in rural areas (from 37.6% to XXX%).

Inflation

The NPS data on household expenditure provides an independent source of information about price levels in Tanzania. The NPS price index computed for this report differs from the official CPI in a number of ways: it relies on household survey data rather than market prices; it focuses on the consumption habits of the poor and includes rural areas in the analysis; and it uses newer data on budget shares to weight the individual prices in the index. However, the index is not intended to serve as a substitute for the CPI, but rather as a complementary data source.

Comparing price levels in the 2007 HBS to the NPS, the inflation rate measured here was 13.9% from Jan. 2007 to Jan. 2008, 20.4% from Jan. 2008 to Jan 2009, and 8.2% per annum in the first 3 quarters of 2009. This pattern of inflation is consistent with the CPI series in the following respects: moderately high inflation levels in 2007 accelerated in 2008, driven primarily by food prices, but peaked in 2008 and fell to a fairly low level in the first three quarters of 2009. However, the inflation rates reported here are consistently higher than rates derived from the official CPI – particularly in 2008 when official inflation was 12.9% and the NPS index records a rate of 20.4%. The analysis below shows that part of this discrepancy is due to differences in weighting of individual prices, however this cannot account for the full difference.

Comparing inflation across rural and urban areas, the patterns are strikingly similar. However, Dar es Salaam is an outlier, with much higher inflation in 2008, driven primarily by non-food prices.

Employment & Income

Unemployment in 2008/09 remained low, at just 3.2% by the standard definition, and 1.8% by the more restrictive ILO international definition. Unemployment was highest among the young (age 15-24), at 7.6% and 4.0% by these two definitions.

Looking at earnings levels – and comparing public-sector wage workers, private-sector wage workers, and the non-farm self employed – median, nominal, monthly earnings in Dar es Salaam were T.Sh. 230,000, T.Sh. 104,000 and T.Sh. 160,000 for these three occupations, respectively. In other urban areas the figures were T.Sh. 170,000, T.Sh. 57,000, and T.Sh. 75,000; in rural areas T.Sh. 142,000, T.Sh. 50,000 and T.Sh. 72,000, and in Zanzibar, T.Sh. 98,000, T.Sh. 87,000 and T.Sh. 75,000. Thus the gap between the public and private sector was largest in Dar es Salaam, at over 120%, and lowest in Zanzibar at just 13%.

The report also summarizes longer-term trends in employment and earnings, comparing various survey sources from 1991 to 2009 and dividing the adult population (age 15-65) by their main occupation. The main trends that emerge in terms of employment levels by occupation are (i) no significant trends in the size of public or private wage employment, (ii) volatility and/or inconsistency across surveys in the share of the population in farming, but no sign of a steady decline, and (iii) steady growth in the share of urban workers who are self-employed, from 18.4% in Dar es Salaam in 1991 to 29.7% in the NPS in 2008/09; and

from 13.8% in other urban areas in 1991 up to 24.1% in 2008/09.

Looking at long term wage trends, there is a stark difference between the 1990s and the 2000s. During the 1990s real, median earnings grew steadily for all occupations – but particularly for the public sector, where real wages grew at 12.9% per annum from 1991 to 2000 as measured by the HBS. Since 2000, real wage growth for both public- and private-sector wage workers has more or less stopped. Throughout the decade, median wages, in real 2007 Shillings, remained at around T.Sh. 110,000 to T.Sh. 115,000 for public sector workers, and around T.Sh. 41,000 to T.Sh. 44,000 for private-sector wage employees. Measured real earnings for the non-farm self-employed have been more volatile in the 2000s, but show some signs of moderate growth during the 2000s.

Agriculture

The NPS contains an extensive agricultural module, administered to all households involved in farming, fishing, or livestock cultivation.

Survey results show modest gains in crop production during the 2008 long rainy-season (*masika*) relative to the 2002 long rainy-season covered by the 2002/03 National Sample Census of Agriculture. The *masika* harvest of major cereal crops – maize, rice paddy and sorghum – increased moderately between the two surveys: up by 31.1% for maize, up 34.8% for paddy, and up 40% for sorghum. However, production of cassava, another major food crop, declined by 44.8% between the surveys.

One clear reason for the lack of large gains in small-holder production has been the failure to adopt improved farm technologies. The

number of households using irrigation rose modestly from 240,721 in 2002/03 to 276,958 in 2008/09. However, the share of households using inorganic fertilizer showed no change – 12.0% in 2002/03 and 11.6% in 2008/09. (Use of organic fertilizer fell from 26% to 19.2% over the same period.) Similarly, the share of households using improved seed varieties grew only slightly from 18.0% to 19.5%.

Public Services

The NPS covers household access to and use of a range of public services, including electricity generation, water supply, sanitation, education, health facilities, and so on.

Electricity. Access to the electricity grid remained low, at 59.3% in Dar es Salaam, 27.4% in other urban areas, just 2.1% in rural areas, and 24.7% in Zanzibar. For the most part these levels reflect little or no change from recent rounds of the NPS.

Water. The proportion of households with access to piped water in 2008/09 was 74.1% in Dar es Salaam, 60% in other urban areas, 22.7% in rural areas, and 79.8% in Zanzibar. For the mainland as a whole, the 2008/09 rate of roughly 40% reflects a modest increase over previous years. Previous rates were 35.9% in 1991, 39.3% in 2001, and 33.9% in 2007.

Education. The net primary school enrolment rate calculated in the NPS was 81.9% for the country as a whole (mainland and Zanzibar), and significantly higher for girls (85.0%) than for boys (78.6%). On the mainland, primary enrolment rates showed a slight decline (by approximately 1.4%) compared to 2007, but maintained most of the dramatic gains in enrolment achieved under the free primary

education policy which saw net primary enrolment increase on the mainland from 58.7% in 2000 to 83.7% in 2007, as measured by the HBS.

Net secondary enrolment rates (for Form I to IV) continued to rise rapidly: from 5.1% for the mainland in 2001, to 15.2% in 2007 and 23.5% in 2008/09. In part this may reflect the delayed effect of primary enrolment increases earlier in the decade. As with primary enrolment, for the country as a whole (including Zanzibar) the overall net secondary enrolment rate was higher for girls (27.3%) than boys (23.2%).

Health. The NPS collects information on health facility usage, and takes detailed height and weight measurements for all household members to track nutritional status. One key indicator on this front in the MKUKUTA monitoring framework is the proportion of births attended by a skilled health worker – an indicator with obvious links to both infant and maternal mortality. Among women who reported giving birth to a child in the last 24 months, 47.3% reported giving birth to their most recent child in a hospital, 7.6% in a clinic, 43.5% at home, and 17.8% elsewhere.

Looking at nutrition indicators, low height-for-age or “stunting” among children under 5 years old provides an indicator of chronic malnutrition. The rate of severe stunting for all children under 5 was 15.6% in rural areas, 5.4% in urban areas, 11.2% in Dar es Salaam and 9.1% in Zanzibar.

Gender-Based Violence

The first round of the NPS contained an experimental module which is the first attempt to measure the incidence of actual gender-based violence at the national level (in contrast to the opinions about GBV as

measured by the Demographic and Health Surveys). Based on women's own reports, 14.1% of women aged 15 to 50 years old said their partner had slapped them or thrown something that could hurt them; 10.7% reported being pushed or shoved, 8.6% hit with a fist, and 6.5% reported being forced to have sexual intercourse by their current partner.

Looking at the correlation between GBV and women's personal characteristics, women's belief that abuse is justified falls dramatically with education, but the actual incidence of abuse does not. Similarly, views about GBV

are more progressive among younger women, but the incidence of abuse is not significantly different. Patterns of abuse are quite similar across rural and urban areas. Divorced or separated women are the most likely to report being physically abused.

The majority of women affected by GBV report the abuse only to family members (53%). In 20.5% of cases, women reported going to community or village leaders, and in only 6.4% of cases to the police.

CLUSTER 1: GROWTH AND POVERTY REDUCTION

The National panel survey is, first and foremost, a socio-economic survey. A high proportion of the questionnaire is devoted to measuring household consumption and wealth, as well as farm production for small-holder households.

The following table provides a list of the MKUKUTA indicators under Cluster 1, denoting whether or not the indicator is

covered in the NPS questionnaire. It should be noted that primarily due to time constraints in the few weeks since fieldwork ended, not all available indicators are presented in the current report. Additional indicators will be computed prior the release of official results in early 2010.

Table 2. Cluster 1 MKUKUTA indicators available in the NPS

Indicator	Covered in NPS?
GDP growth per annum	No
GDP growth of sectors per annum	No
Gini coefficient	Yes ⁴
Headcount ratio, basic needs poverty line	Yes
Goal 1: Ensuring sound economic management	
Annual rate of inflation	Yes
Central Government revenue as % of GDP	No
Fiscal deficit as % of GDP (before and after grants)	No
External Debt Service as % of Exports	No
Export as % of GDP	No
Goal 2: Promoting sustainable and broad-based growth	
Unemployment Rate	Yes
Domestic credit to private sector as % of GDP	No
% increase in foreign direct investment	No
Interest rate spread on lending and deposits	No
% of rural population who live within 2 kms of an all-season passable road (Rural access indicator)	No
% of trunk and regional road network in good and fair condition	No
Proportion of enterprises undertaking Environmental Impact Assessments	No
Food self sufficiency ratio	No
Proportion of districts reported to have food shortages	No

⁴ Not calculated in this report. Further analysis of consumption data from the NPS is planned in the future, which will include the Gini coefficient.

Indicator	Covered in NPS?
% change in food crop production	Yes
Proportion of households who take no more than one meal per day	No ⁵
% of small holders participating in contracting production and out-grower schemes	Yes*
% of small holders using modern methods of farming (irrigation, fertilizers and hybrid seeds)	Yes
% of small holders who accessed formal credit formal credits for agricultural purposes	Yes*
% of small holder households who have one or more off-farm income generating	Yes*
% of households whose main income is derived from the harvesting, processing and marketing of natural resource products	Yes
% increase in number of customers connected to the national grid and off-grid sources of electricity	No ⁶
% of households in rural and urban areas using alternative sources of energy to wood fuel (including charcoal) as their main source of energy for cooking	Yes
Total electricity generating capacity and utilization	No

*Indicators covered by the NPS questionnaire but which are not yet covered in this report.

⁵ While this specific indicator was not included in the year 1 questionnaire, much more detailed information on food consumption is available, and it is possible to calculate daily caloric intake.

⁶ Household connectivity to the national grid is measured.

Cluster-wide indicators: Poverty & Inequality

Providing a benchmark for the next MKUKUTA targets

Measuring poverty, through the collection of detailed data on household consumption, is a central goal of the National Panel Survey. By using a consistent methodology and questionnaire in each subsequent round of the survey, the NPS will provide comparable measures of household welfare on a routine basis. Because the completion of the first round of the NPS coincides with launch of the new MKUKUTA targets (as well as Kilimo Kwanza goals), it is intended that the new poverty line and headcount poverty rates derived from the NPS will serve as a benchmark for measuring progress toward these goals.

The focus of the new poverty calculations for the NPS will be to provide a starting point for comparisons going forward. However, it is also necessary to place current results in an historical context. To do so requires comparison to the poverty figures published in the various HBS reports since 1991/92. Unfortunately, a simple direct comparison of consumption figures between the HBS and NPS is not feasible, for reasons documented in the following sub-section.

A partial bridge linking the NPS poverty results to the HBS can be provided by using techniques developed for “Small Area Estimation” or poverty mapping. These techniques are less reliable than direct measurement of consumption, however, they are specifically intended to overcome methodological differences between surveys

such as the HBS and NPS. Box 1 provides preliminary estimates of “projected” poverty rates based on these methods. It should be stressed, however, that these results are very preliminary and subject to revision upon release of the final 2008/09 NPS report in early 2010.

A cautionary note on making comparisons between the HBS and the NPS

Household Budget Surveys conducted in 1991/92, 2001, and 2007 have traditionally provided the main source of information on household welfare in Tanzania. The National Panel Survey, which will be repeated on a much more frequent basis to track annual progress on a variety of MKUKUTA indicators, replicates a number of key features of the HBS. However, there are important methodological differences that make any direct comparison of poverty rates across the surveys potentially misleading.

The principal methodological differences are outlined below. Many of these changes were driven by an attempt to ensure strict control over data quality during fieldwork, including the use of a much smaller and more closely supervised corps of enumerators in the NPS. These enumerator teams were ‘mobile’, spending only a few days in each enumeration area or village, in contrast to the locally-recruited enumerators for the HBS who resided in their respective survey areas year round.

1.1 “Recall” versus “diary” measurement of food consumption

First, the NPS collects data on food consumption by asking the head of the household or their spouse to recall how much they have eaten of various food items in the past seven days. (See Section K of the “Household and Individual Questionnaire”.) In contrast, the HBS requests households to keep a running diary of their food intake (and other expenditures) for 30 days.

1.2 A shorter list of food items

A second difference between the HBS and NPS questionnaires themselves is in the list of food and non-food items for which consumption data is collected. See the appendix for a detailed list of the correspondence between HBS and NPS items that was used in construction of the price indices presented in the next chapter.

1.3 Different treatment of home-produced food

Most Tanzanians, particularly in rural areas, get a majority of their calories from food they produce themselves. This food has never been purchased and thus has no directly observable market price. To construct a monetary measure of welfare, it is necessary to assign a monetary value to this home-produced food. There are a number of methodologies commonly used internationally to do this, none of which is perfect.

The HBS questionnaire asks respondents to report a Shilling value for all food consumed, whether it is purchased or produced at home. For purchased food this should be the purchase price, but for home-produced food it is a subjective assessment of the food’s value. The consumption aggregate in the HBS reports relies on these subjective assessments

of home-produced food to measure food consumption. However, these subjective valuations are not solicited in the NPS. Rather, home-produced food will be assigned a value by relying on prevailing prices in the geographic stratum as reported by other households who reported purchases of the item. This approach, relying on locally reported ‘unit values’ is increasingly common in poverty analysis, and will provide the basis for the new annual, NPS poverty series.

Box 1. Preliminary “projections” of poverty in 2008/09

As noted in the main text, the official poverty numbers from the NPS, based on household consumption data, are still in process. These numbers will not be directly comparable to the HBS. However, a preliminary estimate of changes in welfare between the 2007 HBS and the 2008/09 NPS can be derived by modeling consumption using other household characteristics that are common across the surveys. These include household demographics, schooling and human capital, building materials and household amenities, and asset ownership.

Preliminary projections show no significant change in the headcount poverty rate between the 2007 HBS and the 2008/09 NPS for Mainland Tanzania. However, there is evidence of a decline in urban poverty outside Dar es Salaam and a slight increase in rural areas.

Disaggregating the results by geographic area suggests that there has been a slight divergence between rural and urban areas in the last 18 months. Both food poverty and basic needs poverty declined (by 4.1% and 6.0% respectively) in urban areas outside Dar es Salaam, while they rose by a small margin (2.0% and 2.5%) in rural areas. In Dar es Salaam both figures rose by negligible amounts. Further analysis of the NPS consumption data is required to lend more confidence to these results.

This box presents preliminary estimates based on this methodology. Full details of the underlying methods can be found in the appendix.

Table 3 shows the poverty headcount ratios for each stratum (Dar es Salaam, other urban areas, and rural areas) in each round of the HBS from 1991/92 to 2007, together with estimated rates for 2008/09 using NPS data.

Results from the NPS 2008/09 suggest that poverty has remained virtually unchanged in Mainland Tanzania as a whole – with food poverty rising (insignificantly) from 16.6% in 2007 to 17.4% in 2008/09 and basic needs poverty from 33.6% to 34.0%. This is in line with the long-term trajectory of poverty documented in previous HBS reports, which show that both food and basic needs poverty have declined on average by about 0.3 percentage points per annum over the last 17 years, well within the margin of error used here.

Table 3. Comparing the NPS to the HBS based on “projected” poverty headcounts rates (%)

		Food Poverty Rate	Basic Needs Poverty Rate
Dar es Salaam	'91/92	13.6	28.1
	'01	7.5	17.6
	'07	7.4	16.4
	'08/09	7.6	15.9
Other urban	'91/92	15	28.7
	'01	13.2	25.8
	'07	12.9	24.1
	'08/09	8.8	18.1
Rural	'91/92	23.1	40.8
	'01	20.5	38.7
	'07	18.4	37.6
	'08/09	20.4	40.1
Main-land	'91/92	21.6	38.6
	'01	18.7	35.7
	'07	16.6	33.6
	'08/09	17.4	34.0

Goal 1: Ensuring sound economic management

Indicator: Annual rate of inflation

The annual rate of inflation measures the percentage change in prices over the course of a year. Maintaining low, stable inflation is a key indicator of economic management in the MKUKUTA framework. However, both international and domestic events made achieving this goal especially difficult during the period covered here:

from the beginning of 2007 through the third quarter of 2009. As noted in the Bank of Tanzania's June 2009 Monetary Policy Statement, "the economy continued to experience inflationary pressures that had arisen from the lagged effects of soaring world commodity prices earlier in the year, compounded by severe food supply shocks in the region, and poor short rains in some areas of Tanzania in the last quarter of 2008."⁷

This section of the report presents measures of inflation based on the prices paid for goods and services by households in the HBS 2007 and the NPS 2008/09. The inflation rates presented in this section are *not* intended to be directly comparable to the official CPI for a variety of reasons. Rather, the inflation numbers presented here are designed for the

specific purpose of comparing household welfare over time in the HBS and NPS datasets. The numbers presented here differ from the official CPI in three key ways: (a) they cover rural as well as urban areas, (b) they give greater weight to the items consumed by the poor, and (c) they use newer data on consumption habits, otherwise known as 'budget shares', to weight the prices in the consumption basket.

The appendix at the end of the report provides details on the methodology used to measure prices in this report, and explains the reasons why this methodology – and thus the results – differ somewhat from the official CPI series.

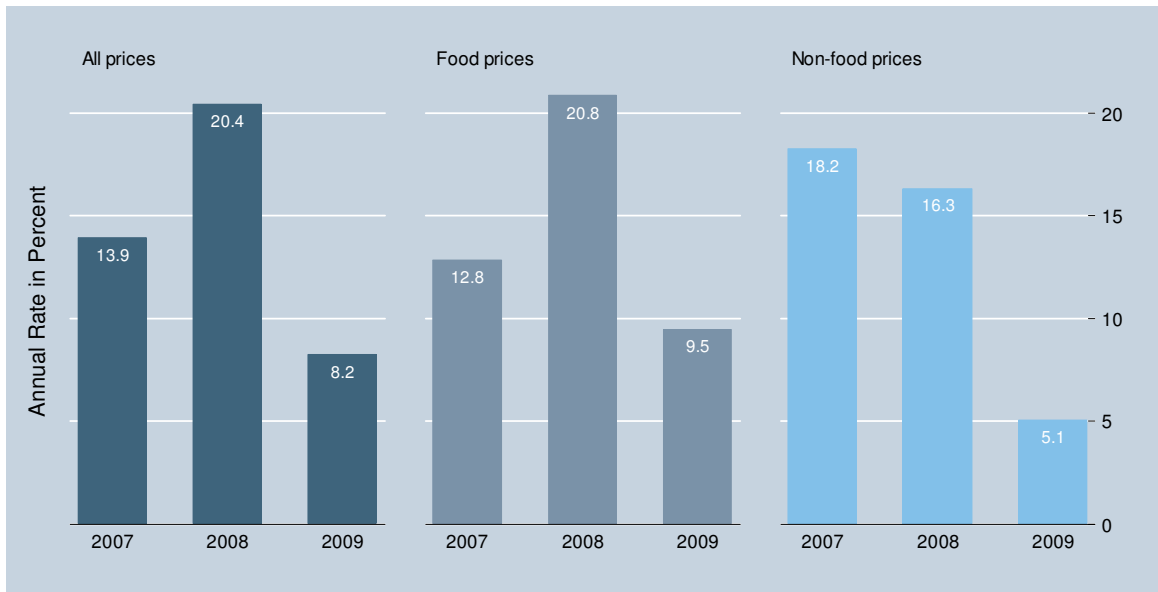
Figure 1 summarizes the pattern of inflation during 2007, 2008 and 2009 (ending in September). The rates shown measure the annual percentage change in a weighted basket of prices, measured from January to January (Jan 2007 to Jan 2008, Jan 2008 to Jan 2009, and Jan 2009 to Sept 2009). The items in the consumption basket are weighted by the consumption habits (budget shares) of the poorest 50% of the population within each stratum of the survey: Dar es Salaam, other urban areas, and rural areas.

The left side of Figure 1 shows the level of food price inflation. Food inflation jumps from 11.7% in 2007 to a high of 25.5% in 2008, but falls rapidly again to a current rate

Data on food expenditure can be used to analyze price increases between the HBS and NPS. However, any attempt to compare these inflation numbers to the official CPI should take careful note of methodological differences outlined in the appendix.

⁷ Governor, Bank of Tanzania, *Monetary Policy Statement*, June 2009, p. vii.

Figure 1. Price inflation, annual percentage change in price indices, by year



Food prices are based on costs reported by households in the 2007 HBS and 2008/09 NPS (i.e., ‘unit values’). Disaggregated, raw data for non-food prices is taken from the CPI database and re-weighted using 2007 HBS and 2008/09 NPS budget shares.

of 6.5% per annum in the first three quarters of 2009.

The right side of Figure 1 shows non-food price inflation. As seen, non-food price inflation has steadily declined over the period covered, from a high of 19.9% in 2007, to 13.4% in 2008 and just 1.7% per annum in the first three quarters of 2009.⁸

Rural-urban differences

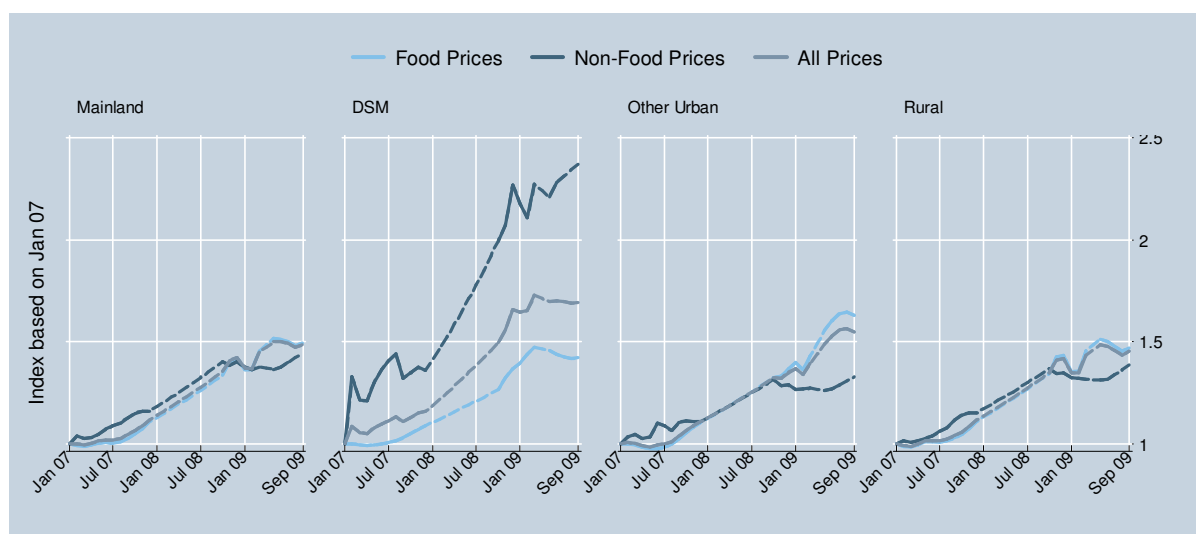
As noted already, one key limitation to the existing, official CPI series is that all data is collected in major urban centres. It is an urban price series. Thus an obvious

outstanding question for policymakers is whether the inflation captured through the CPI accurately measures price changes experience by the majority of Tanzanians who live in rural areas? Data from the NPS and HBS can help to answer this question, particularly for differences in food prices.⁹

⁸ A cautionary note is important here: the basket of non-food items with comparable measurement across the HBS and NPS is relatively small, and is disproportionately weighted toward energy and fuel expenditures. The full list of items included in the index can be found in the appendix.

⁹ All food prices presented in the main text are based on “unit values” reported by households in the HBS and NPS data. However, the NPS does not collect price information on non-food items. Thus the non-food price indices rely on raw price data collected for the purposes of the official CPI series in urban areas only. Nevertheless, separate non-food inflation rates are presented for urban and rural areas here. The difference between them stems entirely from differences in consumption patterns: i.e., the weight given to different items. For instance, an increase in maize prices will have a greater impact on rural households, and rice prices will have a greater impact on urban

Figure 2. Food and non-food price indices, by strata and month (Jan 2007 to Sept 2009)



All price indices begin at 1 in Jan 2007, and figures in the graph show the price level relative to this date. Food price data and budget shares are not available from Jan to Sept. 2008, when neither the HBS nor the NPS was in the field. The NPS also paused in April 2009, creating a second break. Price levels for these periods are shown with dashed lines, connecting the nearest available data points.

Table 4 shows a break-down of food price inflation, non-food price inflation, and the overall index for the three Mainland strata used in the surveys, and Figure 2 gives a visual depiction of the same information.

Two key points emerge from these figures. First, food price inflation – while high across the board, particularly in 2008 – has been fairly even across rural and urban areas. If anything, urban areas have fared somewhat worse, with food price inflation peaking at 32.1% in 2008 (excluding Dar es Salaam) compared to 23.8% in rural areas. While not shown here, in welfare terms it is likely that rural households are further cushioned from these food price increases due to the larger share of their food consumption which is derived from home production.

The second point where a notable discrepancy between inflation across strata is seen is the relatively high rate of non-food price inflation in Dar es Salaam in 2007. (Note that this difference represents differences in both underlying prices and budget shares, as the CPI collects separate price data for Dar es Salaam and each other regional capital.) While not shown here, this increase was largely attributable to a rapid surge in the price of charcoal in Dar es Salaam in early 2007.

households – as rural households eat relatively more maize and less rice.

Table 4. Price inflation, annual percentage change in price indices, by strata and year ^a

		2007	2008	2009 ^b
Dar es Salaam	Food prices	10.4%	26.4%	1.8%
	Non-food prices	41.3%	54.3%	8.9%
	All prices	18.8%	38.6%	2.9%
Other urban	Food prices	12.6%	24.1%	16.6%
	Non-food prices	12.9%	12.2%	4.7%
	All prices	12.7%	21.3%	13.3%

Box 2. Why do the NPS inflation figures differ from the official CPI?

Attentive readers will note that the inflation figures cited in this report are significantly different from NBS's Consumer Price Index – the official measure of price inflation in Mainland Tanzania. Why are the figures so different?

To understand the differences, note that there are two main ingredients in any price index: (i) prices for individual goods at various locations for each month, and (ii) a set of weights used to aggregate the prices of various goods and to average across the prices paid by different people in different places. The weight assigned to each good should reflect that good's share of total expenditure for a representative consumer, or the "budget share". The CPI and the NPS price index use both different price data and different budget shares.

First, consider the price data. The official CPI is based on market prices: these are collected by NBS staff during monthly visits to marketplaces in the main city of each region of the country. The NPS price index uses this same price data for non-food expenditure. However, for food prices, the NPS index is based on households' reports of how much they paid (per kilogram, litre or item) for the food items they purchased in the past week – the technical term for these household prices is a "unit value". Because the NPS visits households all across the country, the unit values it collects represent both urban and rural consumers, while the CPI collects price data only in urban centres.

Second, the NPS uses newer data on budget shares, and allows the spending habits captured by these shares to vary each month.

Up until 2009, the official CPI weighted each good according to its share of expenditure in the 2000 HBS (this was recently updated to use budget shares from the 2007 HBS). In contrast, the NPS index relies on data from the 2007 HBS and the 2008/09 NPS. In addition, because a primary focus of the NPS is on poverty measurement, the price index reflects the average prices paid by the poorest 50% of Tanzanians.

To provide an example, the total budget share for food in the CPI is XX%, and this share is revised only every several years. In the NPS index however, the share of food in total expenditure is re-calculated every month, to reflect seasonal fluctuations and responses to changes in food prices. The average food share for the index was XXX% in 2007, XXX% in 2008 and XXX% in the first three quarters of 2009.

Which of these two factors is more important in explaining the difference between the NPS and the CPI? Figure XXX helps to illustrate the relative importance of (i) different underlying price data, and (ii) different weights in explaining the gap between the CPI and the NPS index. The figure shows the inflation rate for each index in 2007, '08 and '09. The dark blue columns show the NPS index, using NPS household survey data for food prices and NPS weights to create the index. The light blue columns show the official CPI, using market price data and official weights from the 2000 HBS. In between, the grey columns show a hybrid index, using the market price data from the CPI, but weighted using the NPS weights. This hybrid measure highlights the role of different data sources and different weights in explain the discrepancies between

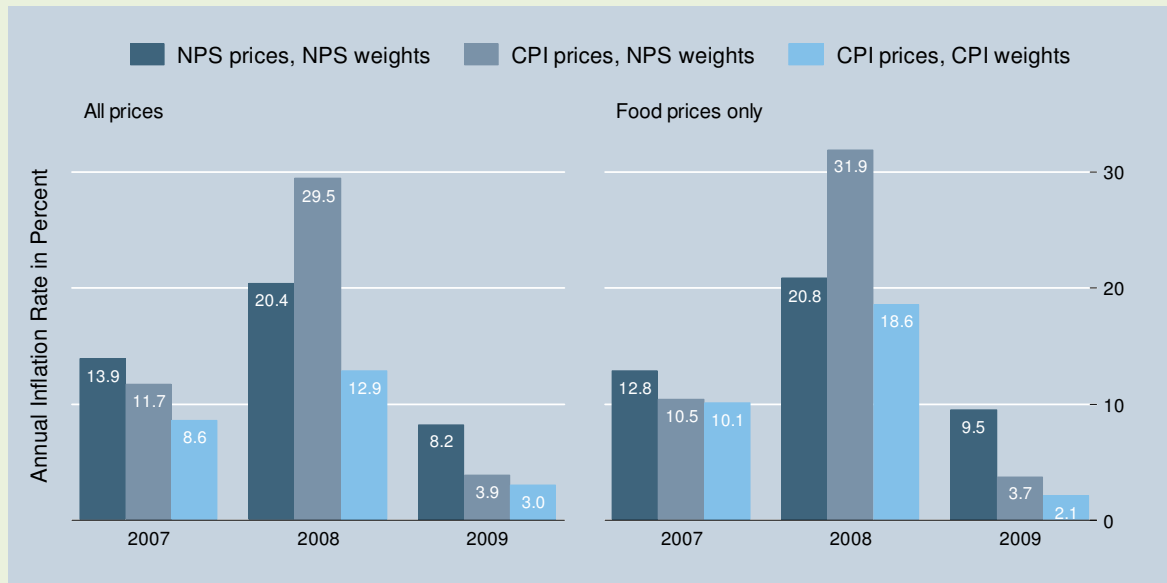
the two main indices. The figure is reproduced for the overall price level on the left, and exclusively for food prices on the right, since this is the area where the NPS index and the official CPI differ in terms of data sources.

The results show that under 'normal' conditions, such as 2007 and 2009, the hybrid index gives an inflation rate in between the (higher) NPS index and the (lower) official CPI inflation rate. Thus the difference is explained partially by differences in data and partially by

differences in weights. (This is true for overall prices and food prices, though for food it seems the differences in inflation for 2007 and 2009 are explained mostly by the different data sources: applying NPS weights to the CPI market price data gives results relatively similar to the official CPI.)

In 2008 however, the situation is quite different. The hybrid index, combining CPI market price data with NPS weights, gives a much higher inflation rate than either of the other indices. [Explanation??]

Figure 3. Inflation rates using different price data & different budget shares



Inflation rates are measured from Jan of the year listed to Jan of the following year. (This choice of periods, rather than Dec to Dec, is due to the lack of survey data for Dec 2006). Due to the duration of the survey and limitations on data availability at the time of writing, for 2009 the inflation rates reflect changes in the price indices from Jan 2009 to July 2009.

Goal 2: Promoting sustainable, broad-based growth

Indicator: Unemployment rate

Under the internationally recommended definition, a person is classified as unemployed if she/he meets all the following three conditions during a specified period (one week), that he/she is: (a) without work, (b) available for work, and (c) seeking work.

The international recommendations allows the relaxation of condition (c) above, i.e. seeking work, especially in countries where a large proportion of the population is engaged in agriculture and informal activities with generally low knowledge of labour market developments in the rest of the economy.

Tanzania is characterized by the above-mentioned conditions, and therefore uses the relaxed international definition of unemployment, while at the same time presenting results according to the stricter

Table 6. Labour force participation rates in %: ILFS 2006 and NPS 2008/09

		All	Women	Men
DSM	2006	87.3	86.2	88.5
	2008/09	88.6	89.9	87.0
Other urban	2006	89.0	88.4	89.8
	2008/09	87.8	88.1	86.4

international definition for comparison with other countries. Those persons who were without work, available but have not taken active steps to find work, thus satisfying conditions (a) and (b) above, are referred to as unemployment category B. The sum of

Table 5. Unemployment rates in %: by age category and sex

By age:	Int'l. Definition	Standard Definition
15-24	4.0	7.6
25-34	2.3	3.4
35-64	0.4	0.9
65+	0.1	0.4
Total	1.8	3.2

these two components of unemployment gives the overall unemployment rate based on the relaxed standard definition, hereafter referred to as the standard definition.¹⁰

Table 5 shows unemployment rates by both of these definitions in the 2008/09 NPS, broken down by age and sex. Overall, total unemployment in Mainland Tanzania in this period was 1.7% by the international definition and 3.1% by the standard definition. By both definitions unemployment is highest for the youngest members of the labour force: 4% and 7.7% by the respective definitions for individuals 15 to 24 years of age. Looking at the gender breakdown, there are no differences between males and females by the standard definition. However, men show slightly higher rates of

¹⁰ The Integrated Labour Force Survey, 2006, also computes a third definition of unemployment, referred to as the "national definition", which includes individuals with "extreme marginal attachment to employment". Unfortunately it is not possible to calculate unemployment by this definition in a comparable way in the 2008/09 NPS.

unemployment by the international definition (2.1% versus 1.4% for women).

Overall, unemployment as defined here is extremely low in Tanzania as a whole, reflecting the tendency for poorer individuals to find free-entry, low-income work in small-holder agriculture or informal self-employment rather.

The most authoritative source for labour market indicators in Tanzania is the Integrated Labour Force Survey (ILFS), which was last conducted over the calendar year of 2006. Unfortunately, due to changes in the wording for questions related to availability for work, job search, and treatment of unpaid household labor, it is not informative to make a direct comparison of unemployment rates

between the ILFS and the NPS. However, it is possible to compare another important labor market indicator, the participation rate.

Table 6 shows a comparison of participation rates in the NPS with the ILFS. The overall trend shows a slight decline in the labour force participation rate for Mainland Tanzania as a whole, from 91.6% to 90.9%. Disaggregating by gender, this decline is concentrated among women, whose participation rate declines from 92% to 90% between the two surveys. In all cases though, these changes are not sufficiently large relative to the sample sizes to provide a confident signal an economically significant shift in the structure of the labour market. The overall picture is of relative stability

Table 7. Nominal and real *median* monthly earnings, by occupation, 1991 – 2008/09^a

		Self-employed earnings		Private sector wages		Public sector wages	
		Nominal	Real ^b	Nominal	Real ^b	Nominal	Real ^b
1991	HBS	4,167	18,260	6,000	25,364	7,167	32,924
2000	HBS	16,667	30,616	30,250	53,846	52,000	98,087
2001	ILFS	26,000	44,082	30,000	50,278	65,000	115,442
2006	ILFS	45,500	46,511	45,000	44,771	110,000	114,697
2007	HBS	29,167	27,432	45,000	41,231	116,000	110,431
2009	NPS	90,000	56,081	70,000	42,163	170,390	111,341

^a The public sector here includes both local and central government employees, as well as individuals working for religious organizations, political parties, NGOs or international organizations. The private sector includes parastatal enterprises as well. "Farming" includes crop-farming as well as livestock keeping and forestry. "None" includes individuals who are not in the labour force (including the disabled and students), the unemployed and unpaid family workers. Precise definitions for each category in each survey are listed in Appendix C.

^b Real earnings are expressed in (June) 2007 Tanzanian Shillings. Nominal and real figures from 2007 do not perfectly coincide because real figures take account of geographic price differences as well as differences across time. Thus wages from Dar es Salaam are deflated to reflect national price levels, and similarly for urban and rural areas. All wages are deflated using the poverty lines published in the HBS reports. For intermediate years (2001 and 2006), levels of the poverty line are estimated using a logarithmic interpolation. For the 2008/09 NPS, wages are deflated using the price index presented in the chapter above on inflation. This price index was constructed to be a continuation of the deflators underlying HBS poverty line.

rather than change.

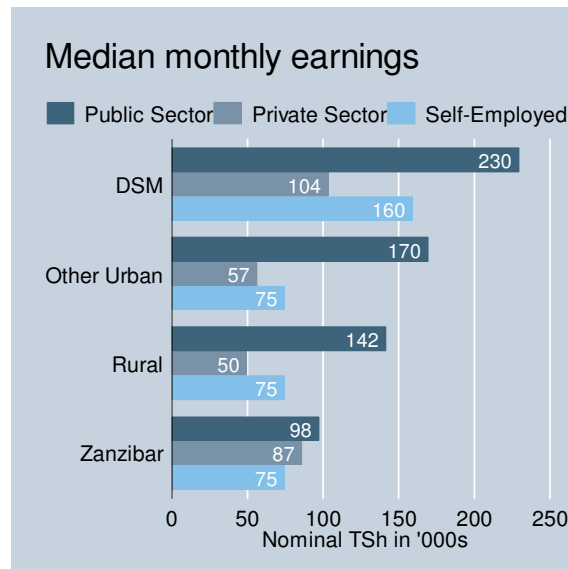
Given the attention paid in recent years on the pace of job creation, Table 7 provides a breakdown of the wage employment rates and wage rates by three different sectors: public employment, which includes both central and local government, the private sector, and “other” categories which include political parties, coops, NGOs, international organizations and religious organizations. The table is restricted to non-agricultural wage employment.

Looking at the first two columns which deal with the distribution of employment, overall there is a sign of a small increase in the size of the private sector between the two surveys. Further rounds of data collection will be needed to establish whether this is a genuine trend rather than a cyclical fluctuation or sampling fluke. Nevertheless, the available evidence points to an increase from 5.1% to 6.7% of the mainland adult population (15 years or older) in private sector wage employment. In proportional terms, this increase has been largest in rural areas, where the share nearly doubled from 2.1 to 4.1% of the population working in private sector wage employment. Nevertheless, this overall level remains quite low, and even in Dar es Salaam, the proportion of the adult population with a private sector wage job is just 18.3%.

Turning to wage levels, the public sector continues to pay dramatically higher wages than the private sector: an average of TSh.312,130 per month in the former and TSh.215,262 in the latter.

However, nominal wage increases in the public sector have lagged behind the private sector slightly, particularly in rural areas. Median nominal wages in the public and private sector rose by an annual rate of 24.4

Figure 4. Median Monthly Wages, Public and Private Sector Wage Employees



and 27.3% respectively. In assessing these changes it is important to bear in mind that these are nominal changes and should be compared to changes in the CPI over the 2006-2009 period to appreciate the significance of these movements in real terms.¹¹

¹¹ Because the price indices computed for the poverty analysis were only done for the 2007-2009 period covered by the HBS and NPS, there is no attempt to present real wage changes here, as the price series used in this report is not available for 2006.

Box 2. Comparing labour market indicators over time

Box 1 addressed the challenges of estimating changes over time in poverty – defined by low levels of household consumption. To understand why poverty is or is not falling, it is equally important to examine trends in household *income*. This box examines labour market earnings, from both wage employment and non-farm self-employment. (Farm production is dealt with in the next section.)

How do the wage and self-employment earnings levels recorded in the NPS compare to earlier surveys? Have significant changes taken place in the distribution of the labour force across sectors in recent years? This box attempts to create trends in earnings and employment levels over the eighteen years from 1991 to 2009, by comparing three sets of surveys: the HBS (1991, 2000, 2007), the ILFS (2001, 2006), and the NPS (2008/09). The figures presented here are based on new analysis of the micro-data from each survey, attempting to align definitions and categories, so they may differ from earlier official reports.

Readers should note that key labour market questions are asked in different ways in each set of surveys. Thus direct comparisons of the HBS, ILFS and NPS labour data must be treated with extreme caution. In particular, while the ILFS and NPS ask relatively similar questions, based on current activities in the past seven days and earnings in the most recent payment period, the HBS asks questions over a 12-month recall period. Similarly, the occupation categories used to

divide workers between jobs and sectors differ between surveys. The analysis presented here groups workers into a small list of broad categories, to ensure that the groupings are as consistent as possible across years.¹²

From 1991 to 2009, the fastest growing sector of employment has been non-farm, self-employment in urban areas. The share of adults in farming and wage employment has not changed dramatically over time. Real earnings for both wage-earners and the self-employed grew rapidly during the 1990s. with

Sector of employment

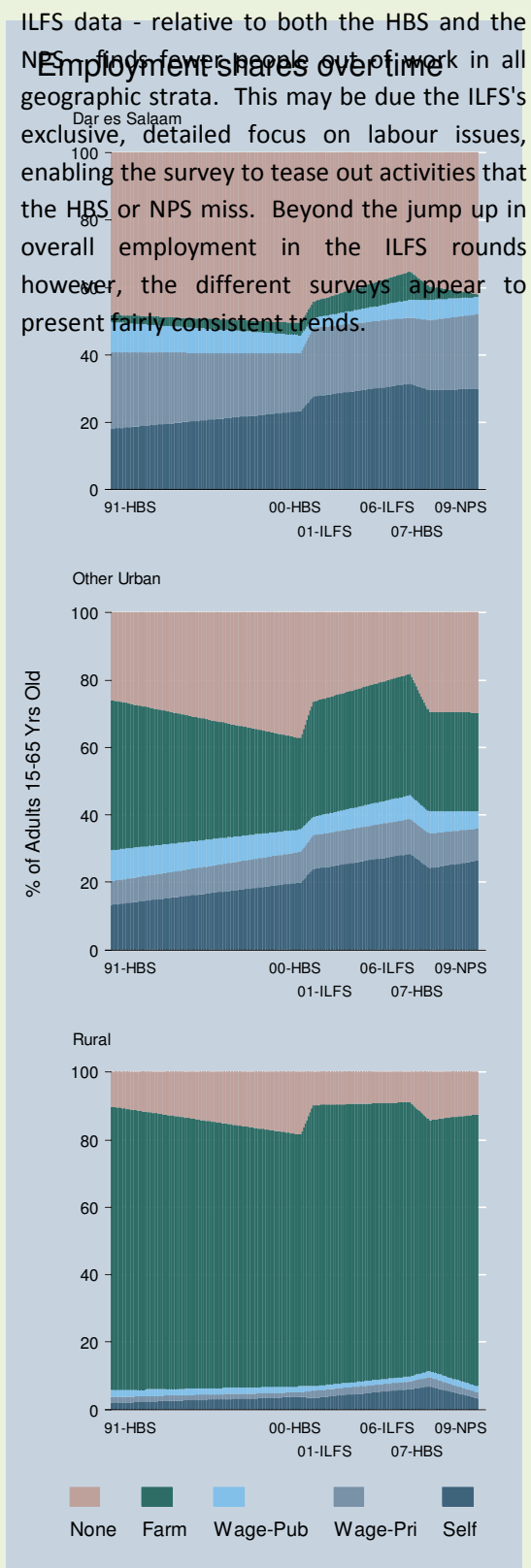
Figure 4 divides all adults, age 15 to 65, by their main occupation: (i) farming, (ii) public-sector wage employment, (iii) private-sector wage employment, (iv) non-agricultural self-employment, (v) or none of the above.¹³ The top panel shows this

breakdown for Dar es Salaam, the middle panel for other urban areas on the Mainland, and the bottom panel for rural Mainland Tanzania. The figure includes data from six points in time covered by the HBS, ILFS and NPS, spanning the period 1991 to 2009.

¹² See Appendix C for a detailed comparison of the question phrasing used for occupational categories, wages, and self-employed earnings in the HBS, ILFS, and NPS.

¹³ The public sector here includes both local and central government employees, as well as individuals working for religious organizations, political parties, NGOs or international organizations. The private sector includes parastatal enterprises as well. “Farming” includes crop-farming as well as livestock keeping and forestry. “None” includes individuals who are not in the labour force (including the disabled and students), the unemployed and unpaid family workers. Precise definitions for each category in each survey are listed in Appendix XXX.

Figure 5. Comparing employment levels by occupation and strata across 6 surveys

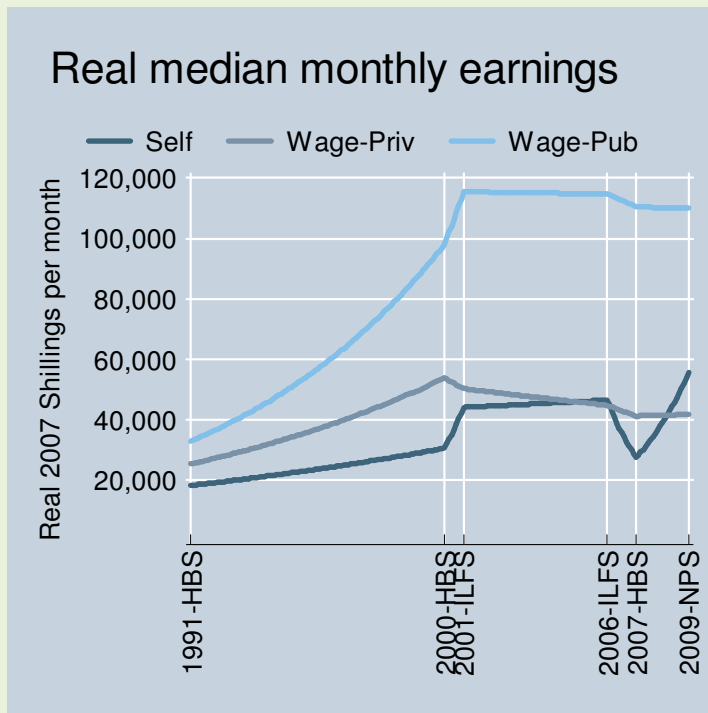


Three key trends in employment levels seen in Figure 4 include:

First, there has been a sustained increase in the share of the population involved in non-agricultural self-employment, particularly in urban areas. This rate rises fairly steadily from 18.4% in Dar es Salaam in 1991 to 29.7% in the NPS in 2008/09; similarly in other urban areas the rate rises 13.8% to 24.1% over the same period.

Second, the share of the workforce in agriculture has declined significantly in urban areas outside Dar es Salaam (from 42.8% in 1991 to just 29.2% in 2008/09) but only modestly in rural areas (from 83.1% to 80.0% over the same period). However, this share is highly volatile across surveys, likely reflecting differences in measurement techniques as much as genuine economic fluctuations.

Figure 1. Comparing earnings by occupation across 6 surveys, 1991-2009



Third, the relative size of the wage-employment sector (both public and private) has not grown dramatically over the period covered here. The public sector has employed just over 20% of the adult population in Dar es Salaam throughout this period, at or below 10% in other urban areas, and approximately 2% in rural areas. Meanwhile, the private sector has employed roughly 5% of adults in Dar es Salaam and other urban areas, and between 1 to 2% in rural areas. (The private sector employment figures in Dar es Salaam have been particularly volatile, fluctuating between 2.9% and 8.7%, but show no sustained trend upward or downward.)

Earnings levels

Figure 5 examines median, monthly, real earnings in 2007 Tanzanian Shillings in three

of the occupation categories analyzed above: public sector wages, private sector wages, and non-agricultural self-employed earnings (farm income is not included here). Once again, individuals are grouped by their main occupation, and earnings are presented only for that main occupation category.

Once again, three key trends in real wage levels stand out in Figure 5:

First, during the 1990s, median real earnings grew steadily across all occupation categories, and earnings inequality between sectors grew much wider. Real earnings grew at a rate of 5.9% for the self-employed,

8.7% for private-sector wage employees, and 12.9% for public-sector wage employees.

Second, in the 2000s, median real earnings for wage workers (both public and private) have stagnated. Median earnings in the public and private sectors were Tsh. 115,441/- and TSh. 44,770/- respectively in the 2001 ILFS, and had fallen slightly to TSh. 110,071/- and TSh. 41,764/- in the 2008/09 NPS.

Third, earnings of the non-farm self-employed appear to have surpassed private-sector wages during the 2000s. Earnings in the HBS years are consistently much lower than the ILFS and NPS rounds. However, a general trend is discernible of increased earnings for the self-employed despite declining private-sector wages. Interestingly, these increased earnings for the self-employed come while

the share of workforce in self-employment is increasing steadily in urban areas.

Table 8. Share of adults (age 15-65) by sector of employment, 1991-2009

	Year	Farming	Self- Employed	Private Wage Employee	Public Wage Employee	None
Dar es Salaam	1991-HBS	2.3%	18.5%	22.1%	8.7%	48.4%
	2000-HBS	3.6%	23.2%	17.3%	5.3%	50.6%
	2001-ILFS	4.8%	27.6%	20.4%	2.9%	44.3%
	2006-ILFS	8.4%	31.3%	19.7%	5.3%	35.4%
	2007-HBS	4.0%	29.4%	20.7%	6.1%	39.7%

Goal 4: Reducing income poverty of both men and women in rural areas

As noted in the introduction to the report, the NPS contains a wealth of information on smallholder farming activities. A separate one-and-a-half hour interview was conducted specific to agriculture, livestock and fishing activities for all households engaged in these sectors. As such, the NPS has the potential to track virtually all of the agriculture-related MKUKUTA indicators, as well as various other indicators related to the Agricultural Sector Development Program (ASDP) and the emerging *Kilimo Kwanza* goals.

The overall picture which emerges from the NPS agriculture data is unsurprising: the vast majority of smallholders rely on traditional farming techniques and employ relatively few new ‘modern’ technologies such as hybrid seeds, inorganic fertilizer, etc.

However, these results are relatively uninformative without a benchmark for comparison. In future years the NPS will provide this time series and show the evolution of technology adoption, crop choice, farm output and other indicators over

time. In this baseline year however, an attempt is made below to put the NPS figures in context by making direct comparisons, wherever possible, to the results of the 2003 National Sample Census of Agricultural, referred to here as the “Agricultural Census”.

By linking these two datasets, it is possible to see how some key indicators have developed over time. These include crop output numbers, asset holdings and various indicators of farming technologies. As the Agricultural Census and the NPS use different questionnaires, it is often the case that the indicators produced from the two will differ qualitatively on various points. Below is a description

Table 9. Production of Major Crops (in tons), Ag Census 2002/03 and NPS 2008/09

	2002/03 NSCA	2008/09 NPS	% Change
Masika only (2002, 2008)			
Maize	2,004,388	2,628,430	31.1%
Paddy	513,652	692,506	34.8%
Beans	207,571	152,175	-26.7%
Sorghum	173,174	242,426	40.0%
Groundnuts	138,847	407,515	193.5%
Sweet potatoes	131,123	291,840	122.6%
Sunflower	52,925	151,767	186.8%
Full year of the NPS			
Maize	2,617,115	2,993,055	14.4%
Cassava	2,102,838	1,159,987	-44.8%
Paddy	604,978	956,767	58.1%
Mango	336,028	929,099	176.5%
Beans	333,312	217,733	-34.7%
Sweet potatoes	216,478	385,755	78.2%
Sorghum	216,435	251,989	16.4%
Orange	186,695	345,043	84.8%
Cashew	183,419	73,066	-60.2%
Groundnuts	160,257	434,273	171.0%
Coconut	102,458	348,747	240.4%
Coffee	61,602	69,417	12.7%
Sunflower	55,070	153,799	179.3%

Table 10. % of households with erosion problems

	Ag Census	NPS
Having Erosion Problem		23.8%
Using Erosion Control	10.0%	25.6%
Type of Erosion Control		
Terraces	13.3%	43.2%
Erosion Control Bunds	53.0%	36.5%

of how the NPS indicators are produced and what are the limitations in terms of comparability to the Ag Census numbers.

% change in food crop production

The NPS collects data on production of all major crops in a way that is intended to be comparable to the 2002/03 Ag Census. However, the Ag Census sample is much larger than the NPS sample so some differences in the figures derived from these surveys may be due to the greater sampling error in the NPS. The timing of the questions during the crop cycle also differed between the surveys.

In the 2002/03 Ag Census, all respondents were asked about the 2002 long rainy season (*masika*) and the 2002/03 short rainy season (*vuli*). In contrast, the NPS fieldwork began in October 2008 and ended in October 2009. Thus all respondents were asked about their farming activities for the long rainy season

2008. However, respondents interviewed during roughly the first half of fieldwork were also asked about farming during the short rainy season in 2007-08, while those interviewed in the second half were asked about the 2008-09 short rainy season. As a result, the crop year covered by the NPS differs by respondent. The most consistent figures are those restricted to the long rainy-season only.

Table 9 reports total crop production for major food crops in the 2002/03 Ag Census and the 2008/09 NPS. The figures for the long rainy season cover 2002 and 2008. The figures are nationally representative, including Zanzibar, but include only smallholders. All production figures are measured in metric tons.

As seen in the table, the *masika* harvest of major cereal crops – maize, rice paddy and sorghum – increased moderately between the two surveys: up by 31.1% for maize, up 34.8% for paddy, and up 40% for sorghum. These increases represent annual percentage growth rates of between 4.6% and 5.8% over six years. Also noteworthy is the change in cassava production. This figure is calculated on an annual basis, and declined by 44.8% when comparing the 2002/03 agricultural year to the full calendar year covered by the 2008/09 NPS.

% of small holders using modern methods of farming (irrigation, fertilizers and hybrid seeds)

The statistics on modern farming methods include the fractions of all households cultivating at least one plot of land who are using erosion controls, irrigation, organic and inorganic fertilizers, and pesticides. There is also more detailed information on type of erosion controls, irrigation types,

Preliminary comparisons with the 2002/03 agricultural census show that use of key modern technologies by smallholders has remained remarkably constant over the past six years: roughly 12% use any inorganic fertilizer and just less than 20% use any improved seeds.

methods and water sources, pesticide and fertilizer type used, etc. In addition to this, there is information on the fraction of all households growing annual crops using improved seeds. The information on improved seeds is only available in the section on annual crops, and so any usage of improved seeds for permanent crops/fruits is not recognized.

With regard to organic fertilizer, the closest reference in the Ag census is on the usage of farm yard manure as a fertilizer. As usage of compost as fertilizer is reported separately, it is not possible to see from the reported statistics what fraction are using at least one of them, which would have been a closer match to the NPS version of the question.

For the types of erosion controls used, the Ag Census reports the percentage of the structures that belong in different categories. While the categories match well between the Ag Census and the NPS, the latter only contain information on whether a structure exists, so it is only possible to construct statistics on the fraction of the households using a specific control structure.

For the irrigation water source statistics, the Ag Census and NPS categories do not perfectly match align; non-matching codes have been re-assigned as follows: NPS references to “pond/tank” were matched to ag census references to “dam”, NPS responses stating “river/stream” to ag census responses of “canal or river” and NPS “other” responses to ag census “lake or pipe water” responses.

Table 11. % of households with irrigation

	Ag Census	NPS
Number of HH Using Irrigation	240,721	276,958
Percent Using Irrigation		4.7%
Type of Irrigation:		
Flooding	56%	66.0%
Sprinkler	2%	3.3%
Drip Irrigation	n/a	3.2%
Bucket/Watering Can	41%	24.6%
Water Hose	1%	5.2%
Other	n/a	0.0%
Method of Obtaining Water		
Gravity	58%	73.0%
Hand Bucket	39%	24.5%
Hand/Foot Pump	1%	2.7%
Motor Pump	1%	10.2%
Other	1%	1.3%
Source of Water		
Well	15%	14.3%
Borehole	1%	12.3%
Pond/Tank	3%	2.8%
River/Stream	75%	73.6%
Other	4%	5.1%

Ownership of farm implements

The NPS includes detailed information on the farm implements owned by a household. The indicators based on this information are presented as the fraction of the households owning a specific implement (such as a hand hoe, a tractor, etc.). It is important to note that this refers to the fraction of the total number of households involved in agriculture, i.e. either owns or cultivates some land or keeps some livestock.

Extension services

The NPS contains information on whether households have received any extension services regarding agricultural activities or prices, and from what source this extension came (e.g. the government, an NGO or the radio). As in the case of farm implements, the indicators presented are expressed as the percentage of people receiving an extension from a specific source. Note that also in this case do the percentage indicators refer to the fraction of people involved in agriculture that received some extension.

Table 13. Use of improved seeds

	Ag	
	Census	NPS
Using Improved Seeds	18.0%	19.5%
Type of Improved Seeds		
Certified Seeds		86.2%
Quality Declared Seeds		17.5%

When comparing this measure to the Ag census measure, there is a discrepancy between the interview questions. While the Ag census indicator refers to “crop extension services” the NPS refers to both “advice for your agricultural/livestock activities” and “agricultural prices”. In addition to this, the NPS explicitly asks about extension received via more sources than did the Ag Census. The

Table 12. Use of fertilizers and pesticides/ herbicides

	Ag	NPS
	Census	
Using Organic Fertilizer	26%	19.2%
Using Inorganic Fertilizer	12%	11.6%
Type of Inorganic Fertilizer		
Di-Ammonium Phosphate (DAP)		13.1%

following sources were not included in the Ag Census: Radio, Publication and Neighbor.

Finally, additional agricultural indicators that can be extracted from the NPS but which have not been analyzed to date include: the % of small holders who accessed formal credit formal credits for agricultural purpose; % of small holder households who have one or more off-farm income generating activities; and % of households whose main income is derived from the harvesting, processing and marketing of natural resources products.

Table 14. Use of modern farming methods by gender of household head

	Male-headed	Female-headed
Using Irrigation	4.5%	4.3%
Using Erosion Control	24.4%	24.3%
Using Organic Fertilizer	19.7%	12.6%
Using Inorganic Fertilizer	11.8%	9.7%
Using Pesticide/Herbicide	12.6%	8.8%
Using Improved Seeds	20.4%	14.9%

Table 16. % of households that received **Table 17. Ownership of farm implements**
Table 15. Possession of land titles among farming households, by gender of household head

	All Farm Households	Male-headed	Female-headed
Having a title for at least one plot	11.1%	12.0%	8.1%
Type of Title (Multiple Responses Allowed)			
Granted Right of Occupancy	18.7%	18.1%	22.0%
Cert. Of Customary Right of Occupancy	10.2%	11.2%	5.5%
Residential License	0.5%	0.5%	1.0%
Village-Government-Witnessed Purchase Agreement	25.6%	28.3%	12.3%
Land Certificate/Title Deed	0.4%	1.7%	5.1%
Large Scale Farmer	0.3%	2.4%	
Radio	n/a	27.1%	
Publication	n/a	4.6%	
Neighbour	n/a	37.4%	
Other	0.0%	9.2%	
Tractor Plough		2%	0.1%
Tractor Harrow			0.4%
Sheller/Thresher		2%	0.1%
Hand Mill/Grinder			0.4%
Watering Can			2.0%
Farm Buildings			6.4%
Geris Cans/Drums			10.5%

Goal 6: Provision of reliable and affordable energy to consumers

% increase in number of customers connected to the national grid and off-grid sources of electricity

Comparison with the Household Budget Survey series provides a picture of the evolution of electricity usage by Tanzanian household over time. Table 18 shows the proportion of households in each geographic stratum of the survey who have access to (a) electricity through the grid or (b) solar power. The results show a significant increase in Dar es Salaam (from 55% in 2007 to 62.4% in 2008/09). Urban areas show a much smaller increase (from 25.9% to 27.2%) and in rural areas – where electricity access is extremely sparse – there was a slight decline in the estimated figures, from 2.5% to 2.3%. While no time-series comparison is presented here, the overall rate of electricity access in Zanzibar is roughly equivalent to urban areas outside Dar es Salaam on the mainland at 23.5%. In all strata the usage of solar power has been and remains extremely low.

Table 18. % increase in number of customers connected to the national grid and off-grid sources of electricity

		Electricity grid	Solar
Dar es Salaam	2001	58.9	1.3
	2007	55.0	0.7
	2008/09	59.3	0.1

% of households in rural and urban areas using alternative sources of energy to wood fuel (including charcoal) as their main source of energy for cooking.

Table 19 shows trends across the HBS and NPS in terms of fuel-type for cooking, broken down by geographic strata. Looking across strata, the overwhelming majority of Tanzanians in Mainland rural areas (and in Zanzibar) rely on farm residuals for cooking fuel. In urban areas, and in particular in Dar es Salaam however, the primary cooking fuel is charcoal.

The subsequent rounds of the HBS have shown a steady increase in the proportion of households reporting reliance on charcoal. Results here suggest that this trend may be stabilizing – as charcoal usage on the Mainland as a whole fell slightly from 22.7 to 20.2% from 2007 to 2008/09 – though more data from future rounds is necessary to determine whether this is a permanent change in the trend.

Table 19. Main fuel used for cooking (%) by stratum and year

		Elect.	Gas	Biogas	Paraffin	Char-coal	Wood	Other
Dar es Salaam	91/92	9.7	1.2	.	33.7	52.1	1.2	2.1
	2001	4.8	0.4	0.2	43.0	46.2	4.6	0.9
	2007	2.2	0.9	0.1	12.4	74.9	8.0	1.5
	08/09	1.5	3.1	0.0	11.5	78.4	3.1	2.3
Other Urban	91/92	4.8	0.6	.	13.3	36.6	43.4	1.3

CLUSTER 2: IMPROVEMENT OF QUALITY OF LIFE AND SOCIAL WELL-BEING

In addition to collecting a wide-variety of household characteristics, the NPS questionnaire also includes several detailed modules which are administered at the individual level. These provide disaggregated information on personal demographics, education, health, and nutrition. The survey combines not only outcome indicators – e.g., height and weight for children, years of education achieved, etc. – but also provides

information on recourse to public versus private facilities for service delivery, money spent on health and education for each member of the household, and so on. This extensive individual-level data is central to tracking progress on various indicators under Cluster 2.

Table 20. Cluster 2 MKUKUTA indicators available in the NPS

Indicator	NPS coverage
Goal 1: Ensure equitable access to quality primary and secondary education for boys and girls, universal literacy and expansion of higher, technical and vocational education	
Literacy rate of population aged 15+	No
Net enrolment at pre-primary level	Yes
Net primary school enrolment rate	Yes
% of cohort completing Standard VII	Yes*
% of students passing the Primary School Leavers' Exam	No
Pupil/Teacher ratio	No
% of teachers with relevant qualifications	No
Pupil/text book ratio	No
Transition rate from Standard VII to Form 1	Yes*
Net secondary enrolment	Yes
% of students passing the form four examination	No
Enrolment in higher education Institutions	No
Goal 2: Improved survival, health and well-being of all children and women and especially vulnerable groups	
Infant mortality rate	Yes
Under-five mortality rate	No
% change in mortality attributable to malaria among children under-five	No
DPTHb3 coverage	No
Proportion of under-fives moderately or severely stunted (height for age)	Yes
Maternal mortality ratio	No

Indicator	NPS coverage
Proportion of births attended by a skilled health worker	Yes
% of persons with advanced HIV infection receiving ARV combination therapy	No
HIV prevalence amongst 15 - 24 yrs	No
TB treatment completion rate	No
Goal 3: Increased access to clean, affordable and safe water, sanitation, decent shelter and a safe and sustainable environment	
Proportion of population with access to piped or protected water as their main	Yes
No. of reported cholera cases	No
% of households with basic sanitation facilities	Yes
% of schools having adequate sanitation facilities (as per Policy)	No
Total area under community based natural resources management	No
Goal 4: Adequate social protection and rights of the vulnerable and needy groups with basic needs and services	
Goal 5: Systems are in place to ensure effective universal access to quality public services that are affordable and available	
Proportion of children in child labour	Yes
Proportion of children with disability attending primary school	Yes
Proportion of orphaned children attending primary school	Yes
Proportion of elderly accessing medical exemptions at public health facilities	Yes*
Proportion of population reporting to be satisfied with health services	No

*Indicators covered by the NPS questionnaire but which are not yet covered in this report.

Goal 1: Ensure equitable access to quality primary and secondary education for boys and girls, universal literacy and expansion of higher, technical and vocational education.

Net primary school enrolment rate

The net enrolment rate (NER) at the primary level is defined as the share of children age 7 to 13 who are enrolled. Table 21 reports the primary school NER for boys and girls in each geographic stratum of the survey sample, together with comparable figures from the HBS.

After the elimination of primary school fees in

Table 21. Net primary school enrolment rates, by year, sex and stratum

		All	Boys	Girls
Dar es Salaam	2000/01	71	68.3	73.4
	2007	90.8	91	90.7
	2008/09	81.2	82.8	79.5
Other urban areas	2000/01	71.4	72	70.7
	2007	91.3	91	91.6
	2008/09	88.3	84.8	91.5
Rural areas	2000/01	56	53.9	58.4
	2007	81.5	78.7	84.4
	2008/09	81.1	77.3	84.6
Mainland Tanzania	2000/01	58.7	56.7	60.8
	2007	83.7	81.4	86.1
	2008/09	82.3	78.9	85.5
Zanzibar	2008/09	78.9	76.0	81.7
URT	2008/09	81.9	78.6	85.0

2002, the NER rose quite dramatically, as documented in shift between the 2000/01 and 2007 rounds of the HBS. The total NER on the mainland rose from 58.7 to 83.7% over this period, with similar increases for both boys and girls.

In the short period between the 2007 HBS and the 2008/09 NPS the table shows that there has been a slight reversal of this trend. The decline in enrolment is most pronounced in Dar es Salaam, where the primary NER fell from 90.8% to 81.8%. However, enrolment was relatively stable in rural areas, which drives the national results. (Also, it is worth noting that the largest changes are witnessed in the urban strata with the smallest sample and hence largest potential sampling errors in the NPS.)

Net secondary enrolment

Following the practice in the HBS reports, net enrolment rates for secondary school are divided between the rate for Forms 1-IV, which uses the population of individuals age 14 to 17 in the denominator, and the NER for Forms I-VI, which uses the population of individuals age 14 to 19 in the denominator.

Table 22 shows the results for these secondary school indicators. The general pattern, unlike at the primary level, is of a

continued rapid rise in enrolment. Across mainland Tanzania the proportion of secondary-school aged children enrolled in Forms 1-4 rose from just 5.1% in 2000/01 to 15.2% in 2007 and to 22.1% in 2008/09.

Rural areas continue to lag behind urban areas, unsurprisingly, with a secondary-school NER of 14.9% compared to 46.8% in urban areas outside Dar es Salaam. Indeed, girls in rural areas are the one group shown in the Table with little or no improvement in secondary NER over the past year and a half.

Across the board, gender differentials remain considerable. Contrary to the situation in primary school, boys are now more likely to be enrolled in secondary school than girls. This phenomenon is new, as increased enrolment by boys has pushed the male secondary NER above the female rate only within the past year and half across Mainland Tanzania.

Table 22. Net secondary school enrolment rates, by year, sex and stratum

Forms I-IV:		All	Boys	Girls
Dar es Salaam	2000/01	18.9	17.2	20.4
	2007	31.5	33.7	29.8
	2008/09	44.9	51.3	39.0
Other urban areas	2000/01	15.2	12.7	17.1
	2007	28.1	25.7	30.2
	2008/09	46.4	44.7	47.9
Rural areas	2000/01	2	1.5	2.5
	2007	10.4	9.7	11.2
	2008/09	15.6	16.8	14.2
Mainland Tanzania	2000/01	5.1	4	6.1
	2007	15.2	13.9	16.5
	2008/09	23.5	23.8	23.2
Zanzibar	2008/09	37.7	18.9	55.7
URT	2008/09	25.2	23.2	27.3
Forms I-VI				
Dar es Salaam	2000/01	16	14.5	17.4
	2007	31.7	35.8	28.5
	2008/09	44.8	54.5	36.1
Other urban areas	2000/01	15.3	14.9	15.6
	2007	29.2	29	29.4
	2008/09	44.9	46.0	43.8
Rural areas	2000/01	2.3	1.8	2.8
	2007	11.4	11.7	11.1
	2008/09	18.3	18.7	17.8
Mainland Tanzania	2000/01	5.3	4.6	5.9
	2007	16.4	16.5	16.3
	2008/09	25.8	26.6	24.9
Zanzibar	2008/09	39.7	28.3	50.6
URT	2008/09	27.6	26.8	28.4

Goal 2: Improved survival, health and well-being of all children and women and especially vulnerable groups

Proportion of under-fives moderately or severely stunted (height for age)

Height-for-age provides an indication of children's nutritional status. While the height of individual children may vary for a variety of reasons, including genetic differences, the existence of a large proportion of children with extremely low height-for-age in a given population is a strong indication of food security deficiencies.

“Moderate stunting” measures the proportion of children whose height is more than two standard deviations below the mean height for their age in an international reference population. Similarly, “severe stunting” measures the proportion of children more than three standard deviations below the average for their reference group.

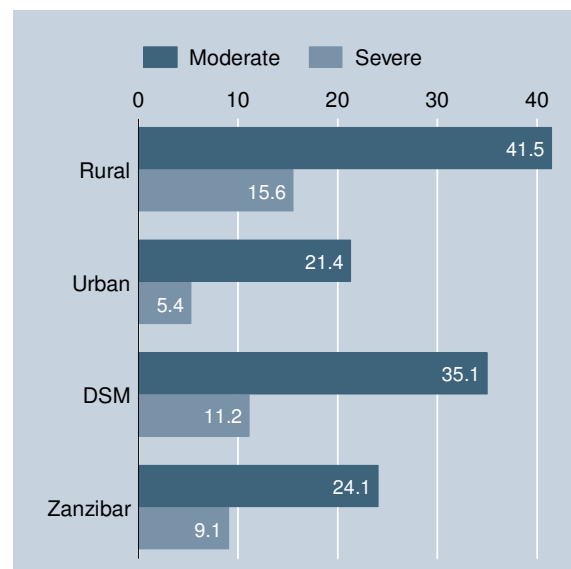
The NPS collected anthropometric data on all members of the sampled households, from age zero upwards. However, the data analyzed here is restricted to children under five, in line with the scope of the MKUKUTA indicator.

To complement the data on stunting, this section also reports the proportion of children who are moderately or severely wasted (low weight-for-height) and moderately or severely underweight (low weight for age). Low scores

on these latter indicators are generally interpreted as an indication of short-term malnutrition, while low height-for-age is seen as a measure of the cumulative effects of chronic malnutrition.

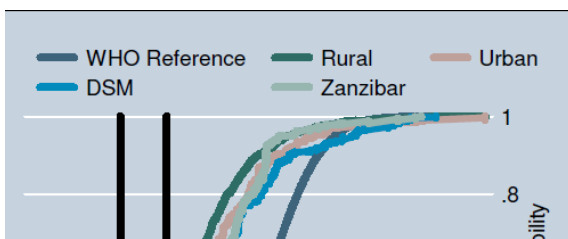
The analysis here was conducted in Epi-Info based on the sex-specific 1978 CDC/WHO

Figure 7. Stunting: Proportion of children under 5-years moderately and severely stunted, by stratum



normalized version of the 1977 NCHS reference curves for height-for-age, weight-

Figure 8. Cumulative distributions of Height-for-Age Z-Scores by stratum



for-age, and weight-for-height.¹⁴ The reference curves provide the basis for the calculation of Z-scores (percentile ranks on a standardized normal distribution of anthropometrics in the reference population) which underlie the classification of children as moderately or severely stunted, wasted, or underweight.

Figure 7 gives a more precise look at the distribution of height underlying the simple proportions reported in stunting and wasting statistics. The figure shows the cumulative

most and right-most vertical lines indicate the share of children moderately and severely stunted, respectively. What is perhaps somewhat surprising about this graph is the similarity of the distribution of height – particularly at the lowest levels – between Dar es Salaam and rural areas.

Table 23. Proportion of children under 5 years-old with low height-for-age (stunted), weight-for-height (wasted), or weight-for age (underweight), %

	Severely stunted	Moderately Stunted	Severely wasted	Moderately wasted	Severely underweight	Moderately underweight
Total:	13.4	36.9	0.8	3.0	3.8	21.0
By age: (months)						
0 to 6	7.0	21.5	3.2	4.6	2.8	5.8
7 to 11	14.6	35.8	1.7	4.5	3.6	17.3
12 to 23	17.7	46.3	0.8	3.7	4.8	25.5

distribution of the height-for-age Z-scores relative to the 1978 CDC/WHO reference population. The two vertical lines are at two and three standard deviations below the average. The points (on the y-axis) at which the sample distribution intersects the left-

¹⁴ Dibley MJ, Goldsby JB, Staehling NW, Trowbridge FL. Development of normalized curves for the international growth reference: historical and technical considerations. *Am J Clin Nutr* 1987;46:736-48

Proportion of births attended by a skilled health worker

Among women who reported giving birth to a child in the last 24 months, 47.3% reported giving birth to their most recent child in a hospital, 7.6% in a clinic, 43.5% at home, and 17.8% elsewhere.

Table 24 shows the proportion of births attended by various service providers. Nationwide, 60.8% of births were attended by a skilled health worker – either a doctor, nurse or midwife – and that rate was above 90% in both Dar es Salaam and other urban areas.

Table 24. Proportion of births attended by various service providers

	Doctor/Clinical Officer	Nurse	Midwife	Total Skilled	Traditional Birth Attendant	Friend/Relative	Self	Other	Total Unskilled
Total	15.8	32.2	12.8	60.8	15.7	18.7	3.9	0.9	39.2
Dar es Salaam	35.7	54.0	5.4	95.1	3.4	1.5	0.0	0.0	4.9
Urban	34.9	44.2	12.3	91.5	2.1	4.9	1.6	0.0	8.5
Rural	11.3	28.6	12.8	52.8	15.8	24.9	5.2	1.3	47.2
Zanzibar	12.0	30.2	17.8	60.0	37.8	2.2	0.0	0.0	40.0

Goal 3: Increased access to clean, affordable and safe water, sanitation, decent shelter and a safe and sustainable environment

Proportion of population with access to piped or protected water as their main drinking water source

Table 25 reports the primary source of drinking water for households in the each geographic stratum of the survey. An attempt is made to provide a direct comparison to figures from the multiple rounds of the HBS. However, one important difference between the HBS and the NPS relates to the reference period of the question: whereas the HBS asks about a household's primary source of drinking water in general, the NPS asks separate questions for the 'rainy' and 'dry' seasons.

Within the NPS, sources of drinking water are relatively constant across seasons. On the mainland as a whole, between 34 and 35% of households have access to piped water of some sort in each season. The rate is significantly lower, roughly 22% for the majority of Tanzanians in rural areas.

Looking across time, the overall picture is one of continuity rather than change. The overall proportion of households with access to piped water has been relatively stable since the 1991/92 HBS. The notable exception to this trend is Dar es Salaam, where access to piped water has actually declined, from 93.1% in 1991/92 to the current rate of between 72.8 and 76.3%. This decline appears to be related to the phenomenon of rural to urban migration. Access to piped water has declined at least marginally in all other Mainland strata as well, while the Mainland average has remained constant – reflecting the larger proportion of households in urban areas, including Dar es Salaam, in later survey rounds. In short, it appears that Tanzanian households have maintained access to improved sources of drinking water by moving to water infrastructure (i.e., cities) rather than the water infrastructure moving to them.

Table 25. Primary source of drinking water (%), by stratum and year/season

		91/92	2001	2007	08/09 Rainy	08/09 Dry
Dar es Salaam	Any piped water	93.1	85.8	61.5	72.1	76.1
	Piped water inside dwelling	22.1	13.7	8.0	11.5	11.1
	Private outside standpipe tap	52.6	19.1	11.8	25.0	25.8
	Piped water neighbor	.	46.4	37.6	27.7	29.1
	Public standpipe tap	18.4	6.6	4.1	2.4	2.9
		91/92	2001	2007	08/09 Rainy	08/09 Dry
Mainland Tanzania	Any piped water	35.9	39.3	33.9	34.7	35.4
	Piped water inside dwelling	5.2	3.8	3.8	4.1	3.9
	Private outside standpipe tap	9.2	5.5	4.8	6.4	5.7
	Piped water neighbor	.	10.2	10.1	9.3	9.7
	Public standpipe tap	21.5	19.8	15.2	13.7	13.6
	Any well	34.0	34.3	38.3	28.5	31.6
	Rainwater	.	.	0.7	8.9	0.4

% of households with basic sanitation facilities

Table 26 shows households' access to various types of toilet facilities, by stratum and year. Across all strata, the vast majority of households have access only to pit latrines – 80.9% report using a pit latrine on the Mainland in the NPS. In urban areas, access to ventilated improved pit latrines (VIP) has

increased steadily over time, to a current rate of 18.1% in Dar es Salaam and 13.7% in other urban areas. However, the large jump upward in VIP access in just roughly 18 months in Dar es Salaam suggest something of a statistical fluke here, and results should be treated with caution.

Table 26. Toilet type (%), by stratum and year

		No toilet	Flush toilet	Pit latrine	VIP	Other toilet
Dar es Salaam	1991/92	1.3	9.3	89.1	0.2	0.1
	2001	5.7	10.6	82.0	1.7	0.0
	2007	1.1	10.3	80.5	7.8	0.2
	2008/09	0.1	18.9	62.4	18.4	0.0
Other Urban	1991/92	1.8	3.4	94.6	0.2	0.0
	2001	2.3	7.5	87.5	2.5	0.2

Table 27. Household tenure status by stratum and year

		Owned by the household	Occupying w/out paying rent	Rented	Subsidized by employer
Dar es Salaam	1991/92	31.2	3.8	62.3	2.7
	2001	32.4	3.6	62.7	1.2
	2007	38.8	5.3	55.2	0.6
	2008/09	39.0	6.4	54.3	0.2
Other urban	1991/92	55.8	2.3	41.0	0.8
	2001	54.2	4.1	40.5	1.1
	2007	55.0	4.6	39.9	0.5
	2008/09	51.6	6.7	39.7	0.4
Rural	1991/92	95.3	1.6	2.7	0.3
	2001	94.5	2.3	2.9	0.2
	2007	92.3	3.1	4.5	0.0
	2008/09	91.3	5.5	3.1	0.0
Total Mainland	1991/92	85.4	1.8	12.1	0.5
	2001	84.3	2.7	12.5	0.4
	2007	79.9	3.6	16.3	0.2
	2008/09	78.3	5.9	15.4	0.1
Zanzibar	2008/09	86.0	10.4	3.6	0.0
URT	2008/09	79.2	6.4	14.0	0.1

Table 28. Building materials (%), by stratum and year

	Dar es Salaam				Other Urban				Rural				Mainland Tanzania				Zanz	URT
	91/92	2001	2007	08/09	91/92	2001	2007	08/09	91/92	2001	2007	08/09	91/92	2001	2007	08/09	08/09	08/09
Floor:																		
Earth	14.5	6.7	8.7	5.6	44.6	38.3	37.1	33.0	90.8	86.6	83.1	83.3	79.2	74.0	67.0	65.3	30.1	61.3
Cement, tiles	84.3	92.4	90.4	94.2	54.2	61.1	61.9	66.8	8.0	12.5	15.6	15.2	19.6	25.2	31.8	33.6	69.4	37.7
Other	1.2	0.9	1.0	0.0	1.2	0.5	0.9	0.2	1.2	0.9	1.3	1.5	1.2	0.8	1.2	1.1	0.5	1.0
Walls:																		
Poles, branches, etc.	3.4	0.9	1.5	0.8	5.7	5.3	4.6	3.6	23.7	19.3	16.9	12.4	19.8	16.0	13.0	9.5	1.8	8.6
Mud & poles / stones	15.1	5.2	4.7	2.7	16.3	13.1	10.9	18.1	27.7	21.8	22.0	26.4	25.3	19.4	18.2	22.4	49.9	25.6
Mud only	2.0	2.2	1.9	0.5	11.1	12.1	10.3	1.6	14.6	18.1	12.0	4.6	13.3	16.1	10.7	3.5	0.5	3.2
Mud bricks	12.0	3.2	1.3	0.2	37.6	30.8	22.6	30.7	24.2	23.5	26.4	30.3	25.4	23.3	23.2	27.6	2.3	24.6
Baked / burnt bricks	4.8	1.3	1.6	0.2	11.9	15.9	29.9	23.3	8.1	13.7	18.8	22.3	8.5	13.2	19.3	20.5	0.3	18.1
Concrete, cement, stone	62.1	87.2	88.3	95.0	17.1	22.4	20.7	22.7	1.5	3.0	3.1	3.5	7.6	11.5	14.8	16.1	41.0	18.9
Other	0.7	0.0	0.5	0.5	0.2	0.4	1.0	0.1	0.1	0.6	0.9	0.6	0.2	0.5	0.9	0.5	4.3	0.9
Roof:																		
Grass, leaves, bamboo	1.1	1.1	2.1	1.5	21.7	14.3	12.3	13.0	63.1	55.7	48.2	46.1	53.1	45.8	36.8	34.9	24.1	33.6
Mud & grass	0.2	0.7	0.4	0.2	1.7	1.5	2.6	0.8	12.8	12.5	9.2	5.6	10.4	10.1	7.1	4.1	0.8	3.7
Concrete, cement	3.4	3.6	1.2	1.7	0.7	0.5	0.0	0.4	0.1	0.0	0.0	0.1	0.4	0.3	0.1	0.3	0.3	0.3
Galvanised metal sheets	91.5	91.7	94.4	94.5	74.2	81.9	84.1	84.6	23.8	31.1	41.8	46.3	35.4	42.8	55.1	59.0	73.5	60.6
Asbestos sheets	0.1	0.5	0.3	0.4	0.0	0.3	0.3	0.6	0.1	0.0	0.2	0.1	0.1	0.1	0.2	0.3	1.3	0.4
Tiles	3.8	2.4	1.2	1.5	0.5	1.0	0.2	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.2	0.2	0.1	0.2
Other	0.0	0.0	0.3	0.0	1.3	0.5	0.5	0.4	0.1	0.5	0.6	1.6	0.3	0.5	0.5	1.2	0.0	1.1

Goal 4: Adequate social protection and rights of the vulnerable and needy groups with basic needs and services

Proportion of children with disability attending primary school

Disability rates in the NPS are calculated on the basis of the response to the single, straightforward questions “Are you physically handicapped?” On this basis, 3.34% of Tanzanians are classified as handicapped. Figure 8 shows a breakdown of the type of disability among this slice of the population classified as disabled, with blindness and partial paralysis as the largest categories.

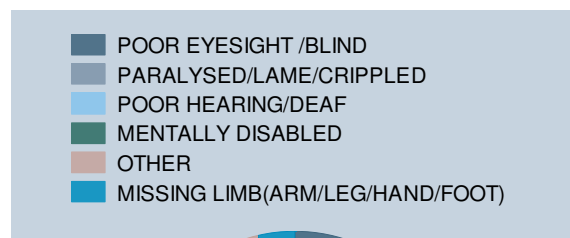
Among children in the age-range used to calculate net enrolment rates for primary schooling, i.e., 7 to 13 years old, the disability rate 1.40% by this definition.

This provides a quite small sub-sample of disabled children in the NPS sample with which to calculate enrolment rates, of just 48 children. Table 29 presents the results from this small-sample calculation, showing that just 57.6% of disabled children of primary-school age are enrolled, as compared with 82.3% of Tanzanian children who are not reported as disabled. While the sample size demands caution in the interpretation of these results, this disparity suggests a potentially serious gap in access to education for the disabled.

Table 29. Net primary school enrolment rate among disabled

	% Enrolled
Total	81.8
With disability	57.6
Without disability	82.3

Figure 9. Types of disability among those classified as disabled



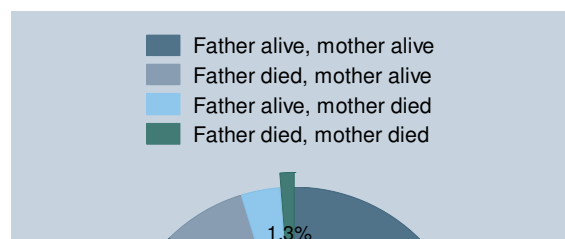
Proportion of orphaned children attending primary school

Figure 9 shows the proportion of Tanzanian children of primary-school age who are orphaned. Among children age 7 to 13, 1.3% have lost both their father and mother, an additional 3.5% have lost their mother, and an additional 7.4% have lost their father.

Table 30 shows the primary school enrolment rate among orphaned children, distinguishing among children who have lost neither, one, or both parents. As with the case of enrolment among disabled children, it should be noted that the sample sizes available to calculate these enrolment rates are quite small.

Taking the results at face value, the enrolment pattern implies little or no disadvantage in educational access for children losing one parent, but a modest enrolment gap for children who have lost both parents. The latter group shows an enrolment rate of

Figure 10. Orphanhood status among children of primary school age (7-13 yrs)



72.3%, relative to 81.8% for children with both parents alive.

Table 30. Net primary school enrolment rate among orphans

	% Enrolled
Total	81.8
Non-orphan	81.5
Father deceased	87.3
Mother deceased	83.6
Both parents deceased	72.3

CLUSTER 3: GOVERNANCE AND ACCOUNTABILITY

The core of the NPS is a questionnaire related to households' material conditions, their economic welfare and their means of earning a living and accessing basic services and amenities. The majority of governance and accountability indicators under Cluster 3 of MKUKUTA relate to system and institution outcomes that are best measured through administrative data. However, specifically

with the Cluster 3 indicators in mind, a deliberate attempt was made in the design of the NPS to incorporate into the questionnaire a specific modules related to governance indicators that are appropriately captured at the household level. This includes a module on crime, citizens' views about their local and national leaders, and women's experiences of gender-based violence.

Table 31. Cluster 3 MKUKUTA indicators available in the NPS

Indicator	NPS coverage
Goal 1: Structure and systems of governance as well as the rule of law are democratic, participatory, representative, accountable and inclusive	
% of population with birth certificates	Yes
Proportion of women among senior civil servants	No
% of women representatives (elected) to district council	No
Proportion of women among Members of Parliament	No
Proportion of villages assemblies holding quarterly meeting with public minutes	Yes
Proportion of LGAs posting public budgets, revenue and actual expenditures on easily accessible public notice boards	No
% of female from small holder households with land ownership or customary land rights	Yes
Goal 2: Equitable allocation of public resources with corruption effectively addressed	
Total revenue collected as % of revenue due at national level	No
% of procuring entities complying with the public procurement act and procedures	No
% of government entities awarded clean audit certificate from the National Audit Office	No
Number of corruption cases convicted as % of number of investigated cases sanctioned for prosecution by the Director of Public Prosecutions	No
% of LGAs that receive the full calculated amount of their annual formula-based budget allocation	No
Total value of revenue received from concessions and licenses for mining, forestry, fishing and wildlife as % of their estimated economic value	No

Indicator	NPS coverage
Goal 3: Effective public service framework in place to provide foundation for service delivery improvements and poverty reduction	
% of population reporting satisfaction with Government Services	No
% of population who found key service providers to be absent when they needed a service	No
Goal 4: Rights of the poor and vulnerable groups are protected and promoted in the justice system	
% of court cases outstanding for two or more years	No
% of prisoners in remand for two or more years compared to all prisoners in a given year	No
% of detained juveniles accommodated in juvenile remand homes	No
% of districts with a team of trained Paralegals	No
Goal 5: Reduction of political and social exclusion and intolerance	
Number of cases filed on infringement of human rights	No
Goal 6: Improved personal and material security, reduced crime, eliminate sexual abuse and domestic violence	
Average no. of inmates per facility as % of authorized capacity	No
Number of cases of crimes reported	Yes
% of cases of sexual abuse reported that resulted in a conviction	No
% who agree that a husband is justified in hitting or beating his wife for a specific reason	Yes
Goal 7: National cultural identities enhanced and promoted	
At present, process indicators will be used which follow the MKUKUTA Annex. Outcome indicators should evolve from this process.	

Goal 6: Improved personal and material security, reduced crime, eliminate sexual abuse and domestic violence

% who agree that a husband is justified in hitting or beating his wife for a specific reason

The first round of the NPS included a free-standing module in the household questionnaire devoted specifically to the issue of gender-based violence (GBV). The inclusion of this module – though well outside the normal scope of integrated household surveys – was deemed important by the NPS technical committee given the increased focus on violence against women among civil society groups and international organizations, paired with the relative lack of concrete information on its prevalence, causes and effects.

The GBV module in the NPS focused on two dimensions of the issue: (i) attitudes toward GBV, which are the basis for the MKUKUTA indicator and are currently being measured again through the DH, and (ii) prevalence of GBV – i.e., actual, self-reported experience of victimization.

The questionnaire was administered to all women in the sampled households aged 15 to 50, regardless of marital status. Questions on prevalence focused on intimate-partner violence and referred to either a husband, or boyfriend where applicable.

Enumerators administering the GBV module were instructed to take particular caution in ensuring that the interview was conducted in private, that the respondent understood that all responses would be confidential, and that

she was free to stop the interview at any time or request that the enumerator move on to another question.

Attitudes

Roughly half (51%) of Tanzanian women feel that a husband is justified in hitting or beating his wife in at least some circumstances.

Table 32 shows women’s response to a question – now standard in surveys around the world – asking whether such abuse is justified in specific contexts. For the four circumstances commonly included in this battery of questions – going out without telling him, neglecting the children, arguing, or refusing sex – between 1/4th and 1/3rd of women feel that physical violence is justified.

Interestingly however, when presented with

Table 32. % of women 15-50 yrs old who agree with the following statements

“Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations:”

	% who agree
If she goes out without telling him	35.8
If she neglects the children	38.1
If she argues with him	31.3
If she refuses to have sex with him	33.7
If there are problems with his or her family	3.5
If there are money problems	1.7
If there is no food at home	6.4

Table 33. Self-reported incidence of domestic violence (% of women 15-50 yrs old)

Has your current partner, or any partner...	ever...	in the past 12 months...
Slapped or thrown something at you that could hurt you?	18.0	7.9
Pushed you or shoved you?	13.1	6.6
Hit you with his fist or with something else that could hurt you?	10.9	4.8
Kicked you, dragged you, or beaten you up?	8.1	3.6
Choked or burnt you on purpose?	1.2	0.5
Threatened to use or actually used a gun, knife or other weapon against you?	2.3	1.0
Physically forced you to have sexual intercourse when you did not want to?	8.0	4.9
Did you ever have sexual intercourse you did not want because you were afraid of what he might do?	6.1	3.5

alternative scenarios which are less closely related to any specific action by the women (family problems, money problems, lack of food), the vast majority of respondents felt that felt that violence was not justified.

Prevalence

Table 33 shows the pattern of women’s responses to a series of questions about their own experiences with GBV. The structure of the table mimics the structure of the questionnaire itself: respondents were asked whether their current partner or any other partner had ever committed one of the acts listed. For affirmative responses, follow-up questions asked about the frequency of this abuse and whether it had occurred in the last 12 months.

Overall, 14.1% of women reported that they had ever been slapped or had something thrown at them by a partner, and 5.8% of women had experienced this in the past year. 6.5% of women reported having been raped by a partner, and 3.9% in the past. In total, 19% of women reported that they had ever experienced one of the forms of violence listed.

As alarming as these statistics on prevalence are, there is reason to believe that the underlying truth is much worse, and that women significantly under-report actual violence. One suggestive piece of evidence is the significant relationship between the gender of the interviewer and the prevalence of violence reported. As seen in the bottom panel of Table 35, the overall rate of reported physical abuse is more than double (31.8% versus 15.3%) when a woman is speaking to another woman. These results provide a clear guideline for the conduct of future rounds of the survey.

Correlates

This section examines personal characteristics that correlate with women’s attitudes toward and experiences of GBV. Correlation is not causation. Nevertheless, much can be learned about risk-factors associated with GBV by examining the profile of victims.

Table 35 disaggregates the responses from previous tables along several dimensions: location, age, marital status, education, and employment. The implicit hypothesis behind this disaggregation is that more autonomous individuals may be less subject to condone or fall victim of violence.

Table 34. % of domestic violence victims who report abuse to various institutions

After any of the incidents of physical violence, did you ever go to [...] for help?

Family	49.6
Hospital/health centre	7.3
Village/community leaders	21.7
NGO	0.7
Religious leader	2.8
Police	4.4
No one	0.4

Taking each of these dimensions in turn, results show that while attitudes are more permissive toward GBV in rural areas, and the prevalence is higher, these differences are not large. GBV is ubiquitous. Similarly, there are not particularly marked differences in attitudes toward or prevalence of GBV across age groups, with the exception of the youngest bracket (15-24 years) where both are much lower.

Looking at marital status, single, never-married women are the least likely to condone violence, and women living together with a partner but not married are the most likely to condone it. The highest rates of prevalence are seen among women in polygamous marriages and divorcées.

Results are fairly strong in suggesting that education reduces women's acceptance and experience of GBV, in line with the autonomy hypothesis. However, dividing women between those who have and do not have a non-farm cash income, shows the opposite result. Women with an earned-income are more accepting of GBV, and more than twice as likely to report having experienced violence themselves.

Table 35. Gender-based violence indicators, by respondent's characteristics (women 15-50 yrs old)

	% who agree hitting is justified in some cases	% who have ever been abused	% who have been abused in past 12 mos.	% of those abused who reported abuse
Total	53.5	24.9	13.4	56.7
By location:				
Dar es Salaam	47.0	23.8	13.4	52.3
Other urban areas	49.8	19.6	10.2	54.9
Rural areas	55.6	26.9	14.5	57.7
By age:				
15-19 yrs	42.8	6.0	4.6	48.3
20-29 yrs	54.3	28.3	17.7	55.4
30-39 yrs	58.8	31.3	17.1	58.5
40-50 yrs	57.1	31.9	11.2	58.3
By marital status:				
Married - mono	57.2	27.5	15.9	57.5
Married - poly	58.3	45.1	21.5	55.3
Living together	70.8	35.4	25.7	50.4
Divorced	54.2	44.6	16.9	72.3
Separated	65.7	36.6	14.2	80.9
Never married	40.7	7.3	4.4	44.6
Widowed	53.4	21.8	5.4	33.2
By education:				
None	61.8	29.9	15.7	52.8
Some primary	58.7	31.2	16.9	59.6
Some secondary	36.5	7.9	4.3	43.1
By employment status:				
No income	53.4	20.4	11.3	58.1
Non-farm income	53.6	35.1	18.2	54.9
Alcohol consumption				
No	52.2	23.4	12.5	55.2
Yes	63.0	35.8	20.3	63.8
Gender of interviewer				
Male	49.5	21.0	11.6	52.4
Female	62.3	33.8	17.5	62.5

Appendix A. ‘Projecting’ poverty rates for comparison with the HBS

This appendix presents the methodology used to estimate preliminary, “predicted” poverty rates for the NPS, as presented in the section of the report on “Cluster 1: Growth and Poverty Reduction”. The goal of the analysis presented here is to enable comparison of poverty over time even when there is doubt about the comparability of the measures of household consumption between surveys (as in the case of the HBS and NPS, where the methodology for collecting consumption data changed dramatically between surveys).

The methodology draws on Mathiassen (2009) who presents a regression-based model for estimating the headcount poverty rate without relying on consumption or expenditure data.¹⁵ A similar approach has been presented by Stifel and Christiaensen (2007) to estimate the evolution of poverty over time in Kenya.¹⁶ Christiaensen, et al (2008) extend this approach with further applications to Russia and Vietnam.¹⁷ The latter authors build directly on Small-Area-Estimation techniques formalized by Elbers et al. (2003), which laid the groundwork for a

large body of applied work on poverty mapping.¹⁸

At the core of all of these approaches is a linear regression model of household consumption. And the basic underlying logic is closely analogous to that of poverty mapping. In the latter context, the relationship between consumption and widely-available household and community characteristics is estimated in survey data, and the results are used to estimate consumption (and hence poverty) in disaggregated geographic areas with census data. In the current application, the challenge is to extrapolate over time rather than space, using the relationship between consumption and household characteristics in the 2007 HBS to predict poverty rates in 2008/09 based on changes in those same household characteristics. The following sections detail the steps in this process.

Step 1. Comparing HBS (2007) and NPS (2008/09) variables

The first task in a survey-to-survey comparison of consumption levels is to identify a set of plausible correlates of consumption that are measured in a comparable way across surveys. The HBS and NPS questionnaires differ enormously in terms of structure and content. However, precisely for the purpose of maintaining a consistent set of welfare indicators across surveys, virtually all NBS social surveys employ

¹⁵ A. Mathiassen (2009). “A model based approach for predicting annual poverty rates without expenditure data.” *Journal of Economic Inequality*, 7(2), pp. 117 – 136.

¹⁶ D. Stifel and L. Christiaensen (2007). “Tracking poverty over time in the absence of comparable consumption data.” *World Bank Economic Review*, 21(2), pp. 317 – 341.

¹⁷ L. Christiaensen, P. Lanjouw, J. Luoto, and D. Stifel (2008). “The reliability of small area estimation prediction methods to track poverty.” World Bank, mimeo.

¹⁸ C. Elbers, J. Lanjouw and P. Lanjouw (2003). “Micro-level estimation of poverty and inequality.” *Econometrica*, 71(1), pp. 335 – 364.

a common set of core questions that provide the basis for the modelling exercise here.

In particular, variables are available in five categories that are commonly used in Small Area Estimation of poverty. These include:

- Demographic characteristics, including the number of males and females in the household in various age categories, as well as indicators of marital status and relationship to the household head.
- Education levels for each member of the household. We also interact education with the household-head variable to allow for the potentially greater significance of the head's human capital in explaining the socioeconomic status of the household. Also, the two surveys contain comparable questions about the current enrolment status of children, and the level of schooling attended: primary, secondary or tertiary.
- Occupational status. Unfortunately, the labour market questions in the HBS and the NPS are not identical. However, basic indicators can be constructed in a comparable way. These include an indicator variable for whether or not each household member is working at all, and whether or not their primary activity is agriculture.
- Housing and amenities. The HBS and NPS contain nearly identical questions on the materials used to construct the roof, walls, and floor of the dwelling, and questions about the tenure of the house (owned, rented, occupied without rent, etc.). An attempt has been made to line up responses to questions about energy and fuel usage for the section of the report above that deals specifically with these topics. However, it was judged that

the discrepancies in response options rendered these variables unusable for consumption modelling.

- Assets. The HBS and NPS ask about household ownership of a common set of 52 assets, including the number of each item owned.

Given that the point of the consumption modelling exercise conducted here is to measure changes in poverty over time, rather than to map poverty rates across space as in standard Small Area Estimation, it is important to highlight the variables in the model that can reasonably be expected to vary over time and thus explain genuine changes in welfare between 2007 and 2008/09.¹⁹ These variables include occupational status, school enrolment, and a number of the less-durable (and therefore more frequently purchased) asset variables.

In total, after inspection of the questionnaires and summary statistics for each survey, a total of 86 variables were deemed comparable across years. These 86 variables comprise the set of 'candidate' variables to be used in the regression modelling in the next section. The full set of candidate variables used in the analysis is given in Table 36, separated by stratum and listed side-by-side for the two survey samples.

¹⁹ Note that the average levels of all variables in the model are likely to change between surveys, due to sampling error and measurement error in both surveys. Our focus here is on variables that might genuinely change for a given household over time, ignoring measurement error.

Step 2. Modelling consumption in the 2007 HBS

The model of consumption

At the core of step 2 is a regression model of consumption which is estimated with the 2007 HBS data and used to construct “predicted” consumption in the 2008/09 NPS data. Denote total nominal household consumption per adult equivalent in household i and cluster j at time t by Y_{ijt} . Assuming a log-linear relationship between consumption and the household characteristics described above, contained in the matrix X_{ijt} , we can write:

$$(1) \quad \ln Y_{ijt} = X_{ijt}\beta + \varepsilon_{ijt}$$

where ε_{ijt} is an error term with total variance σ_{ijt}^2 . The headcount poverty rate is defined as the proportion of the population whose consumption per adult equivalent lies below some poverty line, which we denote z . Based on our model of consumption, the probability that a given individual is poor can be rewritten as follows:

(2)

$$P_{ijt} = P(Y_{ijt} < z) = P(\ln Y_{ijt} < \ln(z)) = P(X_{ijt}\beta + \varepsilon_{ijt} < \ln(z))$$

where $\Phi(\cdot)$ denotes the standard cumulative normal distribution function. The final equation in this expression shows how estimates of the model parameters from (1) combined with household characteristics yield an estimate of poverty rates. Averaging these individual poverty probabilities over the sample of individuals gives our empirical estimator of headcount poverty:

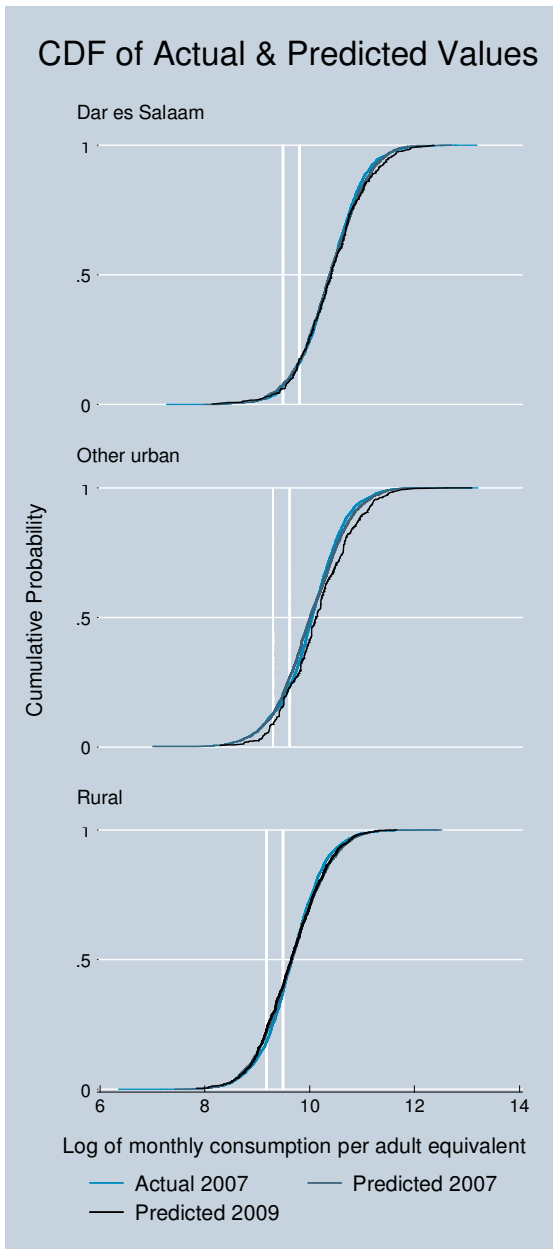
(3)

$$\hat{P} = \frac{1}{n} \sum_i s_{ijt} \hat{P}_{ijt} = \frac{1}{n} \sum_i s_{ijt} \Phi\left(\frac{\ln z - X_{ijt}\hat{\beta}}{\sigma_{ijt}}\right)$$

In practice (3) is estimated with household rather than individual level data, and this difference is accounted for in the sampling weights denoted s_{ijt} .

Finally, because estimates of the headcount poverty rate from equation (3) will be highly sensitive to the variance of the residuals, it is important to account for possible heteroskedasticity in the consumption model.

Figure 11. Cumulative distribution of log consumption by stratum



of the residual for each data point as a function of the exogenous characteristics in the consumption model:

$$(4) \quad \sigma_{ijc}^2 = X_{ijc}\gamma + \omega_{ijc}$$

As with the main consumption model, the variance model in equation (4) is estimated

using the 2007 HBS data, and the estimated γ parameters are used to predict error variances for the 2009 NPS sample.

Estimating the model

The regression model in equation (1) is estimated by OLS using data from the 2007 HBS. The model is estimated separately for each stratum of the survey, to allow for parameter heterogeneity, i.e., differences in the relationship between household characteristics and consumption across strata. All regressions are weighted with individual sampling weights.

In many applications of Small Area Estimation, the set of potential regressors is limited by the small number of variables common to the household survey and the census. In the case of comparing the HBS and the NPS the opposite is the case: as already noted, the number of variables available is quite large relative to the sample size in particular strata of the NPS: 86 variables compared to just XXX observations in “other urban areas”.

Lacking firm theoretical grounds on which to prioritize certain variables over others, we opt instead to use a stepwise regression approach, dropping variables from the model whose regression coefficients have a p-value

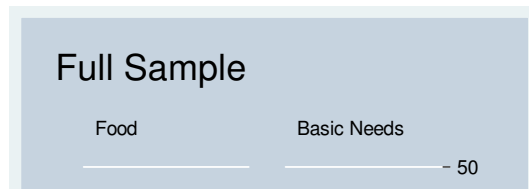
To do so, we estimate the predicted variance

of less than 0.2. The stepwise procedure is repeated for each strata, allowing the model specification – like the individual regression coefficients – to vary across strata, as it is likely that the set of characteristics explaining consumption in rural and urban areas may differ dramatically.

The estimates of the regression model are given in Table 37. In addition to the independent variables shown, all equations include a full set of dummies for region and month of interview (these variables were ‘locked’ into the model during the stepwise procedure). The R-squared across various strata ranges from .4 to .45, a reasonably high number by the standards of SAE. Particular care should be taken in not over-interpreting individual parameter estimates. For instance, the fact that the dummy variable for whether the head of household is married has a significant *negative* coefficient in Dar es Salaam should not be interpreted, in isolation, to imply that such households are generally poorer. This statement is only true controlling for a large, highly correlated, and somewhat arbitrary set of other household characteristics.

As a check on the estimates provided by the model, Figure 10 shows a graphical comparison of the raw consumption data (log consumption per adult equivalent) and the fitted values from the regression model for both 2007 and 2009. For the sake of graphical comparison, the fitted values include a simulated error component. This is created by drawing a random number from a normal distribution with mean zero and variance as predicted by the variance model described above. (Without including these simulated errors, the variance of predicted log consumption will be, by construction, significantly lower than the variance of actual

Figure 12. Predicted food poverty and basic needs poverty rates, HBS 2007 and NPS 2008/09, based on alternative samples



log consumption. This lower dispersion will lead to the calculation of lower poverty rates. The inclusion of the simulated error terms is not necessary in the statistical calculation of headcount poverty rates, as the estimated variance of the residuals is accounted for in equation 3.)

The final “predicted” poverty rates based on our model are given in Table 38. These results correspond to, and provide greater detail underlying the numbers presented in the main text in Table 3.

Note that in reporting the poverty rates in Box 1 in the main part of the report, only the changes are used (column 3 of Table 38). Rather than revise previous poverty estimates for the HBS – which would be unwarranted and lead to potential confusion – the Box puts the NPS figures in context simply by adding or subtracting any estimated percentage-point changes to the poverty rates estimated for the 2007 HBS and already published in the official report.

The table shows the regression of the predicted probability of poverty for each household, in both the HBS and NPS datasets (each row corresponds to a separate regression). The first column “HBS headcount” shows the weighted-average value of these probabilities in the HBS, and the third column “Change in the NPS” shows the difference, if any, in the poverty rate in 2008/09.

The overall pattern of results in the top panel of the table – using the full sample of households – is that poverty has not changed significantly (in either an economic or statistical sense) in Tanzania between the 2007 HBS and the 2008/09 NPS. However, breaking this down by stratum, there is a hint of a decline in poverty in urban areas outside Dar es Salaam (4.34% decline for food poverty; 6.5% decline for basic needs poverty), but nationally this decline is offset by a smaller but statistically significant increase in poverty in rural areas (1.77% increase for food poverty; 2.09% increase for basic needs poverty). The following section examines the robustness of this result.

Step 3. Checking the robustness of the results

Robustness of the consumption model specification

The first technique used to check the robustness of the results in Table 38 is to vary the model specification. The underlying concern is that the model employed in Step 2 – and in particular the set of *X* characteristics included in the regression specification – were quite arbitrary. If the overall results for predicting poverty are sensitive to the particular specification chosen, this would undermine confidence in the results.

To test for robustness, we re-estimate the

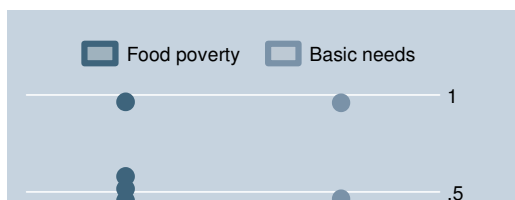
underlying consumption model using the full sample of HBS households, but varying the specification by dropping one regressor in each iteration. (Note: the stepwise procedure is not repeated. In each iteration one regressor is dropped from the baseline model presented in Table 37 and subsequently replaced in the next iteration.)

The results from this exercise are summarized in Figure 12, showing the predicted change in food and basic needs poverty from each iteration of the model. In the box plots in the figure each observation corresponds to one iteration of the model. The boundaries of the box – which are barely distinguishable given the relatively stability of the results – show the 25th and 75th percentiles. As seen, these results seem to indicate that the predicted poverty rates in Table 38 are fairly stable, with an average increase in food poverty of around 1/4th of one percentage point, and no change whatsoever in basic needs poverty.

Using the panel dimension of the survey to remove sampling error from the comparison of the HBS and NPS

Out of the 410 clusters in the NPS, 200 were taken from the HBS sample of clusters. Furthermore, a sub-sample of the NPS households in these clusters were drawn from the HBS sample, creating a panel of households. This section uses the unique features of panel data to provide an alternative estimate of the change in poverty between the two survey rounds. Returning to the same clusters or same households dramatically reduces sampling error in measuring a change in any indicator. However, there is a trade-off here. The sample size is much smaller for the panel element of the NPS, in particular for the Dar es Salaam and ‘other urban areas’ strata.

Figure 13. Box plots showing the sensitivity of poverty projections to alternative specifications



Any sample survey is subject to sampling error. There are known probabilities that a sample statistic will deviate from the true population statistic by some degree. Two surveys using independently drawn samples of the same population will, then, potentially diverge, even if the underlying reality has not changed. One way to avoid this sampling error in making comparisons over time is to return to the identical sample. Doing so ensures that the sampling error in the estimates – whatever they may be – will be identical in both surveys. This allows us to ensure – without adding any additional variables to the model – that there are no observed or unobserved time-invariant differences between the samples used in the two surveys; i.e., that apparent changes are not due to sampling error.

The center and bottom panels of Table 38 show the results from repeating the estimation of predicted poverty described above, but limiting the sample to (a) only households in enumeration areas or villages that were surveyed in both the HBS and NPS, or (b) specific household which appear in both samples. In both cases, the regression coefficients (β parameters) used are identical to those used in the main estimates for the full sample. This is to highlight any differences resulting from changing the sample, without muddying the waters by also allowing regression coefficients to differ.

In brief, the results in the bottom parts of Table 38 confirm the earlier results from the main sample. Nationally, poverty appears to be if anything lower in 2008/09 than in 2007, but any decline is not particularly robust. Looking across strata, we find some corroboration for the result that poverty has been declining in urban areas outside Dar es

Salaam and increasing in very modestly in rural areas.

Table 36. Average values for independent variables in the model of log consumption, by strata and year

	Dar es Salaam						Other urban areas						Rural areas					
	2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS		
	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Log consumption	10.53 (0.619)	10.58 (0.695)	10.53 (0.607)	11.35 (0.637)	11.37 (0.576)	11.28 (0.584)	10.17 (0.663)	10.09 (0.665)	10.03 (0.666)	10.71 (0.676)	10.60 (0.669)	10.58 (0.652)	9.789 (0.620)	9.788 (0.617)	9.780 (0.599)	10.22 (0.575)	10.23 (0.561)	10.23 (0.562)
Members < 1 yr old							0.110 (0.322)	0.0870 (0.293)	0.0637 (0.245)	0.0937 (0.313)	0.0822 (0.275)	0.0701 (0.256)	0.158 (0.389)	0.161 (0.392)	0.172 (0.406)	0.178 (0.417)	0.190 (0.430)	0.190 (0.430)
Members 1 - 5 yrs old	0.428 (0.657)	0.422 (0.677)	0.496 (0.829)	0.441 (0.624)	0.402 (0.572)	0.424 (0.599)	0.587 (0.770)	0.525 (0.733)	0.490 (0.694)	0.471 (0.648)	0.379 (0.540)	0.382 (0.561)	0.836 (0.937)	0.846 (0.943)	0.847 (0.937)	0.732 (0.837)	0.727 (0.824)	0.727 (0.825)
Members 5 - 9 yrs old	0.319 (0.595)	0.260 (0.533)	0.296 (0.554)	0.501 (0.733)	0.491 (0.754)	0.480 (0.736)	0.512 (0.759)	0.502 (0.776)	0.490 (0.756)	0.577 (0.762)	0.571 (0.747)	0.611 (0.790)	0.661 (0.850)	0.669 (0.855)	0.640 (0.835)	0.842 (0.902)	0.850 (0.913)	0.849 (0.916)
Members 10 - 14 yrs old	0.374 (0.677)	0.355 (0.649)	0.400 (0.741)	0.417 (0.686)	0.372 (0.617)	0.384 (0.632)	0.576 (0.833)	0.559 (0.808)	0.599 (0.854)	0.588 (0.764)	0.580 (0.764)	0.605 (0.758)	0.679 (0.881)	0.687 (0.888)	0.708 (0.913)	0.758 (0.935)	0.764 (0.943)	0.764 (0.944)
Members 15 - 24 yrs old	0.801 (1.052)	0.731 (1.020)	0.944 (1.214)	1.138 (1.247)	1.179 (1.271)	1.328 (1.419)	0.851 (1.129)	0.791 (1.078)	0.879 (1.365)	0.991 (1.222)	0.858 (1.081)	0.879 (1.134)	0.864 (1.126)	0.863 (1.127)	0.879 (1.148)	0.935 (1.160)	0.954 (1.212)	0.957 (1.217)
Members 25 - 34 yrs old	0.790 (0.757)	0.762 (0.731)	0.792 (0.733)	0.857 (0.859)	0.855 (0.821)	0.784 (0.867)	0.696 (0.756)	0.574 (0.702)	0.529 (0.721)	0.691 (0.788)	0.644 (0.802)	0.611 (0.829)	0.638 (0.772)	0.640 (0.775)	0.641 (0.763)	0.601 (0.768)	0.597 (0.780)	0.602 (0.782)
Members 35 - 64 yrs old	0.863 (0.836)	0.855 (0.834)	0.944 (0.826)	0.890 (0.849)	0.897 (0.892)	1.040 (0.911)	0.890 (0.828)	0.925 (0.806)	0.987 (0.840)	0.865 (0.825)	0.881 (0.843)	0.936 (0.860)	1.007 (0.856)	1.016 (0.858)	1.045 (0.847)	1.024 (0.839)	1.079 (0.839)	1.075 (0.838)
Members 65 + yrs old	0.0843 (0.309)	0.0928 (0.326)	0.160 (0.429)	0.115 (0.379)	0.103 (0.344)	0.112 (0.386)	0.150 (0.418)	0.165 (0.450)	0.217 (0.523)	0.187 (0.476)	0.242 (0.543)	0.306 (0.606)	0.249 (0.528)	0.250 (0.528)	0.257 (0.520)	0.284 (0.560)	0.293 (0.554)	0.291 (0.555)
Male hh members													2.487 (1.708)	2.507 (1.714)	2.528 (1.667)	2.578 (1.801)	2.663 (1.901)	2.658 (1.900)
Head male							0.691 (0.462)	0.676 (0.468)	0.662 (0.474)	0.680 (0.467)	0.671 (0.471)	0.650 (0.479)						
Head completed sec.	0.259 (0.438)	0.281 (0.450)	0.272 (0.447)	0.240 (0.428)	0.274 (0.447)	0.248 (0.434)	0.164 (0.371)	0.137 (0.345)	0.127 (0.334)	0.159 (0.366)	0.128 (0.335)	0.108 (0.312)	0.0410 (0.198)	0.0383 (0.192)	0.0384 (0.192)	0.0351 (0.184)	0.0358 (0.186)	0.0351 (0.184)
Head completed tert.	0.0719 (0.258)	0.0623 (0.242)	0.0800 (0.272)	0.0838 (0.277)	0.0812 (0.274)	0.104 (0.306)												
Head working	0.944 (0.231)	0.939 (0.239)	0.920 (0.272)	0.924 (0.266)	0.923 (0.267)	0.920 (0.272)	0.942 (0.234)	0.930 (0.256)	0.917 (0.276)	0.932 (0.251)	0.936 (0.245)	0.930 (0.256)	0.940 (0.238)	0.942 (0.233)	0.940 (0.238)	0.966 (0.181)	0.965 (0.183)	0.965 (0.184)
Head agric	0.0464 (0.210)	0.0762 (0.265)	0.0720 (0.260)	0.0745 (0.263)	0.0342 (0.182)	0.0400 (0.197)	0.341 (0.474)	0.391 (0.488)	0.363 (0.482)	0.318 (0.466)	0.393 (0.489)	0.433 (0.497)	0.790 (0.407)	0.802 (0.398)	0.797 (0.403)	0.878 (0.327)	0.878 (0.327)	0.878 (0.327)
Head never married	0.181 (0.385)	0.191 (0.393)	0.144 (0.353)	0.143 (0.351)	0.137 (0.344)	0.104 (0.306)							0.0401 (0.196)	0.0374 (0.190)	0.0340 (0.181)	0.0173 (0.130)	0.0119 (0.109)	0.0121 (0.109)
Head married	0.584 (0.493)	0.575 (0.495)	0.640 (0.482)	0.533 (0.499)	0.517 (0.501)	0.544 (0.500)	0.602 (0.490)	0.569 (0.496)	0.548 (0.499)	0.488 (0.500)	0.457 (0.499)	0.490 (0.502)						
Head divorced							0.0526 (0.223)	0.0779 (0.268)	0.0637 (0.245)	0.113 (0.317)	0.128 (0.335)	0.108 (0.312)						
Head separated	0.0556 (0.229)	0.0609 (0.239)	0.0640 (0.246)	0.0298 (0.170)	0.0299 (0.171)	0.0480 (0.215)												

	Dar es Salaam						Other urban areas						Rural areas					
	2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS		
	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	
Head widowed	0.0763 (0.265)	0.0748 (0.263)	0.0800 (0.272)	0.0838 (0.277)	0.0812 (0.274)	0.0800 (0.272)												
Members attending tert.	0.0340 (0.224)	0.0332 (0.221)	0.0240 (0.199)	0.110 (0.429)	0.0940 (0.382)	0.0960 (0.369)												
Walls = mud	0.0103 (0.101)	0.0249 (0.156)	0.00800 (0.0894)	0.00931 (0.0961)	0 (0)	0 (0)												
Walls = mud brick	0.0160 (0.125)	0.0125 (0.111)	0 (0)	0.00186 (0.0432)	0.00427 (0.0654)	0 (0)												
Walls = brick	0.0192 (0.137)	0.0388 (0.193)	0.0560 (0.231)	0.00186 (0.0432)	0.00427 (0.0654)	0 (0)	0.296 (0.456)	0.263 (0.440)	0.242 (0.430)	0.294 (0.456)	0.288 (0.454)	0.306 (0.462)						
Walls = concrete							0.221 (0.415)	0.197 (0.398)	0.210 (0.409)	0.242 (0.429)	0.187 (0.391)	0.166 (0.373)						
Walls = other	0.00444 (0.0665)	0.00693 (0.0830)	0.00800 (0.0894)	0.00559 (0.0746)	0.0128 (0.113)	0.0160 (0.126)	0.0101 (0.0999)	0 (0)	0 (0)	0.00218 (0.0467)	0 (0)	0 (0)	0.0120 (0.109)	0.0110 (0.105)	0.0110 (0.104)	0.00773 (0.0876)	0.0119 (0.109)	0.0121 (0.109)
Floor = concrete	0.930 (0.256)	0.898 (0.304)	0.968 (0.177)	0.916 (0.277)	0.953 (0.212)	0.920 (0.272)	0.619 (0.486)	0.573 (0.495)	0.561 (0.498)	0.662 (0.473)	0.589 (0.493)	0.567 (0.497)	0.152 (0.359)	0.140 (0.347)	0.148 (0.355)	0.132 (0.339)	0.127 (0.333)	0.128 (0.335)
Floor = other													0.0133 (0.114)	0.0136 (0.116)	0.0132 (0.114)	0.0161 (0.126)	0.0163 (0.127)	0.0165 (0.127)
Bicycles													0.549 (0.703)	0.558 (0.710)	0.562 (0.717)	0.565 (0.804)	0.557 (0.800)	0.555 (0.802)
Boats							0.00654 (0.0902)	0.0122 (0.135)	0 (0)	0.00871 (0.114)	0.00913 (0.135)	0.0127 (0.160)	0.0126 (0.134)	0.0123 (0.134)	0.0110 (0.124)	0.00714 (0.109)	0.00434 (0.0806)	0.0044 (0.081)
Carts	0.0006 (0.0243)	0.00139 (0.0372)	0 (0)	0.00559 (0.0964)	0.00855 (0.131)	0 (0)							0.0271 (0.170)	0.0286 (0.174)	0.0351 (0.190)	0.0274 (0.187)	0.0337 (0.203)	0.0340 (0.204)
Books	2.785 (11.15)	2.668 (19.16)	2.552 (5.997)	5.361 (19.33)	4.598 (15.91)	4.144 (11.34)							1.189 (4.201)	1.134 (3.745)	1.313 (4.812)	1.136 (5.442)	1.128 (5.342)	1.136 (5.371)
Livestock							1.087 (5.357)	1.113 (5.375)	1.338 (6.251)	1.174 (4.692)	1.370 (5.809)	1.548 (6.631)	20.96 (877.9)	22.00 (901.4)	61.88 (1657)	6.077 (21.95)	7.018 (22.50)	7.046 (22.61)
Hoes													3.033 (2.206)	3.072 (2.198)	3.065 (2.112)	2.861 (2.013)	2.907 (2.033)	2.905 (2.037)
Wheelbarrow													0.0188 (0.163)	0.0185 (0.163)	0.0165 (0.127)	0.0416 (0.396)	0.0456 (0.415)	0.0461 (0.417)
Mosquito nets							1.806 (1.610)	1.869 (2.110)	2.146 (3.364)	1.978 (1.800)	1.735 (1.671)	1.815 (1.690)	1.214 (1.367)	1.203 (1.364)	1.243 (1.405)	1.171 (1.419)	1.188 (1.469)	1.182 (1.472)
Irons	0.624 (0.606)	0.568 (0.574)	0.568 (0.544)	0.667 (0.640)	0.637 (0.594)	0.600 (0.582)	0.480 (0.614)	0.365 (0.574)	0.382 (0.572)	0.512 (0.659)	0.411 (0.602)	0.420 (0.579)	0.204 (0.453)	0.202 (0.453)	0.202 (0.441)	0.183 (0.419)	0.192 (0.429)	0.193 (0.430)
Cars							0.0324 (0.239)	0.0229 (0.217)	0.0318 (0.238)	0.0741 (0.461)	0.0548 (0.313)	0.0510 (0.316)	0.00308 (0.0554)	0.00325 (0.0569)	0.00220 (0.0468)	0.00773 (0.106)	0.0109 (0.131)	0.0110 (0.132)
Watches	0.907 (1.034)	0.832 (1.123)	0.792 (1.166)	0.741 (0.919)	0.726 (0.895)	0.720 (0.839)							0.579 (0.897)	0.579 (0.900)	0.599 (0.884)	0.345 (0.690)	0.380 (0.748)	0.384 (0.751)

	Dar es Salaam						Other urban areas						Rural areas					
	2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS		
	Full sample (1)	Panel EAs (2)	Panel HHs (3)	Full sample (4)	Panel EAs (5)	Panel HHs (6)	Full sample (7)	Panel EAs (8)	Panel HHs (9)	Full sample (10)	Panel EAs (11)	Panel HHs (12)	Full sample (13)	Panel EAs (14)	Panel HHs (15)	Full sample (16)	Panel EAs (17)	Panel HHs (18)
Radios							0.887 (0.701)	0.853 (0.697)	0.847 (0.744)	0.935 (0.788)	0.890 (0.817)	0.936 (0.867)	0.778 (0.746)	0.774 (0.742)	0.790 (0.754)	0.752 (0.782)	0.751 (0.787)	0.753 (0.790)
Ploughs	0.00059 (0.0243)	0.00139 (0.0372)	0 (0)	0.00745 (0.122)	0.00855 (0.131)	0 (0)	0.0229 (0.190)	0.0122 (0.123)	0 (0)	0.0109 (0.104)	0.00913 (0.0953)	0.00637 (0.0798)	0.135 (0.449)	0.141 (0.458)	0.144 (0.455)	0.110 (0.431)	0.130 (0.478)	0.132 (0.481)
Cell phones	1.052 (0.981)	1.003 (0.955)	1.080 (0.867)	1.613 (1.305)	1.611 (1.259)	1.640 (1.253)	0.606 (0.826)	0.446 (0.760)	0.478 (0.829)	1.017 (1.112)	0.900 (1.145)	0.847 (1.122)	0.161 (0.431)	0.156 (0.424)	0.159 (0.422)	0.315 (0.616)	0.318 (0.602)	0.319 (0.604)
Donkeys													0.133 (1.042)	0.139 (1.069)	0.125 (0.690)	0.121 (0.712)	0.138 (0.760)	0.139 (0.764)
Poultry													6.669 (8.609)	6.728 (8.588)	6.675 (7.955)	7.228 (10.03)	7.562 (9.364)	7.533 (9.335)
Stoves							0.0828 (0.340)	0.0534 (0.280)	0.0446 (0.236)	0.122 (0.421)	0.0868 (0.313)	0.102 (0.343)						
Other stoves	1.421 (0.847)	1.273 (0.837)	1.336 (0.906)	1.708 (0.784)	1.709 (0.759)	1.648 (0.806)	1.152 (0.962)	0.925 (1.015)	0.803 (0.937)	1.102 (1.026)	0.831 (0.900)	0.726 (0.896)	0.314 (0.604)	0.301 (0.590)	0.285 (0.574)	0.284 (0.582)	0.305 (0.607)	0.305 (0.607)
Harvesting machines							0.00027 (0.0165)	0.00153 (0.0391)	0 (0)	0 (0)	0 (0)	0 (0)						
Spraying machines							0.0313 (0.261)	0.0412 (0.362)	0.00637 (0.0798)	0.0501 (0.280)	0.0594 (0.347)	0.0510 (0.316)						
Satellite dishes							0.0695 (0.275)	0.0473 (0.220)	0.0382 (0.192)	0.153 (0.437)	0.100 (0.394)	0.115 (0.438)						
Mopeds							0.0286 (0.216)	0.0183 (0.199)	0.00637 (0.0798)	0.0697 (0.741)	0.0320 (0.201)	0.0382 (0.223)						
Fields	0.214 (0.777)	0.220 (0.542)	0.240 (0.447)	0.410 (0.699)	0.346 (0.611)	0.384 (0.565)	1.354 (3.425)	1.699 (3.224)	1.739 (2.418)	1.279 (2.292)	1.511 (2.273)	1.726 (2.536)						
Milking machines	0.00148 (0.0516)	0 (0)	0 (0)	0.00372 (0.0863)	0.00855 (0.131)	0 (0)	0.00027 (0.0165)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)						
Heaters							0.248 (0.885)	0.217 (0.727)	0.197 (0.645)	0.0632 (0.353)	0.0137 (0.117)	0.0191 (0.137)						
Telephones (land0)							0.0207 (0.155)	0.0153 (0.123)	0.0127 (0.113)	0.0283 (0.202)	0.00913 (0.135)	0.0127 (0.160)						
Water pumps							0.00654 (0.0839)	0.00916 (0.0953)	0 (0)	0.00871 (0.0930)	0.00913 (0.0953)	0.0127 (0.113)						
TVs	0.471 (0.563)	0.470 (0.562)	0.472 (0.590)	0.596 (0.645)	0.594 (0.630)	0.560 (0.627)	0.159 (0.388)	0.105 (0.331)	0.0764 (0.290)	0.303 (0.570)	0.237 (0.540)	0.223 (0.526)						
Couches							1.074 (1.624)	0.884 (1.529)	0.924 (1.466)	2.492 (3.201)	1.986 (3.342)	1.834 (2.552)						
Tables							1.563	1.553	1.656	1.721	1.676	1.694						

	Dar es Salaam						Other urban areas						Rural areas					
	2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS			2007 HBS			2008/09 NPS		
	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs	Full sample	Panel EAs	Panel HHs
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	
							(1.221)	(1.364)	(1.367)	(1.324)	(1.375)	(1.319)						
Motorcycles							0.0262 (0.177)	0.0214 (0.145)	0.0255 (0.158)	0.0349 (0.216)	0.0365 (0.251)	0.0510 (0.295)						
Beds							2.177 (1.928)	2.215 (2.534)	2.433 (3.359)	2.318 (1.734)	2.187 (1.744)	2.338 (1.655)						
Lamps							1.052 (0.982)	1.024 (1.012)	1.025 (1.209)	1.068 (1.071)	0.986 (1.038)	0.962 (1.061)						
Pots							22.68 (23.69)	20.15 (20.74)	18.52 (17.25)	56.67 (67.84)	44.32 (46.10)	46.02 (47.12)						
Fans	0.615 (1.031)	0.568 (1.002)	0.632 (0.963)	0.745 (1.113)	0.718 (1.047)	0.744 (0.975)												
Fridges	0.326 (0.553)	0.353 (0.583)	0.304 (0.512)	0.425 (0.662)	0.415 (0.617)	0.440 (0.653)												
Video players	0.255 (0.491)	0.269 (0.497)	0.248 (0.452)	0.454 (0.654)	0.479 (0.636)	0.432 (0.614)												
Tractors	0.00029 (0.0172)	0.00139 (0.0372)	0 (0)	0.00745 (0.122)	0.00855 (0.131)	0 (0)												
Harrowing machines	0.00118 (0.0344)	0.00139 (0.0372)	0 (0)	0.00931 (0.114)	0.0171 (0.160)	0.0160 (0.126)												
Cupboards	0.984 (1.427)	0.845 (1.212)	1 (1.631)	1.196 (1.428)	1.291 (1.542)	1.400 (1.486)												
Observations	3382	722	125	537	234	125	3671	655	157	459	219	157	3245	3078	911	1681	921	911

Table 37. Regression of log consumption per adult equivalent on household characteristics in 2007 HBS

	(1) Dar es Salaam	(2) Other urban areas	(3) Rural areas
Members < 1 yr old		-0.0730** (0.0297)	-0.0710*** (0.0244)
Members 1 - 5 yrs old	-0.0218 (0.0157)	-0.0449*** (0.0153)	-0.0437*** (0.0113)
Members 5 - 9 yrs old	-0.0959*** (0.0175)	-0.0981*** (0.0124)	-0.0958*** (0.0116)
Members 10 - 14 yrs old	-0.143*** (0.0172)	-0.131*** (0.0139)	-0.146*** (0.0113)
Members 15 - 24 yrs old	-0.137*** (0.0106)	-0.0882*** (0.00989)	-0.111*** (0.00945)
Members 25 - 34 yrs old	-0.0936*** (0.0149)	-0.0777*** (0.0167)	-0.0536*** (0.0164)
Members 35 - 64 yrs old	-0.0646*** (0.0174)	-0.114*** (0.017)	-0.0844*** (0.0152)
Members 65 + yrs old	-0.0780** (0.0348)	-0.0710** (0.0296)	-0.0827*** (0.0207)
Male hh members			0.015 (0.00948)
Head male		0.045 (0.0305)	
Head completed secondary school	0.0933*** (0.0244)	0.0561* (0.0301)	0.117** (0.0467)
Head completed tertiary school	0.227*** (0.0457)		
Head working	0.139*** (0.0454)	0.157*** (0.049)	0.200*** (0.0436)
Head in agric	-0.0851 (0.053)	-0.0728*** (0.0257)	-0.168*** (0.0276)
Head never married	-0.0523 (0.0384)		0.105* (0.0592)
Head married	-0.0854** (0.0332)	-0.0713** (0.0297)	
Head divorced		-0.127** (0.0544)	
Head separated	-0.101* (0.0545)		
Head widowed	-0.0953* (0.0501)		
Members attending tertiary	0.0562 (0.0385)		
Walls = brick	0.139 (0.0909)	0.0471* (0.0263)	
Walls = mud	0.159** (0.0784)		

	(1) Dar es Salaam	(2) Other urban areas	(3) Rural areas
Walls = mud brick	-0.101 (0.0751)		
Walls = concrete		0.0650** (0.03)	
Walls = other	-0.336** (0.169)	0.313*** (0.0855)	0.240*** (0.0671)
Floor = concrete	0.0783* (0.0435)	0.127*** (0.0266)	0.0910*** (0.0272)
Floor = other			0.0681 (0.0519)
Cell phone	0.0406*** (0.0135)	0.0828*** (0.015)	0.0902*** (0.0218)
Other stove	0.0366*** (0.0127)	0.0485*** (0.0142)	0.0327** (0.0151)
Plough	0.667*** (0.0595)	0.0817* (0.0466)	0.0809*** (0.0229)
Iron	0.0466** (0.0211)	0.0471** (0.0205)	0.0722*** (0.0202)
TV	0.0952*** (0.0249)	0.0595* (0.0316)	
Milking machines	0.531** (0.209)	0.601*** (0.067)	
Fields	0.0156 (0.0102)	-0.00447* (0.00251)	
Books	-0.000871* (0.00052)		0.00469** (0.00232)
Carts	0.456* (0.263)		0.0786 (0.0585)
Watches	0.0566*** (0.013)		0.0217** (0.0102)
Cars		0.0679 (0.0469)	0.606*** (0.224)
Radios		0.0389** (0.0172)	0.0574*** (0.0139)
Livestock		0.00392*** (0.00151)	5.13e-06*** (1.7E-06)
Boats		0.151 (0.0927)	0.120** (0.0596)
Mosquito nets		0.0245** (0.0115)	0.0454*** (0.00761)
Fridges	0.0980*** (0.0256)		
Video players	0.037 (0.0254)		
Tractors	-2.085***		

	(1) Dar es Salaam	(2) Other urban areas	(3) Rural areas
	(0.321)		
Harrows	0.289 (0.215)		
Cupboards	0.0159** (0.00733)		
Fans	0.0343*** (0.0119)		
Spraying machines		0.0437 (0.0314)	
Satellite dishes		0.0862** (0.0427)	
Mopeds		0.149** (0.0663)	
Heaters		0.0152 (0.0106)	
Telephones (land)		-0.106 (0.069)	
Water pumps		0.209* (0.125)	
Couches		0.0161* (0.00912)	
Tables		0.0324*** (0.0103)	
Motorcycles		0.106** (0.0502)	
Beds		-0.0104 (0.00771)	
Lamps		0.0290*** (0.011)	
Pots		0.00164*** (0.0005)	
Stoves		0.0752** (0.0305)	
Harvesting machines		-0.695*** (0.269)	
Bicycles			0.0713*** (0.0174)
Hoes			0.0226*** (0.00534)
Wheelbarrows			0.154** (0.0617)
Donkeys			0.0241*** (0.00608)
Poultry			0.00245** (0.00119)

	(1) Dar es Salaam	(2) Other urban areas	(3) Rural areas
Constant	10.36*** (0.077)	9.799*** (0.0823)	9.505*** (0.0691)
Observations	3382	3671	3245
R-squared	0.467	0.466	0.448

Table 38. Projected poverty rates based on regression model of log consumption

	Poverty line	HBS Headcount	S.E.	Change in NPS	S.E.	Observations
Full Sample						
Mainland	Food	0.175***	(0.00412)	0.00554	(0.00745)	12912
	Basic needs	0.340***	(0.00522)	0.00449	(0.00947)	12912
DSM	Food	0.0682***	(0.00359)	0.00188	(0.00908)	3906
	Basic needs	0.167***	(0.00558)	-0.00510	(0.0134)	3906
Other urban	Food	0.127***	(0.00435)	-0.0414***	(0.0117)	4109
	Basic needs	0.254***	(0.00581)	-0.0596***	(0.0180)	4109
Rural	Food	0.196***	(0.00526)	0.0198**	(0.00927)	4897
	Basic needs	0.378***	(0.00656)	0.0251**	(0.0113)	4897
Panel EAs						
Mainland	Food	0.192***	(0.00515)	-0.00220	(0.0103)	5796
	Basic needs	0.370***	(0.00640)	-0.00924	(0.0125)	5796
DSM	Food	0.0733***	(0.00737)	-0.000340	(0.0123)	954
	Basic needs	0.177***	(0.0122)	-0.00185	(0.0210)	954
Other urban	Food	0.137***	(0.0101)	-0.0524***	(0.0147)	869
	Basic needs	0.276***	(0.0140)	-0.0781***	(0.0217)	869
Rural	Food	0.197***	(0.00545)	0.0224*	(0.0120)	3973
	Basic needs	0.378***	(0.00675)	0.0287**	(0.0141)	3973
Panel HHs						
Mainland	Food	0.189***	(0.00908)	0.0103	(0.0132)	2367
	Basic needs	0.364***	(0.0110)	0.0110	(0.0158)	2367
DSM	Food	0.116***	(0.0281)	-0.0234	(0.0325)	250
	Basic needs	0.241***	(0.0413)	-0.0321	(0.0491)	250
Other urban	Food	0.127***	(0.0152)	-0.0373*	(0.0206)	311
	Basic needs	0.272***	(0.0238)	-0.0695**	(0.0313)	311
Rural	Food	0.192***	(0.00947)	0.0266*	(0.0143)	1806
	Basic needs	0.369***	(0.0114)	0.0367**	(0.0169)	1806

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix B. Creating the price deflators

As noted at the beginning of this appendix, the most common way of comparing consumption figures over time is to use a price index that adjusts nominal monetary values for inflation. The price index is intended to measure differences in the overall cost of living, both over time and between geographic areas. Constructing the price index requires data on prices for a large number of goods (ideally, all the goods in the consumption aggregate) and information on the budget shares for each item to weight its importance in the overall price index.

For the NPS poverty analysis, three separate price indices were created: for Dar es Salaam, other urban areas, and rural areas respectively. Each index began with a value of 1 in Jan 2007, the first month of HBS data collection and ends in September 2009, the final month of NPS 2008/09 data collection. A value for each index is computed for each month. When the price for a given item in a given stratum and given month was unavailable (for instance, because no household in the sample purchased that item in that month), missing values were imputed through interpolation as described below. In addition, because the prices from survey data can be quite noisy due to sampling error with small samples in each stratum-month, the price series were smoothed by taking a moving average of prices for each item over time.

All “real” monetary values in this report are deflated using these monthly, stratum-specific price indices.

Sources of price data

There are two principal sources of price data used in the NPS poverty analysis: raw prices collected by NBS regional staff as inputs into

the official CPI series, and prices reported by households within the household surveys themselves (both HBS and NPS).

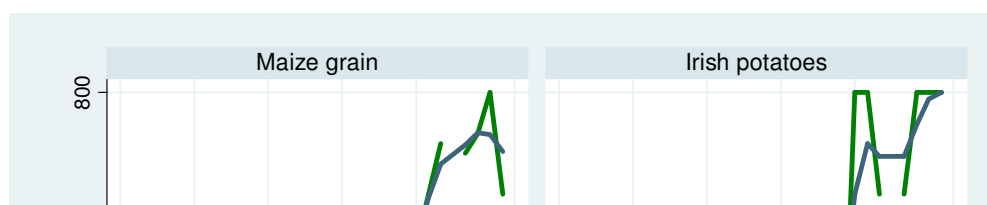
Where available, it is generally recognized as best practice to use prices from the household survey itself, as these measure the actual cost of goods in the specific locations where the consumption data is collected (Deaton & Zaidi). Because the CPI is based exclusively on urban prices in Tanzania, it may not reflect local price variation, especially in rural areas. Thus the preferred price deflator for food prices in this report compares prices from within the HBS and NPS surveys. However, survey data comparing the HBS and NPS is not available for non-food prices, as explained below. Thus the price deflator used in the NPS analysis for non-food prices relies on CPI data, reweighted to reflect contemporary budget shares.

Prices from within the household surveys

Within both the HBS and the NPS surveys, prices can be computed using ‘unit values’. The unit value is simply the total expenditure on an item (say TZS 6,000 of maize) divided by the quantity consumed (say 10 kg of maize, yielding a unit value of 600 TZS/kg) for a given household and a given item. Unit values for a consistent set of food items were constructed from the 2007 HBS and the NPS. (Unit values were re-computed for the 2007 HBS, rather than relying on the published figures from the 2007 HBS report because of the need to align the item categories with the NPS as discussed in detail below.)

Unit values for non-food consumption are not available in the NPS (Sections L and M of the household questionnaire, as well as sections C and D, respectively for education and health

Figure 14. Examples of ‘raw’ and ‘smoothed’ price series for Dar es Salaam



expenditure) or for food consumption outside the household (e.g. restaurant meals, as measured in Section F). In order to measure unit values, it is necessary to have both the price paid in monetary units (current TZS) and the quantity purchased in comparable units across observations. In sections C, D, L, and M only the total TZS monetary value paid is recorded. There are no quantities recorded to use in the denominator for these sections, so instead CPI price data is used.

For food consumption, unit values from roughly 40,000 food purchases in the NPS and over 1.7 million food purchases in the HBS are used to construct monthly prices for each item in each stratum. This is done in three steps. First, within each month-item-stratum cell, the median unit value is found. This is referred to below as the ‘raw’ unit value. For many items the raw unit value may be missing in a given month, perhaps because no one interviewed in, say, February 2009 in the rural NPS sample had purchased Irish potatoes in the last 7 days. Even when unit values are available, monthly medians tend to be quite volatile due to the small sample sizes in a given month, particularly for the NPS.

To overcome this volatility – which may be spurious due to sampling errors rather than genuine price fluctuations – the second step taken to convert unit values into usable prices is to compute a moving average of the price series for each item and stratum. The moving average uses a 1-4-6-4-1 symmetric envelop (i.e., a weight of 1 on the unit values from two periods back, a weight of 4 on the unit values from the previous period, 6 on the current period, 4 on the subsequent period, and 1 on

the unit values from two periods forward). Finally, the third step is to impute missing unit values. This is done through log-linear interpolation/extrapolation. Interpolation and extrapolation are used for only a handful of monthly-stratum-item cells, all of which are items that have budget shares less than 0.5%.

To provide a visual illustration of what the moving average filter and interpolation do to the unit value time series for each item,

Figure 13 shows two examples from Dar es Salaam: the raw monthly unit values for maize grain and Irish potatoes respectively. As seen in the figure, the raw unit values are somewhat volatile, and this volatility is moderately smoothed by the blue moving average line. In addition, missing values for the raw values are interpolated – though in the example shown, interpolation is only used for months when the survey was not running.

CPI Price data

Price data for the official NBS Consumer Price Index is collected on a monthly basis from all regional capitals. A minimum of three quotations is solicited for each price in each location, and for certain staple goods actual purchases are made. The clear shortcoming of the official CPI data for poverty measurement is that it reflects urban prices only. However, for the bulk of non-food items, this is the only price data available which is comparable over time. While rural-urban price differentials clearly exist, this will only pose a problem for the analysis if price *changes* (i.e. inflation) differ between rural

and urban areas as well.²⁰ Furthermore, for many infrequently-purchased items, goods are unlikely to be available within a given village, and rural residents will likely purchase these non-food items from urban centres. In this case, regional prices provide a relevant estimate of non-food inflation even for rural households.

To construct price deflators for the NPS, the raw CPI data (at the level of prices for individual items in a given region and month) was re-analyzed. This re-analysis and re-aggregation was necessary because (i) the weights on various items used to compute the official CPI may have changed since they were last calibrated in 2001, and (ii) primarily for consistency with earlier HBS poverty numbers, the NPS relies on a Fisher ideal index rather than a Laspeyre's index as used in the published NBS CPI series.

Aggregating the raw CPI price data to construct a new Fisher index poses a number of data challenges. Two key challenges are: (i) dealing with missing values for a given price in a certain region and month, and (ii) matching and aggregating the specific prices recorded for the CPI to the level of the broader categories of consumption recorded in the survey data.

To construct the Fisher index, missing values are imputed in three steps. These steps were designed to minimize the influence of

imputed values on the overall price index.

First, if prices for a given item are reported within the same region both before and after the missing value, the price is interpolated based on a logarithmic trend.

Second, if at least one price observation exists for a given item in a given region, but missing values extend from the beginning or to the end of the series, prices are extrapolated as follows. Median inflation rates for the item are constructed across all regions with data available. These median inflation rates are then used to cast prices backward or forward in time for regions with missing data.

Third, if no price observations are reported for a given item in a given region, a subjective assessment is made. Items with very few price observations nationally and which correspond to items in the survey data with a very small budget share are dropped entirely from the index. (On this basis the following items are dropped from the raw CPI data: domestic servants' wages, 19- and 20-inch televisions, and entry fees to football matches.) For the remaining items, prices for regions with no data are assigned the median national price at the beginning of the series (Jan 2007) and median, item-specific inflation rates are used to extrapolate prices forward, as described in (ii).

Raw CPI price data was used for 27 months (Jan 2007 to March 2009) for 20 regional

Table 39. Imputation of missing price data from the raw CPI data files

Data source	Observations	%
Original data, not imputed	128,877	92.86%
(i) Interpolated using prices on the same item within the same region	2,290	1.65%
(ii) Backward extrapolation using national inflation for the item	1,533	1.10%
(ii) Forward extrapolation using national inflation for the item	1,841	1.33%
(iii) Regional values imputed from national levels	4,239	3.05%
Total	138,780	100.00%

collection points and 257 items, giving an observation count of 138,780. Table 39 gives a breakdown of the sources of imputation. It is worth noting that imputed values are disproportionately used for items with a very small budget share, as reflected in NBS regional offices' inability to locate the items for sale. As a result, they will have a relatively minor influence on the overall price index.

Correspondence of consumption items across surveys

The first task in comparing prices over time is to align consumption items between the NPS 2008/09 and HBS 2007.

In the calculations, unit values and budget shares for each stratum and each month are used. However, to give a rough idea of how well it is possible to match the items in the two surveys, and the movements in prices and budget shares between the two surveys, Table 41 Table 46 give median prices and budget shares for each item in the consumption basket, broken down by stratum.

A full list of the correspondence between HBS 2007 and NPS 2008/09 items was also prepared (due to space constraints, it is not reproduced here).

The second task in comparing prices over time is to line up budget shares from the surveys (HBS and NPS) to price data from the NBS CPI surveys conducted on a monthly basis in each regional capital. This involves careful matching of each HBS codes to the corresponding item in the CPI questionnaire employed by regional statistical managers. (Due to the length of this list, it is not reproduced here.)

Having matched NPS items to HBS items, and both of these to CPI information, it is possible to produce a weighted index of prices, using the budget shares from the household surveys to weight the price information from the CPI (in the case of non-food items) and from the surveys themselves (in the case of food items).

Methodology for measuring price differences: Fisher's ideal index

As shown in the main report, food prices in Tanzania have risen dramatically in recent years. However, underlying this index, different prices have moved at different rates. Generally, as prices for an item go up consumers consume less of that item. This presents the fundamental challenge of creating a price index: how to weight different items in the consumption basket when their relative importance is shifting over time?

The standard approach used by statistical offices around the world in calculating a CPI is to rely on a Laspeyres index. This is the procedure used by NBS for the official CPI series. The Laspeyres index weights prices by their budget shares in the baseline period. If v_{i0} denotes the value spent on good i in period 0, and p_{it} is its price, then the Laspeyre's index is calculated as follows:

$$L_p = \sum_i \left(\frac{v_{i0}}{\sum_i v_{i0}} \right) \left(\frac{p_{it}}{p_{i0}} \right)$$

This approach – which does not require new information on budget shares in period t – is particularly useful when price data is collected and reported regularly, but information on consumer habits and budget shares is only collected infrequently (e.g., monthly CPI releases versus the HBS conducted every 5 years). However, as consumers substitute away from goods which become more expensive, the Laspeyre's index will tend to

overstate the true inflation experienced by households.

An alternative approach is to use a Paasche index, which uses budget shares in the *final* period to weight the prices of different items. This is given by:

$$P_P = \sum_i \left(\frac{v_{it}}{\sum_i v_{it}} \right) \left(\frac{p_{it}}{p_{i0}} \right)$$

The problem here is perfectly symmetrical to the challenges with the Laspeyres index: if consumers substitute away from goods whose price rises, the Paasche index will underestimate the true level of inflation by focusing only on consumers final consumption patterns.

On theoretical grounds, the preferred approach is to use a combination of the Laspeyres and Paasche indices. One possible combination is the Fisher index, which is the geometric mean of the Laspeyres and Paasche indices.

$$F_P = \sqrt{L_P \times P_P}$$

In specific economic models (where consumers have quadratic utility functions) the Fisher index can be shown to provide the “true” cost of living index. On a more practical level, the Fisher index avoids extreme values which may be produced by either of the alternatives.

The main weakness of the Fisher index is that it requires data on both prices and budget shares at multiple points in time. In the current analysis, however, such information is available, and thus the Fisher index is employed. This choice will explain, in part, the divergence shown below between the price deflators used here for poverty analysis, and the official CPI series. It should in no way imply that one approach is better than the other: each is tailored to the particular task at hand.

Comparing alternative methodologies in practice

Readers familiar with the pattern of inflation in Tanzania will be attentive to the fact that the numbers presented in the main text differ from the official CPI series. This section highlights and attempts to partially disentangle two reasons for that divergence: methodology and data sources.

The previous section examined the choice of methodology for constructing a price index for the NPS – a Fisher index – while Section 0 outlined the various sources of price data available for analysis: household survey data and CPI records, with differing availability for food and non-food items.

Combining these options in terms of methodology and data source, and distinguishing food from non-food prices, produces 5 different indices that are relevant for the analysis:

F1. A Fisher food price index using only household survey data (HBS 2007 and NPS 2009).

F2. A Fisher food price index using CPI records.

F3. The official NBS (Laspeyre's) food CPI deflator.

As explained above, for non-food consumption it is not possible to create a price index relying exclusively on the survey

Table 40. Price inflation, annual percentage change in price indices, by strata and year ^a

		2007	2008	2009 ^b
Dar es Salaam	Food prices (Survey data)	9.9%	29.0%	-1.1%
	Food prices (CPI data)	24.4%	40.5%	25.5%
	Non-food prices	39.7%	21.8%	4.1%
	All prices	16.4%	27.8%	-1.1%
Other urban	Food prices (Survey data)	11.6%	32.1%	9.1%
	Food prices (CPI data)	8.4%	31.2%	4.9%
	Non-food prices	13.8%	11.3%	3.0%
	All prices	11.9%	28.0%	7.8%
Rural	Food prices (Survey data)	11.8%	23.8%	6.0%
	Food prices (CPI data)	9.5%	29.7%	1.9%
	Non-food prices	19.4%	12.9%	1.1%
	All prices	12.5%	22.8%	5.1%
Mainland	Food prices (Survey data)	11.7%	25.5%	6.5%
	Food prices (CPI data)	10.4%	30.8%	4.2%
	Non-food prices	19.9%	13.4%	1.7%
	All prices	12.6%	24.0%	5.1%
	Official CPI – Food prices	10.1%	18.6%	2.1%
	Official CPI – All prices	8.6%	12.9%	3.0%

^a Inflation rates are measured from Jan of the year listed to Jan of the following year. (This choice of periods, rather than Dec to Dec, is due to the lack of survey data for Dec 2006).

^b For 2009, the inflation rates reflect changes in the price indices from Jan 2009 to Sept 2009 for survey-based prices, and Jan 2009 to July 2009 for prices taken from the official CPI data. All figures are converted to annual rates of change.

data from the HBS and the NPS. Thus there are just two options to examine here:

NF1. A Fisher non-food price index using CPI records.

NF2. The official NBS (Laspeyre's) non-food CPI.

Table 40 presents each of these indices side by side, separately for each geographic stratum in Mainland Tanzania.

As a starting point for comparing the indices, notice that in the bottom panel the overall inflation rate for Mainland Tanzania reported in the official CPI for 2008 was 12.9%, while in the current analysis it is 24.0%. The pattern of results in the rest of the table suggest that two things explain this gap.

First, with respect to food prices, the table shows that it is the difference in methodology between the official CPI and the present analysis that explains the different results – not the different price data used. When applying the Fisher methodology and new budget shares and weights to the raw, official, CPI food price data, the result is an even higher rate of food price inflation: 30.8% in 2008, compared to 25.5% in the survey data and just 18.6% in the officially released figures.

This result is somewhat anomalous. It would be expected that the Fisher index produce somewhat *lower* inflation than the official

Laspeyres index. However, the opposite is true here. It appears that other differences in the methodology (possibly the use of new budget shares from the 2007 HBS and the NPS, as opposed to the 2001 weights used in the official CPI) are pushing the survey-based Fisher index up relative to the official CPI.

The second factor that appears to explain the differences in overall inflation rates is the smaller non-food consumption basket used in the NPS analysis. Again, the items in this basket are limited to those which can be linked between the HBS and NPS.

The table shows that the divergence in the overall index (24.0% vs 12.9% for 2008) is somewhat greater than the discrepancy in food prices only (25.5% vs. 18.6%). While no separate non-food aggregate index is produced as part of the official CPI, the implication here appears to be that the narrower set of items included in the NPS basket (focused, as noted in the main text, disproportionately on fuel prices) have had more rapid price rises than the broader basket used for the official CPI. An alternative explanation is that the new budget shares drawn from the NPS place higher weight on items with rapid price increases, however this would be counter-intuitive in terms of the underlying economics (with consumers substituting toward goods whose price is rising).

**Table 41. Average budget shares and prices underlying the price indices, 2007 and 2009.
(Dar es Salaam)**

Description	NPS codes	Budget share		Price		Price ratio
		2007	2009	2007	2009	2007/2009
rice	101-102	13.7%	14.4%	800	1,200	1.50
maize	103-105	11.1%	11.0%	403	702	1.74
millet	106-107	0.1%	0.6%	906	1,154	1.27
cassava	201-202	1.2%	1.1%	351	452	1.29
other carbs	203-207	2.5%	3.3%	469	655	1.40
meat	108-112	12.5%	8.2%	1,070	1,210	1.13
fish	401	5.9%	4.9%	821	1,300	1.58
vegetables	601-603	10.8%	12.1%	805	912	1.13
fruits	701-704	3.7%	3.8%	683	657	0.96
dairy	901-903	0.9%	2.0%	1,036	1,407	1.36
fats	1001-1002	4.7%	5.5%	1,837	2,731	1.49
eggs	807	0.4%	1.1%	4,000	4,000	1.00
bread, etc	801-806	7.6%	11.4%	2,567	3,906	1.52
pulses	808-810	8.0%	5.5%	1,886	2,882	1.53
sugar etc.	301-303	7.4%	5.6%	1,124	1,350	1.20
nuts and seeds	501-505	3.6%	4.3%	659	743	1.13
salt and spices	1003-1004	0.6%	0.8%	550	1,045	1.90
drinks	1101-1105	5.3%	4.2%	1,818	1,839	1.01

**Table 42. Average budget shares and prices underlying the price indices, 2007 and 2009.
(Other Urban)**

Description	NPS codes	Budget share		Price		Price ratio
		2007	2009	2007	2009	2007/2009
rice	101-102	10.5%	12.5%	720	988	1.37
maize	103-105	17.6%	16.7%	337	553	1.64
millet	106-107	0.9%	3.6%	664	891	1.34
cassava	201-202	3.3%	2.7%	268	330	1.23
other carbs	203-207	4.5%	5.2%	280	495	1.76
meat	108-112	4.9%	5.2%	1,086	1,563	1.44
fish	401	6.2%	4.9%	767	1,200	1.57
vegetables	601-603	11.5%	9.5%	631	877	1.39
fruits	701-704	2.9%	2.8%	496	665	1.34
dairy	901-903	1.2%	1.9%	502	670	1.34
fats	1001-1002	5.8%	4.8%	1,881	2,246	1.19
eggs	807	0.2%	0.6%	3,000	4,000	1.33
bread, etc	801-806	8.1%	9.6%	2,156	3,421	1.59
pulses	808-810	9.7%	5.8%	1,365	2,112	1.55
sugar etc.	301-303	7.0%	6.2%	1,252	1,345	1.07
nuts and seeds	501-505	1.9%	4.3%	870	747	0.86
salt and spices	1003-1004	0.9%	0.9%	474	694	1.46
drinks	1101-1105	2.8%	2.7%	2,081	2,335	1.12

**Table 43. Average budget shares and prices underlying the price indices, 2007 and 2009.
(Rural)**

Description	NPS codes	Budget share		Price		Price ratio
		2007	2009	2007	2009	2007/2009
rice	101-102	13.7%	14.4%	800	1,200	1.50
maize	103-105	11.1%	11.0%	403	702	1.74
millet	106-107	0.1%	0.6%	906	1,154	1.27
cassava	201-202	1.2%	1.1%	351	452	1.29
other carbs	203-207	2.5%	3.3%	469	655	1.40
meat	108-112	12.5%	8.2%	1,070	1,210	1.13
fish	401	5.9%	4.9%	821	1,300	1.58
vegetables	601-603	10.8%	12.1%	805	912	1.13
fruits	701-704	3.7%	3.8%	683	657	0.96
dairy	901-903	0.9%	2.0%	1,036	1,407	1.36
fats	1001-1002	4.7%	5.5%	1,837	2,731	1.49
eggs	807	0.4%	1.1%	4,000	4,000	1.00
bread, etc	801-806	7.6%	11.4%	2,567	3,906	1.52
pulses	808-810	8.0%	5.5%	1,886	2,882	1.53
sugar etc.	301-303	7.4%	5.6%	1,124	1,350	1.20
nuts and seeds	501-505	3.6%	4.3%	659	743	1.13
salt and spices	1003-1004	0.6%	0.8%	550	1,045	1.90
drinks	1101-1105	5.3%	4.2%	1,818	1,839	1.01

**Table 44. Average budget shares for non-food items, 2007 and 2009.
(Dar es Salaam)**

NPS Code	Description	Budget share	
		2007	2009
6	Medical expenses	1.9%	6.3%
7	Educational expenses	2.5%	9.5%
8	Food outside home	16.3%	30.4%
101	Cigarettes or tobacco	1.1%	0.6%
102	Matches	0.4%	0.3%
103	Public transport	14.7%	14.0%
201	Kerosene	9.2%	3.5%
202	Electricity, including electricity vouchers	0.6%	2.6%
203	Gas (for lighting/cooking)	0.0%	0.3%
204	Water	7.1%	1.2%
205	Petrol or diesel	0.5%	1.0%
206	Cell phone voucher	5.1%	9.8%
207	Charcoal	31.8%	8.3%
209	Bar soap (body soap or clothes soap)	2.8%	1.5%
210	Clothes soap (powder)	2.7%	2.5%
211	Toothpaste, toothbrush	0.9%	0.9%
212	Toilet paper	0.0%	0.1%
213	Glycerin, Vaseline, skin creams	0.7%	0.6%
214	Other personal products (shampoo, razorblades, cosmetics, hair products, etc.)	0.6%	2.8%
215	Household cleaning products (dish soap, toilet cleansers, etc.)	0.4%	0.2%
216	Light bulbs	0.0%	0.1%
217	Phone, internet, postage stamps or other postal fees	0.2%	0.5%
218	Donation - to church, charity, beggar, etc.	0.0%	1.5%
221	Wages paid to servants	0.0%	0.7%
302	Linen - towels, sheets, blankets	0.2%	0.4%
304	Mosquito net	0.1%	0.1%
306	Sports & hobby equipment, musical instruments, toys	0.1%	0.2%
307	Film, film processing, camera	0.0%	0.0%

**Table 45. Average budget shares for non-food items, 2007 and 2009.
(Other urban)**

NPS Code	Description	Budget share	
		2007	2009
6	Medical expenses	3.4%	7.9%
7	Educational expenses	4.7%	13.3%
8	Food outside home	6.1%	14.0%
101	Cigarettes or tobacco	2.8%	3.4%
102	Matches	1.6%	1.7%
103	Public transport	5.7%	5.6%
201	Kerosene	20.6%	7.9%
202	Electricity, including electricity vouchers	0.4%	1.6%
203	Gas (for lighting/cooking)	0.0%	0.0%
204	Water	7.7%	0.8%
205	Petrol or diesel	0.2%	0.3%
206	Cell phone voucher	4.1%	13.4%
207	Charcoal	19.9%	8.5%
209	Bar soap (body soap or clothes soap)	11.8%	6.0%
210	Clothes soap (powder)	2.8%	2.5%
211	Toothpaste, toothbrush	1.1%	1.9%
212	Toilet paper	0.0%	0.2%
213	Glycerin, Vaseline, skin creams	3.8%	2.7%
214	Other personal products (shampoo, razorblades, cosmetics, hair products, etc.)	0.8%	2.6%
215	Household cleaning products (dish soap, toilet cleansers, etc.)	0.9%	0.2%
216	Light bulbs	0.1%	0.2%
217	Phone, internet, postage stamps or other postal fees	0.4%	0.2%
218	Donation - to church, charity, beggar, etc.	0.1%	3.1%
221	Wages paid to servants	0.0%	0.6%
302	Linen - towels, sheets, blankets	0.7%	0.8%
304	Mosquito net	0.1%	0.2%
306	Sports & hobby equipment, musical instruments, toys	0.1%	0.2%
307	Film, film processing, camera	0.1%	0.1%

**Table 46. Average budget shares for non-food items, 2007 and 2009.
(Rural)**

NPS Code	Description	Budget share	
		2007	2009
6	Medical expenses	5.7%	16.8%
7	Educational expenses	5.6%	13.5%
8	Food outside home	4.6%	12.6%
101	Cigarettes or tobacco	4.2%	3.5%
102	Matches	3.4%	3.1%
103	Public transport	3.9%	5.2%
201	Kerosene	31.5%	9.6%
202	Electricity, including electricity vouchers	0.0%	0.1%
203	Gas (for lighting/cooking)	0.0%	0.0%
204	Water	2.7%	0.1%
205	Petrol or diesel	0.2%	0.2%
206	Cell phone voucher	1.0%	5.8%
207	Charcoal	1.1%	0.9%
209	Bar soap (body soap or clothes soap)	21.5%	10.2%
210	Clothes soap (powder)	2.1%	2.0%
211	Toothpaste, toothbrush	0.7%	1.8%
212	Toilet paper	0.0%	0.1%
213	Glycerin, Vaseline, skin creams	8.1%	5.6%
214	Other personal products (shampoo, razorblades, cosmetics, hair products, etc.)	1.2%	2.0%
215	Household cleaning products (dish soap, toilet cleansers, etc.)	0.9%	0.1%
216	Light bulbs	0.1%	0.0%
217	Phone, internet, postage stamps or other postal fees	0.1%	0.3%
218	Donation - to church, charity, beggar, etc.	0.0%	4.2%
221	Wages paid to servants	0.0%	0.3%
302	Linen - towels, sheets, blankets	1.4%	1.6%
304	Mosquito net	0.1%	0.3%
306	Sports & hobby equipment, musical instruments, toys	0.0%	0.1%
307	Film, film processing, camera	0.0%	0.0%

Appendix C. Comparing labour market indicators across various household surveys, 1991-2009

Box 2 in the main report compares labour market indicators – including both sector of employment and earnings levels – across three different sets of surveys: the Household Budget Surveys conducted in 1991, 2000 and 2007; the Integrated Labour Force Surveys, conducted in 2001 and 2006, and the NPS round 1, 2008/09.

This appendix provides details on the definitions of the indicators used for the analysis in Box 2, as well as Tables XXX and XXX. As noted in the main text, the question phrasing and answer categories differ across the three surveys. For convenience, the table

below presents the precise question used from each survey to create indicators of occupational status (farmer, public-sector wage employee, private-sector wage employee, self-employed or none) and to measure earnings for both categories of wage employees as well as the non-farm self-employed. Additionally, to resolve any ambiguity about which occupation codes were assigned to which of these five broad occupational categories, the STATA code used to create the indicators in the 2007 HBS, 2006 ILFS and the NPS are included in the table as well.

Table 47. Question phrasing for key labour market indicators in the HBS, ILFS and NPS

	HBS 2007 (Phrasing is nearly identical for 1991 and 2000)	ILFS 2006 (Phrasing is nearly identical for 2001)	NPS 2008/09
Sector of employment: Question phrasing	<p>Section 2, Question 17: What type of work did [NAME] do last week?</p> <ol style="list-style-type: none"> 1. Government employee 2. Parastatal / private employee 3. NGO employee 4. Religious organization employee 5. Other sector employee 6. Self-employed (with others) 7. Self-employed (alone) 8. Household duties 9. Fishing 10. Livestock keeping 11. Crop farming 12. Forests keeping 13. Unpaid family helper 	<p>Form 2, Question 18(a), section on "main (only) economic activity": (12q18a)</p> <p>Are you working as:</p> <ol style="list-style-type: none"> 1. A paid employee. A self-employed (non-agric): 2. ...With employees 3. ...Without employees 4. Unpaid family helper (non-agric.) 5. Unpaid family helper (agric.) 6. On your own farm or shamba. <p>Form 2, Question 22: Is this enterprise: (12q22)</p> <ol style="list-style-type: none"> 1. Central government 2. Local government 3. Parastatal 4. Political party 5. Partnership registered 6. NGO 7. Religious organization 8. Co-operative - registered 9. International/regional organization 10. Household - fetching water & 	<p>Section B, Question 10: What was [NAME]'s main occupation for the past 12 months? (sbq10)</p> <ol style="list-style-type: none"> 1. Agriculture/livestock 2. Fishing 3. Mining 4. Tourism Employed 5. ...Government 6. ...Parastatal 7. ...Private sector 8. ...NGO/religious Self-employed (not agriculture): 9. ...With employees 10. ...Without employees 11. Unpaid family work 12. Job seekers 13. Student 14. Disabled 15. No job 16. <5 years old <p><i>*Note: responses to section B were generally given by a single respondent for all household members. Thus responses from section E, administered one-to-one were used to override Section B in cases where (a) an individual</i></p>

	HBS 2007 (Phrasing is nearly identical for 1991 and 2000)	ILFS 2006 (Phrasing is nearly identical for 2001)	NPS 2008/09
		<p>collection of firewood for home use</p> <p>11. Household - other economic activities</p> <p>12. Cooperative unregistered</p> <p>13. Private own account</p> <p>14. Private sector - employed</p> <p>15. Partnership un-registered</p> <p>16. Other private</p>	<p>was classified as not working in section B, but (b) reported wage or self-employed work in section E through the following questions:</p> <p>Section E, Question 9 (seq9): Did you do any wage work during the last 7 days? (i.e. work for someone else for pay)</p> <p>Section E, Question 10 (seq10): Did you do any wage work during the last 12 months? (i.e. work for someone else for pay)</p> <p>Section E, Question 22 (seq22): Did you operate any business or do any self-employed activity during the last week, other than agriculture?</p> <p>Section E, Question 23 (seq23): Did you operate any business or do any self-employed activity during the last 12 months, other than agriculture?</p> <p>Section E, Question 46 (seq46): In the last 7 days, how many hours did [NAME] spend on household agricultural activities (including livestock or fishing, whether for sale or for household food)? Responses > 20 hrs were coded as farmers if otherwise not working.</p>
Sector of employment: STATA code to	<pre>. generat occup = 4 if q17b11_moccup == 1 . replace occup = 3 if q17b11_moccup == 2</pre>	<pre>. generat occup =. . replace occup = 1 if l2q18a==5 l2q18a==6 . replace occup = 2 if</pre>	<pre>. generat occup =. . replace occup = 1 if sbq10==1 sbq10==2 . replace occup = 2 if sbq10==9 sbq10==10 . replace occup = 3 if sbq10==3 sbq10==4 sbq10==6</pre>

	HBS 2007 (Phrasing is nearly identical for 1991 and 2000)	ILFS 2006 (Phrasing is nearly identical for 2001)	NPS 2008/09
create key indicators in report	<pre>. replace occup = 4 if q17b11_moccup == 3 . replace occup = 4 if q17b11_moccup == 4 . replace occup = 3 if q17b11_moccup == 5 . replace occup = 2 if q17b11_moccup == 6 . replace occup = 2 if q17b11_moccup == 7 . replace occup = 5 if q17b11_moccup == 8 . replace occup = 1 if q17b11_moccup == 9 . replace occup = 1 if q17b11_moccup == 10 . replace occup = 1 if q17b11_moccup == 11 . replace occup = 1 if q17b11_moccup == 12 . replace occup = 5 if q17b11_moccup == 13 . replace occup = 5 if q17a1_mtasco == 9998 . label define occup 1 "self employed - farming" 2 "self- employed - other" 3 "wage employed - private" 4 "wage employed - non- private" 5 "unemployed/not active" . label values occup occup . tab occup, g(occupd)</pre>	<pre>l2q18a==2 l2q18a==3 . replace occup = 3 if l2q18a==1 & (l2q22 ==5 l2q22 ==14 l2q22 ==15 l2q22 ==96) . replace occup = 4 if l2q18a==1 & (l2q22 ==1 l2q22 ==2 l2q22 ==4 l2q22 ==7 l2q22 ==8 l2q22 ==9) . replace occup = 5 if l2q08==1 l2q08==2 . label define occup 1 "self employed - farming" 2 "self-employed - other" 3 "wage employed - private" 4 "wage employed - non-private" 5 "unemployed/not active" . label values occup occup . tab occup, g(occupd)</pre>	<pre> sbq10==7 sbq10==11 sbq10==12 . replace occup = 4 if sbq10==5 sbq10==8 . replace occup = 5 if sbq10==11 sbq10==13 sbq10==14 sbq10==15 sbq10==16 . gen occup = . . replace occup = 1 if sbq10==1 sbq10==2 . replace occup = 2 if sbq10==9 sbq10==10 . replace occup = 3 if sbq10==3 sbq10==4 sbq10==6 sbq10==7 sbq10==11 sbq10==12 . replace occup = 4 if sbq10==5 sbq10==8 . replace occup = 5 if sbq10==11 sbq10==13 sbq10==14 sbq10==15 sbq10==16 . replace occup = 1 if occup==5 & (seq46>20 & seq46!=.) . replace occup = 2 if occup==5 & (seq22==1 seq23==1) . replace occup = 3 if occup==5 & (seq12==3 seq12==9) . replace occup = 4 if /*occup==5 &*/ (seq12==1 seq12==2 seq12==4 seq12==5 seq12==6 seq12==7 seq12==8) . replace occup = . if seq3==1 & occup==5 . replace occup = . if seq4==1 & occup==5 . label define occup 1 "self employed - farming" 2 "self- employed - other" 3 "wage employed - private" 4 "wage employed - non-private" 5 "unemployed/not active" . label values occup occup . tab occup, g(occupd)</pre>
Wage earnings: Question phrasing	<p>Section 7, Annual household income: Give details of household income during the previous 12 months excluding the survey month.</p> <p>[Section is administered at the household level, but disaggregates income sources by member and type of income as follows]</p>	<p>Form 2, Question 58(b): (12q58b) What was your gross cash income from your paid employment last month (all paid)?</p>	<p>Section E, Question 18 (seq18_1, _2) How much was your last payment? IF RESPONDENT HAS NOT YET BEEN PAID, ASK: What payment do you expect? What period of time did this payment cover?</p> <ol style="list-style-type: none"> 1. Hour 2. Day 3. Week 4. Fortnight

	HBS 2007 (Phrasing is nearly identical for 1991 and 2000)	ILFS 2006 (Phrasing is nearly identical for 2001)	NPS 2008/09
	<p>Income from employment (in cash)</p> <ul style="list-style-type: none"> • Line/member number • Name of household member • Amount in Shillings <p>Income from employment (in kind) [same questions]</p>		<p>5. Month</p> <p>6. Quarter</p> <p>7. Half year</p> <p>8. Year</p>
Self-employed earnings: Question phrasing	<p>Same as above:</p> <p>Income from non-farm self-employment:</p> <ul style="list-style-type: none"> • Line/member number • Name of household member • Amount in Shillings 	<p>Form 2, Question 59: (12q59b, c, d)</p> <p>(b) What gross income/takings did you get from your business or businesses last week/month? Period: Week 1, Month 2</p> <p>(c) What were your expenses to earn this money? Period: Week 1, Month 2</p> <p>(d) Your net income from your business or businesses is thus: (b) – (c) in the last week/month Period: Week 1, Month 2</p> <p>*Note, during entry and data cleaning, the response to (d) was forced to correspond to the difference between (b) and (c).</p>	<p>Section E (seq35, 36, 38, 39 40):</p> <p>35. What gross income/takings did you get from your business or businesses last week/month? Period: Week 1, Month 2</p> <p>36. What was your net income (profit) from your business or businesses last week/month? Period: Week 1, Month 2</p> <p>38. What is/was your total expenditure on wages last month?</p> <p>39. What was your total expenditure on raw materials last month?</p> <p>40. How much were your other operating expenses (for this business) such as fuel, kerosene, electricity, etc. last month?</p> <p>*Note: for consistency with the ILFS, net profit was calculated as the difference between gross revenue and expenses.</p>

