

Tanzania National Panel Survey Report

Round 2, 2010-2011



United Republic of Tanzania



National Bureau of Statistics

Table of Contents

Introduction	3
<i>The National Panel Survey</i>	3
Objectives	3
Sample design	3
Fieldwork	4
Outline of the report.....	7
Cluster 1: Growth and Poverty Reduction	8
<i>Cluster-wide indicators</i>	8
Gini coefficient.....	8
Poverty headcount.....	9
<i>Goal 1: Ensuring sound economic management</i>	13
Annual rate of inflation.....	13
<i>Goal 2: Promoting sustainable, broad-based growth.....</i>	15
Unemployment rate	15
<i>Goal 4: Reducing income poverty of both men and women in rural areas</i>	17
Percentage of households involved in the agricultural sector	17
Changes in production and major crop yields over time.....	18
Percentage of households using irrigation	21
Percentage of households using fertilizers and improved seeds	23
Percentage of households experiencing erosion.....	25
Percentage of households using mechanization and labor-saving technologies	26
Percentage of households implementing crop diversification.....	27
Percentage of households selling production and/or experiencing losses	28
<i>Goal 6: Provision of reliable and affordable energy to consumers.....</i>	30
Percentage increase in the number of households connected to the national grid and off-grid sources of electricity	30
Percentage of households in rural and urban areas using alternative sources of energy to wood fuel as their main source of energy for cooking.....	31
<i>Special Section 1: Poverty Dynamics.....</i>	32
<i>Special Section 2: Food Security.....</i>	42

Cluster 2: Improvement of quality of life and social well-being.....	46
<i>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.....</i>	<i>46</i>
Net enrolment rate at pre-primary school	46
Net primary school enrolment rate	47
Secondary school net enrolment.....	47
Gross enrolment rate in higher education institutions	48
<i>Goal 2: Improved survival, health and well-being of all children and women and especially vulnerable groups.....</i>	<i>50</i>
Proportion of under-fives moderately or severely stunted (height for age).....	50
Proportion of births attended by a skilled health worker	52
<i>Goal 3: Increased access to clean, affordable and safe water, sanitation, decent shelter and a safe and sustainable environment.....</i>	<i>53</i>
Proportion of households with access to piped or protected water as their main drinking water source	53
Proportion of households with basic sanitation facilities.....	54
<i>Goal 4: Adequate social protection and rights of the vulnerable and needy groups with basic needs and services.....</i>	<i>55</i>
Proportion of children in child labour.....	55
Proportion of orphan children attending primary.....	56
Cluster 3: Governance and accountability	58
<i>Goal 1: Structure and systems of governance as well as the rule of law are democratic, participatory, representative, accountable and inclusive.....</i>	<i>58</i>
Percentage of the population with birth certificates	58
Percentage of female small landholders with land ownership	60
References.....	63
Appendix A. Methodology for Consumption-Poverty Analysis.....	64

Introduction

The National Panel Survey

The National Panel Survey (NPS) is a nationally representative household survey that collects information on the living standards of the population such as socioeconomic characteristics, consumption, agricultural production, and non-farm income generating activities. The term “panel” means that the survey will follow the original sampled population over time to track the evolution of its living conditions. The NPS is scheduled to have several rounds; the first round of the survey (NPS1) was conducted from October 2008 to September 2009, and the second round (NPS2) was conducted from October 2010 to September 2011.

Objectives

The NPS was designed to fulfil three main objectives, all of which benefit from the fact that the NPS1 serves as a baseline against which future rounds can be compared. The first objective is to track the progress of the National Strategy for Growth and Reduction of Poverty (known by its Swahili acronym as MKUKUTA). Assessing progress on growth and poverty reduction, improvement of quality of life and social wellbeing, and progress on governance and accountability is possible because the NPS allows the estimation of many of these MKUKUTA goals.¹ The second objective is to provide a better understanding of the determinants of poverty reduction. The panel feature of the survey allows for information on the poverty status of households to be available at different points in time, thus permitting the study of poverty dynamics at the household level. This is a key advantage with respect to the usual cross-sectional household surveys, which allow the monitoring of poverty at the aggregate level, such as by region or by state, but not at the household level given that they do not follow the same households over time. The third objective of the NPS is to assess the impact of public policy initiatives. The NPS can be a powerful tool to evaluate the impact of development policies and programs implemented by the government or nongovernmental institutions. If a person, household or community has been affected by a particular policy and has been sampled in the NPS, the survey may allow the estimation of indicators that capture that effect. Coordination with those that implemented these policies is crucial in order to determine both how the impact evaluation can be done and if complementary data are required. Lastly, the NPS need not be limited to these three goals. Many non-MKUKUTA indicators, such as several Millennium Development Goals, can also be estimated, simply by comprehensively exploring the different modules of the NPS. The panel feature of the survey is suitable for investigating the dynamics of many topics such as the educational progression of children, the labour mobility of the adult population, or the evolution of agricultural yields.

Sample design

The NPS is based on a stratified, multi-stage cluster sample design. The sampling frame is the 2002 Population and Housing Census, more specifically, the National Master Sample Frame, which is a list of all populated enumeration areas in the country.

¹ See *MKUKUTA Monitoring Master Plan and Indicator Information* for a detailed list of all indicators.

The sample design of the NPS explicitly recognizes four analytical strata: Dar es Salaam, other urban areas in mainland, rural areas in mainland, and Zanzibar. Within each stratum, clusters were randomly selected as the primary sampling units, with the probability of selection proportional to their population size. In urban areas, clusters match census enumeration areas, while in rural areas, clusters match villages. In the last stage, 8 households were randomly chosen in each cluster.

The first round of the NPS was also designed to have a panel component with the 2007 Household Budget Survey (HBS). The panel is only possible in mainland Tanzania, where 200 of the 350 clusters were drawn from the HBS sample and hence a panel of 1,600 households was expected between the NPS and the HBS.

In total, the NPS sample comprises 409 clusters and 3,265 households. Table 1 shows the allocation of clusters and households across strata. There is a slight mismatch in some strata between the expected and the actual number of clusters and/or households. The missing rural cluster in mainland, which accounts for 8 of the 15 missing households, was dropped from the final sample because of the poor quality of the data. The additional 7 missing households refer mostly to panel households between the NPS and the HBS that could not be located and for which no replacement could be found.

Table 1. Clusters and households by stratum, NPS1

	Clusters		Households	
	Expected	Actual	Expected	Actual
Tanzania	410	409	3280	3265
Mainland	350	349	2800	2786
Dar es Salam	70	70	560	555
Other urban	60	60	480	480
Rural	220	219	1760	1751
Zanzibar	60	60	480	479

Fieldwork

The NPS1 was carried out from October 2008 to September 2009. The fieldwork was planned over a 12-month period to address concerns about intra-year seasonality since seasonal fluctuations can affect the living standards of the population considerably. Table 2 indicates that the distribution of the sample within each stratum is fairly spread across the year.

Table 2. Distribution of the NPS1 sample by stratum and quarter of interview

	October- December 2008	January- March 2009	April- June 2009	July- September 2009	Total
Tanzania	879	742	642	1002	3265
Dar es Salam	166	112	135	142	555
Other urban	93	147	96	144	480
Rural	494	369	316	572	1751
Zanzibar	126	114	95	144	479

Another equally important consideration of the fieldwork would have been to spread the urban and rural sample evenly within Dar es Salaam and Zanzibar. This is not a concern in other urban areas and rural areas in mainland given that these two strata are entirely urban and rural respectively. Table 3 shows the proportion of rural households by stratum and by quarter of the interview. The share of rural households in Dar es Salaam varies considerably across quarters, but the fact that rural households represent a relatively small proportion of that stratum suggest that this might not be a critical issue. In Zanzibar, however, the first 6 months of the fieldwork were devoted only to rural households and the last 6 months were devoted only to urban households. The oversight could affect not only the precision of the estimations in Zanzibar but also the comparisons with the mainland strata. A decision was taken for the NPS2 to keep the same pattern in Zanzibar, that is, comparability over time in that stratum was considered a better alternative than spreading the rural sample evenly over the year.

Table 3. Proportion of rural households by stratum and quarter of interview

	October- December 2008	January- March 2009	April- June 2009	July- September 2009	Total
Tanzania	71	69	53	59	63
Dar es Salam	0	29	18	11	13
Other urban	0	0	0	0	0
Rural	100	100	100	100	100
Zanzibar	100	100	0	0	50

The second round of the NPS began two years after the first round. The fieldwork for the NPS2 started in October 2010 and finished in November 2011. Enumerators visited all households again, following the same schedule of the NPS1. The objective was to track all people present in the first round of the survey, as the NPS is in practice an individual panel

survey. Three scenarios were possible: the individual remained in the same location, the individual moved to a close location, or the individual moved to a distant location. Enumerators were able to keep the NPS1 schedule for those that stayed in the same location and for those that moved to a close location. For those that moved to a distant location, their new contact details were first obtained. Some of these individuals were interviewed throughout the main survey process, and the remaining individuals were interviewed as part of a final tracking push in October and November 2011.

For the purposes of this analysis, an additional consideration was taken into account. The NPS2 tracked all individuals present in the NPS1 regardless of their household membership status. Some people were not considered household members if they had not lived in the household for 3 or more months within the past 12 months. A few exceptions were allowed such as newborns, new household members, and boarding school students. If a person was not considered a household member, that person will be listed in the household roster but the enumerator would not have asked him or her any questions regarding education, health, employment, etc.

The protocol of following all individuals listed in the household roster of the NPS1 meant that some individuals tracked in the NPS2 had not been considered household members in the NPS1. This led to a problem when these people were the only individuals that linked the household in both rounds, which happened if they split from their original household (and none of those considered household members moved out with them), or if none of those considered household members were contacted again. It was decided that the analysis should exclude these cases because they cannot be considered panel.

Although the NPS tracks individuals, it is relatively common in panel surveys to report tracking and attrition rates in terms of households. A household will be considered successfully tracked if at least one person considered a household member in the first round is present in the second round and still considered a household member. The second round of the NPS tracked 97% of the original households. The attrition rate of 3% of households is fairly low and relatively similar across strata (see Table 4). The most likely reason for household attrition is the inability to relocate any household member rather than refusal to participate in the second round of the survey.

Table 4. Evolution of the NPS sample

	NPS1 (A) = (B) + (C)	Attritted (B)	Tracked (C)	NPS2
Tanzania	3265	99	3166	3846
Dar es Salam	555	38	517	614
Other urban	480	18	462	568
Rural	1751	31	1720	2121
Zanzibar	479	12	467	543

The NPS sample grew to 3,846 households in the second round. The increase is explained by the fact that some members left their original household and they now belong to a new household. Marriage and migration are the most common reasons for households splitting over time. On average, 18% of households split between the first two rounds of the NPS. The proportion is relatively stable across strata: 14% in Zanzibar, 15% in Dar es Salaam and 19% in the two remaining mainland strata.

Outline of the report

This report is organised around the NPS objectives, particularly tracking progress of the MKUKUTA 1 indicators and improving the understanding on poverty dynamics. The former benefits from the NPS being representative at the national level and across strata in each of its rounds, while the latter takes additional advantage of the panel features of the survey. Assessing the impact of specific public policy initiatives, however, is not covered in this analysis, as this does not fall within the purview of the work program of the NBS. Preference has been given to indicators that can be calculated in both rounds of the survey in order to emphasise the temporal trend. Finally, the following discussion of each indicator takes into account the confidence intervals surrounding the indicators in order to note the significance of a given result. Differences over time or across strata in each round of the survey may appear to be important, but they might not be statistically significant, and hence it would be misleading to make inferences without considering the sampling error.

The report examines the evolution of the MKUKUTA 1 indicators between the first two rounds of the NPS. The structure of the report follows the organization of the MKUKUTA in terms of clusters, goals and indicators. Cluster 1 focuses on the indicators that play a role in the promotion of growth and the reduction of poverty. Cluster 2 examines indicators relevant to the improvement of quality of life and social well-being. Cluster 3 provides information on indicators related to governance and accountability. Finally, Appendix A explains in detail the methodology for poverty analysis.

Cluster 1: Growth and Poverty Reduction

Cluster-wide indicators

Gini coefficient

Income inequality refers to the distribution of income among the population. Consumption will be used as a proxy for income, thus low inequality implies that consumption is similarly allocated among the population, whereas high inequality indicates that consumption is concentrated in a relatively small group of the population.

The Gini coefficient is the most commonly used single measure of inequality of a population. It ranges from 0, which means that every person has the same consumption, to 1, which means that one person has all of the consumption in the country. The Gini coefficient is particularly sensitive to changes in the middle of the consumption distribution.

The Gini coefficient stands at 0.36 in the NPS1 and at 0.37 in the NPS2 (see Table 5), which means that the level of consumption inequality has remained constant across rounds of the NPS. The pattern seems similar across the country. Other urban areas in mainland and rural areas in mainland are the two strata where the Gini coefficient did not change, whereas in Dar es Salaam and Zanzibar a very modest and insignificant decline occurred. Visible patterns of inequality hold across both rounds. Inequality is higher in urban areas compared to rural areas. Zanzibar shows lower inequality than mainland. Across strata, Dar es Salaam and other urban areas in mainland are the two strata with higher inequality, while rural areas in mainland and Zanzibar display lower inequality.

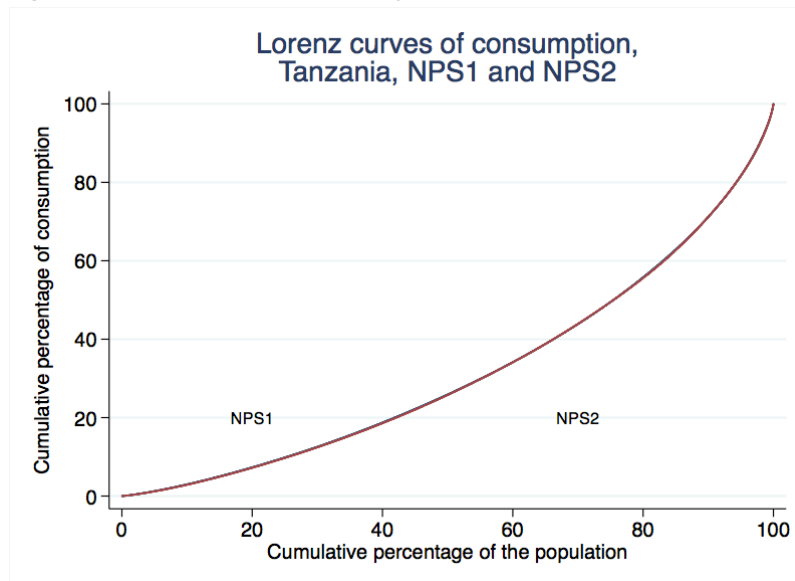
Table 5. Gini coefficient

	NPS1	NPS2
Tanzania	0.36	0.37
Rural	0.31	0.31
Urban	0.37	0.36
Mainland	0.36	0.37
Dar es Salam	0.34	0.33
Other urban	0.35	0.35
Rural	0.31	0.31
Zanzibar	0.32	0.31

The Gini coefficient is based on the Lorenz curve, which is a graphical manner of assessing inequality for the same population over time or across different groups of the population at one point in time. The Lorenz curve plots the cumulative percentage of the population in the horizontal axis (ranked in ascending order of consumption) against the cumulative

percentage of consumption in the vertical axis. The closer the Lorenz curve is to a 45-degree line, the lower the level of inequality is, while the closer the Lorenz curve is to the horizontal axis, the higher the level of inequality is. Figure X shows the Lorenz curves for the NPS1 and the NPS2. The two curves overlap each other almost perfectly, that is, inequality has not changed across both rounds of the NPS. This finding reinforces the results obtained so far. While the Gini coefficient is a summary indicator based on the Lorenz curve and it would be possible to obtain similar Gini coefficients with different consumption distributions, by plotting both Lorenz curves it is immediately evident that no changes have occurred along the entire distribution of consumption. Lorenz curves drawn for urban and rural areas, for mainland and Zanzibar, and for all four strata display similar patterns.

Figure 1. Lorenz curves of consumption



Poverty headcount

Providing reliable and consistent monetary poverty estimates is one of the principal objectives of the NPS. The sample design, the organization of the fieldwork to take into account seasonality concerns, and the layout of the questionnaire of the NPS are devised to capture the living standards of the population as accurately as possible. The estimation of the consumption aggregate is of particular importance because it is the base for measuring poverty.

Household Budget Surveys (HBS) are the official source of the incidence of poverty in the country. The poverty analysis based on the NPS uses the same methodology as the HBS, but a major caveat is that the findings from the NPS are not directly comparable to those of the HBS. An attempt to reconcile figures between both surveys is currently being planned, however, for the purposes of this report, no efforts have been made to show a poverty trend that is consistent between the HBS and the NPS. Although the comparison between these two surveys is indeed an issue, the NPS does provide reliable and consistent poverty estimates on its own over time. In other words, while the level of poverty is not comparable

between the HBS and the NPS, the poverty trend across the different rounds of the NPS is representative for the country and across strata.

The HBS and the NPS differ significantly in many ways, but given that the estimation of the consumption of the household is the first key component of the poverty analysis, it is worth mentioning the four main differences that will directly affect the consumption aggregate. First, food consumption is collected in the HBS through a diary that is left with the household for a month, while the NPS uses a recall period of the last seven days. Second, in the HBS, households provide a self-reported value for the non-purchased food that is consumed, whereas in the NPS, households do not need to provide such subjective assessments. Instead, the valuation of non-purchased food in the NPS is based on the prices paid by households that purchased similar food items in the same month and in the same region or stratum. Third, the HBS uses a more extensive list of food and non-food items for which consumption is collected than the NPS. Finally, the NPS does not collect information on clothing expenditures or on rent (actual or imputed), whereas the HBS does gather data on both of these consumption components.

The methodology for poverty analysis is discussed in detail in Appendix A. However, a brief discussion to review the main elements of the approach will be useful. First, per adult equivalent real consumption is the measure of welfare of the population. Consumption is the total value of food and non-food goods and services consumed. It includes imputed values for non-purchased items, that is, goods self-produced by the households or received in kind as gifts or transfers. Nominal consumption in each round of the NPS was adjusted for temporal and spatial price differences, thus real consumption is expressed in Tanzanian prices. Second, a single national poverty line is estimated using the Cost of Basic Needs Approach. The food poverty line is anchored to a daily intake of 2,200 kilocalories per adult equivalent. The food bundle consumed by the bottom 50% of the population in the country ranked in terms of real consumption is scaled to provide the required energy intake. The food poverty line is the value of this food bundle valued at median prices paid by the same reference group. The non-food poverty line is based on the food share of the bottom 25% of the population in the country ranked in terms of real consumption. The total poverty line is the value of the food poverty line after scaling it up with the food share of the non-food reference group. Finally, a household will be considered poor if its per adult equivalent real consumption is lower than the total poverty line.

The total poverty line per adult equivalent per 28 days stands at TSh 23,645 at NPS2 prices, that is, prices from October 2010 to September 2011. The food poverty line is TSh 18,508 and the non-food poverty line is TSh 5,137. Food accounts for 78% of the total poverty line and non-food for the remaining 22%.

The incidence of poverty grew from 15% of the population in the NPS1 to 18% in the NPS2 (see Table 6). Even though the share of poor in the population shows large variations in some geographical domains, none of the changes is statistically significant over time. Rural areas appear to have worsened across rounds, a finding that is driven by the increase in poverty in rural areas in mainland. Urban areas display a modest fall, a result that can be

associated with a decrease in other urban areas in mainland. The incidence of poverty in mainland seems to have increased, whereas the opposite happened in Zanzibar.

A few patterns hold in both rounds of the NPS. Rural areas have higher poverty incidence than urban areas, but the differences between mainland and Zanzibar are not significant. Unambiguous statements across strata are more difficult to make. In mainland the ranking is robust over time: rural areas is the stratum with the highest proportion of poor, followed by other urban areas, and Dar es Salaam is the stratum with the lowest poverty incidence. On the other hand, in the NPS1, Zanzibar is poorer than urban areas in mainland and Dar es Salaam, but the difference with rural areas in mainland is not significant. In the NPS2, Zanzibar is only poorer than Dar es Salaam, but the differences with the other two strata in mainland are not significant.

Table 6. Poverty incidence

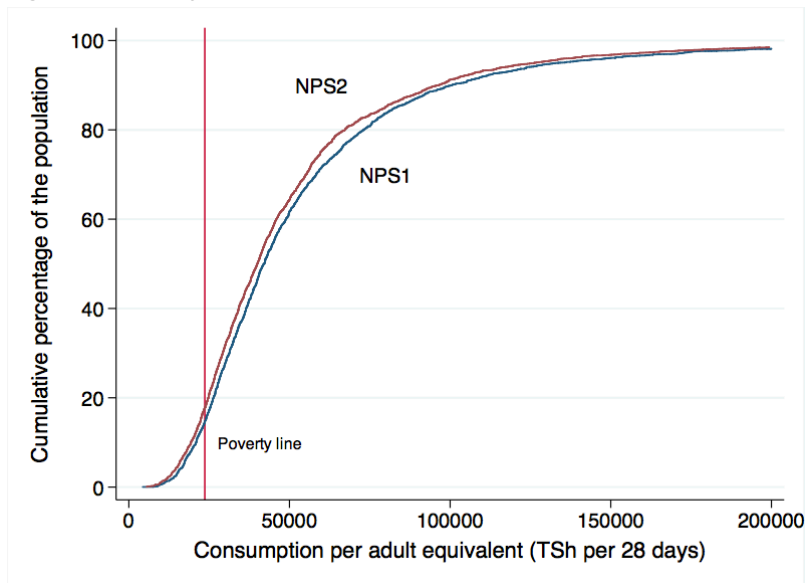
	NPS1	NPS2
Tanzania	14.7	17.7
Rural	17.2	21.4
Urban	5.7	5.0
Mainland	14.5	17.8
Dar es Salam	1.0	1.5
Other urban	7.5	6.4
Rural	17.1	21.8
Zanzibar	20.4	12.6

A natural concern that arises is to evaluate the sensitivity of the poverty incidence with respect to the level of the poverty line. While considerable effort has been put in deriving a poverty line following a previously implemented methodology and trying to be as transparent and objective as possible, an unavoidable degree of arbitrariness is involved in the process. Many explicit and implicit assumptions have been made along the way and these may not be amenable to all. Other poverty lines might be equally appealing and justified.

Assessing the degree to which the incidence of poverty will change when the poverty line is shifted upwards or downwards as well as the robustness of the poverty comparison between the first two rounds of the NPS is possible by plotting the cumulative distribution functions of consumption (Figure 2). For a given consumption level on the horizontal axis, the curves indicate on the vertical axis the percentage of the population with a lesser or equal level of consumption in each round of the NPS. If one thinks of the chosen consumption level as the poverty line, the curves will show the associated poverty incidence and thus they can be seen as poverty incidence curves. The incidence of poverty appears to be quite sensitive to the choice of the poverty line as the slope of the curves is relatively

steep around the poverty line – that is, small changes to the poverty line will have large impacts on the poverty incidence. With regards to the comparison between both rounds, the conclusion is unambiguous: no matter what the poverty line is, the poverty incidence in the NPS2 is always higher than in the NPS1. However, the small gap between both curves suggests that the increase in poverty incidence is likely to not be statistically significant for almost any reasonable poverty line.

Figure 2. Poverty incidence curves



Goal 1: Ensuring sound economic management

Annual rate of inflation

Inflation measures the percentage change in the cost of a bundle of goods and services consumed by the population. Given that the bundle is fixed over time, inflation is generally interpreted as the percentage change in prices over a certain period of time. Maintaining a low and stable inflation is an essential objective of the economic management of the country, partly because a high inflation discourages investments and erodes the real value of wages, profits, and consumption.

The official reference to track inflation in Tanzania is the consumer price index (CPI) but an alternative measure of inflation can be estimated from the NPS. Both sets of figures are not directly comparable and inferences should be done with caution. However, it is worthwhile to use the NPS to calculate changes in the cost of living, as it can complement the information provided by the CPI and can be used as a crucial input for the welfare comparison across rounds of the NPS.

Before commenting on the similarities and differences between the CPI and the NPS inflation, it will be helpful to review how inflation is estimated. Inflation figures are derived from price indices, which simply represent the relative cost of the bundle being analysed in each period of time. A price index is a combination of prices and budget shares in a base and a comparison period. The budget shares are the weights that each commodity has in the index and are equivalent to their share in the cost of the bundle being analysed. It follows that differences in inflation could be driven by differences in prices and/or by differences in budget shares.

Using the NPS inflation rather than the official CPI for the purposes of this analysis presents advantages and disadvantages.² The first advantage of using the NPS is that it is possible to produce price indices by stratum, across urban and rural areas, and across mainland and Zanzibar. By contrast, the CPI is mainly an urban price index that is produced separately for mainland and for Zanzibar. A second advantage is that with the NPS, the weights of the price indices are updated in each round, a feature that might reflect the consumption pattern of the population more accurately than the CPI weights. The third advantage is particularly relevant for welfare comparisons, and it refers to the fact that the NPS allows the construction of price indices that take into account temporal and spatial price differences, whereas the CPI reflects only temporal price differences.

On the other hand, the disadvantages are related to data collection issues. The NPS does not collect information on prices for any goods or services. For all food items, the survey gathers information from the households on the amount spent and on the quantity purchased. A measure of prices, or rather a measure of unit values, is obtained by dividing the expenditure by the quantity. The first major disadvantage is that unit values can only be calculated for food items because the survey does not collect information on quantities for

² See a more detailed discussion about the differences in methodology and data collection in Box 1.

non-food items. If price indices based solely on the NPS were to be used, the implicit assumption would be that the spatial and temporal price differences of non-food goods and services are similar to those of food items. A second disadvantage is that unit values, unlike CPI prices, also reflect the mixture of varieties within each commodity. The NPS asks information for 59 food items, and even though the list could be considered detailed, many of these goods are not completely homogeneous. By contrast, the CPI bundle could be fairly specific, and it is not unusual for some items to even refer to a particular brand.

Food price indices based on the NPS are shown in Table 7. The left panel of the table displays the spatial price differences in each round of the NPS. If the cost of a food bundle in Tanzania stands at 100, how does the cost change across the country? Rural areas are less expensive than the national average, while urban areas are more expensive. When comparing mainland with Zanzibar, prices in the former are similar to those for the entire country, whereas in the latter, prices are slightly more expensive than the national average. Across strata, Dar es Salaam is the most expensive stratum. Other urban areas in mainland and Zanzibar are fairly similar in terms of the cost of living, while rural areas in mainland is the least expensive stratum. Overall, spatial price differences have remained approximately constant in each round of the NPS.

The right panel of the table shows the inflation between both rounds of the NPS. If the cost of a food bundle stood at 100 during the NPS1 (October 2008 to September 2009), what is the percentage change in the cost of that bundle during the NPS2 (October 2010 to September 2011)? Food prices have increased 21% between the NPS1 and the NPS2. Rural areas experienced higher inflation than urban areas, whereas the inflation in Zanzibar is barely higher than in mainland. Across strata, differences in inflation are minor, with Dar es Salaam displaying the lowest inflation and Zanzibar the highest increase in prices.

Table 7. Spatial and temporal food price indices

	Spatial		Temporal NPS1 - NPS2
	NPS1	NPS2	
Tanzania	100	100	21
Rural	93	94	24
Urban	112	110	18
Mainland	100	100	21
Zanzibar	105	103	23
Dar es Salam	116	114	19
Other urban	102	103	21
Rural	93	91	20
Zanzibar	105	104	23

Goal 2: Promoting sustainable, broad-based growth

Unemployment rate

Participation in the labour force and unemployment are based on the standard approach set by the International Labor Organization (ILO). The reference period is the last seven days previous to the interview and all individuals 15 years and older are considered. The labour force comprises all economically active people, that is, people that are employed or unemployed. The employed comprise people that for at least one hour in the last seven days did any work for wages, profits, barter, or in the family business for free. In addition it includes those that did not work at all during the last seven days but have a job to which they will definitely return to work.

The unemployed comprise people that fulfil three conditions: (a) did not work in the last seven days and did not have a job to which they will return to, (b) were available to work, and (c) were looking for a job. The ILO's recommendations allow the relaxation of the condition (c), i.e., looking for a job, especially in countries where a large proportion of the population is engaged in subsistence agriculture and informal activities and has generally little knowledge of labour market developments in the rest of the economy. Tanzania is characterised by these conditions, and therefore uses a relaxed standard definition of unemployment. This approach will be used in the estimation of labour market indicators based on the NPS.

Usual labour market figures in the country, however, are based on a third approach, which unfortunately cannot be estimated with the NPS. The Tanzanian definition of unemployment was formulated to account for people classified as employed under the standard definition who might actually be unemployed for most of their time, depending on the degree of attachment to their jobs. The national definition considers unemployed those who satisfy conditions (a) and (b) plus those with extreme marginal attachment to employment.

A methodological issue arose in the estimation of the labour market indicators. The labour status of a person, that is, whether they are employed, unemployed or out of the labour force, is commonly determined by a set of screening questions at the beginning of the labour module in a survey. In the NPS, a person will be considered to have worked in the last seven days if the answer to "Did you do any work of any type for pay, profit, barter or home use during the last 7 days?" is positive. This question should encompass all types of work: wage employment, self-employment and unpaid family work. However, within the labour module, additional questions are asked to further probe for specific work done as wage employed, self-employed or unpaid family worker. It is expected that if a person answered positively to any of the specific employment questions, that person would also answer positively to the sole general question at the beginning of the module. This is the case indeed for wage employment and self-employment, but not for unpaid family work. A significant proportion of the population, particularly in the NPS1, answered no to the general employment question but answered yes to having worked as unpaid family workers in a non-farm household business or having worked in the household farm. The mismatch might have been further compounded by a change in the way these two questions about

unpaid work were asked. In the NPS1, people were asked directly the number of hours they worked as unpaid family workers in a non-farm family business and the number of hours they worked in the household farm. If they reported a positive number of hours, they would be considered unpaid family workers. In the NPS2, filter questions were added before asking the same questions. For instance, for unpaid work in a non-farm family business, people were asked first if they had done any work in such a business and only if they answered positively would they be asked how many hours they actually worked. The potential impact of this change on how these questions were answered is unclear. Overall, the difference in how the labour market indicators are estimated affects the level of labour force participation in both rounds and the direction of the trend over time.

The labour force participation rate and the unemployment rate under both scenarios are shown in Table 8. The labour force participation under the single question approach increases from 78% to 83%, whereas under the combined approach it decreases from 92% to 86%. Differences between both approaches are quite large in the NPS1, while the gaps are more modest in the NPS2. The national pattern is replicated across rural and urban areas, mainland and Zanzibar, and all strata.

The unemployment rate rises from 2.5% in the NPS1 to 3.3% in the NPS2 under the single question approach, while it increases from 0.4% to 2.6% between rounds under the combined approach. Both approaches suggest that the unemployment rate rose between the NPS1 and the NPS2. However, Dar es Salaam appears to be an exception. The unemployment rate in the capital under the single question approach goes down from 16% to 13%, but under the combined approach it increases from 2% to 11%.

Table 8. Labour force participation and unemployment rate

	Single general question				Combined approach			
	Labour force		Unemployment		Labour force		Unemployment	
	NPS1	NPS2	NPS1	NPS2	NPS1	NPS2	NPS1	NPS2
Tanzania	77.6	83.0	2.5	3.3	92.2	85.9	0.4	2.6
Rural	81.2	86.5	0.7	1.9	92.9	89.5	0.2	1.4
Urban	67.1	73.2	8.5	8.2	90.4	75.8	1.0	7.0
Mainland	78.0	83.6	2.3	3.0	92.2	86.5	0.4	2.4
Dar es Salam	68.0	72.6	16.0	13.0	93.4	74.5	1.9	11.4
Other urban	68.3	74.7	4.1	4.9	88.9	77.7	0.5	3.9
Rural	81.4	87.1	0.6	1.5	92.8	90.1	0.2	1.1
Zanzibar	64.1	65.8	7.9	17.5	93.7	66.9	1.1	14.6

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

Percentage of households involved in the agricultural sector

Agriculture is the foundation of the Tanzanian economy, accounting for 45 percent of the GDP in 2005 and employing 63 percent of the labor force (World Bank, 2007). It represents a source of livelihood to three quarters of the population: 76.3 percent of the households are cultivating some land (whether owned or rented in), and 74.1 percent of the households have some livestock. Moreover, cultivation of land appears to be a rather static status over short periods of time, with less than 10 percent of the population moving in or out of farming between the two rounds of NPS. Indeed, three fourths of the households harvested land in both rounds, and hardly any household acquired land within the two year period (see the left panel of Table 9 **Error! Reference source not found.**). However, moving out of agriculture is closely linked to family splits: 20 percent of the households splitting between the two rounds moved out of farming (see the right panel of Table 9).

Table 9. Percentage of agricultural households across rounds of the NPS

Whole sample		2010/2011		Only households who split between rounds		2010/2011	
		Non-ag HH	Ag HH			Non-ag HH	Ag HH
2008/2009	Non-agricultural households	16.3	2.2	2008/2009	Non-agricultural households	14.2	2.3
	Agricultural households	7.4	74.1		Agricultural households	18.0	65.6

Note: a household who splits between 2008/9 and 2010/11 is a household that was divided into 2 or more households from the first to the second round (due to marriage, divorce, etc). An agricultural household is a household that cultivates at least one field.

While agriculture is the major sector of the economy, rural areas continue to bear the brunt of poverty: with 93.3 percent of poor households living in rural areas, 6.4 million rural individuals need to find a way to survive each day. Poverty rates among land cultivators are 6 times higher (18.4 percent) than for the rest of the population (3.3 percent). Agricultural growth of 4.8 percent annually between 2000 and 2005 remained moderately high by regional standards (World Bank, 2007), but is not sufficient to make a significant dent in poverty rates in rural areas, which remain the locus of food insecurity and hunger, both of which are accentuated by widespread lack of access to (largely inadequate) resource endowments.

Poverty and agricultural production and practices are thus closely linked in a country where being poor is both a symptom and a cause of low agricultural production and limited use of modern agro-technologies. Despite the abundance of unutilized land, small-scale subsistence farmers dominate the agricultural sector in Tanzania. Farmers cultivate farm plots of 2.6 hectares on average, and 85 percent of the farmers own less than 4 hectares of

land. The vast majority is engaged in sole subsistence farming with just one third of the farmer selling at least some of their production.

Tanzania is endowed with vast untapped agricultural land. With a total area of 95 million hectares of land, it contains approximately 40 million hectares that are classified as suitable for agriculture. However, part of this arable land may be only marginally suited for agricultural production for a variety of reasons including soil leaching, drought proneness, and tsetse infestation. According to aerial surveys done in the 1990s by the FAO and the World Bank, 7 million hectares of land were suitable for cropping but unused, and 23 million were grassland and bushland unsuitable for cropping, but that could be used for grazing. Tanzania is also well endowed with water, both on the surface and below ground, but suffers from water shortages due to insufficient capacity to store and access it.

As is the case in much of Africa, Tanzania has seen over the past 20 years only modest increases in labor productivity (World Bank, 2007). One of the main limitations on the size of landholding and land utilization is the reliance on hand hoes as the main cultivating tool, which sets limitations on the area that can be grown using family labor. Similarly, adoption of modern farming technologies is very limited and most cultivated areas are in rainfed zones. The absence of drastic changes between the two rounds of NPS may be explained by two different factors: climatic variations that balance out in such a way that production and yield figures do not vary much over time, or the absence of changes in farmers' cultivating techniques. While the NPS contains little information on the former³, it has extensive information on the latter. With no serious land expansion constraints in most districts, factors that may increase smallholders' agricultural production include the use of labor and the use of inputs: technologies to maintain or expand utilized land area (erosion control), and intensification of the existing cultivated area (irrigation, fertilizers, improved seeds, mechanization).

Changes in production and major crop yields over time

Due to the different agro-climatic areas and socio-economic conditions, there are significant differences in cropping patterns and farming systems. However, Tanzanian agriculture sector remains dominated by a few main staple crops produced by farming households: maize, paddy, beans, cassava, potatoes, sweet potatoes, and sorghum. Grown vegetables (horticultural production) are most frequently tomatoes. The cash crops most frequently grown by households are cashew nuts, pigeon peas, coconut, coffee, and sugar cane. The planting of fruit trees is an important complement to the production of staple and cash crops, even though these are largely retained for home consumption, as is the case with bananas. Trees of importance are banana, mango, papaw and orange trees. The total area under cultivation during the long rainy season is estimated to be 7 million hectares, of which

³ Respectively 3 and 5 percent of the fields that were not planted on their total area were subject to drought in 2008/2009 and 2010/2011.

3.1 million are planted with maize and 0.7 million are planted with rice.⁴ During the short rainy season, 1.3 million hectares are planted with maize, and 100,000 hectares with paddy.

Due to the sampling framework of NPS, this chapter will only report statistics on maize and paddy. Between the NPS1 and the NPS2, total production⁵ during the full year (Masika and the short rainy season, Vuli) has increased for maize and paddy, from 2.2 to 3.4 million tons and from 0.5 to 0.9 million tons respectively (see Table 10).

Table 10: Full Year (Masika + Vuli) Total Crop Production (Metric Tons)

	2008/09	2010/11
Maize	2.16	3.37
Paddy	0.53	0.94

Note: Dropping top 1% of the plot observations in the distribution for total agricultural production (metric tons).

Yields⁶ of the major cultivated crops remained quite stable over time (see Table 11 and Table 12). In 2010/2011, average maize yields range between 801 (farmer-reported plot area) and 939 (GPS-based plot area) kg per hectare, as compared to 782 kg per hectare in 2008/2009. Average paddy yields range from 1,354 (farmer reported plot area) to 1,725 (GPS-based plot area) kg per hectare, as compared to 1,313 kg in 2008/2009. The stability of yields over time is in line with the existing literature on the evolution of yields in Tanzania (see World Bank, 2007).

⁴ In 2008/2009, the areas under maize and paddy cultivation during Masika were respectively 3 and 0.5 million hectares. These numbers need to be taken with caution as only 20 percent of the fields were measured with GPS and the rest rely on farmers' estimations.

⁵ Trimming was done by dropping the top 1 percent of the plot observations in the distribution for total agricultural production (metric tons).

⁶ Trimming was done by dropping the top and bottom 1 percent of the plot observations in the distribution for crop yield (kg per hectare cultivated).

Table 11. Average yield of maize (kg / area planted in hectare)

2008/2009					
<i>Using Farmer Reported Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	1817	782	779	25	5,272
Purestand Plots	601	906	842	25	5,189
Intercropped Plots	1216	715	734	25	5,272
Plots w/ Organic Fertilizer	256	1,012	944	33	5,272
Plots w/Inorganic Fertilizer	283	1,160	906	33	4,942
Plots w/ Any Fertilizer	476	1,066	930	33	5,272
2010/2011					
<i>Using Farmer Reported Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	2237	801	761	40	4,942
Purestand Plots	792	885	799	49	4,942
Intercropped Plots	1445	748	731	40	4,942
Plots w/ Organic Fertilizer	295	920	789	49	4,744
Plots w/Inorganic Fertilizer	418	1,178	944	44	4,744
Plots w/ Any Fertilizer	640	1,054	868	44	4,744
2010/2011					
<i>Using GPS-Based Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	1914	939	947	30	5,719
Purestand Plots	676	1,058	993	30	5,719
Intercropped Plots	1238	867	911	30	5,491
Plots w/ Organic Fertilizer	278	1,012	960	31	5,295
Plots w/Inorganic Fertilizer	368	1,351	1,121	30	4,942
Plots w/ Any Fertilizer	578	1,170	1,047	30	5,295

Note: Dropping top 1% of the plot observations in the distribution for total agricultural production (metric tons).

Yields are quite sensitive to cultivation methods. Intercropped maize plots record maize yields 15 to 20 percent lower than pure stand plots, while intercropped paddy plots record yields 50 percent lower than pure stand paddy plots. Similarly, maize plots where fertilizers were used, whether organic or inorganic, achieved yields 25 to 30 percent higher than average. That increase is driven by inorganic fertilizers, which raise yields by 20 to 25 percent compared to plots using organic fertilizers only.

Table 12. Average yields of paddy (kg / area planted in hectare)

2008/09					
<i>Using Farmer Reported Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	490	1,313	1,275	28	9,973
Pure stand Plots	409	1,438	1,334	37	9,973
Intercropped Plots	81	805	830	28	6,795
Plots w/ Organic Fertilizer	23	1,967	1,179	395	4,567
Plots w/Inorganic Fertilizer	59	1,803	1,423	31	5,560
Plots w/ Any Fertilizer	70	1,793	1,301	31	5,560
2010/11					
<i>Using Farmer Reported Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	632	1,354	1,194	49	7,611
Pure stand Plots	538	1,455	1,219	49	7,611
Intercropped Plots	94	744	799	49	4,448
Plots w/ Organic Fertilizer	33	2,412	1,935	282	5,560
Plots w/Inorganic Fertilizer	73	1,881	1,549	49	5,272
Plots w/ Any Fertilizer	98	1,899	1,555	49	5,560
2010/11					
<i>Using GPS-Based Plot Areas</i>					
	Obs	Mean	Std. Dev.	Min	Max
All Plots	464	1,725	2,225	73	24,711
Pure stand Plots	388	1,876	2,356	88	24,711
Intercropped Plots	76	940	1,069	73	6,076
Plots w/ Organic Fertilizer	24	2,733	1,810	380	5,668
Plots w/Inorganic Fertilizer	51	1,873	1,562	97	5,668
Plots w/ Any Fertilizer	68	1,893	1,518	97	5,668
<i>Note: Dropping top 1% of the plot observations in the distribution for total agricultural production (metric tons).</i>					

Percentage of households using irrigation

Tanzania has large surface and belowground water, which is matched by ample land suitable for irrigation. The estimated irrigation potential is up to 2 million hectares (World Bank, 2001). However, Tanzanian agriculture remains largely rainfed, and therefore unfavorable weather results in poor agricultural performance. Irrigation helps to diversify income and reduce risk as it mitigates vulnerability from unpredictable rainfall. However, irrigation is underused in Tanzania; only 4 percent of farmers are using irrigation in at least one of their fields, which corresponds to less than 2 percent of cultivated fields (see Table 13). If we assume that fields planted with the two major crops, maize and paddy, are slightly more likely to be irrigated (respectively 2.3 and 3.2 percent), it is clear that the average incidence of irrigation remains very low.

Table 13. Percentage of households using irrigation

	2008/9	2010/11
Share of households using irrigation	4.8	3.8
Share of fields using irrigation (surface)	1.8	1.8
-> share of maize fields using irrigation (surface)	2.2	2.3
-> share of paddy fields using irrigation (surface)	3.8	3.2
<i>Note: only farmers cultivating their field are included in the computations (rented out, given out, and fallow fields are not considered in the computations).</i>		

Low incidence of irrigation is combined with traditional techniques of irrigation for those who are watering their plots; a majority of farmers use traditional and non-mechanized irrigation methods. For example, over 70 percent of the farmers are using furrow irrigation (flooding) and 18 percent use watering buckets. More modern methods such as sprinklers, drip irrigation, and water hoses are used by less than 10 percent of farmers in the NPS.⁷

Table 14. Type of irrigation used by households

Proportion of households using at least:	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
- Flooding	0.66	0.51	0.82	0.70	0.54	0.85
- Sprinkler	0.05	-0.01	0.10	0.02	-0.02	0.07
- Drip irrigation	0.02	-0.01	0.04	0.03	-0.01	0.08
- Bucket/watering can	0.24	0.09	0.39	0.18	0.07	0.29
- Water hose	0.05	-0.02	0.12	0.06	0.00	0.12

Note: only farmers cultivating their field are included in the computations (rented out, given out, and fallow fields are not considered in the computations).

Very little irrigation is at present based on the abstraction of ground water, which provides a promising area for future development with direct and affordable benefits to the poor. The vast majority of those using irrigation rely on large bodies of water, including streams, rivers, lakes and ponds (75 percent). Since the surface water available varies with rainfall, open wells and boreholes or tube-wells would spread the availability of water throughout the growing season. Currently, wells are used by 18 percent of the farmers irrigating their fields, and boreholes by less than 2 percent (see Table 15). Such groundwater irrigation systems are less capital-intensive than large surface irrigation schemes and could reduce the reliance on large bodies of water, including rivers and lakes, and promote more sustainable use of locally sourced and managed irrigation systems. Integrating groundwater abstraction with rainwater harvesting and watershed management, along with efficient water distribution systems, could greatly improve the irrigation system.

⁷ Because farmers are asked which kind of irrigation they were using for each plot, a farmer may be listing more than one type of spraying water on his fields. In addition, only 111 and 101 plots were using some type of irrigation in 2008/9 and 2010/11 respectively, so comparing the type of irrigation across the two rounds should be done with caution.

Table 15. Percentage of households using various sources of water

Proportion of households using:	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Well	0.15	0.05	0.24	0.18	0.07	0.29
Borehole	0.02	-0.01	0.05	0.02	-0.01	0.05
Pond/tank	0.02	-0.02	0.05	0.03	-0.01	0.08
River/stream	0.77	0.65	0.88	0.74	0.62	0.87

Note: only farmers cultivating their field are included in the computations (rented out, given out, and fallow fields are not considered in the computations).

Irrigation is at present constrained by the high cost of investments required and by the limited profitability of their use. Equipment is relatively expensive in Tanzania, even the relatively modest implements needed for localized access to ground water. To compound the adverse impact of high initial costs, producers face difficulties accessing high yielding varieties and moving products to market. Irrigation and agricultural productivity are intimately linked, and neither can advance substantially independently from the other.

Percentage of households using fertilizers and improved seeds

Fertilizer use was in decline in Tanzania since the phasing out of fertilizer subsidies (1991-1994), but with the recent return of limited fertilizer subsidies, use of fertilizers has increased. Districts with the highest incidence of fertilizers among households are located in the South of the country (Ruvuma and Mbeya). The proportion of farmers using fertilizers is highest for crops such as tobacco, carrots, onions, and tomatoes (Tanzania Agricultural Sample Census, 2002/3).

Use of fertilizers is and remains low, whether using organic or non-organic fertilizers; three quarters of the fields do not have any fertilizer (see Table 17). The introduction of the National Agricultural Input Voucher Scheme in 2008 did not appear to have a significant impact on the use of inorganic fertilizers, as it remained at about 15-20 percent of the fields.

Table 16. Percentage of households using fertilizer, seeds, and pesticides (field-level)

Proportion of households using at least:	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Any fertilizer	0.28	0.24	0.32	0.32	0.28	0.36
Using organic fertilizers	0.20	0.16	0.23	0.21	0.17	0.24
Using non-organic fertilizers	0.15	0.11	0.18	0.18	0.14	0.22
Using vouchers for non-organic fertilizers				0.69	0.61	0.77
Using pesticides/insecticides	0.14	0.12	0.17	0.13	0.10	0.16
HH received seeds/fertilizers/pesticides/herbicides	0.02	0.01	0.04	0.02	0.01	0.04

In addition, seeds purchase has dropped between the NPS1 and the NPS2. Between the two rounds, the proportion of farmers who have purchased seeds has dropped from 35 percent to 28 percent (statistically significant at a 95 percent confidence interval). This is primarily due to a drop in the use of traditional seeds from 27 to 20 percent of all fields. The large majority of seeds hence come from the farms themselves, harvested from last year's growth. The farmers then use their own, more diverse, gene pool, distinct from other gene pools at other farms, ensuring larger diversity of gene pools within each crop.

Figure 3. Use of seeds (field-level)

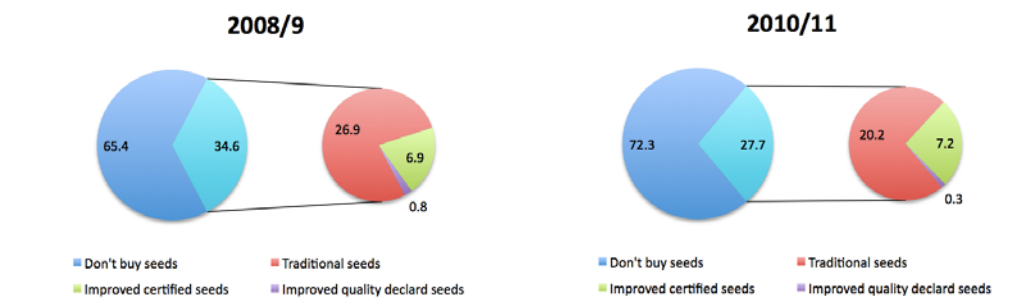


Table 17. Percentage of households using fertilizer, seeds, and pesticides (field-level)

Proportion of households using at least:	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
<i>Use of fertilizers for all fields production</i>						
No fertilizer	0.80	0.77	0.83	0.76	0.72	0.79
Any fertilizer	0.20	0.17	0.23	0.22	0.19	0.25
Organic fertilizers only	0.08	0.06	0.11	0.10	0.08	0.12
Inorganic fertilizers only	0.10	0.08	0.11	0.09	0.08	0.11
Using vouchers for non-organic fertilizers				0.49	0.41	0.57
Using pesticides/insecticides	0.11	0.08	0.13	0.09	0.07	0.11
HH received seeds/fertilizers/ pesticides/herbicides	0.01	0.01	0.02	0.01	0.01	0.02
<i>Use of fertilizers for Maize production</i>						
No fertilizer	0.73	0.68	0.77	0.69	0.64	0.74
Any fertilizer	0.27	0.23	0.32	0.30	0.25	0.35
Organic fertilizers only	0.12	0.08	0.16	0.15	0.11	0.19
Inorganic fertilizers only	0.12	0.10	0.15	0.11	0.08	0.13
Using vouchers for non-organic fertilizers				0.57	0.48	0.66
Using pesticides/insecticides	0.11	0.07	0.14	0.09	0.05	0.12
HH received seeds/fertilizers/ pesticides/herbicides	0.01	0.00	0.02	0.01	0.00	0.02

Note: only farmers cultivating their field are included in the computations (rented out, given out, and fallow fields are not considered in the computations).

Percentage of households experiencing erosion

Erosion appears to be one of the major impediments to maintenance of the same amount of utilized land: one of every four Tanzanian farmers experiences erosion in at least one of his fields.⁸ The statistics are consistent with those obtained during the first round, and the sources of erosion remain the same, primarily erosion from rain (see Table 18).

Table 18. Percentage of households experiencing erosion

	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Proportion of households with at least one field subject to erosion	0.25	0.22	0.28	0.24	0.21	0.27
Cause of erosion						
Wind	0.02			0.02	0.00	0.03
Rain	0.94			0.97	0.95	0.99
Animals	0.04			0.01	0.00	0.02
Cultivation that does not comply with soil conservation	0.01			0.00	0.00	0.00

Of particular concern is the decline of erosion control. The consequences of erosion may be more dramatic in 2010/2011 as the proportion of households adopting erosion control techniques has nearly halved, dropping from 27 to 16 percent. The mix of techniques used to prevent erosion remain simple, with over two thirds of farmers using terraces or control bunds. Techniques that require more heavy construction work, such as dams, are essentially nonexistent (see Table 19).

Table 19. Percentage of households using erosion control methods

	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Households using erosion control	0.27	0.23	0.31	0.16	0.14	0.19
Type of erosion control						
Terraces	0.44	0.37	0.51	0.63	0.57	0.70
Erosion Control Bunds	0.29	0.23	0.35	0.02	0.00	0.03
Gabions/sandbags	0.01	0.00	0.02	0.01	0.00	0.02
Vetiver grass	0.04	0.01	0.06	0.02	0.01	0.04
Tree belts	0.08	0.04	0.11	0.06	0.03	0.09
Water harvest bunds	0.10	0.06	0.14	0.14	0.09	0.19
Drainage ditch	0.16	0.11	0.21	0.19	0.14	0.24
Dam	0.00	0.00	0.00	0.00	0.00	0.00

⁸ Farmer's own assessment.

These differences should however be taken with caution, as the significant drop in erosion control may be explained by methodological differences in the implementation of the questionnaire. In the NPS2, farmers were asked whether they were using erosion control and were shown drawings of the different techniques used to prevent erosion, which could explain why farmers were less likely to report an erosion control if there was in fact none.

Percentage of households using mechanization and labor-saving technologies

The low level of mechanization among Tanzanian smallholder farmers is both a cause and a symptom of rural poverty. Given the generally abundant land supply, households' capacity to maintain and increase their production through land expansion depends on the extent to which they can hire labor or use labor-saving technologies (e.g., animal traction, tractors, minimum cultivation techniques), and the extent to which land markets exist and function properly.

One of the major limitations on farmers' production and average yield presented earlier is the heavy reliance on hand hoes as the main cultivating tool (over 95 percent of the households are using hand hoes), which sets obvious limitations on the area of crops that can be grown using family labor. The use of animal traction is also limited, but while many farmers do not own an ox, many can afford to rent an ox plough (18 percent) or an ox cart (18 percent) when they need to use them. The use of mechanized traction and processing engines (e.g., tractors, shellers/threshers) is very limited with less than 10 percent using tractors, and no one using threshers. In addition, poorer farmers have lower access to, or use of, each listed item than the overall population, although the differences were not significant in most cases.

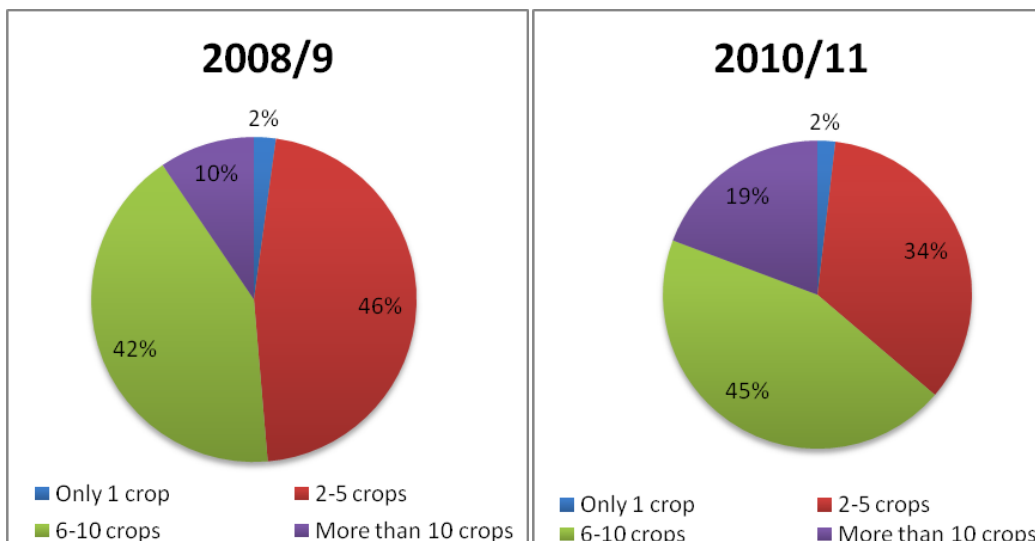
Table 20. Percentage of households using mechanized technology

	2008/9		2010/11	
	Own item	Used item	Own item	Used item
Hand hoe	98.18	95.76	96.68	91.98
Hand powered sprayer	7.00	12.84	5.74	8.34
Ox plough	8.69	18.17	9.27	17.61
Ox seed planter	9.95	19.37	10.46	18.49
Ox cart	0.11	0.38	0.02	0.05
Tractor	2.44	7.66	2.31	5.03
Tractor plough	0.14	2.81	0.20	2.82
Tractor harrow	0.27	1.42	0.12	2.25
Sheller/thresher	0.05	0.11	0.02	0.01
Hand mill	0.48	1.09	0.12	0.11
Watering can	1.97	1.81	1.23	1.12
Farm buildings	7.51	7.21	6.74	6.50
Geri cans/drums	12.73	10.80	3.83	2.34
Other			10.44	9.82

Percentage of households implementing crop diversification

The majority of Tanzanian farmers cultivate 6 crops or more. Between the two rounds of the NPS, there has been a shift towards more diversification of crops: a smaller proportion of farmers harvest 2 to 5 crops, and larger proportions of farmers cultivate 6 to 10 crops, or 10 or more (see Figure 4).

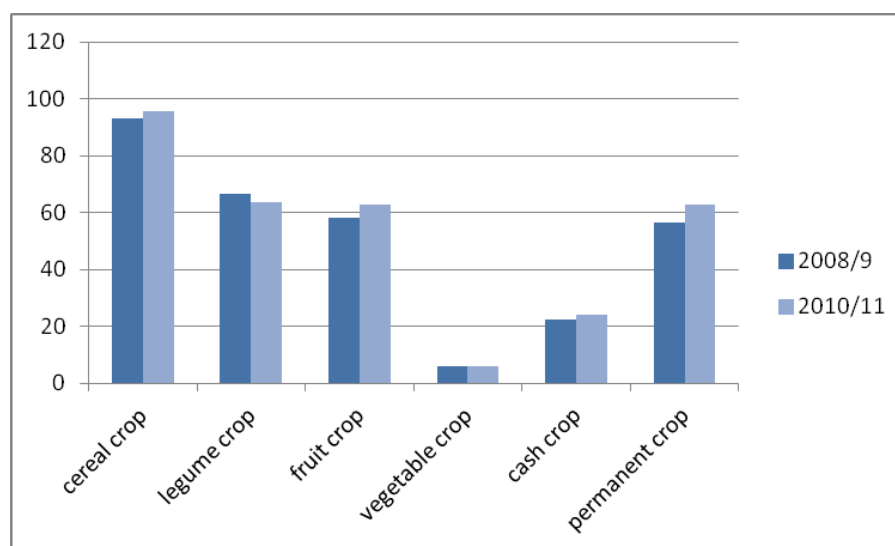
Figure 4: Crop diversity (number of different crops cultivated during the year)



Indeed, over the past 30 years, there has been evidence that crop diversification is acting as a risk-coping mechanism: in 1983, only 9.6 percent of the rural households were cultivating more than 4 crops, and 8.2 in 1991 (Ferreira, 1993). Today, the numbers have increased to include more than half of the farmers. Poor farmers record a similar degree of diversification compared to non-poor farmers, but this may hide issues of quality and quantity of the production. Alternatively, poorer farmers, despite growing a variety of different crops, may need to sell part of their food crops immediately after harvest time when prices are low.

Not only do farmers cultivate a few different crops, they also cultivate different categories of crops. Almost all farmers cultivate at least one cereal crop, and more than half cultivate at least one legume crop, a least one fruit crop, or at least one permanent crop (see Figure 5). 37 percent of the farmers cultivate at least one cereal crop, one legume crop, one fruit crop and one permanent crop.

Figure 5: Crop diversity (by crop category)



We also computed diversity indexes at the household level with regards to crop cultivation. Table 21 shows that all diversity indicators (Shannon-Wiener, Simpson and Berger-Parker) were not only stable over time, but also stable across poverty levels, indicating that crop diversification did not change significantly over time and does not change significantly across income status.

Table 21. Indexes of crop diversification

	Shannon- Wiener	Simpson	Berger-Parker
All farmers 2008/9	0.90	0.49	0.56
All farmers 2010/11	0.92	0.49	0.55
Poor farmers 2010/11	0.91	0.49	0.56

Percentage of households selling production and/or experiencing losses

The majority of farmers are engaged in sole subsistence farming; only a third of the farmers are selling some of their crops (see Table 22). The crop most sold by farmers is maize, with one third of the farmers selling some amount of maize. A large proportion of farmers who are cultivating paddy sell their production, with 40 to 50 percent of the farmers producing paddy selling part of their production.

Post-production storage techniques did not change significantly over time: one third of the households store part of their production away. Storage methods remain unchanged, with two thirds of the farmers using sacks or open drums, and 17 percent using traditional methods of storage. Methods that would decrease post-harvest losses, such as improved local structures, modern storages, and airtight drums, are used by only 6 percent of the farmers. However, and despite farmers' use of traditional methods, post-harvest losses have

decreased significantly between the NPS1 and the NPS2, with only 9 percent (as compared to 14 percent) of the stored production lost in the most recent round.

Table 22. Proportion of households that sold their harvest and/or experienced losses

	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Proportion of households who sell at least part of their harvest	0.29	0.26	0.32	0.34	0.31	0.37
Proportion of households selling maize ^a	0.28	0.24	0.31	0.34	0.31	0.38
Proportion of households selling paddy ^b	0.46	0.36	0.57	0.42	0.32	0.53
Proportion of households who experienced loss of crops	0.14	0.12	0.16	0.09	0.07	0.10
Proportion of households who stored at least part of harvest	0.30	0.27	0.34	0.24	0.21	0.28

^a: conditional on producing maize, ^b: conditional on producing paddy.

Goal 6: Provision of reliable and affordable energy to consumers

Percentage increase in the number of households connected to the national grid and off-grid sources of electricity

Access to electricity could be a key enabler for sustainable economic and social development, health, and gender and environmental quality. It enables communities to operate schools and hospitals, and to provide communication services, safe water supplies and sanitation. Electricity helps households to improve their living conditions by enhancing opportunities for education and employment.

The percentage of households with access to electricity will be used as a proxy for this indicator. The source of electricity could be the Tanzania Electric Supply Company Limited (TanESCO), community generators, personal generators, car batteries, motorcycle batteries or solar panels. A caveat is in order because this indicator does not capture the reliability of the source of electricity.

The percentage of households with access to electricity increased from 13% in the NPS1 to 16% in the NPS2 (see Table 23). The improvement in electrification happened across the country: in urban and rural areas, in mainland and in Zanzibar, and across all strata. Changes over time are not significant.

Patterns appear in both rounds of the NPS. Urban areas have higher access to electricity than rural areas. A lower proportion of households have access to electricity in mainland compared to Zanzibar. Across strata, Dar es Salaam is the stratum with the highest access to electricity, Zanzibar and other urban areas in mainland have similar figures, and rural areas in the mainland is the stratum with the lowest percentage of households with access to electricity.

Table 23. Percentage of households with access to electricity

	NPS1	NPS2
Tanzania	13.0	16.1
Rural	2.4	4.3
Urban	42.8	47.8
Mainland	12.4	15.5
Dar es Salam	61.1	65.5
Other urban	31.4	36.3
Rural	2.0	3.6
Zanzibar	33.9	37.1

Percentage of households in rural and urban areas using alternative sources of energy to wood fuel as their main source of energy for cooking

Using electricity and gas as sources of energy for cooking reduces environmental degradation, improves the health status of the population and contributes to gender equality. Environmental degradation might occur in areas where bush is cleared in order to obtain charcoal. A high incidence of respiratory diseases is typical in households using wood or charcoal because of intense indoor air pollution. Women and children traditionally spend many hours per day collecting wood, limiting their participation in other activities such as working or attending school.

The list of potential sources of energy for cooking in the NPS comprises firewood, electricity, paraffin, gas, biogas, charcoal and animal residuals. Electricity, gas and biogas will be considered alternative sources of energy.

The percentage of households using alternative sources of energy for cooking remained stable at 2% across both rounds of the NPS (see Table 24). The majority of households in the country rely on wood and charcoal for cooking, around 96%, while the remaining households use paraffin and animal residuals, around 2%. Minor improvements appear to have happened in urban areas, particularly in Dar es Salaam, where the use of alternative sources of energy increased slightly. In general, however, none of the changes over time are significant.

By contrast, some trends are significant in both rounds of the NPS. Urban areas have a higher proportion of households relying on alternative sources of energy for cooking compared to rural areas. Differences between mainland and Zanzibar are not significant. Dar es Salaam is the stratum where the use of alternative sources of energy for cooking is the highest. While in the NPS1, differences among rural areas in mainland, other urban areas in mainland and Zanzibar were not significantly different, in the NPS2, rural areas in mainland ranks last among all strata.

Table 24. Percentage of households using alternative sources of energy for cooking

	NPS1	NPS2
Tanzania	1.6	1.8
Rural	0.7	0.5
Urban	4.0	5.4
Mainland	1.6	1.8
Dar es Salam	7.2	10.6
Other urban	2.4	2.5
Rural	0.7	0.4
Zanzibar	1.1	3.3

Special Section 1: Poverty Dynamics

Improving the understanding of poverty dynamics is one of the three main objectives of the NPS. While each round of the survey can provide poverty indices at the national level, in rural and urban areas, in mainland and in Zanzibar and across all four analytical strata, another substantial contribution of the NPS is the possibility of analyzing the poverty paths followed by households in the country. This chapter of the report will provide a first examination of the patterns of poverty dynamics. First, a poverty profile will be presented to introduce the discussion about poverty, followed by classification of all panel households into the different poverty transition states. A descriptive analysis of the household characteristics across the different transitions will follow. Finally, a more thorough econometric analysis is implemented.

A basic poverty profile is shown in Table 25. The left panel displays the poverty incidence, the central panel shows the distribution of the population, and the right panel shows the distribution of the poor. The poor live disproportionately in rural areas because while almost four out of five people live in rural areas, more than nine out of ten poor people live in rural areas. The poor are not overrepresented in mainland or Zanzibar: in both cases the distribution of the poor is broadly similar to the distribution of the population. Across strata, the poor are certainly more likely to live in rural areas in mainland and less likely to live in Dar es Salaam and in other urban areas in mainland. Finally, the proportion of Zanzibaris among the population is similar to the proportion of poor living in Zanzibar.

Table 25. Poverty profile

	Poverty incidence		Population (%)		Poor (%)	
	NPS1	NPS2	NPS1	NPS2	NPS1	NPS2
Tanzania	14.7	17.7	100	100	100	100
Rural	17.2	21.4	78	77	91	94
Urban	5.7	5.0	22	23	9	6
Mainland	14.5	17.8	97	97	96	98
Dar es Salam	1.0	1.5	7	8	0	1
Other urban	7.5	6.4	15	15	8	6
Rural	17.1	21.8	75	74	88	92
Zanzibar	20.4	12.6	3	3	4	2

Understanding poverty dynamics requires following the same households or people over time to compare their poverty status in each round of the survey. The NPS2 tracked 3,166 households from the NPS1. Some of these households split between rounds, increasing the sample to 3,846 households. If a household split in the second round, one household among the split households had to be chosen as the main household for comparison with the original. Several sequential criteria were used to determine the main household in the NPS2. If the household did not split (2,607 cases), the single household in the second round would be the main household. Among the households that split (559 cases), the household that

had the same household head from the first round would be the main household (511 cases). Second, if the household split and the household head changed over time, the household where the household head from the NPS1 lives would be considered the main household (34 cases). Finally, if the household split and the original household head was no longer around, the split household with more tracked members would be considered the main household (14 cases).

Four poverty transitions between the NPS1 and the NPS2 are possible: households that were never poor, households that moved out of poverty, households that moved into poverty, and households that were always poor (see Table 26). Notice that the geographical location of the households in this table refers to the location in the NPS1. Households might have moved between rural and urban areas, across strata or between mainland and Zanzibar, but that information is not reflected in the table because it would have been too difficult to combine with the poverty transitions.

The top panel of the table shows the number of households by original location and poverty transition, while the middle and bottom panels display the percentage distribution of the population. The top panel highlights that few households fall into some of the poverty transitions, particularly in Dar es Salaam, other urban areas in mainland and Zanzibar. Even at more aggregate levels, say, urban areas, caution must be employed when interpreting some of the later findings because the number of households could be fairly small.

The middle panel displays the percentage of the population by poverty transition in each geographical domain. At the national level, 74% of the population were never poor, 8% moved out of poverty, 12% moved into poverty, and 7% were always poor. Although the majority of the population remained either never poor or chronically poor, around one out of five people moved between poverty states – that is, around one out of five people were transitorily poor. More movement into and out of poverty is observed in rural areas than in urban areas (23% and 7% respectively). Similar proportions of the population in mainland and Zanzibar moved into or out of poverty, yet this finding conceals dissimilar patterns across strata. Rural areas in mainland and Zanzibar have figures close to the national pattern, but transitions into or out of poverty barely stand at 9% in urban areas in mainland and 3% in Dar es Salaam.

The bottom panel shows the percentage of the population in each poverty transition state by geographical location. Compared to the distribution of the population shown in the last column of the table, urban dwellers are slightly overrepresented among those that have never been poor. By contrast, rural citizens are disproportionately represented among those moving into and out of poverty and particularly among those chronically poor. For instance, rural dwellers account for 78% of the panel population in the country but represent 95% of the chronically poor. The composition of the never poor and the always poor with regards to mainland and Zanzibar have similar patterns to the shares of these two domains among the population. Mainland is modestly more represented among those that moved into poverty, whereas the same happens for Zanzibar among those that moved out of poverty, reflecting the fact that the poverty incidence increased in mainland and dropped in Zanzibar.

An interesting finding that underlines the importance of using panel data to understand poverty dynamics is the difference between the modest increase of the poverty rate at the national level with the proportion of population falling into or escaping poverty. The findings in Table 25 indicate that the poverty incidence grew from 15% to 18%. However, that result does not tell anything about the movements into and out of poverty between both rounds of the NPS. Did the poor in the first round continue to be poor in the second round, and an additional 3% of the population fell into poverty? Or did all the poor from the first round escape poverty and a separate 18% of the population become poor? Household panel data shows that 7% of the population remained poor in both periods, 12% fell into poverty, and 8% escaped poverty. Considerable movement across the poverty line existed between the first two rounds of the NPS. Half of the original poor escaped poverty and two thirds of the current poor were not poor in the first round.

After quantifying the number of households experiencing each of the four possible poverty transitions, the next step is to assess what characteristics are associated with households experiencing different patterns of poverty dynamics. An initial descriptive analysis is shown in Table 27, which displays a comparison of the demographic composition of households and attributes of the household head by poverty transition state. The comparison focuses on the level of the household characteristics during the first round and on the changes that occurred between rounds.

With regard to the demographic composition of households, a few findings are worth mentioning. The average household size of chronically poor families is larger than households moving into or out of poverty and considerably larger than households that never experienced poverty. These differences do not seem to be associated with any particular age cohort, because differences in the number of children aged 0 to 5 years, children aged 6 to 9 years, children aged 10 to 14 years, and adults or elders are less substantial. The proportion of children and elders with respect to the total number of members in the household varies considerably across poverty transition states. The dependency rate among chronically poor households is rather large compared to that among households that have never been poor. Lastly, increases in household size between rounds are particularly large for those moving into poverty and particularly small for those moving out of poverty. However, no specific age cohort appears to be driving this result.

A second group of characteristics refer to the household head. Interestingly, no major differences were found in terms of age or sex of the household head. Education appears to be strongly associated with poverty dynamics. For instance, one fifth of household heads among households that were never poor had no education, compared to one third of household heads among chronically poor households. By contrast, almost one tenth of households that never experienced poverty have household heads that attained at least some secondary or university education, whereas almost none of the household heads among the chronically poor has that level of education.

Strong patterns also appear when looking at the economic activity of the household heads. Those in households that were never poor are significantly less likely to work in agriculture, livestock or fisheries and are considerably more likely to work in non-agricultural jobs. A similar share of household heads that are not working, that is, unemployed or out of the labour force, is observed across all poverty transition states. Finally, changes in the economic activity of the household head between rounds do not show any noticeable finding. The majority of household heads remained working in agriculture, working in non-agricultural jobs, unemployed, or out of the labour force. A relatively low proportion of household heads moved between agricultural and non-agricultural jobs or between being employed and not being employed.

Investigating the determinants of changes in the standard of living and what influences poverty dynamics can be examined more rigorously with multivariate methods. Two complementary econometric approaches will be employed. The first method focuses on analysing changes in the standard of living, which requires using the consumption aggregate (the continuous and underlying variable that is the proxy for welfare) to model the growth rate of consumption between both rounds of the NPS. The second method focuses on assessing poverty dynamics, which requires using the poverty status (the discrete variable denoting whether or not a household is poor) to model the factors that are correlated with the likelihood of being poor.

Modelling the growth rate of consumption has a couple of advantages over modelling poverty dynamics. Analysing the growth rate of consumption implies no loss of information about the underlying welfare variable. If a household increases its consumption between rounds, everybody will agree that the household has improved its standard of living over time. Yet it could be the case that the household has remained poor in both rounds. The increase in consumption will be properly captured if the analysis focuses on the growth rate of consumption, but that information will be lost if the analysis focuses on poverty dynamics because the household simply continues to be poor. The other consideration is that concerns might exist about the level of the poverty line and its potential effects over movements into and out of poverty. If the poverty line is thought to be either too low or too high, fewer households will be falling into or escaping poverty, resulting in a lower degree of poverty dynamics than a more realistic poverty line would have implied.

An assessment of the household characteristics associated with changes in consumption over time is implemented with a regression of the growth rate of consumption (the logarithm of the ratio between the per adult equivalent consumption in the NPS2 and the per adult equivalent consumption in the NPS1) on the previously discussed household characteristics (see Table 28).⁹ Household size is strongly and negatively associated with the growth rate of consumption, which means that the larger the household was in the first round, the lower the consumption grew in the second round. The proportion of children and elders, which can be interpreted as a proxy for dependency, also has a significant and

⁹ All the econometric analysis presented in this chapter explicitly takes into account the survey design of the NPS, that is, the analytical strata, the clusters and the sampling weights.

negative correlation with growth rates. Increases in the total number of members in the household have a strong negative influence in growth rates. Interestingly, the presence of more elders in the household has a significant and negative effect on growth rates, whereas increases in children of various age cohorts are negatively associated with growth rates but not significantly.

Being a female household head does not have any strong impact on the consumption growth rates. Younger household heads are significantly associated with higher growth rates compared to older household heads. Growth rates are highly correlated with the level of education of the household head. Lower growth rates are observed for those with no education, while higher growth rates are seen for those with secondary or university education. Household heads working in non-agricultural jobs display significantly higher growth rates. Changes in the economic activity of the household head have the expected correlations with growth rates but generally the association is not significant: moving from a non-agricultural sector to agriculture decreases growth rates, while moving in the opposite direction, or moving from being not employed to being employed, increases growth rates. Only household heads previously employed and currently unemployed or out of the labour force show significant lower growth rates.

Regional effects have positive influences on growth rates, but their correlation is not always significant. Living in Dar es Salaam is strongly associated with higher growth rates, living in other urban areas in mainland is weakly associated with higher growth rates, and living in Zanzibar is not significantly correlated with higher growth rates. The initial level of consumption, measured with the logarithm of the consumption in the first round, has a strong and negative relationship with growth rates; that is, households with lower levels of consumption in the NPS1 grew faster than households with higher levels of consumption.

The second complementary approach to investigate changes in welfare over time is to focus on movements into and out of poverty with a series of sequential probit regressions. A probit regression evaluates the degree of correlation between a set of variables and the probability of a certain event happening. In the case of poverty dynamics, each probit regression will assess how the household characteristics are associated with the poverty status of the household. Three different probit regressions will be implemented. The first stage refers to the likelihood of a household being poor in the first round of the NPS, and the second stage estimates the likelihood of a household being poor in the second round of the NPS separately for those being poor in the first round and for those being not poor in the first round. The rationale behind this approach is to differentiate the factors associated with being poor at one point in time with the factors associated with falling into or escaping poverty. The first stage will inform on the household characteristics that influence the probability of a household being poor. The second stage will provide information on the factors that might help households that are poor to escape poverty and the factors that might be correlated with households that fall into poverty.

The results of all three probit regressions are shown in Table 29. The likelihood of a household being poor in the NPS1 is strongly and positively associated with the size of the

household and the share of children and elders. The larger a household, the higher its probability of being poor. Equally, the higher the proportion of children and elders in a household with respect to the total number of members, the more likely that the household is poor. Being a female household head is weakly and positively correlated with poverty. Older household heads appear to be more likely to be poor but this finding is not significant. The education level of the household head shows the expected associations with the likelihood of being poor but the results are seldom significant. Having no education increases the chances of being poor but the finding is not significant. Having at least some secondary or university education decreases the probability of being poor, but the result is only weakly significant. Having a household head working in a non-agricultural job reduces strongly the chances of a household of being poor. Living in Dar es Salaam or in other urban areas in mainland decreases the probability of being poor, although only significantly in the former.

Fewer variables are significantly associated with the likelihood of being poor in the second round of the NPS conditional upon being poor in the first round. The share of children and elders has a weakly positive impact on the probability of remaining poor. Both the number of family members and the increases in family size are positively associated with the household continuing to be poor, but neither association is significant. Interestingly, increases in children aged 10 to 14 years are strongly and negatively correlated with being poor. Neither the sex nor the age of the household head significantly affects the chances of being poor. In terms of the education level of the household head, only having some secondary or university education reduces considerably the probability of being poor. Working in a non-agricultural job or being unemployed or out of the labour force reduces the likelihood of being poor, but not significantly. Becoming unemployed or moving out of the labour force considerably increases the chances of being poor. Regional effects are not significant, although living in Dar es Salaam and other urban areas has a negative association with being poor, while the opposite happens in Zanzibar.

Noticeably, more variables are strongly associated with the likelihood of being poor in the second round of the NPS conditional upon being not poor in the first round. Both household size and the dependency rate are positively associated with falling into poverty, but only the latter has a significant association. Increases in the number of family members have a strong positive effect on becoming poor. Across age cohorts, more elders in the household increase the chances of being poor, but not the various cohorts of children. Being a female head is not strongly correlated with falling into poverty. Older household heads are considerably more likely to be poor compared to younger household heads. Having a household head with no education increases significantly the probability of being poor, but having secondary or university education has only a weakly significant and negative association with being poor. Holding a non-agricultural job decreases strongly the chances of poverty. However, changes in the economic activity of the household head do not have any significant impact on the likelihood of being poor. Finally, all regional effects are significant. Fewer chances of being poor are observed for those originally in Dar es Salaam, other urban areas in mainland, and Zanzibar.

Table 26. Poverty transition matrices by NPS1 location

	Never poor	Move out of poverty	Move into poverty	Always poor	Total
<i>Households (unweighted)</i>					
Tanzania	2,537	222	271	136	3,166
Rural	1,484	178	242	122	2,026
Urban	1,053	44	29	14	1,140
Mainland	2,157	173	256	113	2,699
Dar es Salam	507	3	6	1	517
Other urban	411	24	19	8	462
Rural	1,239	146	231	104	1,720
Zanzibar	380	49	15	23	467
<i>Population (weighted)</i>					
<i>Row percentages</i>					
Tanzania	74	8	12	7	100
Rural	69	9	14	8	100
Urban	91	4	3	1	100
Mainland	74	7	12	7	100
Dar es Salam	97	1	2	0	100
Other urban	89	5	4	2	100
Rural	69	8	14	8	100
Zanzibar	74	13	5	8	100
<i>Population (weighted)</i>					
<i>Column percentages</i>					
Tanzania	100	100	100	100	100
Rural	73	88	94	95	78
Urban	27	12	6	5	22
Mainland	97	95	99	96	97
Dar es Salam	10	1	1	0	7
Other urban	17	10	5	4	14
Rural	70	84	93	92	75
Zanzibar	3	5	1	4	3

Table 27. Descriptive statistics by poverty transition

	Never poor	Move out of poverty	Move into poverty	Always poor	Total
<i>Demographic composition NPS1</i>					
Household size	4.9	5.9	5.3	6.8	5.1
Children 0 to 5 years	0.9	1.2	1.2	1.4	1.0
Children 6 to 9 years	0.6	0.8	0.7	0.9	0.6
Children 10 to 14 years	0.6	1.0	0.7	1.3	0.7
Adults (15 to 64 years)	2.5	2.8	2.4	2.8	2.6
Elders (65 and more)	0.2	0.2	0.3	0.3	0.2
Share of children and elders	43.7	51.3	54.1	57.7	46.0
<i>Household head NPS1</i>					
Age (years)	45.4	46.6	48.2	48.8	45.9
Female (%)	25.5	30.9	31.3	26.8	26.5
Education (%)					
None	19.9	29.8	38.7	33.8	23.3
Primary	63.7	63.7	56.3	62.9	62.9
Secondary or more	9.1	3.7	1.6	0.3	7.5
Other education	7.3	2.9	3.4	2.9	6.3
Economic activity (%)					
Agriculture	63.2	83.8	89.5	89.6	68.7
Non agriculture	32.5	11.3	6.1	6.8	27.0
Not working	4.3	5.0	4.4	3.6	4.3
<i>Changes in demographic composition</i>					
Household size	0.4	0.1	0.8	0.5	0.4
Children 0 to 5 years	0.0	-0.1	0.1	0.1	0.0
Children 6 to 9 years	0.0	0.0	0.1	0.0	0.0
Children 10 to 14 years	0.1	0.0	0.1	-0.2	0.0
Adults (15 to 64 years)	0.2	0.1	0.4	0.5	0.3
Elders (65 and more)	0.0	0.0	0.1	0.1	0.0
<i>Changes in economic activity</i>					
No change	85.5	88.6	90.0	88.2	86.4
From agriculture to non agriculture	4.3	3.7	3.4	1.0	4.0
From non agriculture to agriculture	5.2	3.1	2.8	3.8	4.7
From working to not working	2.1	0.7	1.2	3.9	2.0
From not working to working	2.9	4.0	2.7	3.1	2.9

Table 28. Regression on the growth rate of consumption

	A1	A2	A3
<i>Demographic composition NPS1</i>			
Household size	0.0133 ***	-0.0160 ***	-0.0218 ***
Share of children and elders	-0.0004	-0.0028 ***	-0.0028 ***
<i>Household head NPS1</i>			
Female	-0.0247	-0.0305	-0.0309
Age	-0.0036	-0.0108 **	-0.0113 ***
Age squared	0.0000	0.0001 ***	0.0001 ***
Education			
None	-0.0510	-0.1179 ***	-0.1161 ***
Secondary or more	-0.0634	0.1847 ***	0.1854 ***
Other education	-0.0845 *	0.1340 ***	0.1299 ***
Economic activity			
Non agriculture	0.0712 **	0.2278 ***	0.2482 ***
Not working	0.0597	0.0948	0.0698
<i>Strata NPS1</i>			
Dar es Salaam	-0.0511	0.2786 ***	0.2604 ***
Other urban	-0.0103	0.0791 **	0.0658 *
Zanzibar	0.1354 ***	0.0251	0.0151
<i>Consumption NPS1</i>		-0.6018 ***	-0.6063 ***
<i>Changes in demographic composition</i>			
Household size			-0.0493 ***
Children 0 to 5 years			-0.0053
Children 6 to 9 years			-0.0015
Children 10 to 14 years			-0.0029
Elders (65 and more)			-0.0782 **
<i>Changes in economic activity</i>			
From agriculture to non agriculture			0.0346
From non agriculture to agriculture			-0.0646
From working to not working			-0.1578 **
From not working to working			0.0372
<i>Constant</i>	-0.0454	6.7701 ***	6.8854 ***
Sample size	3161	3161	3161
R2	0.0103	0.3101	0.3383
Prob > F	0.0002	0.0000	0.0000

*Significant at 10% level, **Significant at 5% level, ***Significant at 1% level.

Reference categories: primary education, working in agriculture, living in rural areas in mainland during the NPS1, changes in the number of adults, no change in economic activity.

Table 29. Probit regressions on being poor

	Poor/Not poor in the NPS1	Poor/Not poor in the NPS2 conditional upon	
		Being poor in the NPS1	Being not poor in the NPS1
<i>Demographic composition NPS1</i>			
Household size	0.0739 ***	0.0462	0.0091
Share of children and elders	0.0041 **	0.0085 *	0.0069 ***
<i>Household head NPS1</i>			
Female	0.1551 *	-0.1181	0.0499
Age	0.0016	0.0030	0.0497 ***
Age squared	0.0000	0.0000	-0.0005 ***
Education			
None	0.1075	0.0152	0.3732 ***
Secondary or more	-0.3956 *	-1.4214 ***	-0.3566 *
Other education	-0.2541	-0.5890	0.0078
Economic activity			
Non agriculture	-0.4163 ***	-0.5820	-0.6830 ***
Not working	-0.0318	-0.7323	0.3174
<i>Strata NPS1</i>			
Dar es Salaam	-1.0192 ***	-0.7953	-0.6466 ***
Other urban	-0.1005	-0.1645	-0.3343 **
Zanzibar	0.3402 **	0.1554	-0.4448 ***
<i>Changes in demographic composition</i>			
Household size		0.1068	0.0772 **
Children 0 to 5 years		0.1043	-0.0307
Children 6 to 9 years		-0.1079	-0.0196
Children 10 to 14 years		-0.3052 ***	-0.0212
Elders (65 and more)		0.4449	0.2366 **
<i>Changes in economic activity</i>			
From agriculture to non agriculture		-0.8022	-0.0777
From non agriculture to agriculture		0.6825	0.2372
From working to not working		1.2632 **	-0.1022
From not working to working		0.5207	-0.5111
<i>Constant</i>	-1.7025 ***	-1.0081	-2.5631 ***
Sample size	3163	357	2806

*Significant at 10% level, **Significant at 5% level, ***Significant at 1% level.

Reference categories: primary education, working in agriculture, living in rural areas in mainland during the NPS1, changes in the number of adults, no change in economic activity.

Special Section 2: Food Security

Food security is defined as the state at which all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.¹⁰ A comprehensive food security analysis is beyond the scope of this report, but this chapter will introduce a few food security indicators to provide a sense of the situation in Tanzania. The analysis will solely refer to the NPS2, as the food security module was not available in the NPS1.

Three food security indicators that focus on the past seven days to the interview will first be presented: the percentage of the population that worried about not having enough food, the percentage of the population whose diet was affected negatively, and the percentage of the population who reduced their food intake. A negative change in the diet could refer to households having to rely on less preferred foods or to limit the variety of foods eaten. The change in food intake or the disruption of eating patterns could refer to households limiting the portion size at mealtimes, reducing the number of meals eaten in a day, restricting the consumption of adults so that children can eat, borrowing food or relying on help from a friend or a relative, having no food of any kind, or going an entire day and night without eating anything.

These food security indicators are shown in Table 30. The proportion of the population that worried in the last seven days about not having enough is 36%. Rural areas appear more concerned than urban areas but the difference is not significant. Noticeable differences are observed between mainland and Zanzibar, with the former having more food insecurity than the latter. Across strata, it is difficult to make any conclusive statement because the differences among strata are generally not significant. Zanzibar, however, shows lower food insecurity than Dar es Salaam and rural areas in mainland.

The percentage of the population whose diet became less desirable or less varied stands at 35%. Urban dwellers seem to be less affected than their rural counterparts but the difference is not significant. By contrast, the proportion of the population that experienced a negative change in their diet in Zanzibar is significantly lower than in mainland. Comparisons across strata are not definite because the differences among strata are typically not significant. However, Dar es Salaam and rural areas in mainland have a considerably higher proportion of their population having to rely on less preferred foods or to limit the variety of foods eaten compared to Zanzibar.

The percentage of the population who reduced their food intake is 33%. Unlike the previous two indicators, this proportion is relatively similar across the country. Differences are significant neither across rural and urban areas nor across mainland and Zanzibar. Across strata, it seems that Zanzibar and other urban areas in mainland have a lower share of their

¹⁰ Comprehensive Food Security & Vulnerability Analysis Guidelines, January 2009, World Food Programme.

population reducing their food intake than Dar es Salaam and rural areas in mainland, but the differences among strata are not significant.

Table 30. Food security during the last seven days, NPS2

	Worry about not having enough food	Negative changes in diet	Reduce food intake
Tanzania	36	35	33
Rural	37	36	34
Urban	33	31	29
Mainland	37	35	33
Dar es Salam	39	36	36
Other urban	31	31	28
Rural	37	36	34
Zanzibar	27	24	26

One way of summarising the previous three indicators is shown in Table 31. Notice that Table 30 displays each indicator being estimated independently from the others. Some households might have worried about having enough food but the variety and quality of their diet were not affected. Other families might have limited the variety of their diet and reduced their food intake.

Table 31. Combining the three basic food security indicators, NPS2

	None	Any of the three	All three
Tanzania	54	46	20
Rural	52	48	21
Urban	60	40	20
Mainland	54	46	21
Dar es Salam	58	42	31
Other urban	59	41	17
Rural	52	48	20
Zanzibar	67	33	15

The proportion of the population that did not experience any food insecurity incident in the past seven days stands at 54%, while the percentage of the population that worried about not having enough food, whose diet was affected negatively and that reduced their food

intake is 20%. A significantly higher proportion of urban dwellers did not experience any aspect of food insecurity compared to rural dwellers. Similarly, a higher share of the population in Zanzibar never experienced any concern about food insecurity compared to mainland. On the other hand, the percentage of the population that experienced all three dimensions of food insecurity is similar in urban and rural areas. Differences are not significant between mainland and Zanzibar. Interestingly, across strata Dar es Salaam is the stratum with the highest share of the population experiencing all three food insecurity facets, while differences are not significant among the other three strata.

A second group of food security indicators refers to the number of meals taken per day. Table 32 shows the distribution of households by the number of meals taken by adults and by the number of meals taken by children aged 5 to 59 months. The proportion of households in which adults took one meal per day stands at only 1%, two meals at 36% and three or more meals at 63%. Food insecurity in terms of the number of daily meals taken by adults is quite low and similar across the country. Urban areas display a significantly larger proportion of households in which adults take at least three daily meals compared to rural areas. Across strata, a clear pattern appears: the number of meals taken by adults in Dar es Salaam and other urban areas in mainland is higher than in rural areas in mainland and Zanzibar. Among households with children aged 6 to 59 months, 84% of households have their children taking at least three meals, 14% two meals and barely 2% one meal. Some patterns for the number of meals taken by children are similar to those by adults, but two clear differences are apparent: on average children take a considerably higher number of meals compared to adults, and less disparity is observed across the different geographical domains in the case of children than in the case of adults.

Table 32. Meals per day, NPS2

	Adults				Children 6-59 months			
	One	Two	Three or more	Total	One	Two	Three or more	Total
Tanzania	1	36	63	100	2	14	84	100
Rural	1	42	56	100	2	16	82	100
Urban	1	17	82	100	2	6	92	100
Mainland	1	35	63	100	2	14	85	100
Dar es Salam	0	12	87	100	3	4	93	100
Other urban	1	19	80	100	1	6	92	100
Rural	1	43	56	100	1	16	82	100
Zanzibar	2	41	57	100	3	23	74	100

The last set of food security indicators focuses on food shortages in the last 12 months. Food shortages refer to a situation where there was not enough food to feed the household members. Table 33 shows the proportion of the population that experienced food shortages, the number of months with food shortages and the causes of these food shortages. The percentage of the population that suffered food shortages at least once in the last 12 months stands at 16%. The proportion in rural areas is significantly higher than in urban areas and those living in mainland are also more likely to have experienced food

shortages than those living in Zanzibar. Across strata, Dar es Salaam and rural areas in mainland are the two strata where their dwellers are more likely to have suffered food shortages.

Among the population that experienced food shortages in the last 12 months, the average number of months with food shortages is 2.6. Urban areas appear to experience a higher number of months with food shortages compared to rural areas but the difference is not significant. Mainland and Zanzibar display very similar figures. Very little can be said when comparing across strata because differences are not significant in almost all cases. The only unambiguous statement is that Dar es Salaam experiences more months with food shortages than rural areas in mainland.

What are the main causes of food shortages in the last 12 months? Among the population that experienced at least once not having enough food to feed the members of the household in the last 12 months, the most common cause of food shortages is having inadequate food stocks because of adverse weather (39%), followed by lack of farm inputs (11%), food in the market being expensive (10%), small land size (7%), crop pests (4%), and other reasons (29%). Adverse weather is an overwhelming response in Zanzibar, cited by 70% of the population as the reason for food shortages. Expensive food is particularly relevant in Dar es Salaam and other urban areas in mainland. Unfortunately, the NPS does not seem to do a good job at capturing the reasons for food shortages in urban areas, where more than half of the population report reasons not provided in the module, perhaps suggesting that the list of potential reasons is more appropriate for farming environments rather than for cities and towns.

Table 33. Food shortages in the last 12 months, NPS2

	Not enough food to eat (% population)	Months with food shortages	Among those that experienced food shortages						Total
			Causes of food shortages						
			Drought, poor rains	Crop pest	Small land size	Lack of farm inputs	Expensive food	Other	
Tanzania	16	2.6	39	4	7	11	10	29	100
Rural	17	2.5	44	4	7	12	8	24	100
Urban	12	2.9	15	2	2	6	19	55	100
Mainland	16	2.6	39	4	7	11	10	29	100
Dar es Salaam	17	3.2	5	0	0	3	25	67	100
Other urban	11	2.5	21	4	3	8	16	49	100
Rural	17	2.5	44	5	8	13	8	23	100
Zanzibar	8	2.5	70	6	7	6	0	11	100

Cluster 2: Improvement of quality of life and social well-being

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 enrolment rate at pre-primary school

The net enrolment rate (NER) in pre-primary education is the proportion of children aged 5 to 6 years enrolled in pre-primary school. Table 34 shows the NER in pre-primary education in both rounds of the NPS.

The NER in pre-primary education increased from 20% to 25% between the NPS1 and the NPS2. Improvements in attendance seem to have happened almost across all partitions of the country and for both boys and girls. Better attendance in rural areas appears to be driving the national NER because attendance in urban areas has remained constant. The only stratum where attendance worsened across rounds is other urban areas in mainland. Although none of the changes are significant over time, some patterns hold within each round of the NPS. Urban areas display higher NER than rural areas. Mainland shows similar attendance to pre-primary education than Zanzibar. The ranking across strata is ambiguous because of changes in other urban areas in mainland and Zanzibar. However, Dar es Salaam continues to display the highest NER, while rural areas in mainland and Zanzibar have the lowest. Lastly, boys and girls are equally likely to attend pre-primary schools.

Table 34. Net enrolment rates in pre-primary education

	NPS1	NPS2
Tanzania	20	25
Rural	16	21
Urban	42	42
Mainland	20	25
Dar es Salam	49	52
Other urban	39	36
Rural	16	21
Zanzibar	17	26
Female	21	27
Male	19	23

Net primary school enrolment rate

The NER in primary education is the proportion of children aged 7 to 13 years enrolled in primary school. Table 35 shows the NER in primary education in both rounds of the NPS.

The primary NER in Tanzania fell from 83% to 80% between the NPS1 and the NPS2. Slight reductions in attendance can be found in urban and rural areas, in most of the mainland strata, and for boys and girls. The NER in primary education only did not decline in Zanzibar and in Dar es Salaam: in the former it increased, and in the latter it stayed the same. Even though changes are not significant over time, clear patterns can be found within each round of the NPS. Urban areas display higher NER than rural areas. Mainland shows similar attendance to primary education than Zanzibar. Changes in the NER in primary education in almost all strata cause the ranking among them to be ambiguous. In the NPS1, other urban areas in mainland had better attendance to primary education than rural areas in mainland and Zanzibar. In the NPS2, however, other urban areas in mainland, Dar es Salaam and Zanzibar are indistinguishable from each other and all of these three strata display higher NER in primary education than rural areas in mainland. Lastly, when looking at the NER by sex, girls displayed better NER than boys in the NPS1, yet this is no longer the case in the NPS2 because attendance to primary education is similar for boys and girls.

Table 35. Net enrolment rates in primary education

	NPS1	NPS2
Tanzania	83	80
Rural	81	78
Urban	90	87
Mainland	83	80
Dar es Salam	86	86
Other urban	91	87
Rural	81	78
Zanzibar	79	85
Female	86	81
Male	80	78

Secondary school net enrolment

The NER in secondary education is the proportion of children aged 14 to 17 years enrolled in forms 1 to 4 in secondary school. Table 36 shows the NER in secondary education in both rounds of the NPS.

The NER in secondary education rose from 23% to 27% between the NPS1 and the NPS2. Attendance improved, although not significantly, across urban and rural areas, in all

mainland strata and for boys and girls. Only in Zanzibar did secondary attendance decline, although not significantly. Patterns appear within each round of the NPS. Urban areas display higher NER than rural areas in both rounds of the NPS. Zanzibar shows better attendance to secondary education than mainland in the first round, but their NER were no longer statistically different in the second round. Across strata, other urban areas in mainland and Dar es Salaam are the two strata with the highest NER, while rural areas in mainland continues to display the lowest NER. Zanzibar was similar to the top two strata in the first round, but it has a lower NER in the second round. Attendance to secondary education for boys and girls is similar in both rounds of the NPS.

Table 36. Net enrolment rates in secondary school

	NPS1	NPS2
Tanzania	23	27
Rural	16	20
Urban	49	54
Mainland	23	27
Dar es Salam	45	47
Other urban	49	56
Rural	15	20
Zanzibar	39	36
Female	24	29
Male	22	26

Gross enrolment rate in higher education institutions

The gross enrolment rate in university education will be used as a proxy for the gross enrolment rate in higher education institutions. The gross enrolment rate (GER) in university education is the ratio between those attending university with respect to those aged 20 to 24 years.

The GER in university education is quite low in the country: 3% in the NPS1 and 4% in the NPS2 (see Table 37). Despite none of the changes over time being significant, some strong patterns hold in both rounds of the NPS. Attendance to universities is higher in urban areas compared to rural areas, and mainland and Zanzibar display similar enrolment rates. Across strata, Dar es Salaam and other urban areas in mainland show the highest GER and rural areas in mainland the lowest GER. Last, both females and males are equally likely to attend university.

Table 37. Gross enrolment rates in university education

	NPS1	NPS2
Tanzania	3	4
Rural	1	1
Urban	7	10
Mainland	3	4
Dar es Salam	9	15
Other urban	6	7
Rural	1	1
Zanzibar	2	3
Female	2	3
Male	4	5

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)

Stunting is a measure of chronic malnutrition characterized by a slowing in the growth of a child resulting in a failure of the child to achieve the expected length or height when compared to a healthy, well-nourished child of the same age.¹¹ Stunting is associated with a number of long-term factors such as deficiencies in nutrition (chronically inadequate levels of protein and energy and/or intake micronutrient deficiencies), frequent infections, and inappropriate feeding practices over a sustained period. It is not an accurate measurement of short-term changes in nutritional status.

Information on stunting will be complemented with two other indicators of malnutrition: wasting and underweight. Wasting (low weight for height) is a measurement of acute malnutrition characterized by considerable weight loss or failure to gain weight, resulting in a child having a weight substantially below what would be expected of a healthy child of the same length or height. Wasting indicates current malnutrition and can change quickly over time, even showing marked seasonal patterns associated with changes in food availability and disease prevalence.

Underweight (low weight for age) is a composite measurement of stunting and wasting as it is influenced by both height and weight. Underweight is a good indicator for assessing changes in malnutrition over time, but care must be taken in interpreting this indicator because it reflects both chronic and acute malnutrition.

Stunting, wasting and underweight figures for children less than 5 years are reported in Table 38.¹² Stunting has fallen from 43% in the NPS1 to 35% in the NPS2. In fact, stunting declined across the board: in urban and rural areas, in mainland and in Zanzibar, across strata, for boys and girls, and by age groups. Significant falls in Dar es Salaam and in rural areas in mainland are driving significant declines in rural areas, in mainland and for the entire country. The two strata where the fall in stunting has been not significant are other urban areas in mainland and Zanzibar. Stunting declined for both female and male children, although only significantly for the latter.

Equally important are a few significant findings that occur within each round of the NPS. The proportion of stunted children in rural areas is always higher than in urban areas. Stunting in mainland was higher than in Zanzibar in the first round, but the improvements in mainland have closed the gap and the difference is no longer significant in the second round. It is difficult to make unambiguous statements when looking across strata. Despite notable strides over time, rural areas in mainland remain the stratum with the highest levels of stunting. It should be mentioned, however, that stunting in rural areas in mainland is not

¹¹ Comprehensive Food Security & Vulnerability Analysis Guidelines, January 2009, World Food Programme.

¹² All indicators were estimated using the WHO Anthro 2005 software, World Health Organization.

significantly different from Dar es Salaam in the first round and is not significantly different from Zanzibar in the second round. Last, stunting among female children is similar to stunting among male children in both rounds of the NPS.

Underweight experienced modest declines across both rounds of the NPS: from 16% in the NPS1 to 14% in the NPS2. Similar patterns occurred across the country. The slight fall over time is not significant across any geographical location, by sex or by age. A few robust findings are found when looking at each round of the NPS. The proportion of underweight children is higher in rural areas compared to urban areas. However, differences are not significant between mainland and Zanzibar, or between male and female children. Across strata, Dar es Salaam and other urban areas in mainland display similar figures which are lower than the other two strata.

Wasting among children less than 5 years increased significantly from 3% in the NPS1 to 7% in the NPS2. The proportion of wasted children rose across the country, with significant changes in urban and rural areas. Significant changes in Dar es Salaam and rural areas in mainland drive worsening conditions in mainland. Only urban areas in mainland and Zanzibar experienced changes that were not significant over time. Interestingly, wasting seems to affect children in a relatively similar manner across all variables of interest. Differences in wasting are not significant between urban and rural areas, between mainland and Zanzibar, across strata, or between female and male children.

Table 38. Stunting, wasting and underweight among children under 5 years

	Wasting (weight for height)					
	Total	NPS1		Total	NPS2	
		Severe	Moderate		Severe	Moderate
	2.7	0.7	2.0	6.6	1.8	
	2.9	0.8	2.1	6.9	1.9	
	1.5	0.4	1.1	4.9	1.1	
	2.6	0.7	1.9	6.6	1.8	
	0.9	0.4	0.5	5.3	1.1	
	1.3	0.3	1.1	4.6	1.0	
	2.9	0.8	2.2	6.9	1.9	
	7.0	3.9	3.1	9.8	2.7	
	2.7	0.7	2.0	6.9	1.6	
	2.7	0.8	1.9	6.4	2.2	
	3.3	1.9	1.4	12.0	5.3	
	5.9	2.2	3.7	12.5	3.5	
	2.5	1.0	1.5	7.7	2.7	
	1.6	0.1	1.5	4.3	1.1	
	2.7	0.4	2.2	3.7	0.9	
	2.5	0.5	2.0	5.1	0.1	

Proportion of births attended by a skilled health worker

The proportion of births attended by a skilled health worker can be used as a proxy for access to reproductive health care. Deliveries attended by skilled personnel increase the chances of successfully managing potential complications during childbirth and thus reducing both maternal and infant mortality. Skilled personnel are those trained to provide the necessary supervision, care and advice to women during pregnancy, labour and the post-delivery period. Doctors, nurses and midwives are considered skilled personnel, while traditional birth attendants are not considered skilled personnel.

In the NPS, all women aged 12 to 49 years who gave birth in the last 24 months are asked who delivered their last child born in that period. This information will be used as a proxy for the proportion of births attended by a skilled health worker. Although women might have given birth to more than one child in the last 24 months, for simplicity the last deliveries will be referred to as the total number of deliveries in the last 24 months.

The proportion of births attended by skilled personnel in the last 24 months increased from 59% in the NPS1 to 62% in the NPS2 (see Table 39). Different trends appear across urban and rural areas and across strata, but none of the changes are significant over time. The modest increase in the country appears to be driven by better access to reproductive health care in rural areas. By contrast, the proportion of births attended by skilled personnel declined in urban areas. In both mainland and Zanzibar, access to reproductive health care seems to have improved. Across strata, in Dar es Salaam and in other urban areas in mainland this indicator worsened over time, whereas in rural areas in mainland and in Zanzibar, the proportion of births attended by skilled personnel improved.

Significant patterns appear in both rounds of the NPS. Urban areas have better access to reproductive health care than rural areas, while figures for mainland and Zanzibar are similar. Across strata, the proportion of births attended by skilled personnel in Dar es Salaam and in other urban areas in mainland is higher than in rural areas in mainland and in Zanzibar.

Table 39. Births attended by skilled personnel in the last 24 months

	NPS1	NPS2
Tanzania	59	62
Rural	52	55
Urban	93	89
Mainland	59	62
Dar es Salam	96	94
Other urban	91	86
Rural	52	55
Zanzibar	60	62

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

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

Unsafe water is one of the principal causes of preventable illnesses and deaths. Households without access to safe water are more likely to have their members suffering from water-borne and water-washed diseases, showing higher levels of malnutrition and spending more time fetching water from distant sources. Impaired health negatively affects educational outcomes and labour productivity both in the short and long term.

The sources of drinking water considered safe are piped water inside the dwelling, private or public standpipe or tap, and protected wells. The list of potential sources of drinking water was slightly expanded for the second round, thus raising a small comparability issue. Two of the sources in the NPS1 are wells with pumps and well without pumps, whereas in the NPS2 they were further divided into protected wells with pumps, unprotected wells with pumps, protected wells without pumps and unprotected wells without pumps. The NPS2 shows that 90% of the wells with pumps are protected and that 83% of the wells without pumps are unprotected. Hence, it was assumed that in the NPS1, all wells with pumps are safe sources of drinking water, and that all wells without pumps are not safe sources of drinking water.

Table 40 shows the proportion of households with access to safe drinking water. The NPS collects information for this indicator separately for the rainy season and the dry season. Access to safe drinking water during the rainy season barely fell from 43% to 42% of households. All changes over time are too small to be considered statistically significant. A decline occurred in rural and urban areas. Opposite patterns are observed between mainland and Zanzibar: all three strata in mainland saw this indicator fall across rounds, while the opposite occurred in Zanzibar.

Table 40. Percentage of households with access to safe drinking water

	Rainy season		Dry season	
	NPS1	NPS2	NPS1	NPS2
Tanzania	43.3	41.8	43.5	49.1
Rural	32.8	32.1	32.9	39.8
Urban	72.5	68.2	73.3	74.1
Mainland	42.2	40.7	42.5	48.2
Dar es Salam	77.8	72.2	81.1	75.9
Other urban	67.1	63.5	67.0	71.1
Rural	31.9	30.7	31.9	38.6
Zanzibar	81.3	84.9	80.3	83.5

Access to safe drinking water during the dry season improved from 44% to 49% of households. The trend is almost the opposite of what is observed during the rainy season, although still none of the changes is significant over time. Better access to safe drinking water in rural areas drives the national figures. Improved access is observed also in urban areas, in mainland, and in Zanzibar. Dar es Salaam is the only stratum where access has fallen between both rounds of the NPS.

Regardless of whether it is the rainy or dry season, urban areas have better access to safe drinking water than rural areas and Zanzibar displays better access to safe drinking water than mainland. Across strata, the differences among Dar es Salaam, Zanzibar and other urban areas in mainland are not generally statistically different. Rural areas in mainland is the stratum with the worst access to safe drinking water in both rounds.

Proportion of households with basic sanitation facilities

Poor sanitation is another major cause of preventable diseases such as diarrhoea, dysentery and cholera. Improvements in hygiene are generally associated with better health, which in turn positively affects almost all the other activities of the household.

The sources of basic sanitation facilities are flush or pour toilet, ventilated pit latrines, and simple pit latrines. The proportion of households with basic sanitation facilities fell from 90% in the NPS1 to 87% in the NPS2. Reductions in basic sanitation facilities occurred in urban and rural areas, in mainland and in Zanzibar and across all strata. Significant changes occurred only in other urban areas in mainland, which probably drove the significant fall in urban areas.

Urban areas display better access to basic sanitation facilities than rural areas in both rounds of the NPS. Mainland seems to have improved over time with respect to Zanzibar: in the first round their differences were not significant, but in the second round mainland is better off than Zanzibar. Across strata, Dar es Salaam and other urban areas in mainland are the two strata with the highest access to basic sanitation facilities, whereas rural areas in mainland and Zanzibar display the lowest access to basic sanitation facilities.

Table 41. Percentage of households with basic sanitation facilities

	NPS1	NPS2
Tanzania	89.9	87.0
Rural	86.6	83.3
Urban	99.3	96.9
Mainland	90.2	87.3
Dar es Salam	99.2	97.3
Other urban	99.1	95.8
Rural	86.9	83.7
Zanzibar	80.6	77.6

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

Proportion of children in child labour

The International Labor Organization (ILO) refers to child labour as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development.¹³ A distinction should be made between children working on activities that contribute to their development and to the welfare of their families, that provide them with skills and experiences, and that help them to prepare to be productive members of society during their adult life, as opposed to children working on activities that negatively affect their health and personal development or that interfere with their schooling. The former include helping with household chores, assisting in a family business or earning pocket money outside school hours and during school holidays. The latter include working full-time or too many hours so that their schooling is affected, being exposed to serious hazards and illnesses, and working and living on the streets.

A caveat to keep in mind is that the estimates from the NPS refer to children working rather than child labour. No attempt has been done to exclude activities that are neither exploitative nor harmful because of the lack of information to do so.

Children are considered employed if they worked for at least one hour during the previous seven days to the interview. The same definitions used for determining the labour force status of the adult population are employed for children. Readers are referred to the discussion about labour force participation rates in Cluster 1, Goal 2, unemployment rate.

The labour force participation rate of children aged 5 to 14 years under both approaches is shown in Table 42. The differences between both approaches affect not only the level of this indicator in both rounds of the NPS but also the temporal trend. Under the single question approach, the labour force participation rate of children increased from 14% to 25%, while under the combined approach it plummets from 62% to 36%. Differences between the two approaches are significantly larger in the NPS1 than in the NPS2. The combined approach might be the preferable solution for employment indicators of the adult population, but it certainly creates a puzzle with regards to children because of the large drop in labour participation across both rounds of the NPS.

¹³ ILO's International Programme on the Elimination of Child Labour (IPEC), What is child labour, available at <http://www.ilo.org/ipec/facts/lang--en/index.htm>.

Table 42. Labour force participation rate of children

	Single question		Combined approach	
	NPS1	NPS2	NPS1	NPS2
Tanzania	13.9	26.1	62.2	35.6
Rural	15.6	29.7	63.8	40.0
Urban	6.1	11.0	55.1	17.3
Mainland	14.3	26.8	62.1	36.5
Dar es Salam	1.5	7.3	55.7	9.9
Other urban	8.1	13.4	54.6	21.2
Rural	16.1	30.6	63.7	41.1
Zanzibar	1.3	0.7	65.2	2.6
Female	13.1	24.9	63.1	33.5
Male	14.7	27.2	61.2	37.6

Proportion of orphan children attending primary

Orphan children are among the most vulnerable members of society. Losing one or both parents can put children in a disadvantaged position with respect to children who still have both of their parents.

The net enrolment rate in primary education will be used as a proxy for this indicator. The NER is the proportion of children aged 7 to 13 years attending primary school. To complement this indicator, the NER in pre-primary school (children aged 5 to 6 years attending pre-primary school) and in secondary school forms 1 to 4 (children aged 14 to 17 years attending secondary school) will also be provided.

The NER of pre-primary, primary and secondary school are shown in Table 43. First, the difference in the NER in any of the three levels of education between orphan and non-orphan children is not significant. That is, orphan children do not appear disadvantaged with respect to children who have both of their parents alive. Second, the direction of the changes over time is similar whether or not children are orphans. The NER in pre-primary and secondary school increased for all children, while the NER in primary school declined for all children. Last, whether the children are orphaned or not, none of the changes over time are significant.

Ideally, the analysis should differentiate between single and double orphan children, where the former are children that have lost either their mother or father, while the latter are children that have lost both of their parents. The number of orphan children in the sample, particularly double orphan children, is very small, resulting in estimates that are extremely imprecise. Thus, those findings are not presented.

Table 43. Net enrolment rates by orphanhood status

	Pre-primary		Primary		Secondary	
	NPS1	NPS2	NPS1	NPS2	NPS1	NPS2
Tanzania	20	25	83	80	23	27
Non orphan	20	24	83	81	23	26
Orphan	24	30	84	76	24	31

Cluster 3: Governance and accountability

Goal 1: Structure and systems of governance as well as the rule of law are democratic, participatory, representative, accountable and inclusive

Percentage of the population with birth certificates

Birth registration is an important objective for the country. The government can use this information to update statistics on population and for planning purposes. Knowing the number of people by area could improve the services provided, for instance, by helping to determine if schools or health facilities might be needed. In addition, the population would benefit from birth registration to prove parentage, family relationships, settlement of property rights, and citizenship.

In the NPS, all women aged 12 to 49 years who gave birth in the last 24 months are asked about the birth registration of their last child born in the last 24 months. This information will be used as a proxy for the percentage of the population with birth certificates. Notice that women might have given birth to more than one child in the last 24 months, hence even though the information refers only to their last child born during that period, for simplicity those children will be referred as the population born in the last 24 months.

Birth registration among those born in the last 24 months is shown in Table 44. The percentage of newborns that have their birth registered rose from 75% to 79%. The increase is driven by more birth registration in rural areas, in particular rural areas in mainland. The proportion of those born in the last 24 months that registered their births stayed constant in Dar es Salaam and in other urban areas in mainland. Zanzibar is the only stratum where registration appeared to worsen over time.

Table 44. Birth registration among those born in the last 24 months

	NPS1	NPS2
Tanzania	75	79
Rural	72	76
Urban	93	94
Mainland	75	79
Dar es Salam	94	94
Other urban	92	92
Rural	71	76
Zanzibar	97	92

While none of the changes over time is statistically significant, both rounds of the NPS display significant patterns. Birth registration in urban areas is higher than in rural areas. Mainland lags behind Zanzibar in birth registration, a finding that is entirely explained by rural areas in mainland, where despite recent improvements birth registration are the lowest among all strata. Birth registration in Dar es Salaam, other urban areas in mainland and Zanzibar are similar and differences among them are not significant.

Caution is required when assessing these figures because a methodological issue may be affecting these findings. In the NPS2, a question about possessing a birth certificate was introduced and asked to everyone. If the initial answer was that they did not have a birth certificate, enumerators would probe further by asking whether or not the birth was ever registered with the civil authority and four possible answers were allowed: “Has certificate”, “Registered”, “Neither”, and “Don’t know”. By contrast, the question about birth registration for children born in the last 24 months only asks if the birth was registered, and the two possible answers are “Yes” and “No”.

Different results are found when comparing the figures for birth registration implied by these two questions for the same group of children. The only children for whom this comparison is possible are those less than 2 years whose mothers live in the household and who reported having given birth in the last 24 months. Unfortunately, women that gave birth in the last 24 months do not report if their children are still living with them. Children do however report if their mothers live in the household. Children less than 2 years typically do not have siblings less than 2 years, so for most cases it was relatively straightforward to match them with their mothers. For the few cases where children less than 2 years had a sibling whose age was also less than 2 years, it was assumed that the youngest child of the two is the child for whom the mother is providing information about the birth registration.

Table 45 shows the rates of birth registration for all children less than 2 years whose mothers live in the household and reported having given birth in the last 24 months. For each child, the information about the birth registration was compared with the information on possession of a birth certificate. The left panel of the table shows the comparison for the entire group of these children. Interestingly, 18% of the children for whom their mothers provided information on their birth registration were not found in the household. The main reasons for their absence are presumably that they live somewhere else or that they passed away. For these absent children, the comparison is not possible because the information about possessing birth certificates is not available for them.

The right panel of the table shows the comparison after excluding absent children. The overlapping between both questions is far from perfect. While 80% of the children had their birth registered (not shown),¹⁴ only 42% of the children have been registered and 16% possess a birth certificate. For children whose mother reported that their birth was not registered, 91% reported neither having a certificate nor been registered. For children

¹⁴ The slight difference with the previously reported 79% is because of the exclusion of absent children.

whose mother reported that their birth was registered, only 52% reported been registered, 18% reported having a certificate and 29% reported neither having a certificate nor been registered. The difference in the wording of the two questions seems to have influenced the answers of the interviewees. It appears that the question about possessing a birth certificate was more specific than the question about birth registration. When answering the latter question, mothers might have considered that, say, a document issued by a health facility recording the birth of their children was equivalent to a birth certificate issued by the civil authority. Future rounds of the NPS could improve the wording of the birth registration question in order to provide a more accurate and unambiguous answer.

Table 45. Alternative birth registration rates, NPS2

	Was the birth registered? (Including absent children)			Was the birth registered? (Excluding absent children)		
	Yes	No	Total	Yes	No	Total
Possess birth certificate?	100	100	100	100	100	100
Has certificate	15	3	13	18	4	16
Registered	43	3	35	52	4	42
Neither	24	72	34	29	91	42
Don't know	0	1	0	0	2	0
Children not in the household	17	21	18	-	-	-

Percentage of female small landholders with land ownership

Tanzania's agricultural sector is made up of small owners, whose productivity and land utilization are hindered by limited access to and use of modern farming techniques and tools. Land ownership dominates the rural landscape in Tanzania, with over 80 percent of the fields being owned by farmers (see Table 46). However, only approximately 10 percent of the households owned have a title, most of them being customary right of occupancy, government-witnessed purchase, inheritance letter, and/or letter from the village government (see Table 47).

Land is predominantly owned by men: within households, 42 percent of the plots are owned by a man alone, 37 percent are under mixed ownership and only 20 percent of the fields are owned by a woman alone (see Table 48).¹⁵ In addition, men not only own more plots than women, they also own larger plots: the gender difference in terms of surface owned is even larger. Within households, men own close to 50 percent of the land, and mixed ownership reaches almost 40 percent, but women own only slightly over 10 percent of the family land.

¹⁵ Ownership statuses are defined the following way: a plot is either owned by one person only (either a man or a woman) or collectively (mixed ownership, which could take any of the following forms: two men, two women, or a man and a woman).

Table 46. Levels of plot ownership

	2008/9	2010/11
Owned	84.7%	87.7%
Used free of charge	7.8%	7.5%
Rented in	7.0%	4.3%
Shared	0.5%	0.4%

Table 47. Percentage of households with land titles

	2008/9	2010/11
Title	8.2%	12.1%
Right of occupancy	14.3%	6.8%
Customary right of occupancy	10.6%	23.11%
Government-witnessed purchase	18.2%	12.7%
Certified purchase agreement	1.9%	2.0%
Inheritance letter	8.7%	25.8%
Letter from village government	36.1%	24.1%
Utility or other bill	6.6%	4.1%

Table 48. Proportions of plot ownership disaggregated by gender status

Average number of fields/size of land (acres) owned by	2008/9			2010/11		
	Mean	C.I. (95%)		Mean	C.I. (95%)	
		Lower	Upper		Lower	Upper
Men (fields)	0.95	0.86	1.03	0.86	0.78	0.93
Women (fields)	0.41	0.36	0.46	0.43	0.39	0.48
Mixed ownership (fields)	0.58	0.51	0.65	0.77	0.70	0.84
Men (size of land)	3.03	2.21	3.86	2.81	2.38	3.23
Women (size of land)	0.73	0.57	0.88	0.82	0.68	0.97
Mixed ownership (size of land)	1.59	1.30	1.87	2.28	1.93	2.63

The social division of labor in agriculture involves the whole family. There is moderate use of labor from outside the household, with one fourth of the plots using hired labor force, and less than 40 percent of the households using external labor to some extent. The different steps of the cultivation process are divided up between men and women, with both sexes participating equally in the preparation of the land. As in other sub-Saharan African countries, weeding remains mostly a female task; 64 percent of this work is accomplished by women. Ridging, fertilizing and harvesting remain mostly male activities, with about two thirds of the work carried out by men. Children help with plot preparation (4 percent of the labor force) and weeding (11 percent).

Table 49. Proportion of days disaggregated by gender status

	Proportion of days worked by:		
	Men	Women	Children (up to 14 y.o.)
Any kind of labor	46.7	53.3	4.1
Land preparation	46.7	53.3	4.0
Weeding	36.0	64.0	11.9
Ridging/Fertilizers	72.3	27.7	0.0
Harvesting	60.3	39.7	0.0

In addition, farmers' low levels of education are likely to pose a major obstacle to agricultural transformation as evidence in developing countries suggests a positive correlation between literacy among farmers and improvements in farm productivity. A quarter of the household heads in families cultivating land have no education or pre-primary education and over 60 percent have only a primary education level.

References

- Deaton, A. (1997). *The Analysis of Household Surveys: A microeconomic approach to development policy*. Baltimore and London: The World Bank, The John Hopkins University Press.
- Deaton, A. and J. Muellbauer (1986). On measuring child costs: with applications to poor countries. *Journal of Political Economy* 94, 720-44.
- Deaton, A. and A. Tarozzi (2000). *Prices and poverty in India*. Research Program in Development Studies, Princeton University.
- Deaton, A. and S. Zaidi (2002). *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. LSMS Working Paper 135, World Bank, Washington, DC.
- Ferreira, M. L. (1993). "Poverty and Inequality During Structural Adjustment in Rural Tanzania", The World Bank, Policy Research Working Paper Series 1641.
- Food and Agriculture Organization of the United Nations (2001). *Human energy requirements*. Report of a Joint FAO/WHO/UNU Expert Consultation, Rome.
- Food and Agriculture Organization of the United Nations (2003). *Food energy –methods of analysis and conversion factors*. Food and Nutrition Paper 77, Rome.
- Foster, J., J. Greer, and E. Thorbecke (1984). A class of decomposable poverty measures. *Econometrica* 52 (3), 761–766.
- Houghton, J. and S. Khandker (2009). *Handbook on Poverty and Inequality*. The World Bank.
- Hentschel, J. and P. Lanjouw (1996). *Constructing an Indicator of Consumption for the Analysis of Poverty: Principles and Illustrations with Principles to Ecuador*. LSMS Working Paper 124, World Bank, Washington, DC.
- Ministry of Planning, Economy and Empowerment, United Republic of Tanzania (2006). *MKUKUTA Monitoring Master Plan and Indicator Information*.
- Ravallion, M. (1996). Issues in Measuring and Modeling Poverty. *The Economic Journal* 106, 1328-1343.
- Ravallion, M. (1998). *Poverty lines in theory and practice*. LSMS Working Paper 133, World Bank, Washington, DC.
- Sen, A. K. (1976). "Poverty: An Ordinal Approach to Measurement." *Econometrica* 44 (2):219–31.
- Tanzania National Bureau of Statistics (2003). "Agricultural Census 2002/3".
- The World Bank (2007). "Tanzania: Sustaining and Sharing Economic Growth", Country Economic memorandum and Poverty Assessment, Report No. 39021-TZ.
- World Food Programme (2009). *Comprehensive Food Security & Vulnerability Analysis Guidelines*.

Appendix A. Methodology for Consumption-Poverty Analysis

Poverty analysis in Tanzania has been based on the Household Budget Survey (HBS). A comprehensive welfare assessment of the population should include monetary and non-monetary indicators. Average food consumption per person or median income per person are examples of the former, while literacy rates, deliveries attended by skilled personnel and population with access to proper sanitation are examples of the latter. The HBS and the NPS have their own objectives but both could be employed to evaluate welfare levels and trends. This note describes the derivation of monetary poverty indices, in particular, consumption poverty.

Poverty analysis requires three main elements. The first component is a welfare indicator to rank all the population accordingly. The second element is an appropriate poverty line to be compared against the chosen indicator in order to classify individuals into poor and non-poor. The final component is a set of measures that combine individual welfare indicators into an aggregate poverty figure.

This appendix explains the steps involved in the construction of the consumption measure, the derivation of the poverty line, and the poverty measures. Section 1 reviews the arguments to choose consumption as the preferred welfare indicator and describes the estimation of the nominal household consumption. Subsection 2 is concerned with the spatial and temporal price adjustment and Subsection 3 deals with the household composition adjustment. Section 2 clarifies the derivation of the poverty line. Finally, Section 3 presents the poverty measures used in this report.

1 The welfare indicator

Research on poverty over the last years has reached some consensus on using economic measures of living standards, and these are regularly employed on poverty analysis. Although they do not cover all aspects of human welfare, they do capture a central component of any assessment of living standards. The main decision is to make the choice between income and consumption as the welfare indicator. Consumption is the preferred measure because it is likely to be a more useful and accurate measure of living standards than income.¹⁶

Consumption is more stable than income. For example, in agricultural economies, income is more volatile and affected by the growing and harvest seasons, hence relying on that indicator might significantly overestimate or underestimate living standards. Consumption is also generally an easier concept than income for the respondents to grasp, especially if the latter is from self-employment or own-business activities. For instance, workers in formal sectors of the economy will have no problem in reporting accurately their main source of

¹⁶ See Deaton and Zaidi (2002), Haughton and Khandker (2009) and Hentschel and Lanjouw (1996).

income, i.e., their wage or salary. But people working as self-employed, in informal sectors or in agriculture will have a harder time coming up with a precise measure of their income. Finally, consumption can be more reliable than income. Households are probably less reluctant to share information on consumption than on income. They may be afraid that income information will be used for different purposes such as taxes, or they may consider income questions to be too intrusive.

1.1 The construction of the consumption aggregate

Creating the consumption aggregate is guided by theoretical and practical considerations. First, it must be as comprehensive as possible given the available information. Omitting some components assumes that they do not contribute to people's welfare or that they do not affect the ranking of the population. Second, market and non-market transactions are to be included, which means that purchases are not the sole component of the indicator. Third, expenditure is not consumption. For perishable goods, mostly food, it is usual to assume that all purchases are consumed. However, for other goods and services, such as housing or durable goods, corrections have to be made. Fourth, a common reference period should be chosen. Typically each consumption module in a survey has a different reference period, for instance, education could refer to the last 12 months, food could refer to the last week, and health could refer to the last month. Following common practice in Tanzania, consumption will be reported per 28 days.

1.1.1 Food component

A few general principles are applied in the construction of this component. First, all possible sources of consumption are included. This means that the food component comprises not only consumption from purchases in the market or from meals eaten away from home but also food that was produced by the household or received as a gift. Second, only food that was actually consumed, as opposed to total food purchases or total home-produced food, enters into the consumption aggregate. Third, non-purchased consumed food needs to be valued and included in the welfare measure. The NPS gathers information on the amount spent on purchases and on the quantity purchased for all food items. A measure of prices, or rather a measure of unit values, can be obtained by dividing the expenditure by the quantity and can be used to value own-consumption or food received as a gift.

1.1.2 Non-food component

Data on an extensive range of non-food items are usually available: utilities such as water, kerosene, electricity, health, transportation, communications, recreation, education, furnishings, personal care, etc. Unlike food, the NPS only collects data on purchases of non-food items, that is, the survey assumes that the consumption of non-food goods and services coming from own-production, from gifts or from other sources is negligible and can be ignored. In addition, the NPS does not gather information on quantities purchased because most non-food items are too heterogeneous to try to calculate prices.

Each non-food component is associated with a particular reference period, which reflects the frequency of that purchase or consumption. For instance, expenses on public transportation are collected for the last seven days, expenses on mobile phones and

personal care are collected for the last month, and expenses on furnishings and small appliances for the last twelve months.

The information about some non-food goods and services needs to be excluded from the consumption aggregate because those items are not consumption. Payments of mortgages or debts are financial transactions and not consumption. Losses to theft are neither expenditure nor consumption. Remittances to other households are expenditures but not consumption. Expenditures on marriages, dowries, births and funerals are consumption but given their sporadic nature and the fact that the reported amounts are typically rather large, this consumption is left out to avoid overestimating the true level of welfare of the household.

1.1.3 Durable goods

Ownership of durable goods could be an important component of the welfare of the households. Given that these goods last for many years, the expenditure on purchases is not the proper indicator to consider. The right measure to estimate, for consumption purposes, is the stream of services that households derive from all durable goods in their possession over the relevant reference period. This flow of utility is unobservable but it can be assumed to be proportional to the value of the good. Information on the number of durable goods owned, their age, and their value (current or original) is required to estimate this component of consumption. Unfortunately, the NPS only provides data on the number of durable goods owned by the household. Calculating this consumption component would have involved making assumptions about their age, their current value and their lifespan. This might have resulted in an extremely imprecise estimation, thus it was decided to exclude this component from the consumption aggregate.

1.1.4 Housing

Housing conditions are considered to be an essential part of people's living standards. Nonetheless, in most developing countries limited or nonexistent housing rental markets pose a difficult challenge for the estimation and inclusion of this component in the consumption aggregate. As in the case of durable goods, the objective is to measure the flow of services received by the household from occupying its dwelling. When a household lives in a rented dwelling, and provided rental markets function well, that value would be the actual rent paid. If enough families rent dwellings, imputations can be made for those families that own their dwelling. It is common to include a question for homeowners asking them to provide the hypothetical rent they would pay for renting their dwelling. These self-reported rents can in principle be used to value the consumption the household gets from occupying its dwelling, but these amounts are not always credible or usable, particularly in rural areas where very few households rent. If imputed rents cannot be estimated, actual rents must be excluded from the consumption aggregate for the sake of consistency. The NPS does not collect information on imputed rents and given that the number of households living in rented dwellings is fairly small, this component was excluded from the consumption aggregate.

1.2 Price adjustment

Nominal consumption of the household must be adjusted for cost-of-living differences. Temporal and spatial price adjustments are required to adjust consumption to real terms. Temporal differences are associated with the duration of the fieldwork (TSh 1,000 in October 2010 may not have the same value as in August 2011) as well as with the different recall periods (TSh 1,000 spent in the last month may not have the same value as in the last quarter or in the last year). Spatial differences are associated with the location of households interviewed in the survey (TSh 1,000 in Dar es Salaam may not have the same value as in Ruvuma).

The price index required to adjust nominal consumption could come partly or fully from the NPS. A price index is a combination of prices and budget shares in a base and a comparison period. The budget shares are the weights that each commodity has in the index and are equivalent to their share in the cost of the bundle being analysed. The NPS can provide information on budget shares for all items, but information on prices (unit values) only for food items. Two possible price indices could be constructed: a price index based only on food items (the assumption would be that non-food items show the same temporal and spatial differences than food items) or a price index that takes into account both food and non-food by combining information from the survey (food prices and weights for food and non-food items) and the official consumer price index (non-food prices).

Fisher price indices based only on food items were employed to adjust the nominal consumption aggregate for spatial and temporal price differences. Fisher price indices do a better job than Laspeyres or Paasche price indices at capturing differences in consumption patterns across domains as a consequence of differences in relative prices. They also avoid overstating or understating the true inflation (as would be the case with Laspeyres and Paasche respectively).¹⁷ Price indices were estimated by stratum and quarter (a period of three consecutive months) and the base period comprises the entire period of each round of the NPS – that is, price indices were calculated separately for each round. A price index by stratum and month would have been ideal, but complications arose with the sample size because in some combinations of stratum and month few households were interviewed. Price indices by stratum and quarter might not be as precise as price indices by stratum and month but they provide more robust results. Fisher price indices by stratum and quarter were constructed using the following formula:

$$F_i = \sqrt{L_i P_i}$$

where i is a combination of stratum and quarter, L refers to a Laspeyres price index and P refers to a Paasche price index. The Laspeyres and Paasche price indices are defined as

¹⁷ See Deaton and Tarozzi (2000).

$$L_i = \sum_{k=1}^n w_{0k} \left(\frac{p_{ik}}{p_{0k}} \right), P_i = \left[\sum_{k=1}^n w_{ik} \left(\frac{p_{ik}}{p_{0k}} \right)^{-1} \right]^{-1}$$

where w_{0k} is the average household budget share of item k in the country, w_{ik} is the average household budget share of item k in stratum and quarter i , p_{0k} is the national median price of item k and p_{ik} is the median price of item k in stratum and quarter i .

Food items that had been purchased by at least 10 households by stratum and quarter were included in the construction of the price indices. Residual or catch-all food categories were also excluded because their unit values effectively mix several items. The share of the bundle considered for the price indices with respect to total food consumption is similar in both rounds of the NPS: it stands at around 67% at the national level and goes from 63% in rural mainland to more than 80% in Dar es Salaam and Zanzibar. Median unit values were estimated for the price indices because the median is less sensitive to outliers than the mean.

Table 1 shows the Fisher food price indices for each round of the NPS. Spatial price differences across strata remain fairly constant over time. The most expensive stratum is Dar es Salaam whereas the cheapest is rural areas in mainland. The cost of living in other urban areas in mainland and Zanzibar is relatively similar. Temporal price differences across quarters are noticeably larger during the NPS2, thus reflecting a higher inflation in the second round compared to the first round.

Table 1: Fisher food price indices by stratum and quarter, NPS1 and NPS2

NPS1	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep
	2008	2009	2009	2009
Dar es Salaam	1.08	1.18	1.20	1.15
Other urban	1.00	1.04	1.04	1.04
Rural	0.92	0.86	0.92	0.96
Zanzibar	1.03	1.06	1.07	1.07
NPS2	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep
	2010	2011	2011	2011
Dar es Salaam	1.05	1.11	1.17	1.18
Other urban	0.90	0.97	1.06	1.08
Rural	0.87	0.86	0.98	1.02
Zanzibar	0.89	0.98	1.06	1.07

Updating monetary figures across rounds of the NPS

Price indices will also be required to update monetary figures across both rounds of the NPS. The price indices from Table 1 are used to adjust nominal consumption for cost of living differences within each round of the NPS. Yet it would not be correct to compare real

consumption at NPS1 prices with real consumption at NPS2 prices. Either NPS1 figures should be adjusted to NPS2 prices or NPS2 figures should be adjusted to NPS1 prices.

Fisher price indices based only on food items were employed to adjust consumption for spatial and temporal price differences across rounds of the NPS. It was assumed that non-food goods and services show the same temporal and spatial price differences across rounds than food items. Price indices were estimated for the entire country and for the full extent of each round: the base period was the 12 months of the NPS1 and the comparison period was the 12 months of the NPS2.

Food items that had been purchased by at least 50 households in the country were included in the construction of the price indices. As with the previous price indices, residual food categories were also excluded and median rather than mean unit values were used. The share of the bundle considered for the price indices with respect to total food consumption is similar in both rounds of the NPS: it stands at around 98%. The Fisher food price index across the NPS1 and the NPS2 was estimated at 1.21, that is, the cost of an average food bundle consumed in the country increased by 21% between rounds of the NPS. This inflation will be employed to adjust the consumption aggregate and the poverty lines across the NPS1 and the NPS2.

1.3 Household composition adjustment

The final step in constructing the welfare indicator involves going from a measure of standard of living defined at the household level to another at the individual level. Ultimately, the concern is to make comparisons across individuals and not across households. Two types of adjustments have to be made to correct for differences in composition and size. The first relates to demographic composition. Household members have different needs based mainly on their age and gender, although other characteristics can also be considered. Equivalence scales are the factors that reflect those differences and are used to convert all household members into “equivalent adults”. For instance, children are thought to need a fraction of what adults require, thus if a comparison is made between two households with the same total consumption and equal number of members, but one of them has children while the other comprises only adults, it could be expected that the former will have a higher individual welfare than the latter. Unfortunately there is no agreement on a consistent methodology to calculate these scales. Some are based on nutritional grounds, but while a child may need only 50% of the food requirements of an adult, it is not clear why the same scale should be carried over non-food items. It may very well be the case that the same child requires a larger proportion than the adult in education or clothing.¹⁸

The second adjustment focuses on the economies of scale in consumption within the household. The motivation for this is the fact that some of the goods and services consumed by the household have characteristics of “public goods”. A good is said to be public when its consumption by a member of the household does not necessarily prevent another member

¹⁸ See Deaton and Muellbauer (1986) or Deaton (1997).

from consuming it as well. Examples of these goods could be housing and durable goods. For example, one member watching television does not preclude another from watching too. Larger households may need to spend less to be as well-off as smaller ones. Hence, the bigger the share of public goods in total consumption, the larger the scope for economies of scale. On the other hand, private goods cannot be shared among members – once one household member has consumed them, no other member can. Food is the classic example of a private good and, for instance, in poor economies, where food represents a sizeable share of the household budget, little room exists for economies of scale.

Poverty analysis in Tanzania employs an adult-equivalent scale to implement these two adjustments (see Table 2). In general, children are thought to consume less than adults and women less than men. An alternative and common practice would have been to use a per capita adjustment for household composition. This is a special case of both adjustments and implies that children consume as much as adults and there is no room for economies of scale. In other words, all members within the household consume equal shares of the total consumption and costs increase in proportion to the number of people in the household. In general, per capita measures will underestimate the welfare of households with children with respect to families with no children, and the welfare of large households with respect to families with a small number of members.

Table 2: Adult-equivalent scale by gender and age

Age (years)	Male	Female
0-2	0.40	0.40
3-4	0.48	0.48
5-6	0.56	0.56
7-8	0.64	0.64
9-10	0.76	0.76
11-12	0.80	0.88
13-14	1.00	1.00
15-18	1.20	1.00
19-59	1.00	0.88
60 and more	0.80	0.72

2 The poverty line

The poverty line can be defined as the monetary cost to a given person, at a given place and time, of a reference level of welfare.¹⁹ If a person does not attain that minimum level of standard of living, he or she will be considered poor. Implementing this definition is not straightforward, however, because considerable disagreement can be encountered in determining both the minimum level of welfare and the estimated cost of achieving that

¹⁹ Ravallion (1998) and Ravallion (1996).

level. In addition, setting poverty lines can be a very controversial issue because of its potential effects on monitoring poverty and policy-making decisions.

It will be assumed that the level of welfare implied by the poverty line should enable the individual to achieve certain capabilities, which include a healthy and active life and full participation in society. The poverty line will be absolute because it fixes this given welfare level, or standard of living, in the country and over both rounds of the NPS. This guarantees that comparisons across individuals will be consistent – that is, two people with the same welfare level will be treated the same way regardless of the location where they live. Second, the reference utility level is anchored to certain attainments, in this particular case to obtain the necessary energy requirements to have a healthy and active life. Third, the poverty line will be set as the minimum cost of achieving those energy needs. Finally, poverty analysis over time requires a constant real poverty line. Estimating poverty lines in each round of the NPS does not guarantee that the standard of living implied by these poverty lines is the same over time. This analysis uses poverty lines from the NPS2 for determining the poverty status in both rounds of the NPS. While for the NPS2, a direct comparison between the real consumption aggregate and the poverty line suffices to classify a household as poor or not poor, for the NPS1 the real consumption aggregate at NPS1 prices was further adjusted to NPS2 prices with a Fisher food price index that captures the changes in cost of living differences across rounds.²⁰

The Cost of Basic Needs method was employed to estimate the nutrition-based poverty line. This approach calculates the cost of obtaining a consumption bundle believed to be adequate for basic consumption needs. If a person cannot afford the cost of the basket, this person will be considered poor. First, it shall be kept in mind that the poverty status focuses on whether the person has the means to acquire the consumption bundle and not on whether its actual consumption met those requirements. Second, nutritional references are used to set the utility level, but nutritional status is not the welfare indicator. Otherwise, it will suffice to calculate calorific intakes and compare them against the nutritional threshold. Third, the consumption basket can be set normatively or to reflect prevailing consumption patterns. The latter alternative is considered a better approach and fortunately the use of a household survey allows its implementation. Last, the poverty line comprises two main components: food and non-food.

2.1 Food component

The first step in setting this component is to determine the nutritional requirements deemed to be appropriate for being healthy and able to participate in society. It is rather difficult to arrive at a consensus on what could be considered as a healthy and active life, and hence to assign calorific requirements. Aside from these considerations, requirements vary by person, by his or her level of activity, the climate, etc.²¹ In Tanzania, the reference for energy intake is set at 2,200 kilocalories per adult equivalent per day. Second, the food

²⁰ See subsection 1.2 for details about the price adjustment across rounds of the NPS.

²¹ Food and Agriculture Organization of the United Nations (2001, 2003).

bundle is chosen taking into consideration the existing food consumption patterns of a reference group in the country. The food bundle is obtained as the average food consumption of the bottom 50% of the population, ranked in terms of real per adult equivalent consumption. It is better to try to capture the consumption pattern of the population located at the bottom of the welfare distribution because it will probably better reflect the preferences of the poor. More precisely, using the consumption pattern of the bottom 50% of the population to calculate the food bundle assumes that the composition of that consumption, i.e., the proportion of various items in total food consumption, is not significantly different from the consumption pattern of the poor. Third, calorific conversion factors were used to transform the food bundle into kilocalories. Fourth, median prices were derived in order to value the food bundle. Prices were computed using only transactions from the same reference group. Again, this will capture more accurately the prices faced by the poor. Fifth, the average calorific intake of the food bundle was estimated, so the value of the food bundle could be scaled proportionately to achieve 2,200 kilocalories per adult equivalent per day. For example, the bottom 50% of the population in the NPS2 consumes on average 2,220 kilocalories per adult equivalent per day at a cost of TSh 667, thus the food poverty line would be TSh 661 ($= \text{TSh } 667 \times 2,200 \text{ kilocalories} / 2,220 \text{ kilocalories}$) per adult equivalent per day.

2.2 Non-food component

Setting this component of the poverty line is far from being a straightforward procedure. Considerable disagreement exists on the type of items that should be included in the non-food share of the poverty line. However, it is possible to link this component with the normative judgment involved when choosing the food component. Being healthy and able to participate in society requires spending on shelter, education, health care, recreation, etc. The advantage of using household surveys is that the non-food allowance can also be based on prevailing consumption patterns of a reference group and no pre-determined non-food bundle is required.

The initial step is to choose a reference group that will represent the poor and calculate how much they spend on non-food goods and services. The reference group is set to be the bottom 25% of the population ranked in terms of real consumption. The share of food on total consumption is estimated for this group and then the total poverty line is obtained by dividing the food poverty line by that share. For instance, the food poverty line is TSh 661 per adult equivalent per day and the food share of the bottom 25% of the population is 78%, thus the total poverty line would be TSh 844 per adult equivalent per day ($= \text{TSh } 661 / 0.78$).

3 Poverty measures

The literature on poverty measurement is extensive, but this analysis focuses on the class of poverty measures proposed by Foster, Greer and Thorbecke. This family of measures can be summarized by the following equation:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

where α is some non-negative parameter, z is the poverty line, y denotes consumption, i represents individuals, n is the total number of individuals in the population, and q is the number of individuals with consumption below the poverty line.

The headcount index ($\alpha=0$) gives the share of the poor in the total population, i.e., it measures the percentage of population whose consumption is below the poverty line. This is the most widely used poverty measure mainly because it is very simple to understand and easy to interpret. However, it has some limitations, in that it takes into account neither the gap of the consumption of the poor with respect to the poverty line, nor the consumption distribution among the poor. The poverty gap ($\alpha=1$) is the average consumption shortfall of the population relative to the poverty line. Since the greater the shortfall, the higher the gap, this measure overcomes the first limitation of the headcount. Finally, the severity of poverty ($\alpha=2$) is sensitive to the distribution of consumption among the poor: a transfer from a poor person to somebody less poor may leave the headcount or the poverty gap unaffected but will increase this measure. The larger the poverty gap is, the higher the weight it carries.

These measures satisfy some convenient properties. First, they are able to combine individual indicators of welfare into aggregate measures of poverty. Second, they are additive in the sense that the aggregate poverty level is equal to the population-weighted sum of the poverty levels of all subgroups of the population. Third, the poverty gap and the severity of poverty satisfy the monotonicity axiom, which states that even if the number of the poor is the same, but there is a welfare reduction in a poor household, the measure of poverty should increase. Lastly, the severity of poverty will also comply with the transfer axiom: it is not only the average welfare of the poor that influences the level of poverty, but also its distribution. In particular, if there is a transfer from one poor household to a richer household, the degree of poverty should increase.²²

²² Sen (1976) formulated the monotonicity and the transfer axioms.