REPUBLIC OF RWANDA

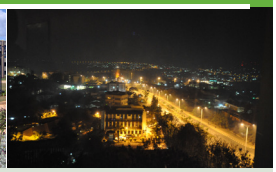
NATIONAL INSTITUTE OF STATISTICS OF RWANDA

THE EVOLUTION OF POVERTY IN RWANDA FROM 2000 T0 2011:

RESULTS FROM THE HOUSEHOLD SURVEYS (EICV)







FEBRUARY 2012

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FOREWORD

Dear Reader,

It is my great pleasure to present the third Integrated Household Living Conditions Survey -EICV3 (Enquête Intégrale sur les Conditions de Vie des Ménages), which is a series of surveys which started in 2000/01 and is designed to monitor poverty and living conditions.

The content of this publication largely provides an account of estimates of the level and pattern of poverty in Rwanda in 2010/11. Concluded in late October 2011, the survey examines poverty trends in comparison to earlier, similar, surveys conducted in 2005/06 and 2000/01 and enables the measurement of total household consumption. Therefore, in combination with high quality price data from other sources, this forms the basis for analysis of consumption poverty over the period. The survey also collects information on a wide range of other non-consumption dimensions of living standards.

Rwanda has had an impressive record in translating its recent growth into poverty reduction across the country over the past five years; the results show a reduction in poverty at the national level by 12 percentage points between 2005/06 and 2010/11. This is a significant reduction over a five-year period. The findings contrast with the limited poverty reduction experienced over the period 2000/01 to 2005/06 of only 2 percentage points.

The milestones highlighted in this report are indeed a testament to the guidance and support of the top leadership in the country in the fight against poverty, we thus commend and thank the hard work and commitment of the entire Rwandan people for their enduring efforts as we strengthen our resilience in the continued journey towards economic development.

John RWANGOMBWA

Minister,
Ministry of Finance and Economic Planning

Acknowledgements

The National Institute of Statistics of Rwanda would like to thank all, but especially the government of Rwanda for the invaluable contribution towards the completion of this Report.

I also wish to register our appreciation to the following partner Ministries, Institutions and Individuals for their respective great support and inputs throughout the process of writing and Publishing this report;

The Ministry of Finance and Economic Planning (MINECOFIN), the Ministry of Agriculture and Animal resources (MINAGRI), the Ministry of Local Government (MINALOC) and the Institute of Policy Research and Analysis (IPAR) Rwanda.

I am also equally grateful to the staff of the National Institute of Statistics of Rwanda (NISR), and The Oxford Policy Management Team (OPM), especially Andy Mckay and Emilie Perge, who tirelessly worked so hard to ensure the report is out on time.
To all I say , Thank you.

Yusuf Murangwa
Director General, NISR.

Executive summary

This report provides a summary analysis of recent changes in poverty in Rwanda, based on three comparable household surveys (EICV: Enquête Intégrale sur les Conditions de Vie des ménages) conducted over the past ten years, EICV1 in 2000/01, EICV2 in 2005/06 and EICV3, just completed, in 2010/11. Much of the report focuses on poverty measured in consumption terms; household consumption is measured in comparable terms across the three surveys and adjusted for differences between households in the prices they face and in their size and composition. A household's standard of living is thus judged by their real consumption per adult equivalent, including imputations for consumption in kind, all expressed in January 2001 prices. Poverty is then judged by comparing this consumption measure with the poverty lines first set for the EICV1 poverty analysis in 2001: this means a poverty line of RwF 64,000 per adult equivalent per year in January 2001 prices and an extreme poverty line of RwF 45,000 in the same units. Some minor re-estimation of earlier results based on the first two EICV surveys has been done to ensure comparability between the three surveys.

The results show an increase in average consumption over the period; consumption grew at an annualised rate of 1.9% between the first two surveys but at 4.4% between the second and third surveys. At the national level, consumption poverty fell from 58.9% in 2000/01 to 56.7% in 2005/06 and again to 44.9% in 2010/11. In other words, poverty fell much faster in the second five-year period than in the first. This partly reflects much faster growth in the second five-year period, but it also reflects the fact that inequality fell in the second five-year period while it rose (by a smaller magnitude) in the first. By province, poverty is consistently lowest by far in Kigali City and highest in the Southern Province.

Poverty was observed to have fallen by large and statistically significant magnitudes in all provinces between 2005/06 and 2010/11, but with a particularly large reduction in the Northern Province followed by the Western Province. This contrasts with modest reductions in the first five-year period (and even a small increase in poverty then in the Southern Province). The depth of poverty for those that are poor remains quite high, but has declined over the period.

Extreme poverty shows similar patterns; at a national level it fell from 40% in 2000/01 to 35.8% in 2005/06 and to 24.1% in 2010/11. Again, this fell by large magnitudes in all provinces in the last five years and by most in the Northern Province. Looking at the pattern of poverty by district in 2010/11, this is highest in more remote and rural provinces in the south and west of the country and generally lowest in the environs of Kigali City and in the Eastern Province.

Households that have a heavy reliance on farm wages to generate their income have by far the highest levels of poverty, followed by those working in agriculture on their own account; those more reliant on non-farm self-employment and especially non-farm wage work tend to be much less poor. The pattern of consumption poverty change is strongly supported by a number of non-monetary indicators summarised in this report and presented in more detail in the accompanying survey report. The message of good progress in poverty results

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List of tables and figures

Abbreviations

CPI	Consumer Price Index
DHS	Demographic and Health Survey
EICV	Integrated Household Living Conditions Survey (Enquête Intégrale sur les Conditions de Vie des ménages)
IPAR	Institute of Policy Analysis and Research
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Economic Planning
NISR	National Institute of Statistics of Rwanda
OPM	Oxford Policy Management

1 Introduction

This paper provides estimates of the level and pattern of poverty in Rwanda in 2010/11 as revealed by the EICV3 (Enquête Integrale sur les Conditions de Vie des ménages au Rwanda) household survey which was concluded in late October 2011, examining poverty trends in comparison to earlier, similar, surveys conducted in 2005/06 and 2000/01. The surveys enable the measurement of total household consumption and, in combination with good quality price data from other sources, this forms the basis for an analysis of consumption poverty over the period. The survey also collects information on a wide range of other, non-consumption, dimensions of living standards; these are the main subject of a companion summary survey report[1] which compares these indicators between 2005/06 and 2010/11. This report then focuses mostly on the pattern of consumption poverty, along with some initial analysis based on income data also collected in the survey. Nonetheless, as the overall judgement about changes in the living conditions of households over this period must reflect both monetary and non-monetary dimensions, this issue is also briefly discussed in this report.

The EICV surveys are only one form of nationally representative data collection undertaken in Rwanda. Another important survey is the DHS, which has again been conducted on a comparable basis over many years and for which initial results from the 2010 survey were published last year. As the name suggests, this survey focuses particularly on heath and demographic aspects; it is, for example, by far the most reliable way to measure mortality, malnutrition and fertility rates, among many other things. Mortality, malnutrition and other dimensions are also very important dimensions of living conditions. The full picture of changes in living standards should draw then from insights from different sources, in particular including the EICV and DHS surveys.

This survey report is structured as follows. The next section briefly summarises the methodology used for consumption poverty analysis, with further details being provided in the annex (Section A1 and A2). Section 3 then describes the base consumption and price data used for the analysis, while Section 4 presents initial poverty results, disaggregated geographically. Section 5 presents a more detailed analysis of poverty according to the economic activity undertaken by the household, as well as in relation to some other characteristics. Section 6 discusses the changes in inequality and its link to growth, while Section 7 presents some initial robustness checks. Section 8 provides a summary of some key non-monetary indicators while Section 9 sets out some discussion of factors which appear to have contributed to the observed pattern of poverty change.

1 NISR, January '2012 Main Indicators Report'

2 Summary of methods

The Government of Rwanda carried out the third of its EICV household surveys over the period November 2010 to October 2011. The EICV household survey is designed to be able to measure poverty in monetary terms, as well as collecting a number of non-monetary measures of poverty and well-being. The third EICV survey, EICV3, was designed to be comparable with the two previous rounds. These surveys are widely regarded as collecting high quality data for the measurement of poverty.

The analysis of poverty reported here is based on household consumption per adult equivalent member, adjusted for differences in prices faced by households between regions, between months of the year and allowing for inflation between one survey round and the next. The details of the construction of this standard of living measure are presented in more detail in appendix section A1 and A2 of this report. With the adjustments described above, these data are properly comparable over time and by location.

The poverty line defines a level of household consumption per adult equivalent below which a household is deemed to be poor. The poverty line used in this report is the same one used in the analysis of the EICV1 survey in 2001, which was RwF 64,000 per adult equivalent per year in January 2001 prices. This poverty line was set with reference to a minimum food consumption basket, which was judged to offer the required number of calories required for a Rwandan who was likely to be involved in physically demanding work, along with an allowance for non-food consumption. An extreme poverty line was also set as the cost of buying the food consumption basket if nothing was spent on non-food at all; this line was RwF 45,000 per adult equivalent per year in January 2001 prices. In current prices, these lines correspond to RwF 118,000 and 83,000 RwF, respectively. Inequality is presented in this report in terms of the Gini coefficient, as well as through other forms of analysing the distribution.

3 Presentation of base data

The measure of household consumption encompasses purchases of food and non-food as well as consumption of home-production of food and non-food. In addition, consumption aggregates include spending on education, frequent health expenses, expenses on housing and utilities (electricity and water), the value of wages received in kind, the estimated value of services derived from durable goods and the value of transfers received in kind from other households. As the data were collected with different periods of recall, the various components of the consumption aggregates are annualised and then combined.

Table 1 Share of food in total household consumption, 2000/01 – 2005/06 – 2010/11

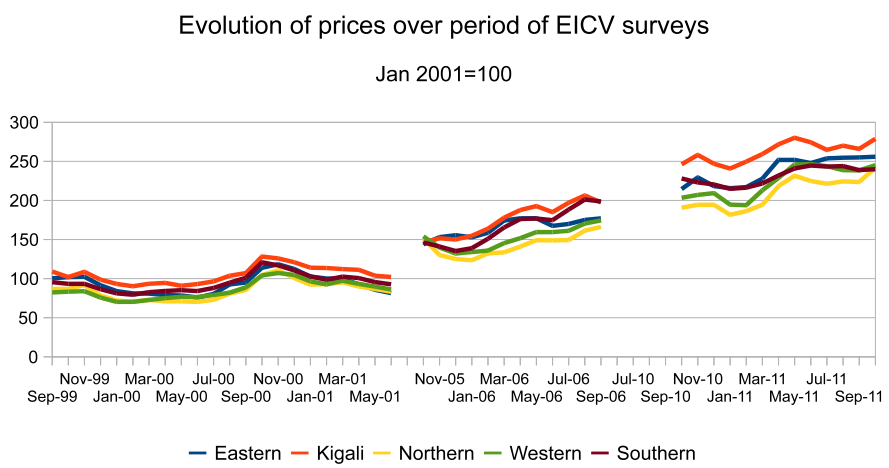
Province	2000/01	2005/06	2010/11
Kigali City	0.463	0.460	0.408
Southern Province	0.672	0.656	0.651
Western Province	0.729	0.661	0.637
Northern Province	0.721	0.666	0.621
Eastern Province	0.680	0.629	0.592
Urban areas		0.489	0.452
Rural areas		0.662	0.630
Total	0.677	0.635	0.605

Before discussing the issue of deflated consumption, it is possible to look at the composition of the consumption data and here we focus specifically on the share of food consumption as a share of the total (Table 1). These results show that, over the three EICV surveys, food shares have decreased, strongly suggestive of a clear improvement in household wellbeing. While, on average, Rwandan households had 67.7% of their consumption on food in 2000/01, in 2010/11 food consumption represents only 60.5% of household total consumption. Across all provinces, households living in the Northern Province have most decreased their food share of total consumption, followed by those in the Western Province. This decrease in food shares between the two latest EICV surveys is observable in both rural and urban areas and to similar extents. More detail on the composition of the consumption variable is provided in the annex (Section A1), where some nominal values are also reported.

Nominal consumption needs to be deflated by a price index capturing differences in the prices of food and non-food commodities by location and time. The price indices were estimated separately for food and non-food commodities (as described in the annex, Section A2) and the combined index is plotted in Figure 1 below. This index is such that national prices are indexed to 100 in January 2001. The index allows for differences between provinces, months and survey years. The index shows substantial price inflation over the period, with prices increasing by a factor of almost two and a half between the beginning

and the end of this period. Second, the index shows clear patterns of seasonality, with prices tending to be lower in the early months of the year corresponding to the larger Season A harvest. Third, there are significant differences in the level of prices by province; the Northern and Western provinces, key producing areas, are consistently the cheapest locations and Kigali City is consistently the most expensive. The annex (Section A2) provides more detail on the food and non-food indices separately; looking at these it is clear that the overall index is driven by the food price index, given that food has a far larger weight in the overall index. It is clear that deflating the nominal consumption values could have an important impact on the distribution of living standards observed.

Index capturing price differences over time and space, 1999–2011



When the price index is used to deflate the consumption measure to provide comparable measures for EICV1, EICV2 and EICV3, consumption in deflated values increased in all of Rwanda over the last 10 years (Table 2); average consumption per adult equivalent increased from RwF 90,601 in 2001 to RwF 99,749 in 2005/06 and 123,891 in 2011. Between 2005/06 and 2010/11, household consumption increases by 24% (an annualised growth rate of 4.4%), while it increased by only 10% between 2000/01 and 2005/06 (1.9% on an annualised basis). Households living in Kigali City over the three rounds consume much more than households living elsewhere. However, it seems that households in the Northern and the Southern provinces have greater growth in their consumption between 2005/06 and 2010/11, with consumption growing by on average 46% in these provinces and by 12% in Kigali City.

Looking at urban and rural areas between 2005/06 and 2010/11, consumption has increased more for rural households compared to urban households. However, in 2010/11 households living in urban areas still consume 2.7 times more than households living in rural areas.

Table 2 Mean household consumption aggregates per adult equivalent, 2000/01 – 2005/06 – 2010/11 (RwF deflated to January 2001 prices)

	2000/01	2005/06	2010/11
Kigali City	253,243	289,504	324,844
Southern Province	68,481	71,550	106,754
Western Province	76,602	87,448	92,896
Northern Province	73,408	76,095	109,995
Eastern Province	71,397	89,901	104,487
Urban areas		240,553	274,029
Rural areas		73,875	98,896
RWANDA	90,601	99,749	123,891

Unless there has been a very large increase in inequality, this fast and widespread consumption growth will almost certainly have translated into significant levels of poverty reduction; this is the focus of the following section of the report.

4 Poverty

Using the RwF 64,000 poverty line, the proportion of the Rwandan population revealed as poor according to the three EICV surveys is summarised in Table 3, disaggregated by province and by urban/rural location, and graphically by province in Figure 2.

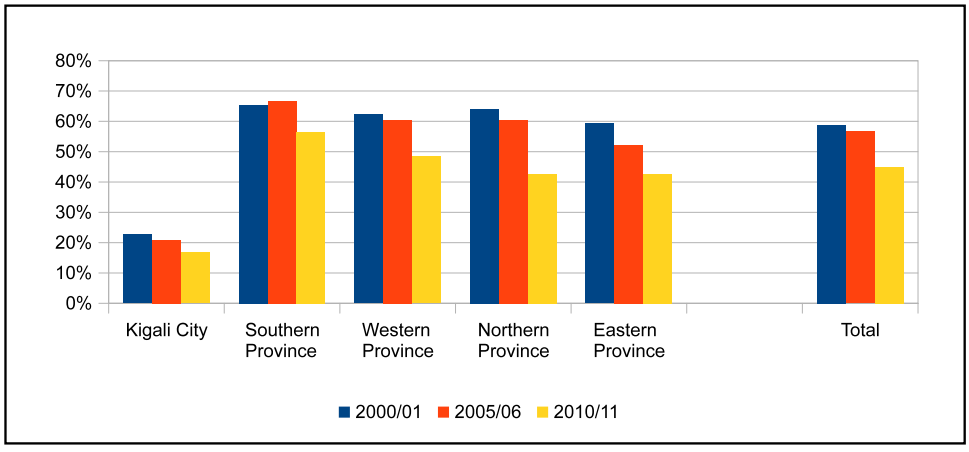
Table 3 Percentage of the Rwandan population identified as poor

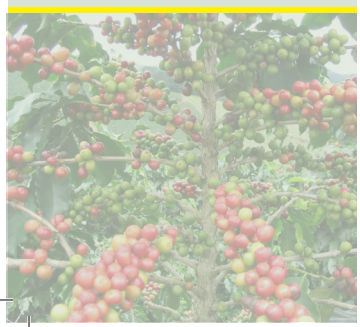
Province	2000/01	2005/06	2010/11
Kigali City	22.7%	20.8%	16.8%
Southern Province	65.5%	66.7%	56.5%
Western Province	62.3%	60.4%	48.4%
Northern Province	64.2%	60.5%	42.8%
Eastern Province	59.3%	52.1%	42.6%
Urban		28.5%	22.1%
Rural		61.9%	48.7%
Total	58.9%	56.7%	44.9%

Comparing levels of poverty by province, poverty is highest in all three rounds in the Southern Province and lowest by far in Kigali City. The Eastern Province is the second least poor province.

Focusing on changes at the national and province level, the results show a national reduction in poverty by 11.8 percentage points between 2005/06 and 2010/11, a large reduction over this five-year period and one which is strongly statistically significant. This contrasts with the limited poverty reduction experienced over the period 2000/01 to 2005/06, where growth was slower over this period and where the positive effects of growth were partly offset by an increase in inequality over that period.

Percentage of the Rwandan population identified as poor





Reductions in poverty over the 2005/06 to 2010/11 period are observed in all provinces and all are statistically significant. While the reduction is notably larger in the Northern Province, there have in fact been large reductions in all provinces, including the Southern Province where poverty in fact increased between 2000/01 and 2005/06. This shows that the consumption growth described in the previous section has translated into impressive poverty reduction progress across the country.

An analysis by district (results not presented here) shows a very large variation in levels of poverty across Rwanda. In 2005/06, poverty ranged from 10% in the least poor district to 85% in the poorest; in 2010/11 it ranges from 8.3% to 73%. There is also a large variation in poverty levels among districts in the same province. Looking at the changes, there was a significant decline in poverty in 13 out of 30 districts, i.e. a decline which could not be explained just by changes in the sample selected. Poverty falls significantly in some districts in all provinces; but in each province some other districts did not experience significant poverty reduction. It is important to note that a district's record on poverty reduction is not just a consequence of policies implemented by district authorities; some of the districts where poverty fell more had advantages in terms of better access to infrastructure, were more urbanised, were closer to borders, or had better fortune in terms of climatic conditions in the period under study. Furthermore, a number of the districts where poverty fell were more rural, more remote or may have suffered poorer climatic conditions. The issue of district-level experiences in poverty reduction needs to be investigated in much more depth.

Percentage of the Rwandan population identified as extreme poor

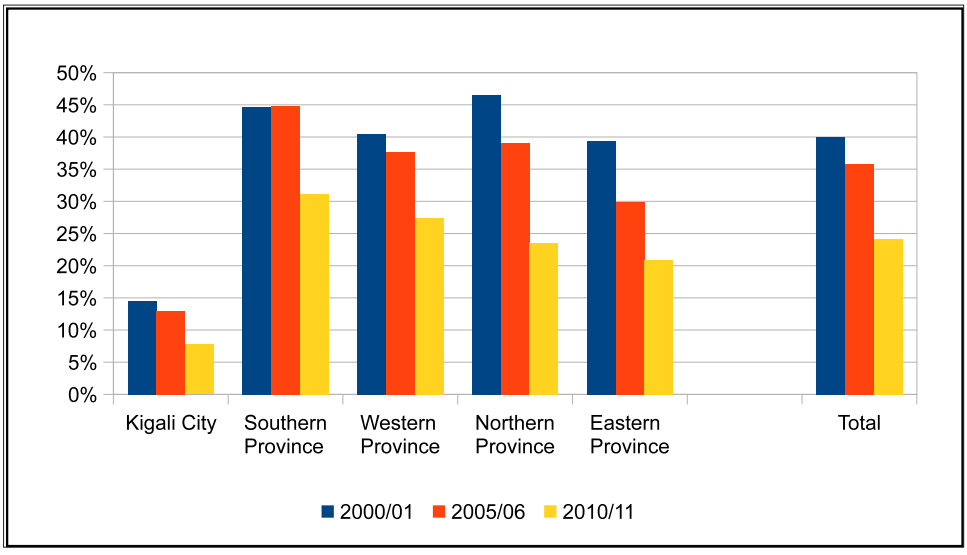


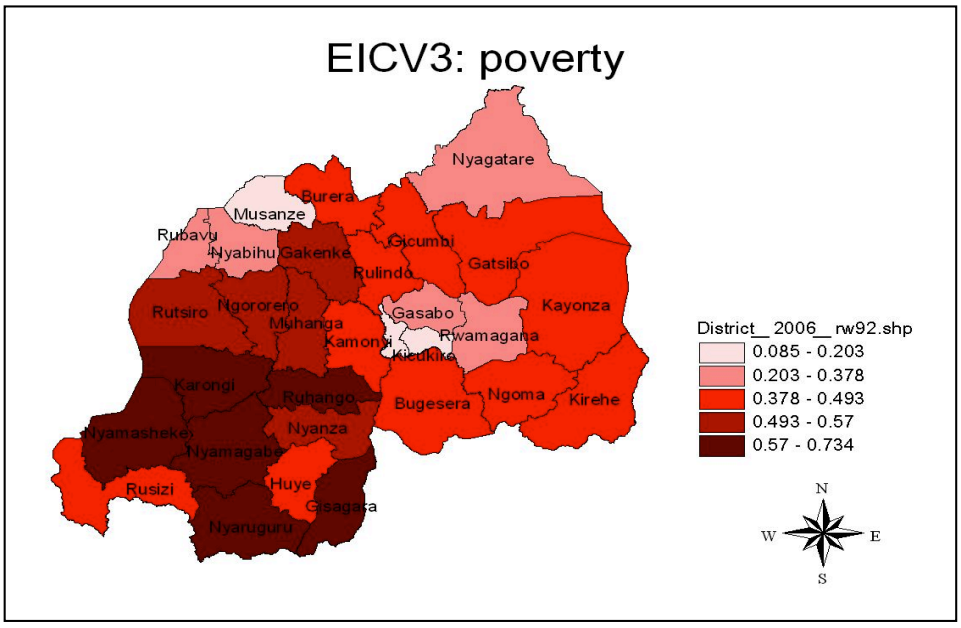
Table 4 Evolution of extreme poverty in Rwanda

Province	2000/01	2005/06	2010/11
Kigali City	14.5%	12.9%	7.8%
Southern Province	44.7%	44.9%	31.1%
Western Province	40.4%	37.7%	27.4%
Northern Province	46.5%	39.1%	23.5%
Eastern Province	39.4%	29.9%	20.8%
Urban		16.0%	10.4%
Rural		39.5%	26.4%
Total	40.0%	35.8%	24.1%

In looking at extreme poverty we are focusing on the poorest households of all. Figure 3 shows the pattern and change of extreme poverty at the national and province levels and Table 4 reports the corresponding statistics. The difference between provinces in the level of extreme poverty is mostly similar to the differences in poverty. The level of extreme poverty fell from 40% in 2000/01 to 35.8% in 2005/06 and then to 24.1% in 2010/11, again a substantial reduction over the recent five-year period following a modest fall in the first five-year period. There are large reductions in all provinces, all of which are statistically significant. Once again, the greatest reduction is in the Northern Province. The Southern Province remains the area of the country with the highest levels of extreme poverty, but here too extreme poverty fell significantly over the past five years.

Figure 4 presents a map of poverty by district in Rwanda in 2010/11. This shows important regional patterns to poverty and also shows important variations within provinces. Poverty in Rwanda in 2010/11 is lowest in two districts of Kigali City and in Musanze, as well as also being low in Rwamagana, Gasabo and locations close to the borders in the north east and north west. However, within the Northern Province, while some districts have very low levels of poverty, others such as Gakenke have quite high levels. The greatest concentrations of poverty in Rwanda are in the south and south west, including districts from both the Southern and Western provinces. On the other hand, within the Southern Province the district of Huye is less poor. This highlights diversity within the provinces, as well as the importance of larger towns, a location close to some borders, and also, in some cases, remoteness. That said, the Eastern Province is more homogeneous and does not have any very poor districts. A similar map for extreme poverty shows a broadly similar pattern, highlighting the three poorest districts as being Nyamagabe, Karongi and Nyamasheke, the latter two of which are in the Western Province.

Percentage of the Rwandan population identified as poor (Map)



The focus to date has been on whether households are classified as poor or not but it is also important to consider how poor people are. This can be done by looking at the depth of poverty, i.e. the proportion by which poor households fall below the poverty line. Table 5 reports these numbers, disaggregated by province and urban/rural location, reporting depth of poverty as a proportion of the poverty line.

A first point to notice is, for all provinces, the large magnitude by which on average a poor Rwandan household falls below the poverty line. The depth of poverty is generally lower in Kigali City than in the other provinces, but the differences between the other provinces tend to be very small. At the national level and in all provinces, the depth of poverty falls between each pair of years but the magnitude of the depth of poverty remains high in 2010/11. The depth of extreme poverty is lower, but shows a similar trend, both at the national level (as in the table) and by province. Even if the situation has improved to some extent over recent years, many poor Rwandans continue to live at levels very far below the poverty line.

Table 5 Poverty depth by province and year

Province	2000/01	2005/06	2010/11
Kigali City	0.366	0.346	0.284
Southern Province	0.422	0.416	0.340
Western Province	0.396	0.395	0.340
Northern Province	0.431	0.400	0.340
Eastern Province	0.415	0.357	0.302
Urban		0.348	0.300
Rural		0.397	0.331
Total	0.414	0.393	0.329
Depth of extreme poverty	0.341	0.329	0.262

Finally some standard poverty measures are reported at the national level in Table 6, including the three Foster-Greer-Thorbecke (1984) poverty indices and the Watts index. All indices fall over the period but particularly the severity measure which reduces to half its 2000/01 value. The Watts index, which also allows for the depth of poverty allows an estimation of the average time for a household to escape poverty; in 2010/11 this is 4.5 years if incomes continue to grow at 4.4% per average (the average growth rate over the past five years) or 3.6 years if the incomes of the poor continue to grow at the rate of 5.6%, the growth rate of the poorest 57% in 2005/06 (the EICV2 poor). Thus if the growth can be maintained and inequality does not increase the prospects for future poverty reduction are good.

Table 6 Some summary poverty measures at the national level

	2000/01	2005/06	2010/11
Headcount ratio (%)	58.9	56.7	44.9
Poverty gap ratio (%)	24.4	22.3	14.8
Poverty severity measure (FGT2) *100	13.0	11.4	6.6
Watts index	36.6	32.9	20.2

5 Poverty by economic activity pattern and other characteristics

It is also important to look at the characteristics of poor households in comparison with non-poor households, in particular in relation to the economic activities undertaken by households. The EICV surveys collect comprehensive and quite good quality data on household incomes, at least in the EICV2 and EICV3 surveys. Household incomes are separated into agricultural self-employment income, non-farm self-employment income, farm wage income, non-farm wage income and transfer income. We then identify households who obtain more than half of their income from any one of these sources and then two cases where households have more diversified livelihoods, giving the classification presented in Table 7. Households obtaining more than half of their income from agriculture in fact obtain on average the large majority of their income from this source, whereas in a number of the other categories, including those reliant mainly on farm wage work, agriculture is a significant secondary income source.

Table 7 Population shares, poverty and extreme poverty classified by the main household activity

	Share of population (%)		Percentage in poverty		Percentage in extreme poverty	
	EICV2	EICV3	EICV2	EICV3	EICV2	EICV3
Mostly agriculture	56.6	52.2	62.8	52.2	39.6	26.6
Mostly farm wage	4.3	3.6	88.1	76.6	74.0	51.5
Mostly non-farm wage	7.3	10.7	36.6	22.8	23.6	13.4
Mostly non-farm self-employment	27.0	16.2	46.5	24.2	25.9	10.4
Mostly transfers	1.5	2.2	45.6	28.6	29.9	18.8
Diversified, but farm wage more than 30%	1.0	4.1	77.3	76.2	63.9	55.3
Diversified, but farm wage less than 30%	2.3	11.1	28.4	47.6	17.8	26.7
Total	100.0	100.0	56.7	44.9	35.8	24.1

Base: all households.

In both survey rounds, a large majority of the population obtain more than half their income from just one of these sources and, among these, agriculture is by far the most important followed by non-farm self-employment. Those with less than 50% of their income from a single source are disaggregated by the importance of farm wage income in the total, depending on whether this exceeds or is less than 30%. In the former category agriculture and non-farm self-employment tends to be the other important income sources; in the latter category agriculture, non-farm wage work and non-farm self-employment tend to be important, as well as transfers in EICV3. There is a reduction in the numbers of households obtaining more than half their income from non-farm self-employment income over this period, as well as increases in both the proportions obtaining half or more of their income

from non-farm wage work and those obtaining less than 50% of their income from one source (the latter partly due to the increase in the importance of transfers).

Of particular interest is the pattern of poverty by economic activity category. Poverty is highest by far among households who obtain more than half their income from farm wage work, in other words from working on other people's land, followed by those with diversified livelihoods who obtain more than 30% or more of their income from farm wage work. It is clear from this that the vast majority of households that rely mostly or heavily on farm wage labour are poor; this is natural as this is very much a last resort activity for households without land or without sufficient land to meet their needs. The next highest level of poverty is among those that are self employed in agriculture, although many others in this category are not poor, an issue which merits more in-depth analysis. However, it should be noted that, in all these groups, including those reliant on farm wage work, poverty has fallen over the period.

It is quite clear that, for many, non-agricultural work is the secure route to escape from poverty. Poverty is lowest for those obtaining half or more of their income from this source, whether from wages or self-employment, and poverty among these groups has fallen by the largest magnitudes over the period. There have also been large reductions in poverty among those receiving more than half their income from transfers.

Looking at the shares of revenue from different sources (Table 8), poor households are more dependent on agriculture than non-poor households even though for both types of households in both 2005/06 and 2010/11, agriculture remains the main source of revenue. In addition, poor households have more revenue from farm wages than non-poor households. In both the EICV2 and EICV3 rounds, non-poor households receive greater shares of their revenue from non-farm wages and non-farm self-employment.

Table 8 Percentages of revenue from different sources overall, for non-poor and poor households

Variable	Overall		Non-poor households		Poor households	
	EICV2	EICV3	EICV2	EICV3	EICV2	EICV3
Agriculture	56.3	49.5	50.1	44.1	61.0	56.2
Farm wage	6.2	9.0	2.5	4.6	9.0	14.4
Non-farm wage	9.1	14.2	13.7	17.7	5.6	10.0
Non-farm self-employment	23.7	19.0	28.6	25.0	19.9	11.7
Transfers	4.7	8.2	5.0	8.6	4.4	7.8
All	100.0	100.0	100.0	100.0	100.0	100.0

With respect to poor households engaged in mixed strategies where farm wage work accounts for more than 30% of their revenue, this activity in both 2005/06 and 2010/11 accounts for 40% of their total revenue and own-account agriculture 36%. For poor

households engaged in mixed strategies where farm wage work represents less than 30% of their revenue, agriculture accounted for 46% in 2005/06 and 38% in 2010/11. For this group the contribution of non-farm wage income and non-farm self-employment income increases over this period from 19% to 22% and 14% to 16%, respectively.

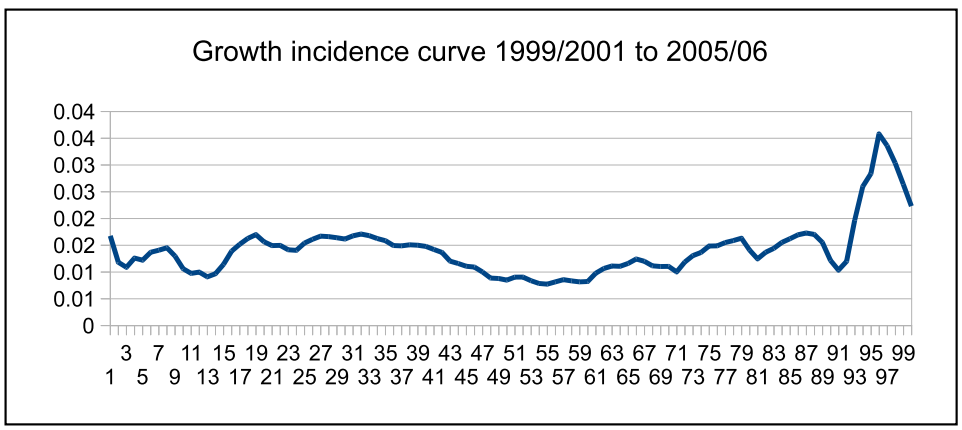
Looking at other household characteristics, over the three EICV surveys female-headed households are on average more likely to be poor than male-headed ones even though the percentage of poor female-headed households has decreased from 66% in 2000/01 to 47% in 2010/11. A similar trend can be noticed for extremely poor households. However, the gap between female-headed and male-headed households is reducing. In 2000/01, 47% of the female-headed households and 37% of the male-headed households were extremely poor, while in 2010/11 the percentage decreases to 26% and 23% respectively.

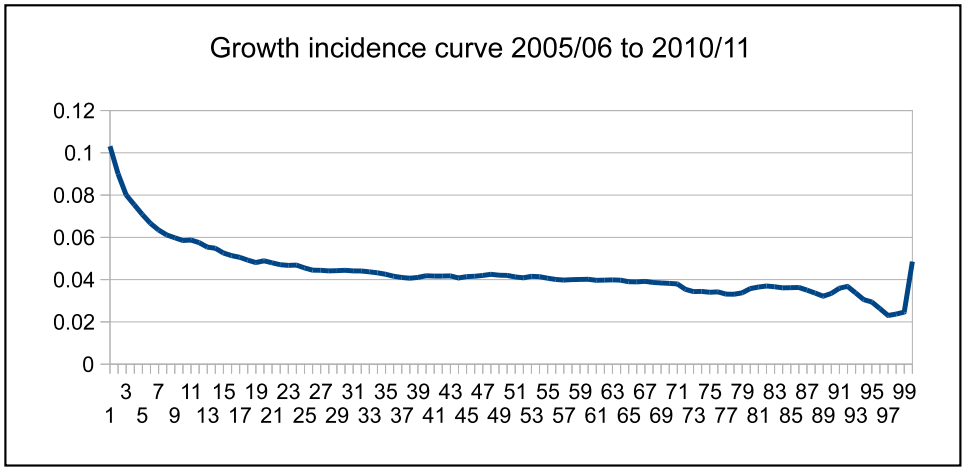
Among female-headed households, widowed household heads are more likely to be poor and extremely poor than other categories. Poor households seem to have more dependants (infants, children and elderly people) than non-poor households and this difference is especially striking in relation to extremely poor households.

6 Inequality and the distributional pattern of growth

The analysis presented in this report shows that, over the past five years, Rwanda has had an impressive record in translating its recent good growth performance into poverty reduction across the country. An important element of this is that growth in the recent five-year period has been accompanied by falling inequality, in contrast to the first five-year period. Figure 5 presents growth incidence curves for Rwanda over the periods between the first two surveys and between the second and third surveys. These curves are based on an ordering of households on the horizontal axis from the poorest to the richest; the chart then displays the annualised growth rate of consumption over the period, comparing each percentile group in the latter period to the corresponding percentile group in the earlier period. These charts show whether growth was faster at the lower or upper end of the distribution.

Growth incidence curves for Rwanda





The charts show quite a contrast between the two periods. Over the 2000/01 to 2005/06 period, growth rates were higher among richer groups and especially at the top of the distribution; the same period saw a rise in inequality. By contrast, in the second five-year period growth was in fact faster at the bottom and generally declined with the percentile, up to around the 97th percentile. This implies a pattern of falling inequality; over this period poorer households became better off in proportional terms on average and at a faster rate than less poor households.

The evolution of two commonly used measures of inequality is presented in Table 9. At the national level, the ratio of the 90th percentile of consumption to the 10th fell between 2005/06 and 2010/11, having increased sharply in the first five-year period. Nationally, the Gini coefficient also falls from 0.52 in 2005/06 to 0.49 in 2010/11, lower than its level in 2000/01. At the province level, inequality as measured by the Gini coefficient increased in most provinces between 2000/01 and 2005/06 and fell in most cases, sometimes sharply, between 2005/06 and 2010/11. In the Northern Province, however, inequality rose marginally between 2005/06 and 2010/11.

Table 9 Evolution of inequality in Rwanda

	2000/01	2005/06	2010/10
Kigali City	0.559	0.586	0.559
Southern Province	0.425	0.446	0.373
Western Province	0.445	0.492	0.395
Northern Province	0.457	0.431	0.438
Eastern Province	0.403	0.436	0.362
National	0.507	0.522	0.490
Ratio of 90th to 10th percentile	7.066	7.100	6.36

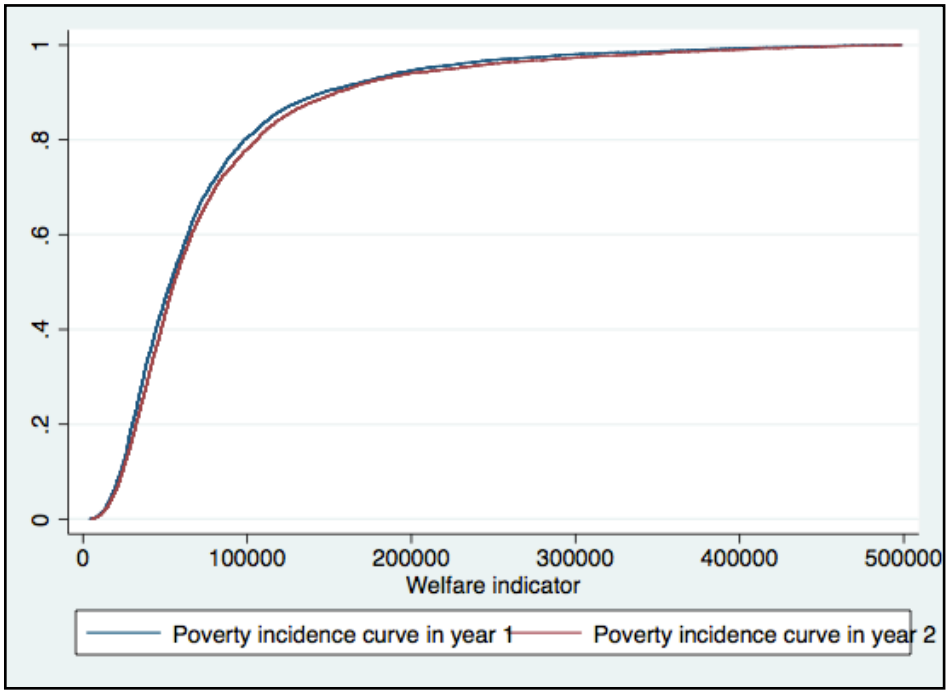
The overall story is of quite a significant reduction in inequality in Rwanda over this period. This is consistent with the growth translating into faster poverty reduction. Successes in increasing non-farm wage opportunities and in increasing production and sales in agriculture are likely to have been important factors here. It may be that some poor people have also been able to undertake non-farm work, though this cannot be confirmed in the absence of panel data.

7 Robustness of poverty comparisons

How confident can we be that the results presented in this report are not highly sensitive to particular methodological choices made in the calculation? Sensitivity can be considered to affect different aspects of the calculation, in particular the level of the poverty line set and to the precise computation of the consumption measure used in analysis. The price index could also be a relevant factor.

In relation to the level of the poverty line, the fact is that the relative levels and patterns of change in poverty by district/province are similar to each other whether or not the poverty or extreme poverty line is used. Nevertheless, a more comprehensive check can be made by looking at cumulative density functions, which show the percentage of the population (on the vertical axis) that lie below particular levels of consumption (on the horizontal axis). If in each case the curve for the later year always lies to the right of that for the earlier year in the range of all plausible values of the poverty line, then we can be confident that estimated poverty has fallen (subject to the normal confidence intervals). This is referred to as the property of dominance. Figures 6 and 7 present cumulative density functions for the EICV1–EICV2 and EICV2–EICV3 comparisons, respectively.

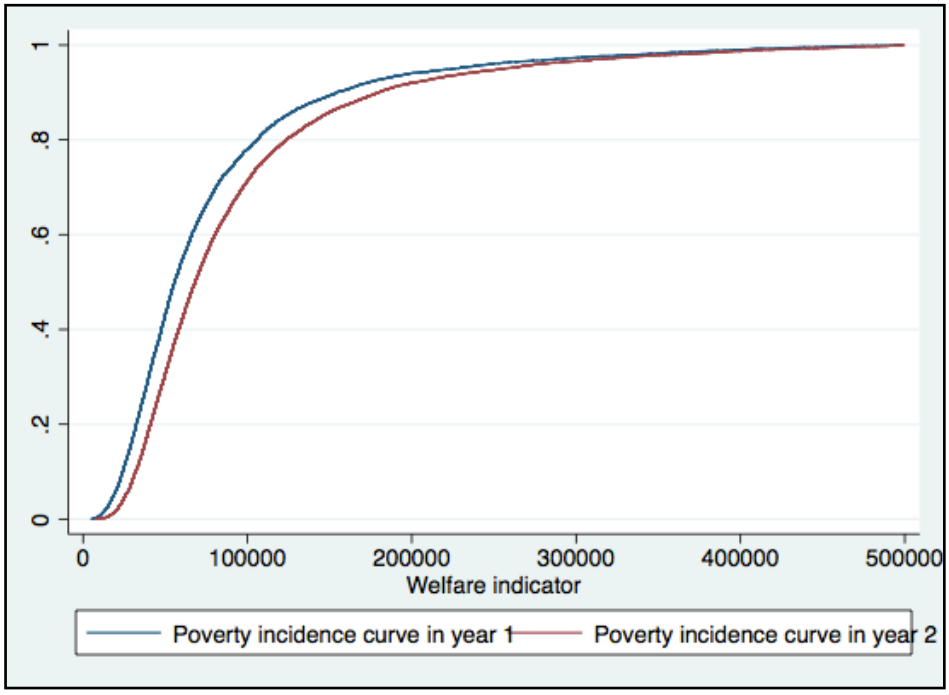
Cumulative density curves for the EICV1–EICV2 comparison



In the case of the EICV1–2 comparison, the two curves are quite close to each other, but the EICV2 curve lies almost always to the right of the EICV1 curve; therefore, the point

estimate of poverty for EICV2 will always be less than that for EICV1. However, whether the differences are sufficiently large to be statistically significant may vary from case to case. In any case, it is clear that over this period the poverty reduction was small, wherever the poverty line is set. However, for the EICV2–3 comparison the curve for the later year lies clearly much to the right of the earlier curve; wherever the poverty line is set, the point estimate of poverty between these two years will certainly have fallen and it is likely that the fall will be statistically significant wherever the poverty line is set. In summary, the results of the poverty comparisons between the three surveys appear not to be sensitive to precisely where the poverty line is set.

Cumulative density curves for the EICV2–EICV3 comparison



The estimate of consumption used to calculate the standard of living measure reflected best quality practices about what such a measure should contain; consistent with making sure that the measure is comparable between the three years. To assure the latter, consumption of own gathered firewood was not included in the consumption measure because it was felt this was not adequately captured in the EICV1 and EICV2 surveys. However, one element that is sometimes not included in measuring poverty is housing costs; inclusion of housing costs may exaggerate urban–rural differences and the estimation of housing costs will be highly dependent on the quality of the estimation of imputed rents for owner-occupied dwellings, which applies to the vast majority of households in Rwanda. Imputed rents are likely to be particularly difficult to estimate in rural areas where rental markets for dwellings are very limited.

Table 10 Poverty estimates based on a consumption measure excluding housing costs

Province	2000/01	2005/06	2010/11
Kigali City	0.247	0.223	0.212
Southern Province	0.706	0.719	0.616
Western Province	0.654	0.654	0.519
Northern Province	0.681	0.659	0.473
Eastern Province	0.648	0.577	0.470
Urban		0.316	0.262
Rural		0.671	0.531
Total	0.567	0.616	0.493

Table 10 presents figures for poverty based on a consumption measure excluding housing costs (imputed rents and actual rental payments). The poverty line has been kept the same here so the focus is the impact of this change is on the pattern and changes in poverty, not on the level of poverty (which will inevitably be higher). What this table shows is that the impact of excluding housing costs actually increases rural poverty more than it does urban poverty; the comparison between urban and rural areas within any one year is changed very little and the same is true for the comparisons between provinces. In addition, the patterns of changes in poverty, at the national, province and urban–rural levels are very similar to that observed with the preferred standard of living and poverty measure. This analysis therefore demonstrates that including housing in the consumption measure does not at all affect the observed patterns and changes in poverty; given this, it is therefore much more appropriate to focus on the preferred standard of living measure.

In addition, the price index used to adjust for spatial and temporal differences might affect the poverty results. This would also be a legitimate issue to consider for sensitivity analysis if an equally justifiable index can be proposed. However, the index used here appears to be clearly superior to other possible alternatives. The MINAGRI data for food prices and CPI data for non-food are clearly the best sources; the EICV1 weights for the food index are clearly appropriate given the 2001 base for the poverty line and the weights used for the non-food index are the most reliable ones available. Thus, while other prices indices may give different results, they are almost certainly inferior to those presented in this report.

8 Evidence from other sources

To what extent is the pattern of significant poverty reduction over the 2005/06 to 2010/11 period supported by other indicators? The EICV surveys also collect data on large number of other indicators of household living conditions and Table 10 shows the evolution in some key indicators of household wellbeing. These cover education, health, housing and assets, disaggregated by province, urban/rural and quintile of consumption. Each of these indicators reveals improvements between 2005/06 and 2010/11 at the national level, in urban and rural areas, in all provinces and in all quintile groups. The improvements are particularly large in relation to secondary school enrolment, sanitation, electricity and radio ownership in rural areas.

Table 11 Evolution of other indicators of living standards between EICV2 and EICV3

		Net secondary enrolment		**Access to improved drinking water source**		**Improved sanitation**		**Primary source of lighting is electricity distributor**		**% of HHs owning a radio**	
		EICV3	EICV2	EICV3	EICV2	EICV3	EICV2	EICV3	EICV2	EICV3	EICV2
All Rwanda		20.9	10.4	74.2	70.3	74.5	58.5	10.8	4.3	60.2	46.7
Province	Kigali City	41.0	24.6	82.7	84.8	83.3	78.5	55.6	29.7	57.3	53.5
	Southern	18.4	8.8	74.8	73.4	66.2	56.2	3.2	2.1	60.4	46.2
	Western	18.3	8.8	74.2	67.8	79.2	57.9	8.2	2.0	51.7	37.6
	Northern	21.3	7.3	78.9	76.7	74.2	64.6	6.7	1.0	63.8	43.8
	Eastern	18.5	10.6	66.6	57.7	74.9	48.5	5.6	1.7	66.9	56.2
Urban/ rural	Urban	37.4	21.1	86.4	83.9	82.6	74.9	46.0	23.1	57.7	50.7
	Rural	18.2	8.3	72.1	67.6	73.1	55.3	4.7	0.7	60.7	45.9
Quintile	Q1	8.6	2.2	68.4	66.6	64.7	42.4	0.4	0.0	42.9	27.5
	Q2	13.0	5.6	71.4	66.7	72.1	51.1	0.8	0.2	58.1	40.0
	Q3	18.7	9.3	71.5	67.2	71.9	55.6	2.1	0.1	63.6	46.9
	Q4	24.3	14.2	73.2	68.9	74.7	60.9	5.6	0.6	66.3	55.8
	Q5	39.8	21.3	84.0	79.6	85.6	76.6	38.8	17.8	66.0	57.7

This is also consistent with evidence from other sources. The preliminary DHS survey results for 2010 showed a dramatic improvement in infant mortality over the past five years, putting the infant mortality rate in Rwanda on a comparable basis with that for Kenya. There was also evidence for quite a good reduction in malnutrition, increased use of health services (in particular those linked to giving birth) and a sharp fall in the fertility rate. This also confirms the pattern of significant welfare improvement over the period which is revealed by the EICV surveys.

9 Initial explanations

What factors might account for Rwanda's progress in reducing poverty over the period? One contributory factor will be the reduction in average household size over the period (implying reduced consumption needs); this is consistent with the declining fertility rate reported in the DHS surveys. But preliminary analysis of the EICV data helps identify other factors that seem to have contributed to the poverty change. Based on the income data, the survey results show an important increase in the contribution of wage income and also an increase in income from transfers; the share of agricultural income falls modestly though remains the majority source of income.

Analysis of the survey data confirms the importance of wage activity by identifying that there has been substantial creation of jobs, predominantly in non-farm activities, over the past five years. Which areas these jobs are in, still needs to be investigated in subsequent work.

A second factor identified from the survey data is increased agricultural production. Looking at aggregate production data confirms significantly higher production levels in 2010/11 than 2005/06, most strikingly in the Northern Province followed by the Western Province (the key producing regions), and this is despite the fact that average land size cultivated per household has fallen over the period. This pattern of increased production is consistent with production data from MINAGRI. At the same time, there was a substantial increase in the use of chemical fertilisers in agriculture over this period.

A third factor has been increased commercialisation of agriculture. In 2005/06, households sold around 18% of their output on average but by 2010/11 the average proportion of output sold had risen to 25%. There was increased demand for agricultural production from Rwanda over this period from neighbouring countries and in part in response to food crises elsewhere.

A fourth factor is the increasing importance of transfers over the period, both private and public. While these do not just benefit the poor, they have contributed to poverty reduction over the period.

While these remain preliminary and incomplete explanations, they are strongly supported based on analysis of the EICV data to date. Further analysis of the data will allow these explanations to be developed further and in more detail.

Finally, it is important also to see the impressive degree of progress Rwanda has made over this five-year period; poverty fell over this period at a faster rate than recent reductions in the other most successful African countries in poverty reduction, including Ghana, Senegal and Uganda.[2] It is clear that the last five years have seen a substantial reduction in poverty in Rwanda and an improvement in the living conditions of many Rwandans.

References / Bibliography

Deaton A. (1997) The Analysis Of Household Surveys. A Microeconometric Approach to Development Policy. World Bank, Washington D.C.

Deaton A. and S. Zaidi (2002), Guidelines for Constructing Consumption Aggregates for Welfare Analysis, World Bank: Washington D.C.

Foster, J., J. Greer and E. Thorbecke (1984), "A Class of Decomposable Poverty Measures", Econometrica, 52(3): 761-766.

2 Ghana reduced poverty by 11 percentage points between 1998/99 and 2005/06; Senegal by 8.5 percentage points between 2001 and 2006 and Uganda by 6.6 percentage points between 2006/07 and 2009/10 or 14.3 percentage points over the longer period of 2002/03 to 2009/10.

Annex A: Further detail on calculations underlying the analysis

A1. Computation of consumption

The calculation of monetary poverty is based on household consumption measures that are comparable to the ones previously calculated for EICV1 and EICV2. Comparability in the computation of household consumption is an important aspect of the poverty computation done in this report, since the analysis relies on the three rounds.

Even if income data have been collected in the EICV3, consumption is a preferable measure since income data are often inaccurate as households often have their income from agriculture and self-employed activities, for which a reliable measure of income is quite hard to obtain. Also, incomes are less stable over the period of a year and are subject to seasonality while consumption is more stable and can be more easily extrapolated from a two-week period to a year (Deaton and Zaidi, 2002).

Consequently, following international practice, poverty is computed using household consumption expenditures per adult equivalent. Household consumption includes purchases and also consumption of home-production and payments or transfers received in kind.

The main elements comprising household consumption are consumption of food from purchases or own production, and consumption of non-food goods and services. In addition to these products, we include in our consumption measures, households' expenditures on frequent health items, education, housing and utilities, and the in-kind transfers received by the households, as well as the value of in-kind wages and other benefits received by households (Table A1).

On the other hand, our measures of consumption exclude the purchases of durable goods that do not contribute in the same way as non-durable goods to households' living conditions (Deaton, 1997). A measure of the use-value, not of the purchase, of durable goods is included and represents the benefit of holding a durable good (Deaton and Zaidi, 2002). We also take great care to exclude from our measure of consumption exceptional expenditures, such as funerals, weddings, hospital expenditures, and the purchase of farm assets. The exceptional items of consumption are excluded precisely because of their one-off nature: a household may have incurred a very high expenditure on a wedding in the period covered by the survey, but if this was included in the consumption aggregate it would exaggerate the household's normal level of consumption.

Also, so as to build comparable measures of consumption across the three rounds of EICV, we deleted several items collected in EICV3 that were not collected in the previous rounds. One important example was firewood gathered by the household which was much more comprehensively collected in EICV3 compared to earlier surveys.

Table A1: Contents of household consumption aggregates used for poverty analysis

Component	Description of contents and items covered	Source of data in questionnaire
Expenditure on education	Household expenses on costs of schooling for all members currently enrolled in any level of education	Section 2, questions S2AQ13A – S2AQ12H
Regular health expenses	Expenses on consultations, for tests and for medicines for those that were ill in the two weeks preceding the interview	Section 3, question S3AQ16, S3AQ19, S3AQ25 and S3AQ28
	Vaccination expenses for children aged 5 and under	Section 3, question S3BQ7
Lodging: rent and utilities	Imputed rental value of owner-occupied dwellings (respondent-provided valuation); rent in cash and in kind; expenses on water and electricity	Section 5, questions S5BQ1, S5BQ2, S5BQ4A, S5CQ2A, S5CQ3, S5CQ7A
Employer provided benefits in kind	Payment received by employees in kind, subsidised houses and other benefits	Section 6, question S6DQ10A, S6DQ12A, S6DQ14A
Non-food expenses	Consumption of own-produced non-food products	Section 9C, questions S9DQ4—S9DQ13, and S9DQ15
	Infrequent non-food items: purchases in past year, but excluding purchases of durable goods and items already reported elsewhere	Section 9A1, question S9A1Q3, but excluding the following items: 22, 28 – 32 inclusive, 37, 38, 45 – 48, 51 – 53, 60, 61, 69, 70, 74, 76 – 87 inclusive, 89
	More frequently purchased non-food items: based on purchases in last month	Section 9A2, question S9A2Q3
	Frequently purchased non-food items	Section 9A3, based on questions S9A3Q4—S9A3Q13
Food purchases	Purchases of all food items	Section 9B, questions S9BQ4—S9BQ13
Consumption of own-produced food	Consumption of own-produced food items	Section 9D, questions S9DQ4—S9DQ13, and S9DQ15, excluding the following (non-food) commodity codes: 103 – 106 inclusive
Transfers paid out	Transfer received from other individuals or households, in kind (food or non-food)	Section 10B, question S10BQ10—S10BQ11
Use value of durable goods	Estimated consumption flows derived from durable goods (based on current value and estimated depreciation rates)	Section 11B, questions S11BQ5A—S11BQ5C, and commodity specific estimates of depreciation rates

In the EICV3, data on consumption are collected considering different recall periods depending on the frequency of purchase or consumption. Households were either asked to report their purchases over the last year or month for the infrequently purchased items such as education expenditures or some large non-food items. For frequently purchased goods, e.g. food and small non-food items, data were collected during ten visits that happen every two days in the areas outside Kigali City, which represents a 14-day recall period. In Kigali City, data were also collected during 10 visits but every three days and the period of recall is for 30 days. In both areas, households are asked to report their purchases or consumption since the last visit of the enumerator. To aggregate all the consumption components, we annualise the data using the appropriate factors to scale up consumption data when the recall period is less than a year. As a result, we obtain annual values of consumption at the household level.

When building the consumption aggregates, we have operated checks and replacements of outliers at the most disaggregated level we could. We identified outliers as being extremely large values for which the value of consumption is overestimated due to data entry or collection errors such as additional zeros or missing decimal points or may simply be misreported. As the EICV data was carefully entered with a process of double data entry, meaning it is quite unlikely that outliers arise due to data entry errors. However, we still check whether there are any or not since households may report extremely high values of consumption that differ greatly from the average consumption. We take logarithms of non-zero consumption values and consider as outliers all values lying 3.5 standard deviation points away from the mean value. Extreme values are then replaced with the mean value and multiplied by the number of adult equivalents where relevant. Outliers are identified at a disaggregated level, calculating the mean and standard deviation value at the regional level, the item level when considering food or non-food consumption, or the number of rooms when considering outliers for housing. The definition of the regions is as follows: Kigali City, other urban areas, rural Southern Province, rural Western Province, rural Northern Province and rural Eastern Province. Doing this check at a regional level and a disaggregated level allows for the fact that average consumption levels of a commodity may differ significantly by location and by type of item or number of rooms.

Within the EICV data, only a small number of outliers was identified and when replacing these extremely high values with the mean values, there is little change to the average value. Therefore, one can confidently assume that such replacements have not significantly modified the estimations of poverty and inequality.

Nominal values of consumption for the three rounds are reported below.

Table A2: National averages of household consumption expenditures per adult equivalent, EICV1, EICV2 and EICV3

Variable	Average value in real prices (RwF/HH/year in January 2001 prices)			Share of total consumption		
	EICV1	EICV2	EICV3	EICV1	EICV2	EICV3
Food purchases	24,805	27,343	33,891	27.10%	26.70%	26.60%
Consumption of own food	24,189	22,216	20,880	20.70%	16.60%	15.80%
Total food consumption (food purchases + consumption of own food)	48,994	49,559	54,772	47.80%	43.30%	42.40%
Non-food consumption, including health expenditures	21,861	31,108	34,223	27.00%	33.30%	28.20%
Rents (imputed and actual rents)	9,999	6,485	10,547	12.10%	7.20%	8.90%
Utilities (electricity and water)	847	883	1,129	1.30%	1.20%	0.90%
Education	1,779	3,053	5,697	2.30%	3.50%	4.90%
Value of in-kind wage and other benefits	2,162	2,766	7,206	2.30%	3.90%	5.70%
Use value of durable goods	3,233	3,730	5,329	4.50%	5.30%	4.90%
Transfers received	1,058	1,313	3,154	0.90%	1.10%	2.40%
Other expenditures	663	847	1,830	0.80%	0.90%	1.40%
HH consumption	90,601	99,749	123,891			

A2. Adjusting for price differences

The consumption measure, the estimation of which is described in detail in Section A1 above, is the basis for the construction of the monetary standard of living measure to be used in the poverty analysis. When information is collected on consumption, households will report their purchases and other consumption values (e.g. from own production) in the prices paid or in other current values. However, the prices households pay are likely to differ from one month of the year to another, reflecting seasonality or inflation. They may also differ from one location to another (reflecting production patterns, market availability, transport costs, etc.) and of course they will differ between one survey round and the next. Before consumption can be used to judge a household's standard of living it is therefore necessary to adjust for these price differences.

This has been approached here separately in relation to food and non-food commodities, reflecting different sources of data (and reflecting the same practice used in adjusting for prices in earlier surveys). The data in relation to food prices come from a detailed price collection programme which has been undertaken across Rwanda by MINAGRI since at

least 1999. The data used for non-food prices have been the price data collected as part of the CPI.

In both cases, the index is computed as the Laspeyres Index, in which prices in a specific time period t and regional location $rp_{i,r,t}$, are compared to a base location and time period $p_{i,0,0}$ according to the following formula:

$$P_{r,t} = \sum_{i=1}^{N} w_{i,r,t} \frac{p_{i,r,t}}{p_{i,0,0}}$$

where $w_{i,0,0}$ is the budget share of item i in the base location and time period and N is the number of commodities.

To begin with, the cost of living indices were estimated with a January 2001 base, the same time period to which the poverty line refers. As there is the likelihood of updating the poverty line, indices were also constructed using a January 2011 base.

A2.1 Food cost of living index

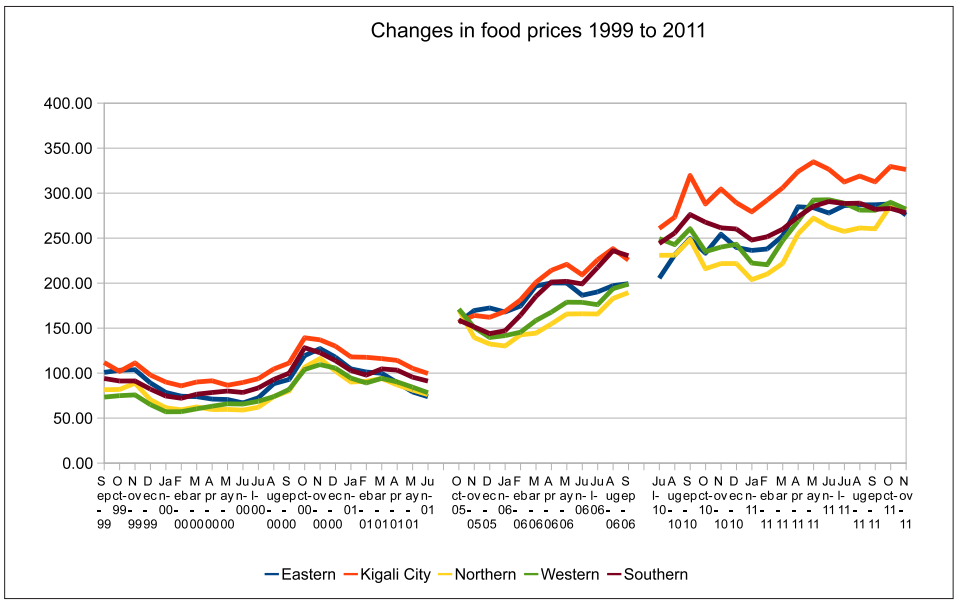
The underlying data for this index has been collected on many food commodities across Rwanda over the entire period covered by the three EICV surveys. Two observations per month are collected for each commodity over a large number of markets in Rwanda. There have been some changes over time in the commodities on which information is collected; in 2006 it was possible to estimate an index based on prices for 26 commodities across 36 markets for the EICV1–2 period, but by 2010/11, because some commodities had been dropped or were only available for some of the period, it was only possible to estimate consistent series of prices for 17 commodities covering the entire EICV period.[3] However, these commodities still cover 60% of household food consumption, so are still more than adequate for estimating a high quality food price index. There were a very small number of missing values in the available price data, which were imputed mostly by linear interpolation.

Because the food price index is estimated at the province level, monthly province-level average prices were computed for each of the 17 commodities over the entire EICV period. For the index, these prices were expressed relative to the national average price for the same commodity in January 2001; the latter was computed as the population weighted average of the province-level average prices in January 2001. These averages are based on a substantial number of observations and the resulting average prices will be a sufficient basis to allow for different levels in prices between provinces, different prices by month and price changes between one survey round and another. The commodity weights used for the food price index were estimated based on the EICV1 survey. The weights were calculated based on the sum of both purchases and consumption of own production for the commodity. This is appropriate because the consumption measure to be deflated will include both purchases and consumption from own production.

The index is expressed as January 2001 = 100 and is plotted in Figure A.1.

3 The commodities which were available in 2000/01 – 2005/06 but not for 2010/11 were fish, oil, sorghum beer, banana beer, aubergines, cabbage, carrots, meat and eggs.

Figure A1: Food price index, September 1999 to October 2011



The index clearly shows seasonality in food prices within each year. Prices tend to be high in October/November, fall in the first quarter of the year and then rise again until September/October; the magnitude of change within the year can be 40% or more. This pattern is quite clear in the EICV1 and EICV3 periods; it is a bit less clear in the EICV2 period, reflecting a disappointing agricultural harvest at that time. Nonetheless, it is still clear that seasonality is important here too, especially in the Northern, Western and Eastern provinces.

It is also clear that there are significant differences in the levels of food prices by province. In all three time periods the prices of food commodities tend to be lower in the key producing Northern and Western provinces and prices are highest in Kigali City, followed generally by the Eastern Province. Similar patterns of seasonality are generally observed in each province. Finally, the charts show substantial inflation in food prices; prices increased by 50% between January 2001 and January 2006 and by more than 50% between January 2006 and January 2011. This is in line with increasing world food prices over this decade. This food price inflation is expected to hit the poor particularly hard if their incomes are not able to keep up; many are likely to be net buyers rather than net sellers of food and food is a very high share of the consumption basket of the poor (the average contribution of food to the consumption basket of the poor in 2001 was 71%). High food price increases were a factor contributing to the increase in inequality between 2000/01 and 2005/06.

An alternative source for food price data could have been the food price data collected for the CPI. The MINAGRI data were preferred because: (a) in the EICV1 and EICV2 periods, the CPI had only covered urban areas; (b) because of the change in the index in 2009; and (c) particularly because of the large number of comparable observations the MINAGRI price data offered. Nevertheless, over the period January 2006 to January 2011, the rate of inflation given by the index based on the MINAGRI price data was very close to that given by the CPI, even though the weights were different.

A2.2 Non-food price index

By far the most reliable source of data for allowing for differences in the price of non-food commodities is the raw price data collected for the CPI. Consistent price information on prices of non-food commodities in urban locations was collected on a monthly basis in 12 locations (the main towns of the old 12 provinces) corresponding to the periods of the EICV1 and EICV2 surveys and these were used to construct a non-food price index for use in analysing these surveys, using non-food budget shares from the EICV1 survey as weights.

In 2009, the CPI was substantially revised and modernised; the number of commodities on which price data was collected increased, new commodities were added and some were discontinued. In addition, prices were not necessarily collected on exactly the same items in each location.

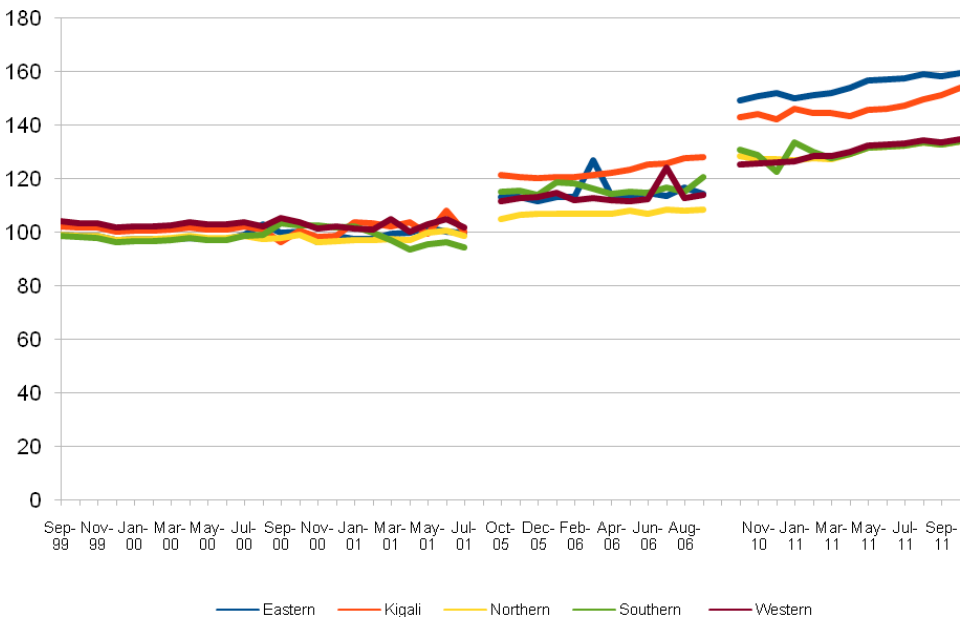
Nonetheless, a careful attempt was made to match commodities on which prices were available in 2010/11 with those which had previously been collected, as well as where the items were similar across the five provinces. This was not necessarily straightforward because of the more limited commodity descriptions available in the early years compared to the latter years and some matches which appeared on paper to be valid had to be rejected because the prices in 2010/11 were implausibly much lower than those for the earlier years.

In this case, the EICV3 data set was used to provide the weights because it allowed a more detailed commodity disaggregation than had been possible for EICV1. Price information was available for these additional commodities, thus increasing the base on which the index could be estimated. In the end it was possible to obtain weights and monthly average price data for five provinces for 41 commodities corresponding to 47% of non-food purchases. There were some instances of missing values where prices had to be imputed using a neighbouring province, but such instances arose in only a very small number of cases.

The approach taken was the same as that adopted for the food index, except that (in line with the budget shares) the reference prices were computed for January 2011 rather than January 2001, so as to correspond with the weights. Prices were then expressed relative to the reference price and an index constructed as the weighted sum of these relative prices where the weights were the corresponding budget shares. The index was then rescaled to report differences in non-food prices on the basis that January 2001 = 100, consistent with the food price index.

The values of the non-food index are plotted in Figure A2 below.

Figure A2: Non-food price index, September 1999 to October 2011



Two striking contrasts with the food price chart are the absence of seasonal variation and the much lower level of inflation. In addition, price levels are not very different between locations, although they have increased in 2005/06 to some extent and more so in 2010/11, in particular when prices in the Eastern Province were higher compared to other provinces. Prices in Kigali City generally tend to be higher on average, but the overall picture is that variations over time and space in non-food prices are much less than those in food prices.

Given the food and non-food indices, an overall index was computed for each month and province by combining the food and non-food indices with a relative weighting of 71:29, the weights reflecting the average share that the poorest 60% in 2000/01 devoted to food and non-food consumption respectively. The values of the combined index are presented in the main text of this report. The combined index computed over the period of the three surveys gives a very similar rate of inflation for the 2000/01 to 2005/06 period to that given by the two survey period index computed for EICV1–2 analysis (39% compared to 41% respectively), so that the change observed between the EICV1 and EICV2 surveys should be very similar to that reported in 2006.

In general, the detail and quality of price data available for Rwanda is very good compared to many other countries and allows us to take account of price variations across the country and over time. In measuring poverty the ability to adequately control for price differences is every bit as important as the ability to measure consumption accurately and we believe that both of these aspects of the standard of living measure are of high quality.

A3. Income and agricultural production

To check the trends of change in poverty between the EICV2 and EICV3 rounds, we computed income measures for EICV2 and EICV3 and looked at agricultural production and sales.

As mentioned earlier, Rwandan households have diversified sources of incomes. They generate their monetary income from agricultural and livestock-raising activities, farm and non-farm wage activities, and non-agricultural self-employed activities and transfers (public and private). As for consumption, the information about income is covered in Part A and Part B of the EICV questionnaire.

Table A.3: Contents of household revenue

Component	Description of contents, and items covered	Source of data in questionnaire
Revenue from livestock	Sales of small livestock and livestock products	Section 8, questions S8AQ8, S8AQ16, S8A3Q7
Agricultural revenue	Sales of large and small crops plus food consumption of own production and income from processed products	Section 8, question S8CQ7, S8DQ8, S8DQ9, S8EQ9, S8FQ42B, S8GQ3, S8HQ11B, S8HQ6 and S8HQ8
Wage income (farm and non-farm)	Cash and in kind received for wage activities	Section 6, questions S6DQ8, S6DQ10A, S6Q12A and S6DQ14A
Self-employed activities (non-farm)	Cash and in-kind revenues for self-employed activities minus labour and non-labour expenditures	Section 7, questions S7AQ8A, S7AQ6A and S7AQ7A
Transfers (public and private)	Cash transfers and transfers of food and non-food received from both public and private sources	Section 10, questions S10BQ8, S10BQ10, S10BQ11 and S10CQ2B;
Others	Imputed rents: income received from being owner of house (not counted in revenue)	Section 5, question S5BQ1
	Rental income: income received from renting out land and share-cropping	Section 8, questions S8B1Q12 and S8B1Q14

As for consumption, we looked at the extremely high values of income using the same methodology as described above; the identified outliers are then replaced by the mean values in each region. In this report we have used the income data primarily to classify households by their main sources of income, as discussed in section 5.

With respect to agricultural production, even if EICV3 is not an agricultural survey, valuable information on household production and sales of crops can be found in Part B of the questionnaire. A majority of households in Rwanda depend on agriculture to generate their income and fulfil their consumption needs. Section 8D of the questionnaire deals with the crops households produce on a larger scale and Section 8E with those produced on a smaller scale. Households also report if they have processed and sold their crops and whether they had any other agricultural income. In addition, households answer questions about their expenditures on inputs used to produce.

In the questionnaire, households are asked direct questions about the quantities harvested for each crop and, if they sell, what were the quantities sold and amounts received for these sales. Agricultural production is then the quantities harvested; however, the difficulty in receiving good answers from direct questions about the quantities harvested led us to define agricultural production as the sum of sales of crops and the consumption of own production by households. It is always harder for households to remember how much they harvested while sales can be a significant event for them, even more so for poorer households.

Working on sales of large and small crops, as usual we implemented a treatment of outliers in each region at the crop level. We used the same routine as previously, defining outliers as being the extremely high values 3.5 standard deviation points away from the mean and replacing these values by the mean value for each crop in each region. We worked separately on large crops in Section 8D and small crops in Section 8E and then we added the aggregated values of sales of large crops and the aggregated values of sales of small crops to find the overall value of sales. The final step consisted in adding to the total value of sales the values of other agricultural income, the income from processed products, and the value of own food and own non-food consumption.

The resulting calculation shows that mean production in nominal and real values increased substantially over the period in the Northern and Western regions, as well as at the national level. The magnitude of the increase in the mean though indicates the impact of some large farms; however the median (which is more relevant from a poverty perspective) also shows real increases in the Northern region in particular. These data provide support for increasing agricultural production over the period, especially in these two key producing regions, a finding supported by evidence from MINAGRI.