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**Measurement and Analysis of Poverty in  
Rwanda**

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# Measurement and Analysis of Poverty in Rwanda

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## Abstract

This study examines the extent of poverty in different provinces and districts in Rwanda using both consumption and income per capita. It also looks at the determinants of household poverty and focuses on four categories for studying the determinants of poverty in the country. The income based study of poverty is based on information from the household survey and uses 14,810 observations in 2006, 2009 and 2012, while the consumption based poverty analysis is based on 7498 observations from 2012 database. The results is found to be very sensitive to the cdefinition of poverty line and use of income or consumption in analysis of poverty. This study shows that older household heads and female-headed households are more likely to be poor. Also living in rural and semi-urban areas increases the probability of being poor. Asset ownership (having a garden, cash crops, and banana trees) decreases the probability of being poor. The findings of this study serve as evidence for policymakers to employ poverty alleviation policies. Increasing investments in physical infrastructure, creating jobs for female-headed households and improving educational levels of household heads should also be focused on.

Keywords: Headcount poverty, poverty gap, poverty severity, Rwanda.

JEL Classification Codes: C25; D69; O40; O55.

## **1. Introduction**

Poverty is a global concern. Like inequality, the burden of poverty is unfairly spread among the regions of the developing world. In Africa poverty is severe and various reports have indicated that poverty increased significantly during the 1980s and 1990s and led to the 'Africanization of global poverty' (White and Kellick, 2001).

Most countries in sub-Saharan Africa (SSA) with very low saving rates and per capita gross domestic product (GDP) are in urgent need of substantial public investments through external assistance to reverse the current increasing poverty trends. A report published by the Economic and Social Research and Training Center for Islamic Countries (2007) points out that on average, sub-Saharan Africa's 726 million (45 per cent) people lived under the international poverty line (US \$1 a day). The highest level of inter-regional poverty is in SSA, where close to 50 per cent of the population is classified as poor. After SSA the next poorest region is South Asia in terms of poverty headcount indices (about 30 per cent of the region's population in 2000).

The facts are worse in Rwanda. The country is one of the poorest in the world. According to data retrieved from the World Bank's Development Indicators (WDI), Rwanda is one of the poorest countries in Africa. Rwanda is a landlocked, resource-poor country that is ranked 15 out of the 25 poorest countries in Africa with a GDP per capita of US\$ 689 in 2016. It was also ranked 167 out of 182 countries in the 2009 United Nations Development Program's (UNDP) Human Development Index (HDI) (Rashidghalam, 2017).

The most recent survey data available for estimating the multidimensional index (MDI) for Rwanda indicated that 69 per cent of its population lived in multidimensional poverty and about 19.4 per cent were vulnerable to multiple deprivations. On the other hand, the intensity of deprivation was 50.8 per cent. The country's MPI value, which is the share of the population that is multidimensionally poor adjusted by the intensity of the deprivations, was 0.35 (HDR, 2013). Therefore, as in many other developing countries even in Rwanda there is an urgent need to address the issue of poverty and to incorporate poverty reduction policies into development strategies. However, the most important question is: How is the government going to achieve this goal?

This question cannot be adequately addressed unless we have information on the level of relative and absolute poverty and characteristics of the poor and how these characteristics determine poverty in the country. With this background, studying these issues in terms of finding the causes and analyzing the ways of alleviating them is very important. This can be done at a micro-level on some groups of society or by concentrating on a particular area, or it can be studied at the macro level. The aim of our paper is: (i) to measure the level of relative and absolute poverty in Rwanda and to analyze the poverty gap and poverty severity in the country, (ii) to compare provinces and districts with regard to different poverty indices, (iii) to single out the major determinants of poverty on households, and (iv) to suggest suitable policy measures to alleviate poverty in the country.

The issue of poverty has been an important target of researchers in development literature and various studies point out the level of poverty and its determinants. Assefa (2003) found that female headship did not have a significant direct impact on poverty levels of households

in urban Ethiopia. On the other hand, household size, educational attainment of the head and the settlement location of the household were key determinants of poverty in this region. He suggests that gender-sensitive poverty alleviation policies that enhance endowments (such as those that increase education levels, employment and ability to control fertility) should be the key ingredients of poverty reduction strategies.

Fistum (2002) compares poverty indices between female- and male-headed households in Addis Ababa. He identifies the determinates of welfare and poverty in households. The results of his study indicate that female-headship had a positive influence on the welfare of the households. He concludes that educational attainment of the household head and number of children in the household are important determinants of poverty. Joo (2011) examined the changes in anti-inequality and anti-poverty effects of children's programs between 1995 and 2007 and suggests that although the poverty reduction effects of the federal child programs increased during this period, the programs' effects on reduction of children's relative and absolute poverty gaps decreased. Also, the anti-poverty effects of the federal child programs were weak for children in immigrant, female-headed and non-working families.

Asadullah and Chaudhury (2012) studied subjective well-being and relative poverty in rural Bangladesh. They show that households reported higher satisfaction levels when they experienced an increase in their incomes over the past years. Also, households which had incomes lower than their neighbors in the village showed less satisfaction with life. Similarly, individuals reported less satisfaction with life in villages with higher levels of inequality. According to their results, when compared to the effects of absolute income, relative income and local inequality are modest. Vaaltein and Schiller (2014) addressed multidimensional child poverty in the Eastern Cape of South Africa. They suggest that monetary support through the child support grant (CSG) should be increased to better accommodate the multidimensional child poverty needs of CSG recipients.

Rashidghalam (2017) studied poverty and its determinants in different provinces and districts of Rwanda in 2012. She concluded that a household's residence in the rural area and distance to market increased the probability of its being poor. She also found that female-headed households were poorer than male-headed ones. Her results show that literate household heads and ownership of property and assets reduced the probability of falling into poverty. Ucal (2014), Menon et al., (2015), Dzanku et al., (2015) and Grobler (2016) have also analyzed this important issue. Therefore, our study could be relevant to better emphasize and address the issue of poverty. It could contribute in filling the gaps in literature that have been left untouched by previous studies. Hence, unlike previous studies our study's scope has been extended to different areas and provinces in Rwanda and the models that we employ look into the determinants of different aspects of poverty.

## **2. Methodology**

A poverty analysis involves a number of steps. The first step and starting point is establishing the poverty line, which is a tool to separate the poor from the non-poor. Absolute versus relative poverty lines can be set in relative or absolute terms. A relative poverty line is related to the general standard of living in a society (explained by median or mean income or

consumption). The relative poverty line is not fixed over time, therefore it changes as the standard of living of society decreases or increases (for example, change in the distribution of income will reduce the number of people in relative poverty). On the other hand, absolute poverty refers to the position of a family or an individual in relation to a fixed poverty line (Ravallion, 1992). The absolute poverty line is fixed over time and in different locations. Adjustments for inflation can be used to change the level of absolute poverty over time. An absolute poverty line has elasticity of zero with respect to changes in society's living standards. Economic growth of a society results in a reduction in the number of people in absolute poverty. A distinction between relative and absolute poverty lines is important in legislation and in poverty reduction policies. Relative poverty lines are mostly applicable in developed countries while absolute poverty lines are commonly used in developing countries (Assefa, 2003).

The second step in a poverty analysis is constructing poverty measures based on poverty lines including the headcount index, the poverty gap index and poverty severity. In literature, absolute and relative poverty lines are treated as constant across provinces, districts, household characteristics and over time. This is a very strong assumption as in reality prices and living costs develop differently across these dimensions.

## 2.1 Headcount Index

The headcount index ( $P_H$ ) measures the proportion of the population with incomes less than the poverty line, regardless of its absolute or relative measurement; these people are considered as poor.  $P_H$  is denoted by:

$$(1) \quad P_H = N_p / N$$

where,  $N$  is the total population and  $N_p$  is the number of poor. Equation 1 can be rewritten as:

$$(2) \quad P_H = 1/N \sum_{i=1}^W I(C_i < z)$$

where,  $(z)$  is the poverty line and  $(C_i)$  is income or consumption expenditure. If the bracketed expression is true, the index  $I(.)$  takes the value of one and zero otherwise. If expenditure is less than the poverty line, then  $I(.)$  equals one and the household is counted as poor. Headcount index has three weaknesses: (i) it does not take the intensity of poverty into account, (ii) it does not indicate how poor the poor persons are and hence does not change if people below the poverty line become poorer, and (iii) poverty estimates should be calculated for individuals and not households. On the other hand, the advantage of the headcount index is that as a frequency measure it is simple to construct and easy to understand.

## 2.2 Poverty gap Index

The other index which is used for measuring poverty is the poverty gap index ( $P_G$ ). This index measures the extent to which households on average fall under the poverty line. This

index does not indicate the inequality changes among the poor. Poverty gap ( $G_i$ ) is defined as:

$$(3) \quad G_i = (z - y_i)I(C_i < z).$$

For the poor, poverty gap equals poverty line less actual income or consumption and for the non-poor above the poverty line it is considered to be zero. The sum of these aggregate gaps is used for measuring the cost of eliminating poverty in a society. Using the index function, the poverty gap index ( $P_G$ ) is written as:

$$(4) \quad P_G = 1/N \sum_{i=1}^N G_i / z.$$

### 2.3 Poverty severity index

Headcount and poverty gap indices do not take into account the inequalities among the poor. Hence, some researchers have used the squared poverty gap index to measure the severity of poverty. Poverty severity ( $P_s$ ) is a weighted sum of poverty gaps. This takes into account not only the distance separating the poor from the poverty line (measuring the poverty gap), but also the inequalities among the poor. That is, a higher weight is placed on those households which are further away from the poverty line (see Rashidghalam, 2017). The index is written as:

$$(5) \quad P_G = 1/N \sum_{i=1}^N (G_i / z)^2.$$

This measure may be thought of as one of a family of measures proposed by Foster, Greer and Thorbecke (1984), which may be written, quite generally, as:

$$(6) \quad P_\alpha = 1/N \sum_{i=1}^N (G_i / z)^\alpha, \quad (\alpha \geq 0)$$

where,  $\alpha$  is a parameter; when  $\alpha$  is larger the index puts more weight on the position of the poorest (WBI, 2005).

### 2.4 Determinants of poverty

Measuring the incidence of poverty, its intensity and severity are important in themselves. However, poverty's causal factors are equally important as a means of its alleviation. An econometric analysis is useful in identifying the factors that influence the extent of poverty. We used the Probit and Tobit models and standard regression analysis for this.

#### A. Probit model of incidence of poverty

A Probit model is used to measure the incidence of poverty. In other words, it is adopted to model factors that determine the probability of a household being poor or non-poor. Therefore, the dependent variable is binary, indicating whether a household is poor (1) or not poor (0) relative to the poverty line. The binary Probit model is expressed as:

$$(7) \quad Y_i^* = X'_{ij}\beta_j + \varepsilon_i, \quad (i=1,2, \dots, n)$$

where,  $Y^*$  is the underlying response variable in which  $Y_i$  equal one if the household is poor and zero otherwise.  $X$  is a vector of household characteristics serving as explanatory variables determining the households' state of poverty,  $\beta$  is a vector of unknown parameters to be estimated and  $\varepsilon_i$  is the residual.

### **B. Tobit models of poverty gap and poverty severity**

We used a generalized Tobit model to analyze jointly the incidence of poverty and poverty gap and poverty severity. It allowed us to estimate the effects of the determinants of poverty gap and poverty severity. In a Tobit model, the dependent (response) variable is not a binary variable and has a limited range. In other words, the response variable of non-poor is excluded. If the sample in this model is a sub-set of a whole population and only households which are below the poverty line are included, then the model is estimated using the ordinary least squares method accounting for sample selection by including the Mills Ratio from the first step Probit model. We analyzed household factors that influence poverty gap and poverty severity through a generalized Tobit regression analysis that accounts for sample selection. Negative coefficients in the model indicate that their variables inversely affected the poverty gap and poverty severity and the coefficient of the variables with a positive sign had a direct positive effect on poverty gap and poverty severity (see Gebru, 2010).

### **3. Data**

We obtained the data for our research from three household surveys in Rwanda. Both incomes and consumption per capita are used in analysis of poverty. The income based data for the household surveys covered 14,810 household observations. There were 2,711, 5,351 and 6,748 observations in 2006, 2009 and 2012 respectively. The consumption data based poverty analysis is based on CFSVA 2012 household data with 7,498 observations. The two datasets do not match. The dataset includes urban, semi-urban and rural areas which in turn form the Southern, Western, Northern and Eastern provinces. Each province is further divided into a number of districts. Nyanza, Gisagara, Nyaruguru, Ruhango, Muhanga and Kamonyi districts are in the Southern province. The Western province includes Karongi, Rutsiro, Rubavu, Nyabihu, Ngororero, Rusizi and Nyamasheke districts and Rulindo, Gakenke, Musanze, Burera and Gicumbi districts are in the Northern Province. The Eastern province includes Rwamagana, Nyagatare, Gatsibo, Kayonza, Kirehe and Ngoma districts.

Table 1.A presents the summary statistics of the income based variables used in our study, while Table 1.B shows the consumption based variables. This table can be divided into four broad parts. Income and livelihood variables are described in the first part (Part A). This part shows that about 6 and 26 per cent of the households were producers of cash crops and had access to credit respectively. The second part (Part B) describes the demographics and education variables. This part includes age of household head, household size, marital status of the head, gender of the head, literacy of the head, population density and population



growth; 59 per cent of the household heads were married. Table 1.A also shows that 23 per cent of the households were women-headed. Part C includes the location of the household. We included the location category to know the importance of region of residence in the poverty status of a household. This part of the table also covers area, distance to a road and distance to the market. In Rwanda a majority of the households (about 87 per cent) are in rural areas and only 4 and 8 per cent of them are located in urban and semi-urban areas respectively. We included these characteristics to study the effect of household assets and migration on the poverty status of households. Part D of Table 1.A includes five variables - number of income generating activities, having access to a farmland, vegetable garden, number of animals, crops and banana trees. According to the survey, about 93 and 56 per cent of the households had access to farmland and a vegetable garden respectively.

Insert Table 1.A and Table 1.B about here

#### **4. Results and Analysis**

An estimation of the poverty line facilitates identification of the poor from the non-poor. Different poverty measurements for Rwanda are presented in Table 2. According to this table the per capita relative poverty line based on income equaled 2,342 and based on this poverty line the relative headcount index was about 29 per cent. This value indicates that at least 29 per cent of the households in Rwanda were unable to meet the minimum income levels. Poverty gap, which is the average distance of a household from the poverty line, was found to be 340. The poverty gap square shows that the severity of poverty was 532,078. Coming to absolute poverty, the share of individuals whose incomes were below the absolute poverty line was 89 per cent, which is 60 per cent greater than the proportion of people who were living under the relative poverty line. Based on the absolute measure of poverty, absolute poverty gap ( $P_{G2}$ ) and poverty severity ( $P_{S2}$ ) were 15,698 and 300,487,390 respectively (all the figures are in Rwandan francs measured in per capita household).

Consumption poverty analysis show that when using relative poverty line based on 50 per cent of median consumption, on the average 26 per cent are classified as poor. The share increases to 53 per cent is one uses mean consumption. This suggest a skewed distribution of consumption despite 1 per cent extreme high consumptions were censored at the 99 per cent. When using absolute poverty line of \$1.25 converted to Rwf and on a monthly basis, consumption poverty headcount is much higher 89 per cent. This is despite the shameless poverty line of \$1.25 per household capita and day.

Insert Table 2 about here

Table 3.A compares the extent of poverty indices across different districts, provinces and regions. Part A of this table includes different districts and gives the following information: First, Nyagatare district had the largest amount of mean per capita income (56,009), therefore the least value of absolute headcount poverty ratio (0.84) and the relative headcount poverty ratio (0.25). Second, the highest value of the relative headcount poverty ratio was in Kamonyi and Gakenke districts while Nyaruguru had the highest absolute

headcount poverty ratio. Therefore, these districts are considered the poorest districts in Rwanda.

Part B of Table 3.A provides the same information for Rwanda's different provinces. Due to lack of information for Kigali, we exclude this province from our study. The Southern province had the lowest total income; it also had the lowest relative poverty line. On the other hand, the maximum relative headcount poverty ratio, poverty gap and poverty severity were in this province.

The households were divided into three groups by region -- urban, semi-urban and rural. Based on Part C of Table 3, headcount poverty ratio in the semi-urban areas was 32 per cent, which is 9 per cent more than urban areas (23 per cent). The rural areas fell in between. On the other hand, the absolute poverty headcount ratio in rural Rwanda was the highest (0.90), indicating that 90 per cent of Rwanda's households in the rural areas were in absolute poverty. Poverty gap and poverty severity were the highest in semi-urban areas.

According to Part D of Table 3.A which compares different poverty indices in different years of the study, in 2012 almost one-third of the population of Rwanda was in relative poverty and about 88 per cent was in absolute poverty. At the all-Rwanda level the relative poverty gap declined from 375 in 2006 to 273 in 2009 and then increased to 375 in 2012. Accordingly, poverty severity decreased from 635,436 in 2006 to 431,684 in 2009 and then increased to 570,185 in 2012. Again all the figures are per capita and in Rwandan francs.

Insert Table 3.A about here

Measure of consumption based poverty and their variations across districts, provinces and urban-rural areas is presented in Table 3.B. It shows, despite use of relative poverty line, evidence of large variations in poverty rate, its gap and severity by location suggesting high degree of inequality related to fertility of land, development infrastructures, etc. The gaps are bigger when considering application of unified absolute poverty line to the entire country. Figure 1.A and Figure 1.B show the per capita consumption expenditures levels across districts, provinces and areas in 2012.

Insert Table 3.B about here

Insert Figure 1.A and 1.B about here

A multivariate econometric analysis can be used for identifying the determinants of poverty. Hence the second part of our results are adapted to identify the determinants of poverty incidence, poverty gap and poverty severity in Rwanda. For this we used the Probit and Tobit models. Before the estimation, we followed the dependent and explanatory exploration process. We provide a simple correlation coefficient matrix to test whether multicollinearity and the risk of confounded effects exist between variables. The results are presented in Table 4.A. Correlation matrix in Table 4.B shows that mean and median consumption per capita are low correlated (0.562). The incidence of poverty is highly correlated with poverty gap (0.830) and severity (0.523) in case of relative consumption poverty, and they are also highly correlated (0.749 and 0.597) when using absolute poverty line. Figure 2.A and Figure 2.B show the incidence of poverty in consumption expenditures across districts, provinces and areas in 2012. Different absolute and relative poverty lines are used. The gaps in

consumption poverty using absolute and relative poverty lines are shown in Figure 3.A and 3.B.

Insert Table 4.A and 4.B about here

Insert Figure 2.A and 2.B about here

Insert Figure 3.A and 3.B about here

Gujarati (1995) has a rule of thumb, that says that there is a serious multicollinearity problem if the correlation coefficient is 0.8 or above. In general, econometrics literature uses 0.5 as the threshold for the multicollinearity problem between explanatory variables. As Table 4.A and 4.B shows we did not find a problem since the correlation between the dependent and explanatory variables was less than 0.1. These results indicate that each variable in different models can capture a distinct feature of poverty.

We estimated six models. Models 1 and 2 are Probit models of the determinants of incidence of poverty using income data where poverty is defined based on relative and absolute poverty lines respectively. Income is defined as total real monthly income per capita with equal weights for household members. The relative poverty line is defined as 50 per cent of median income which varies by district. The absolute poverty line is defined as monthly income expressed in Rwf (\$1.25/day multiplied with 30 days multiplied with Rwf 620 per dollar). Models 3 and 4 are Tobit models of the determinants of poverty gap, where poverty gap is defined as done earlier. Tobit Models 5 and 6 estimate the effects of the determinants of poverty severity and again poverty is defined based on relative and absolute poverty lines.

Table 5.A presents estimation results for the six different models on the determinants of poverty in Rwanda. The models differ in the way in which the poverty line is measured namely relative and absolute approaches. These models include two Probit models (Models 1 and 2) and four Tobit models (Models 3-6). The Probit model helps identify the determinants to explain the probability that a household is poor given normal distribution of the error term. Coefficients of variables with positive signs are positively correlated with the probability of becoming poor and coefficients with negative signs are negatively associated with the probability of becoming poor.

Insert Table 5.A about here

According to Table 5.A and in terms of region it was observed that living in urban and sub-urban areas had a positive effect on the probability of being poor, which was expected from Part C of Table 3.A. This thus confirms the results of Table 3.A. Bigsten et al., (2002) showed that in terms of regions, living standards are significantly higher for households in urban areas. On the other hand, Table 4.A shows that population growth and population density had a negative effect on the probability of being poor. The negative coefficients of community characteristics such as distance to market and distance to road variables indicate that the households which were far from the road or the market were poorer. A study done by Christiaensen and Subbarao (2001) showed that households' market accessibility decreased the vulnerability to consumption shortfalls.

In terms of households' age, Table 5.A shows that the age of the household head was inversely linked with the incidence of poverty. The negative sign of the literacy status variable shows that a household head's literacy level reduced the probability of being poor. This result was expected because education is considered as one of the key determinants of poverty and educated people can improve their chances of getting better jobs and mean incomes. Another important demographic characteristic is marital status and gender of the household head. As indicated in Table 5.A, households with married heads were among the poor households; this contradicts the general expectation. On the other hand, female headed households were poorer than male headed households in Rwanda.

The other demographic variable to be considered is household size; households with larger family sizes had a higher probability of falling into the poverty gap. As expected, having access to productive inputs such as credit decreased the probability of being poor. Also by increasing the number of income generating activities a household was less likely to be poor. Asset ownership (for example, having a garden, cash crops, and banana trees) decreased the probability of being poor.

The same measures of poverty (headcount, gap and severity) computed based on total consumption per capita household data for 2012 are used to estimate their determinants. The poverty incidence models are estimated using probit model, while poverty gap and poverty severity are estimated using tobit models. The results are presented in Table 5.B. The result shows that majority of the selected determinants influence the level and gap and severity of poverty.

Insert Table 5.B about here

## **5. Conclusion and policy implications**

Understanding poverty in Rwanda requires an understanding of its measurement. It is only with accurate measurement tools that we can understand poverty and thus how well we are doing as a society in reducing it. In this regard we used data which covered 14,810 households in 2006, 2009 and 2012. Poverty is measured based on both income and consumption. Consumption is a better measure as it is closer to the needs and suffer less from income reporting problem. We did a descriptive analysis as well as a poverty measurement using different poverty indices and a multivariate regression analyses. In addition, our study also identified some of the key determinants of poverty in Rwanda. We used Probit and Tobit models for analyzing the determinants of household poverty. We also investigated the determinants of poverty gap and poverty severity in which the dependent variable was no more binary and was continuous with limited ranges.

Use of absolute and relative poverty measure and mean or median income or consumption provide different picture of poverty and its intensity due to skewed distributions. Median is a better measure. The two measure are close once one omit the extreme outliers. Our results indicate that in 2012, almost one-third of the population in Rwanda was in relative poverty and about 88 per cent of the population of Rwanda (Kigali excluded) was in absolute poverty. On the other hand, the Southern province had the highest poverty ratio among the provinces

while the largest relative poverty ratio was in Kamonyi and Gakenke districts. The results of the Probit and Tobit models show that female-headed households were poorer and that a larger family had a higher probability of falling into poverty. Also, as expected, asset ownership decreased the probability of being poor.

Based on our empirical findings, we draw the following policy implications to decrease poverty at the household level in Rwanda. First, since a majority of the poor live in rural and semi-urban areas, there is an urgent need to increase the incomes of households in these areas to help reduce poverty. Second, providing more credit to households is an effective way of reducing poverty. Third, it is important to facilitate improved educational levels of household heads so that they can provide their families with better jobs and sources of income. Fourth, by enhancing poor physical assets, most notably vegetable gardens, the government can generate livelihood options. Fifth, creation of special economic, educational and job opportunities for female headed households will have strong implications for family welfare. Finally, increasing investments in public physical infrastructure (for example, rural roads and markets) will also be effective ways of alleviating poverty.

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**Table 1.A Summary income statistics of the variables (N=14,810)**

Variables	Definition	Mean	Std. Dev.	Minimum	Maximum
<u>A. Income and livelihood</u>					
tincome	Total income from all income generating primary activities	39774.82	60940.27	0	2544000
income	Income	12139.07	38102.69	0	2544000
mincome	Mean income	12139.07	2902.24	7153.98	19442
dincome	Median income	4683.31	922.04	3547.20	6609.26
Nrincome	Number of income generating activities undertaken by household	1.77	0.68	0	10
nrcrops	Total number of farmed crops	3.37	1.73	0	10
cashcrop	Equals 1 if the household is a producer of cash crops	0.06	0.24	0	1
credd	Access to credit (=1 if household have access to credit)	0.26	0.44	0	1
<u>B. Demographics and education</u>					
agehead	Age of household head	44.38	14.81	15.00	103
size	Number of people in the household	5.26	2.15	1	18
mshead	Marital status of head, equals 1 if the head is married	0.59	0.49	0	1
dfemale	Gender of head, equals 1 if the head is female	0.23	0.42	0	1
popdens	Population density - number of inhabitants per square kilometer	634.06	762.10	1.90	13009
populg	Population growth	3.16	3.37	-5.67	25.02
lithead	Household head can read and write a simple message	0.83	0.78	0	9
<u>C. Location</u>					
rural	Equals 1 if the households live in a rural area	0.87	0.33	0	1
semiurb	Equals 1 if the households live in a semi-urban area	0.08	0.27	0	1
distroad	Distance to road	3760.76	3525.21	0	21924.65
distmark	Distance to market	77.22	61.95	0	1200
<u>D. Household assets and migration</u>					
worksend	Working elsewhere and sending home remittances	0.05	0.22	0	1
fland	Access to farmland (=1 if household has access to farmland)	0.93	0.26	0	1
vegetd	Vegetable garden (=1 if household owns a vegetable garden)	0.56	0.50	0	1
nranimal	Number of animals	2.99	5.69	0	203
bantrnr	Number of banana trees owned by the household	22.06	112.86	0	3500

Table 1.B Summary statistics of consumption data, Rwanda 2012, 7498 obs.

Variable	Mean	Std Dev	Minimum	Maximum
Head age	46.997	15.598	15.000	103.000
Head literacy	0.607	0.488	0.000	1.000
Marital status	0.687	0.464	0.000	1.000
Number of spouses or partners	1.012	0.279	0.000	5.000
Roof material	2.443	0.544	0.000	6.000
Floor material	1.277	0.729	1.000	7.000
Number of rooms	2.506	1.028	1.000	11.000
Toilet and types	2.861	0.851	1.000	6.000
Electricity improved source	0.475	0.499	0.000	1.000
Number of income activities	1.642	0.635	0.000	4.000
Farming land	0.837	0.369	0.000	1.000
Vegetables plot	0.581	0.494	0.000	1.000
Number of crops cultivated	2.550	1.372	0.000	4.000
Access to credit	0.007	0.082	0.000	1.000
Per capita income	16716.093	43768.483	0.000	1350000.000
Altitude	1725.014	288.152	955.000	2739.000
Distance to road	3565.761	3639.801	0.000	21925.000
Distance to school	24.624	23.469	0.000	150.000
Distance to market	72.157	69.202	0.000	1200.000
Household size	4.967	2.184	1.000	18.000
Sources of water	3.997	2.311	1.000	8.000
Payment for water	0.304	0.477	0.000	6.000
Head female	0.287	0.453	0.000	1.000
Food expenditure	17636.109	24673.353	0.000	144062.000
Items expenditure	31731.004	65622.570	0.000	448617.000
Total expenditure	49808.171	86103.343	83.000	579133.000
Urban	0.120	0.325	0.000	1.000
Rural	0.797	0.402	0.000	1.000
Semi-urban	0.083	0.275	0.000	1.000
Monthly food exp. per capita	3843.529	5443.219	0.000	86800.000
Monthly item exp. per capita	6629.058	15373.576	0.000	418067.000
Monthly total exp. per capita	10503.976	19431.630	48.333	475133.000



Table 2. Income and consumption based poverty measurements

Variables	Definition	Mean	Std. Dev.	Minimum	Maximum
<u>Relative Income Poverty:</u>					
Z <sub>1</sub>	Relative poverty line based on 50% of median	2341.65	461.02	1773.60	3304.63
P <sub>H1</sub>	Headcount poverty ratio by relative poverty line	0.29	0.45	0	1.00
P <sub>G1</sub>	Poverty gap by relative poverty line	339.93	645.41	0	3304.63
P <sub>S1</sub>	Poverty severity by relative poverty line	532078.40	1298410	0	10920575.00
<u>Absolute Income Poverty:</u>					
Z <sub>2</sub>	Absolute poverty line based on \$1.25 per day	23250	0	23250.00	23250.00
P <sub>H2</sub>	Headcount poverty ratio by absolute poverty line	0.89	0.31	0	1.00
P <sub>G2</sub>	Poverty gap by relative absolute line	15697.83	7353.17	0	23250.00
P <sub>S2</sub>	Poverty severity by absolute poverty line	300487390.1 0	177680136.6 0	0	540562500.0 0
<u>Relative Consumption Poverty:</u>					
Z <sub>1</sub>	Relative poverty line based on 50% of median	2387.50	0	2387.50	2387.50
Z <sub>1x</sub>	Relative poverty line based on 50% of mean	5252.00	0	5252.00	5252.00
P <sub>H1</sub>	Headcount poverty ratio by relative poverty line median	0.26	0.44	0	1.00
P <sub>H1x</sub>	Headcount poverty ratio by relative poverty line - mean	0.53	0.50	0	1.00
P <sub>G1</sub>	Poverty gap by relative poverty line	275.14	553.98	0	2339.17
P <sub>S1</sub>	Poverty severity by relative poverty line	382563.92	94695.20	0	5471701.00
<u>Absolute Consumption Poverty:</u>					
Z <sub>2</sub>	Absolute poverty line based on \$1.25 per day	23250.00	0	23250.00	23250.00
P <sub>H2</sub>	Headcount poverty ratio by absolute poverty line	0.89	0.31	0	1.00
P <sub>G2</sub>	Poverty gap by absolute poverty line	15645.45	7168.67	0	23201.67
P <sub>S2</sub>	Poverty severity by absolute poverty line	296162997.7 1	170317427.3 0	0	538317336.1 1

Note: \$1.25 x 620 Rwf x 30 = 23250 Rwf

**Table 3.A Means of income based poverty measure variables by district, province and area**

	hhsizes	Income		Poverty line		Head count		Poverty gap		Poverty severity	
		Total income	Income per capita	Relative Pov line	Absolute Pov line	Head C Relative	Head C Absolute	Gap Relative	Relative Absolute	Gap2 Relative	Gap2 Absolute
<b>A. Means by district</b>											
Nyanza	5	30057	7747	1774	23250	0.28	0.92	232	16682	253040	324242197
Gisagara	5	37317	12497	2700	23250	0.27	0.91	376	15218	659070	284355789
Nyaruguru	6	25344	7154	1831	23250	0.29	0.96	273	17878	337344	352779215
Huye	5	43693	12662	2757	23250	0.30	0.87	393	14908	677878	280510641
Nyamagabe	5	35573	12239	1875	23250	0.29	0.91	330	16890	454074	333206966
Ruhango	5	40873	12511	2623	23250	0.25	0.87	323	15023	526693	282224020
Muhanga	5	31101	9952	1875	23250	0.28	0.93	262	16672	308789	325317460
Kamonyi	5	33495	9226	1800	23250	0.33	0.91	306	16463	354452	325280245
Karongi	5	42495	14365	2724	23250	0.28	0.88	360	15186	601274	283345227
Rutsiro	5	39801	11006	2248	23250	0.31	0.90	329	15763	481543	302672124
Rubavu	6	49709	11508	2932	23250	0.29	0.90	459	14726	898349	270820617
Nyabihu	5	42085	10566	2400	23250	0.27	0.92	272	16015	373677	301284185
Ngororero	5	30157	8815	1809	23250	0.31	0.92	326	16811	423886	330666518
Rusizi	6	46646	14302	2400	23250	0.26	0.89	286	15581	423564	295815926
Nyamasheke	6	38308	10401	2155	23250	0.29	0.89	303	15768	403890	302776711
Rulindo	5	31498	9466	1916	23250	0.25	0.92	249	16827	319880	327479206
Gakenke	5	30302	8668	1902	23250	0.33	0.91	330	16654	423835	329586729
Musanze	5	49056	15527	3143	23250	0.31	0.85	477	14113	921259	261239830
Burera	5	44368	13223	2315	23250	0.32	0.87	392	15175	609749	292862616
Gicumbi	5	43590	11728	2582	23250	0.30	0.88	397	15240	653969	289396758
Rwamagana	5	42464	16879	2032	23250	0.31	0.89	323	15900	431847	309269200
Nyagatare	5	56009	19442	3305	23250	0.27	0.84	431	13741	951568	250470972
Gatsibo	5	35175	11344	1916	23250	0.27	0.90	272	16213	340305	315768651
Kayonza	5	48078	14918	2884	23250	0.30	0.86	398	14461	715518	269874841
Kirehe	5	46331	14893	2918	23250	0.28	0.87	419	14434	806899	266683718
Ngoma	5	37605	15204	1938	23250	0.31	0.88	348	15922	482526	312721988
Bugesera	5	35404	9274	2000	23250	0.27	0.93	267	16492	365690	317130149
<b>B. Means by province:</b>											
Southern	5	34716	10550	2164	23250	0.28	0.91	314	16217	451348	313404070
Western	5	41417	11675	2384	23250	0.29	0.90	333	15674	513011	297820783
Northern	5	40044	11809	2395	23250	0.30	0.89	373	15556	596903	298974171
Eastern	5	43099	14469	2444	23250	0.28	0.88	351	15289	589391	291016712
<b>C. Means by area:</b>											
Urban	5	54853	17354	2370	23250	0.23	0.83	311	13899	542857	259119936
Semi-urban	5	40937	14600	2474	23250	0.32	0.89	402	15785	647803	303045054
Rural	5	38843	11628	2328	23250	0.29	0.90	336	15788	520869	302517432
<b>D. Means by year:</b>											
2006	5	40829	13794	2416	23250	0.30	0.87	375	15358	635436	2.9E+08
2009	6	40111	8482	2326	23250	0.23	0.93	273	15654	431687	2.9E+08
2012	5	39084	14375	2324	23250	0.33	0.88	378	15869	570185	3.1E+08

Table 3.B. Mean consumption variables by province, district and urban areas, 2012 data, 7498 obs.

	Food exp	Item exp	Total exp	poor1	poor1 x	poor2	pgap1	pgap2	pgap1s	pgap2s
District:										
Casabo	12113	17682	30000	0.02	0.08	0.50	8	5401	6311	77277230
Kickiro	9540	15020	24844	0.08	0.22	0.66	83	9285	109560	155891668
Nyarugenge	14710	24519	39818	0.03	0.06	0.45	16	4804	23785	67644446
Nyanza	2009	2824	4634	0.57	0.81	0.98	724	19584	1146405	404832445
Gisagara	2369	3161	5367	0.30	0.69	0.98	258	18240	306000	354910967
Nyaruguru	2968	4864	7953	0.28	0.61	0.92	258	16740	336179	320433715
Huye	3038	3911	6951	0.34	0.67	0.94	296	17524	356907	343649823
Nyamagabe	3056	6342	9397	0.30	0.59	0.92	306	16643	412149	318536623
Ruhango	2434	5517	8141	0.36	0.62	0.95	357	17330	479364	336823150
Muhanga	2050	2933	4971	0.35	0.66	0.98	365	18462	511187	360285199
Kamonyi	1773	4378	6082	0.46	0.69	0.95	541	18006	805356	361146094
Karongi	2639	6019	8597	0.32	0.61	0.94	292	17059	372539	327631849
Rutsiro	2085	1797	3800	0.44	0.78	0.99	536	19501	784006	393480184
Rubavu	4866	6924	11823	0.12	0.38	0.87	90	13856	89807	244176161
Nyabihu	4190	4317	8668	0.17	0.44	0.94	123	15835	139119	284296471
Ngororero	1554	3085	4639	0.39	0.70	0.98	410	18698	563964	369158621
Rusizi	3416	4094	7489	0.28	0.53	0.94	371	16339	566911	311147036
Nyamasheke	2574	5515	8187	0.28	0.56	0.94	224	16546	284934	314922273
Rulindo	2380	4232	6618	0.40	0.73	0.96	378	18253	474334	363824642
Gakenke	2781	3820	6473	0.26	0.59	0.96	235	17179	314966	325852114
Musanze	6028	9092	14981	0.05	0.24	0.83	41	11868	47252	192791104
Burera	3094	5863	8847	0.27	0.58	0.92	283	16090	395020	306246122
Gicumbi	2620	6818	9440	0.25	0.56	0.92	292	16307	404402	310215817
Rwamagana	3049	8788	11985	0.22	0.45	0.90	235	15001	321947	274294375
Nyagatare	3351	7105	10523	0.15	0.41	0.90	164	14683	234558	262447422
Gatsibo	2427	3402	5650	0.28	0.65	0.97	293	17955	377921	347470526
Kayanza	3277	8019	11261	0.14	0.47	0.88	168	14597	249990	264259883
Kirehe	3085	7303	10701	0.12	0.42	0.91	103	14854	112411	262825562
Ngoma	3676	7032	10668	0.18	0.45	0.90	184	15011	264278	272056048
Bugesera	2143	4480	6585	0.49	0.67	0.94	619	17727	985297	356693468
Province:										
Kigali	12121	19074	31554	0.04	0.12	0.54	36	6497	46552	100271115
Southern	2462	4241	6687	0.37	0.67	0.95	388	17816	544193	350077252
Western	3046	4535	7600	0.29	0.57	0.94	292	16833	400199	320683543
Northern	3381	5965	9272	0.25	0.54	0.92	246	15939	327195	299785960
Eastern	3001	6592	9627	0.23	0.50	0.91	252	15689	363764	291403288
Urban-Rural:										
Urban	10731	18108	29115	0.07	0.18	0.59	60	7786	76211	127038910
Semi-urban	2828	4929	7748	0.29	0.58	0.94	307	16797	428896	321057972
Rural	3634	6355	10061	0.27	0.54	0.90	284	15954	380537	301629974
Sample:										
Mean	2387	5252	23250	0.264	0.531	0.895	275	15645	382564	296162998
Std Dev	0.000	0.000	0.000	0.441	0.499	0.307	554	7169	946952	170317427

Notes: poor1=relative poverty line based on 0.50 of median, poor1x=relative poverty line based on 0.50 of mean, poor2=absolute poverty line based on \$1.25 per day, pgap1=poverty gap based on poor1, pgap1x=poverty gap based on poor2; pgap1s=poverty severity based on pgap1; pgap2s=poverty severity based on pgap2.

**Table 4.A Correlation matrix of the variables (N=14,810)**

	Year	Househ. Size	Total income	Income percapita	Povline relative	Povgap relative	Povgap2 relative	Povgap absolute	povgap2 absolute	Popul growth	Distance road	Distance market	Age head	Nr income	Farm land	Vegetable garden	Nr animal	Nr crops	Cash crops	Banana tees nr
Year	1.00																			
House size	-0.09 (0.00)	1.00																		
Total income	-0.01 (0.18)	-0.23 (0.00)	1.00																	
Income per cap	0.03 (0.00)	-0.29 (0.00)	0.81 (0.00)	1.00																
Povline relative	-0.06 (0.00)	0.01 (0.17)	0.11 (0.00)	0.05 (0.00)	1.00															
Povgap relative	0.02 (0.01)	0.34 (0.00)	-0.30 (0.00)	-0.16 (0.00)	0.08 (0.00)	1.00														
Pgap2 relative	0.00 (0.85)	0.28 (0.00)	-0.24 (0.00)	-0.12 (0.00)	0.14 (0.00)	0.94 (0.00)	1.00													
Povgap absolute	0.03 (0.00)	0.53 (0.00)	-0.65 (0.00)	-0.45 (0.00)	-0.13 (0.00)	0.48 (0.00)	0.38 (0.00)	1.00												
povgap2 absolute	0.04 (0.00)	0.53 (0.00)	-0.61 (0.00)	-0.39 (0.00)	-0.14 (0.00)	0.60 (0.00)	0.48 (0.00)	0.97 (0.00)	1.00											
Popul growth	-0.03 (0.00)	0.02 (0.00)	0.06 (0.00)	0.03 (0.00)	0.21 (0.00)	0.02 (0.00)	0.04 (0.00)	-0.03 (0.00)	-0.04 (0.00)	1.00										
Distance to road	0.00 (0.86)	-0.02 (0.02)	-0.03 (0.00)	-0.01 (0.27)	0.06 (0.00)	0.02 (0.03)	0.02 (0.01)	0.01 (0.51)	0.01 (0.43)	0.09 (0.00)	1.00									
Distance market	-0.02 (0.02)	-0.01 (0.10)	-0.05 (0.00)	-0.02 (0.01)	0.02 (0.03)	0.01 (0.32)	0.00 (0.59)	0.03 (0.00)	0.03 (0.00)	0.02 (0.05)	0.18 (0.00)	1.00								
Age head	0.10 (0.00)	0.07 (0.00)	-0.05 (0.00)	0.01 (0.31)	-0.04 (0.00)	0.08 (0.00)	0.07 (0.00)	0.05 (0.00)	0.07 (0.00)	0.00 (0.61)	-0.02 (0.01)	-0.02 (0.07)	1.00							
Nr income	-0.18 (0.00)	0.15 (0.00)	0.09 (0.00)	-0.01 (-0.14)	0.04 (0.00)	-0.11 (0.00)	-0.10 (0.00)	-0.07 (0.00)	-0.09 (0.00)	-0.02 (-0.03)	0.02 (0.02)	0.01 (0.15)	-0.08 (0.00)	1.00						
Farm land	-0.07 (0.00)	0.07 (0.00)	-0.11 (0.00)	-0.10 (0.00)	-0.10 (0.00)	0.01 (0.18)	0.00 (0.83)	0.09 (0.00)	0.09 (0.00)	0.09 (0.00)	-0.08 (0.00)	0.09 (0.00)	0.04 (0.00)	0.20 (0.00)	1.00					
Vegetable garden	0.16 (0.00)	0.11 (0.00)	0.00 (0.63)	-0.05 (0.00)	-0.01 (0.24)	-0.02 (0.01)	-0.02 (0.00)	0.02 (0.00)	0.01 (0.09)	-0.06 (0.00)	0.00 (0.77)	0.01 (0.11)	0.00 (0.94)	0.03 (0.00)	0.10 (0.00)	1.00				
Nr animal	-0.06 (0.00)	0.19 (0.00)	0.06 (0.00)	0.02 (0.02)	0.03 (0.00)	-0.02 (0.02)	-0.02 (0.02)	0.00 (0.57)	-0.01 (0.18)	0.10 (0.00)	0.03 (0.00)	-0.01 (0.13)	0.06 (0.00)	0.18 (0.00)	0.06 (0.00)	0.06 (0.00)	1.00			
Nr crops	-0.08 (0.00)	0.14 (0.00)	-0.01 (0.50)	-0.06 (0.00)	-0.06 (0.00)	-0.04 (0.00)	-0.04 (0.00)	0.01 (0.47)	-0.01 (0.15)	-0.02 (0.04)	0.09 (0.00)	0.02 (0.01)	-0.01 (0.35)	0.19 (0.00)	0.50 (0.00)	0.14 (0.00)	0.15 (0.00)	1.00		
Cash crops	0.02 (0.03)	0.06 (0.00)	0.03 (0.00)	0.00 (0.91)	-0.06 (0.00)	-0.04 (0.00)	-0.04 (0.00)	-0.01 (0.18)	-0.02 (0.03)	-0.04 (0.00)	-0.01 (0.12)	-0.01 (0.10)	0.05 (0.00)	0.04 (0.00)	0.07 (0.00)	0.06 (0.00)	0.04 (0.00)	0.19 (0.00)	1.00	
Banana tees nr	-0.17 (0.00)	0.07 (0.00)	0.03 (0.00)	0.00 (0.88)	0.09 (0.00)	-0.02 (0.00)	-0.02 (0.05)	-0.03 (0.00)	-0.04 (0.00)	0.07 (0.00)	0.05 (0.00)	0.02 (0.06)	-0.02 (0.02)	0.04 (0.00)	0.05 (0.00)	0.01 (0.38)	0.07 (0.00)	0.12 (0.00)	0.00 (0.97)	1.00

Table 4.B Correlation matrix, consumption data, 7,498 obs.

	poor1	poor1x	poor2	pgap1	pgap2	pgap1s	pgap2s
poor1	1.0000	0.5620	0.2054	0.8301	0.5226	0.6752	0.6468
p-value		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
poor1x	0.5620	1.0000	0.3654	0.4665	0.7590	0.3794	0.8530
p-value	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001
poor2	0.2054	0.3654	1.0000	0.1705	0.7490	0.1387	0.5968
p-value	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001
pgap1	0.8301	0.4665	0.1705	1.0000	0.4579	0.9568	0.5813
p-value	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001
pgap2	0.5226	0.7590	0.7490	0.4579	1.0000	0.3835	0.9667
p-value	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001
pgap1s	0.6752	0.3794	0.1387	0.9568	0.3835	1.0000	0.4935
p-value	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001
pgap2s	0.6468	0.8530	0.5968	0.5813	0.9667	0.4935	1.0000
p-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	

Notes: poor1=relative poverty line based on 0.50 of median, poor1x=relative poverty line based on 0.50 of mean, poor2=absolute poverty line based on \$1.25 per day, pgap1=poverty gap based on poor1, pgap1x=poverty gap based on poor2; pgap1s=poverty severity based on pgap1; pgap2s=poverty severity based on pgap2.

**Table 5.A Probit and Tobit models' estimation results**

	<u>Probit, Headcount</u>				<u>Tobit, Poverty gap</u>				<u>Tobit, Poverty severity</u>			
	Model 1: Relative		Model 2: Absolute		Model 3: Relative		Model 4: Absolute		Model 5: Relative		Model 6: Absolute	
	Coeff.	StdErr	Coeff.	StdErr	Coeff.	StdErr	Coeff.	StdErr	Coeff.	StdErr	Coeff.	StdErr
Intercept	-1.79	0.10	-0.94	0.13	-1.42	38.36	7495.43	385.87	62246.55	79839.99	109270000.00	9202477.00
Rural	0.19	0.06	0.23	0.08	25.54	23.75	1311.94	238.85	-10093.60	49420.14	31740460.00	5696239.00
Semiurb	0.34	0.07	0.27	0.10	97.46	28.50	1533.98	286.69	123099.10	59317.61	36978269.00	6837036.00
Popdens	-0.00	0.00	-0.00	0.00	-0.01	0.01	-0.65	0.07	0.82	14.63	-15418.60	1686.32
Populg	-0.01	0.00	-0.01	0.01	1.04	1.52	-65.89	15.30	8814.60	3165.25	-1788472.00	364830.90
Distroad	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.01	0.01	10.83	3.02	-148.76	347.81
Distmark	-0.00	0.00	-0.00	0.00	0.05	0.08	2.07	0.80	59.41	166.08	42607.89	19142.53
Agehead	-0.00	0.00	-0.00	0.00	-0.35	0.37	-28.91	3.69	-32.33	763.06	-581072.00	87951.31
Lithead	-0.12	0.02	-0.17	0.03	-34.45	7.30	-658.13	73.46	-46837.60	15198.50	-16170000.00	1751802.00
Mshead	0.02	0.03	-0.04	0.05	4.77	13.05	197.88	131.26	7440.65	27159.00	3811217.00	3130387.00
Dfemale	0.10	0.04	0.20	0.05	37.28	15.49	567.40	155.85	70684.91	32245.95	13065744.00	3716716.00
Hhsize	0.34	0.01	0.70	0.02	127.57	2.49	2122.56	25.03	209290.60	5179.15	52100272.00	596956.80
Nrincome	-0.36	0.02	-0.30	0.03	-145.99	7.57	-1600.40	76.15	-262164.00	15756.74	-43940000.00	1816146.00
Credd	-0.25	0.03	-0.37	0.04	-82.86	11.58	-1523.48	116.44	-137696.00	24093.02	-37330000.00	2776998.00
Worksend	-0.07	0.06	-0.13	0.08	-27.12	21.84	-567.50	219.64	-47180.90	45444.29	-10760000.00	5237977.00
Fland	0.40	0.06	0.59	0.07	117.43	22.56	2987.80	226.92	155985.10	46950.73	73359017.00	5411611.00
Vegetd	-0.12	0.03	-0.02	0.04	-43.79	10.12	-274.81	101.75	-77724.00	21052.55	-9179226.00	2426549.00
Mranimal	-0.02	0.00	-0.02	0.00	-7.00	0.89	-94.31	8.95	-12348.20	1850.79	-2415835.00	213324.90
Nrcrops	-0.04	0.01	-0.06	0.01	-11.01	3.47	-224.16	34.87	-14587.80	7214.20	-5832576.00	831519.50
Cashcrop	-0.26	0.05	-0.19	0.08	-117.36	20.80	-892.37	209.22	-222821.00	43288.44	-25350000.00	4989490.00
Bantrnr	-0.00	0.00	-0.00	0.00	-0.13	0.04	-2.69	0.44	-238.06	90.87	-67502.00	10474.06
d2009	-0.43	0.04	-0.09	0.06	-182.33	15.77	-1204.06	158.65	-336037.00	32824.88	-39650000.00	3783445.00
d2012	0.05	0.04	-0.11	0.05	-32.84	14.53	131.72	146.11	-132718.00	30231.54	4748735.00	3484532.00
Scale	-	-	-	-	583.21	3.39	5866.04	34.09	1213726.00	7053.19	139900000.00	812961.40

Table 5.B. Probit and Tobit estimation of determinants of headcount, poverty gap and poverty severity.

	Probit	Probit	Probit	Tobit	Tobit	Tobit	Tobit
	Poor1	Poor1x	Poor2	Pgap1	Pgap2	Pgap1s	Pgap2s
Parameter	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	1.4808a	1.1511a	-0.3394b	101.898b	7391.433a	157783.00b	118990000a
Rural	-0.7066a	-0.8283a	-0.7668a	184.005a	5892.334a	272988.50a	127150000a
Semiurb	-0.6895a	-0.7689a	-0.6779a	175.110a	5617.385a	243532.30a	120090000a
Distroad	0.0000b	0.0000a	0.0000b	0.004b	0.085a	6.61b	2063a
Distmark	-0.0003	-0.0006a	-0.0028a	0.139	6.008a	294.78c	127046a
Agehead	-0.0038a	-0.0015	0.0045a	2.264a	-3.936	4097.05a	91830
Lithead	0.2886a	0.3677a	0.5746a	-114.480a	-2400.180a	-181801.00a	-57070000a
Mshead	0.0173	-0.1466b	-0.2087b	-21.768	844.660a	-45389.30	16782314b
Dfemale	-0.1139	-0.2992a	-0.3025a	36.651	1547.484a	48382.37	35800756a
Hhsize	-0.0412a	-0.0650a	-0.0873a	14.575a	384.591a	20244.29a	9170200a
Nrincome	0.2353a	0.2370a	0.3011a	-92.211a	-1480.640a	-143969.00a	-36180000
Credd	-0.0849	0.0469	0.0816	56.987	-426.994	112654.40	-13600000a
FLand	-0.7891a	-0.8669a	-0.7723a	271.295a	5370.623a	394751.50a	129030000a
Vegetd	0.1960a	0.2111a	0.1396a	-94.629a	-794.300a	-159806.00a	-23810000a
Nrcrops	0.1132a	0.0684a	-0.0270	-54.625a	-210.613b	-88330.80a	-8770799
Scale	..	..	..	530.996	6138.447	913641.80	148640000
0	5,521	3,514	790	5,521	790	5,521	790
1 or # 0	1,977	3,984	6,708	1,977	6,708	1,977	6,708
Obs	7,498	7,498	7,498	7,498	7,498	7,498	7,498

Notes: poor1=relative poverty line based on 0.50 of median, poor1x=relative poverty line based on 0.50 of mean, poor2=absolute poverty line based on \$1.25 per day, pgap1=poverty gap based on poor1, pgap1x=poverty gap based on poor2; pgap1s=poverty severity based on pgap1; pgap2s=poverty severity based on pgap2. Significant at less than 1% (a), 1-5% (b), 6-10% (c), not significant ( ).

Figure 1.A Mean consumption poverty among districts in Rwanda, Rwf in 2012.

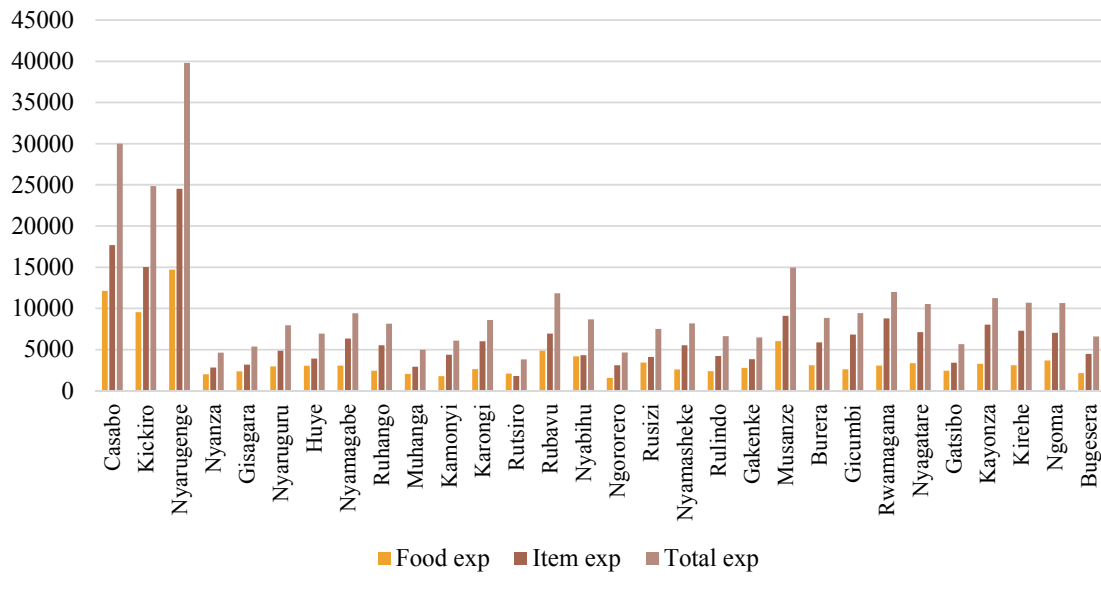


Figure 1.B Mean consumption poverty among provinces and areas in Rwanda, Rwf 2012.

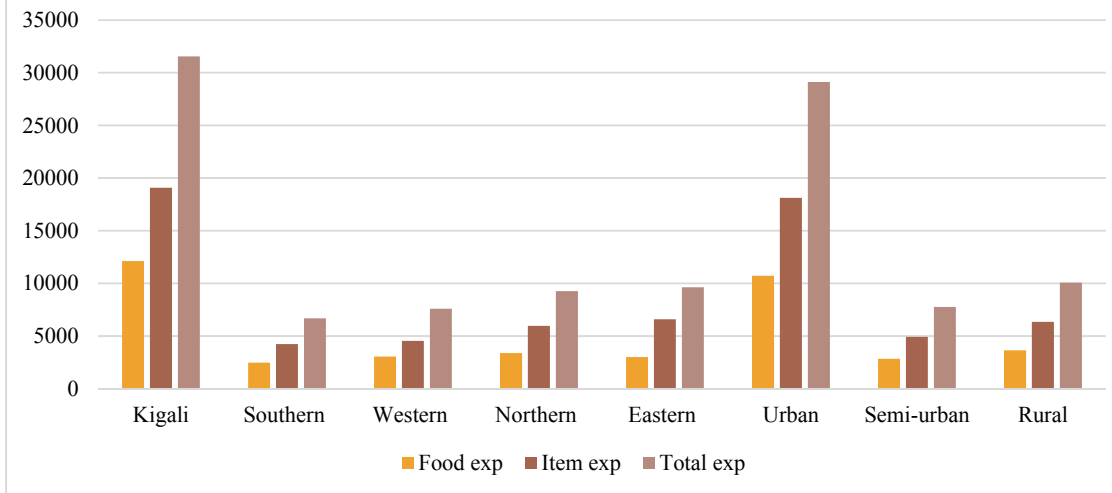




Figure 2.A. Incidence of consumption poverty among districts in Rwanda, % in 2012

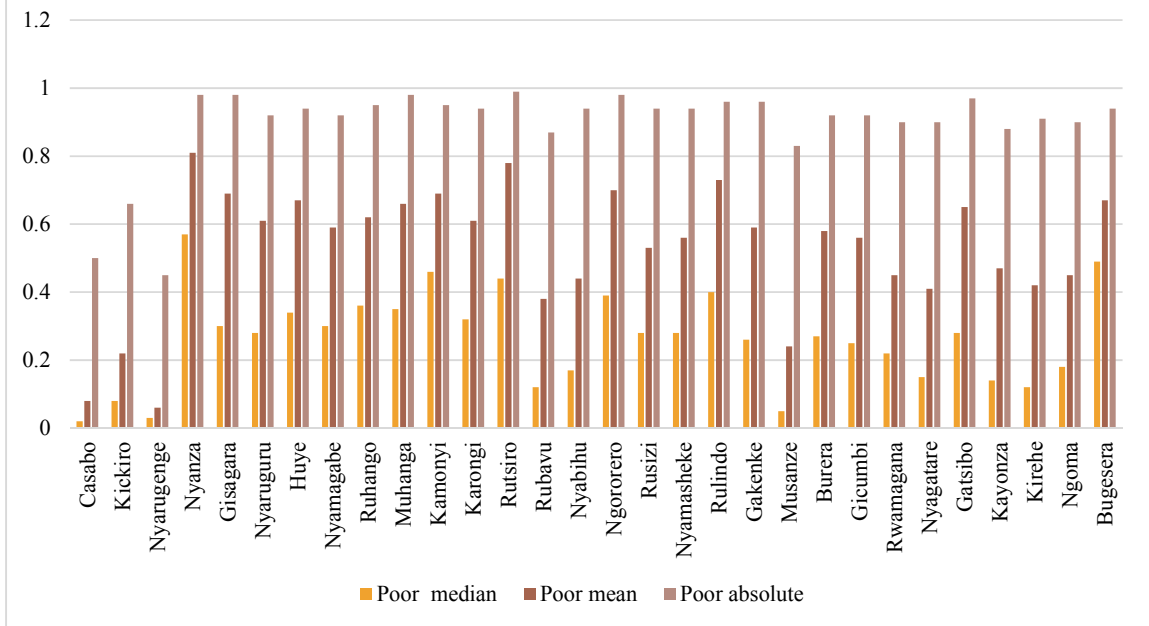


Figure 2.B Incidence of consumption poverty among provinces and areas in Rwanda, % in 2012.

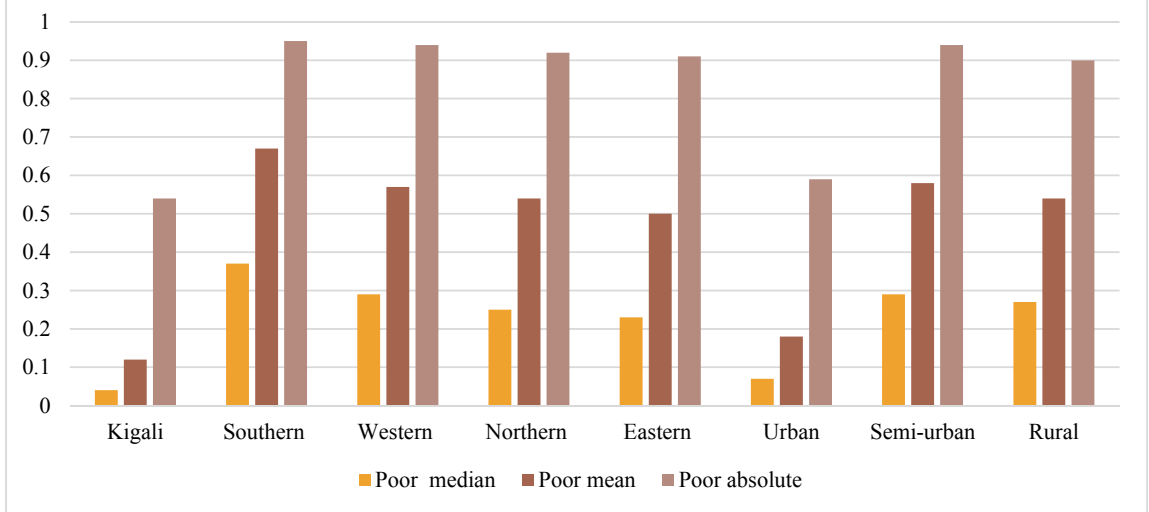


Figure 3.A Consumption poverty gap among districts in Rwanda, Rwf in 2012.

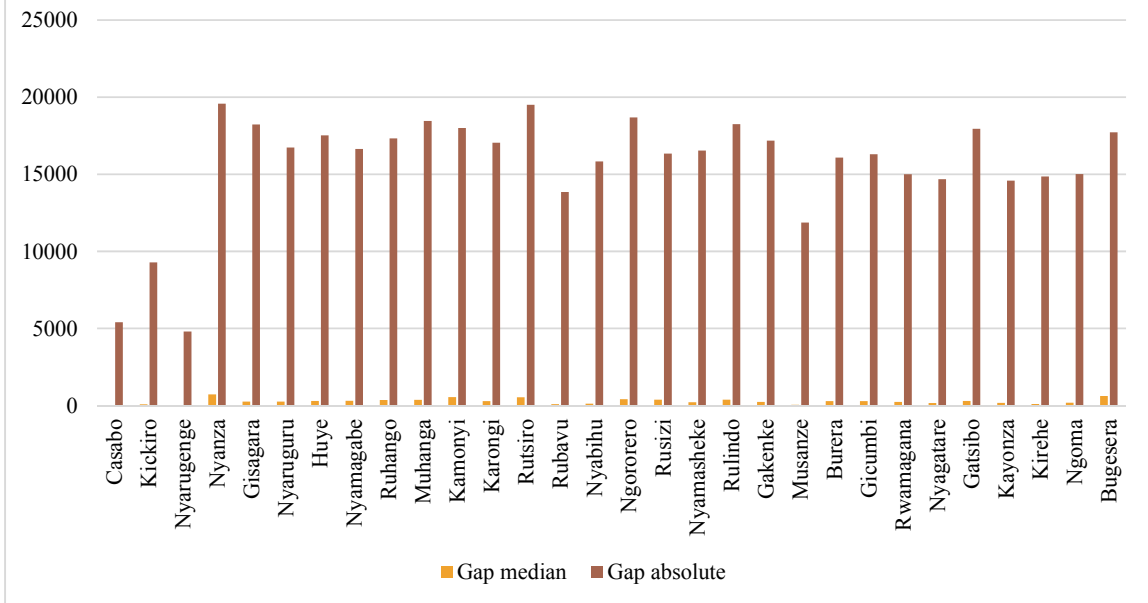


Figure 3.B Consumption poverty gap among provinces and areas in Rwanda, Rwf in 2012.

