Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey

RWANDA

December 2012

(Data collected in March – April 2012)

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Rwanda: Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2012
(Data collected in March-April 2012)

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ACRONYMS AND ABBREVIATIONS

ADDAWIN	Analisi dei Dati – Windows version (Data analysis software)
ARV	Africa Risk View
BMI	Body Mass Index
BMGF	Bill and Melinda Gates Foundation
Cap	Capita
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CGIS-NUR	Center Of Geographic Information Systems of the National University of Rwanda
CI	Confidence Interval
CIDA	Canadian International Development Agency
CIP	Crop intensification Programme
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
CSI	Coping Strategy Index
CU5	Children under 5 years old
DFID	United Kingdom Department for International Development
DHS	Demographic Health Survey
DPEM	District Plans to Eliminate Malnutrition
DRC	Democratic Republic of Congo
EAC	East African Community
EDPRS	Economic Development and Poverty Reduction Strategy
EFSA	Emergency Food Security Assessment
EICV 3	The third Integrated Household Living Conditions Survey
ENA	Emergency Nutrition Assessment
EU	European Union
FAO	United Nations Food and Agriculture Organisation
FARG	Genocide Survivors Support and Assistance Fund
FCG	Food Consumption Group
FCS	Food Consumption Score
FEWS NET	Famine Early Warning Systems Network
FNSMS	Food and Nutrition Security Monitoring System
FS	Food Security
GDP	Gross Domestic Product
GLM	General Linear Model
GSI	Grand Seasonal Index
H	Hour
ha	Hectare
HAZ	Height for age z-score (stunting)
HH	Household
HQ	Headquarters
IYCF	Infant and Young Child Feeding
JAP	Joint Action Plan
Kcal	Kilocalorie
Km	Kilometer
Km^2	Square kilometer
Logit	logistic regression
Min	Minute
MINAGRI	Ministry of Agriculture and Animal Ressources
MINALOC	Ministry of Local Government
MIDIMAR	Ministry of Disaster Management and Refugee Affairs
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education
MIGEPROF	Ministry of Gender and Family Promotion
MINISANTE	Ministry of Health
mm	millimeter
t	ton
MUAC	Mid-Upper Arm Circumference
NBR	National Bank of Rwanda

NGO	Non-Governmental Organization
NISR	National Institute of Statistics of Rwanda
NSR	National Strategic Reserve
PCA	Principal Component Analysis
PDA	Personal Digital Assistant
PRRO	Protracted Relief and Recovery Operation
RAB	Rwanda Agriculture Board
RDRC	Rwanda Demobilization and Reintegration Commission
REMA	Rwanda Environment Management Authority
RRA	Rwanda Revenue Authority
RWF	Rwandan Franc
SD	Standard Deviation
SDC	Swiss Agency for Development and Cooperation
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa
TC	Technical Committee
TLU	Tropical Livestock Unit
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNISDR	United Nations Office for Disaster Risk Reduction
USAID	United States Agency for International Development
USD	United States dollar
VAM	Vulnerability Analysis and Mapping (WFP)
VUP	Vision 2020 Umurenge Program
WAZ	Weight for age z-score (underweight)
WB	World Bank
WFP	United Nations World Food Programme
WHO	United Nations World Health Organization
WHZ	Weight for height z-score (wasting)
WI	Wealth Index
WRSI	Water Requirement Satisfaction Index
yr	Year
z-score	Standard score, normal score

Currency Equivalents

Currency Unit	Rwandan Franc RWF
1 USD	605 RWF (Exchange rate as of March 2012)[1]

[1] Source: UN treasury website.

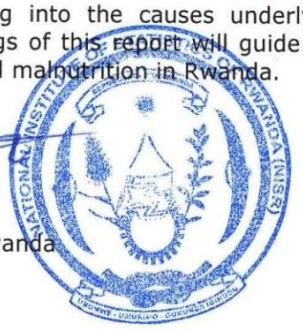
FOREWORD

The objective of this Comprehensive Food Security and Vulnerability Analysis & Nutrition Survey 2012 (CFSVA and Nutrition Survey 2012) is to measure the extent and depth of food and nutrition insecurity in Rwanda, analyze trends over time, and integrate the findings with those from the recent 'Third Integrated Household Living Conditions Survey' (EICV 3) and 'Rwanda Demographic Health Survey 2010' (DHS 2010). The key questions of the report are:

- Who are the people currently facing food insecurity and malnutrition?
- How many are they?
- Where do they live?
- Why are they food insecure and/or malnourished?
- How can food assistance and other interventions make a difference in reducing food insecurity, malnutrition and supporting livelihoods?

It is the third time that this type of survey has been conducted in Rwanda. The previous ones took place in 2006 and 2009 under the overall lead of the National Institute of Statistics of Rwanda. The results of this CFSVA and Nutrition survey confirm the findings of the EICV 3 and DHS 2010, namely that since 2006 Rwanda has taken great strides in terms of reducing poverty and malnutrition. However, it also confirms that food access, food consumption and chronic malnutrition are issues that still need to be tackled and that they go hand in hand with poverty.

We are convinced that by looking into the causes underlying both food insecurity and chronic malnutrition in Rwanda, the findings of this report will guide readers, planners and decision makers towards tackling food insecurity and malnutrition in Rwanda.



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We would, hereby, like to acknowledge the hard work of the data collectors and generosity of the 7500 women and men household heads who devoted their time and sat down with enumerators to answer all the survey questions.

Our profound gratitude is extended to the WFP team who coordinated the survey and questionnaire design, field work, data processing analysis and report writing. Lastly, we appreciate the contribution of the CFSVA and Nutrition Survey 2012 Technical Committee which participated in and validated each step of the survey, and who proofread and approved the report at the final stage of its production.

Ernest Ruzindaza

Permanent Secretary

Ministry of Agriculture and Animal Ressources

KEY FINDINGS

This report analyses the state of food security in Rwanda through the three distinct, but interrelated, dimensions of food availability, food access and food utilization. It also describes the nutritional status of children under five years old and discusses the underlying causes of, and threats to, food and nutrition security in the country, as well as the existing mechanisms in place to solve them. Finally, it formulates recommendations on the way forward to tackle these issues in Rwanda.

Food production is increasing, markets are functioning relatively well and food is flowing easily within and outside the country, thanks to the well-connected road network and market infrastructure.

Still, more than half (51%) of all households report some type of difficulty in accessing food in the year preceding the survey: one fifth of all households report seasonal food access problems, usually from March to May and September to November (in the run up to the season A and B harvests, when food prices are higher and opportunities for casual employment lower); 17% of households experienced unusual 'acute difficulties' in accessing food at some point in the year preceding the survey; and 14% of Rwandan households have usual and almost year round 'chronic difficulties' in accessing food for their families.

In March/April 2012, almost four in five (79%) or about 1,717,000 households had acceptable food consumption and could be considered food secure. Others either had poor food consumption (82,000 households, representing 4% of all households) or borderline food consumption patterns (378,000 households, 17%), adding up to a total of 21% of food insecure households in Rwanda. These figures show clear improvement since the 2006 CFSVA and seem to indicate a slight, although not confirmed, improvement in household food consumption since the last CFSVA and Nutrition Survey was conducted in February/March 2009.

Percentages of households with unacceptable food consumption are especially high in the rural areas bordering Lake Kivu (42%) and West and East of the Congo Nile Crest (43% and 29% respectively), where soils are less fertile and the land more susceptible to erosion. The western province accounts for the largest numbers and highest rates of food insecure households (37%). Although it is home to less than a quarter of all Rwandan households, half of all households with poor food consumption live there as do 38% of those with borderline food consumption. Kigali has by far the highest proportion of households with acceptable food consumption (93%) followed by the eastern province (86%), which is relatively better off than other provinces but most prone to rainfall deficit. At district level, Rutsiro (53%), Ngororero (44%), Rusizi (49%), Nyamasheke (37%) and Karongi (37%) have the highest percentages of households with unacceptable consumption. If a major rainfall deficit were to affect the East (which happens every 4-5 years) an additional 170,000 households would become food insecure.

Food insecure households are typically poor, rural households, living in small crowded homes, depending on low income agriculture or casual labour. They rely on a small number of livelihood activities; often have no kitchen garden and their household food stocks are not sufficient to last through the lean season until the next harvest. The further households are located from a main road or market, the more likely they are to be food insecure. Food insecure households are more likely to be headed by a lowly educated, elderly person. Food insecure households involved in agriculture and land cultivation are likely to farm small plots of land (less than 0.5 ha).

Conversely, households relying on more diversified activities, and especially urban households not involved in agricultural production, are better off in terms of food security. The more crops a farming household cultivates and the more livestock it owns the more likely it is to be food secure.

Acute malnutrition among children between six months and five years is the only nutrition indicator within 'acceptable' limits (3.6%). The prevalence of underweight, which reflects both chronic and acute malnutrition, is 'poor' at 12%. The prevalence of chronic malnutrition (stunting) among children between six months and five years is 'very high' at 43%.

The northern livelihood zones have the highest rates of stunting, exceeding 60% in rural areas, followed by rural areas bordering Lake Kivu (51% stunting), and along the Congo Nile Crest (50%). At provincial level, the northern and western provinces have the highest rates of stunting with over half of all children between six months and five years of age stunted. Stunting is lowest in Kigali (24%).

Boys are more stunted than girls. The smaller the baby at birth, the more likely it is to be stunted later on, and stunting increases with age. Stunted children are more likely to live in poor, crowded, rural households that are further away from services (hospital), often on steeply sloping land. They have young, lowly educated mothers who are themselves stunted. Child feeding practices of children between 12 and 23 months - in particular the types of foods consumed by children - are significant predictors of their stunting. In particular, children between one and two years old who had consumed milk products were significantly less stunted than other children of the same age category.

Four percent of reproductive age women are stunted, 17% overweight and 7% wasted. In addition, 5% of pregnant women are wasted (MUAC).

Based on these results, this report formulates recommendations on the way forward to improve food and nutrition security in Rwanda. They are related to:

- Improving coverage and targeting of assistance and social protection safety nets;
- Upgrading household living conditions, strengthening livelihood strategies and tackling poverty;
- Developing and diversifying agricultural production;
- Building community resilience to food and nutrition insecurity;
- Improving child food consumption;
- Monitoring and further analysing the food security and malnutrition situation.

1 INTRODUCTION

Located just south of the equator, Rwanda is a small (26,000 km^2) landlocked country with limited natural resources[2] characterized by its high population density and hilly terrain. According to the latest EICV 3 the total population of Rwanda in 2011 was 10.7 million people. The average population density of around 400 people[3] per square kilometre is the highest in Africa.

1.1 RWANDA'S IMPRESSIVE ACCOMPLISHEMENTS

Since the 1994 Genocide and the total collapse of Rwanda's economy and social services, the country has embarked on rebuilding itself and improving the quality of life of its population.

At the turn of the century, Rwanda still faced enormous difficulties. Sixty percent of its population of eight million was living below the poverty line, over 90% of the labour force worked mainly in subsistence agriculture and half the population was illiterate. Public debt exceeded GDP, which was only 214 USD per capita, while other social and economic problems were severe.

Rwanda is a small country with high population density, little capital and few natural resources. Landlocked, and connected to ports by bad roads, its inputs are expensive. However, from a tragically low starting point, Rwanda has accomplished a lot in the last decade. Progress with implementing the country's first Economic Development and Poverty Reduction Strategy (EDPRS) has been quite impressive. It has exceeded its poverty reduction targets by reducing poverty from about 56.7% of the population in 2005/6 to 44.9% in 2010/11, while extreme poverty has reduced from 35.8% to 24.1%.[4]

Progress is fast and widespread. The country's macroeconomic framework was remarkably stable, given the difficult external post-crisis environment and Rwanda's position as a highly import-dependent land-locked country.[5] The GDP per capita was 595 USD in 2010 (509 USD in Uganda), which is above the Vision 2020 target of 400 USD for 2010. GDP growth was 8.6% in 2011, which was not an exceptional year.

Agricultural production has been continuously increasing and the country is reporting to have produced enough food to feed its entire people since 2008. Health indicators have improved, as has school enrolment, parity between girls and boys in school and access to clean water.

1.2 POVERTY AND INEQUALITY PERSIST

Despite recent progress in agricultural production and a rapidly growing economy, Rwanda is still facing many developmental challenges. Although, according to the EICV 3, it has made significant progress in terms of poverty reduction, in 2010/2011 almost every other rural household in Rwanda still lived on less than 118,000 RWF per adult per year at current prices,[6] and about one in four rural households on less than 83,000 RWF.[7]

The most recent household living conditions survey (the EICV 3) also found that poverty rates vary enormously between provinces and from district to district. The northern and the eastern provinces have seen the most improvement and now have the lowest rates of poverty in the country while the western and southern provinces still have the highest share. Poverty in Rwanda still remains

[2] Mineral resources are mainly heavy minerals and to a lesser extent gold and sapphires. The potential for hydroelectric power is substantial and is exploited through joint hydroelectric projects with Burundi and the Democratic Republic of the Congo.
[3] Source: NISR.
[4] EICV 3.
[5] World Bank, Rwanda Economic Update Spring Edition April 2011.
[6] Poverty line of 2011. 194 US dollars at the exchange rate of April 2012: 1USD=607.08 RWF.
[7] Extreme poverty line 2011. 137 US dollars at the exchange rate of April 2012: 1USD=607.08 RWF.

disproportionately a rural phenomenon with 22.1% poor in urban areas and 48.7% poor in rural areas according to the EICV 3. There are also large differences in access to health and other facilities between urban and rural areas.

High levels of poverty inequality are a major concern that can hinder growth and reduce its positive impacts. While the Gini coefficient[8] showed modest improvement between 2005/2006 and 2010/2011, it had slipped during the previous five. Today, Rwanda still has a higher Gini than neighbouring Tanzania, Kenya, Uganda or Burundi.[9]

In addition recent surveys estimated that 44% (including urban areas) of children under five were chronically malnourished[10] in 2010 and that 36%[11] of rural households had unacceptable food consumption in September 2011 and could be considered food insecure.

1.3 OUTLOOK AND REASONS FOR THIS ASSESSMENT

Against this context of socio-economic progress mitigated by population growth, widespread poverty and high levels of chronic malnutrition and food insecurity, it was decided to undertake the third national Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey (CFSVA and Nutrition Survey 2012) in Rwanda. Like previous CFSVAs, the overall objective is to analyze trends of food insecurity, malnutrition and vulnerability over time, measuring the extent and depth of food insecurity and identifying the underlying causes. In addition, building on the recently released EICV 3 and 2010 DHS surveys, this study is specifically geared toward producing evidence based support for targeting (including at district level) of social protection and other assistance aimed at eliminating food insecurity and malnutrition in Rwanda.

Table 1: Selected social and economic indicators

Indicators	2000/01	2005/06	2010/11
Total population (million)	7.9	9.5	10.7
Population density/ km²	300	343	393
Population growth	2.7%	3.3%	2.9%
Urban population (percent)	17%	17%	18%
Agriculture/ GDP (percent)	37%	38%	32%
Industry/ GDP (percent)	14%	14%	16%
Services/ GDP (percent)	43%	42%	46%
GDP Growth (percent)	8.5%	9.2%	8.6%
Agricultural growth (percent)	9%	3%	5%
Industrial growth (percent)	13%	12%	18%
Per capita GDP (USD)	212 USD	333 USD	595 USD
Consumer price change (percent)	1.1%	8.8%	5.6%
Food price change (percent)	-	10.2%	6.3%
Exter. public debt service (% revenue)	1.3%	9.8%	2.6%
Overall fiscal deficit (percent GDP)	6.3%	1.4%	4.9%
Poverty	58.9%	56.7%	44.9%
Extreme poverty	40.0%	35.8%	24.1%
Gini coefficient	0.507	0.522	0.490

Source: NISR

[8] Gini coefficient of inequality: this is the most commonly used measure of inequality. The coefficient varies between 0, which reflects complete equality and 1, which indicates complete inequality (one person has all the income or consumption, all others have none) (source: www.worldbank.org).
[9] The Gini coefficient has seen an increase from 0.47 in 2000 to 0.51 in 2005 (EICV 2, 2005/06), mostly in rural areas, which are high levels by global standards. But over the last period 2006-2011, the inequality seems to have decreased as indicated by the Gini coefficient of 0.49 in 2010/2011.
[10] DHS 2010, confirmed by the FNSMS round 3: 43%.
[11] FNSMS round 3, September 2011.

2 STUDY OBJECTIVES AND METHODOLOGY

Previous research[12] shows that poverty and the resulting poor food consumption patterns in Rwandan households are among the main underlying causes of chronic malnutrition. There are strong indications[13] that malnutrition rates are linked to specific livelihood profiles (such as agriculture and daily labour) and have defined geographic distribution patterns (e.g. along the crest of the Nile).

In order to verify these findings, and to further analyze the link between poverty, food insecurity, precarious livelihoods and malnutrition in the rapidly changing context of Rwanda,[14] the third CFSVA and Nutrition Survey was conducted[15] jointly by the Government of Rwanda, the UN, donors and NGOs.

It looks into social protection issues, food insecurity and malnutrition in Rwanda to formulate recommendations so that interventions to tackle poverty, food insecurity and malnutrition can be adequately targeted and designed (including district plans to eliminate malnutrition) and to help monitor progress in the implementation of the Joint Action Plan to fight malnutrition in Rwanda.

2.1 KEY OBJECTIVES OF THE ASSESSMENT

As in 2006 and 2009, WFP and partner organisations launched the CFSVA and Nutrition Survey 2012 in March, just a few months after the main season A harvest. The assessment broadly aims to:

1. Answer the key food security and nutrition questions specified in Box 1;
2. Train and build capacity of government partners to manage and conduct food security and nutrition assessments;
3. Formulate specific recommendations for social protection, food security and nutrition interventions, including geographic and household level targeting criteria.

Box 1: Key questions of the assessment

1. What have been the historical food security and nutrition trends and what is the outlook for the country?
2. Who are the food-insecure, malnourished or vulnerable people?
3. How many people are food-insecure, malnourished or vulnerable?
4. Where do they live?
5. What are the underlying causes and threats of food insecurity and malnutrition?
6. What are the implications for social protection, food security and nutrition interventions?

2.2 CONCEPTUAL FRAMEWORK AND DEFINITIONS

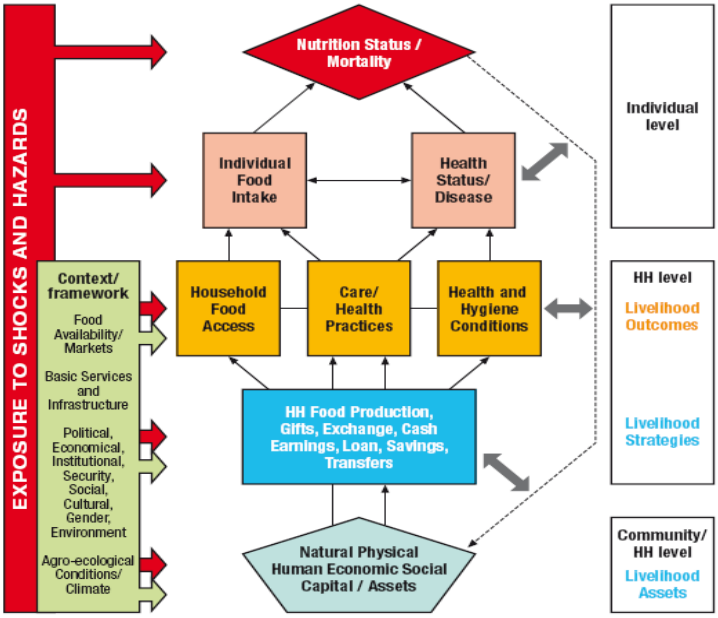
The CFSVA and Nutrition Survey analysis is based on a particular understanding of food security and vulnerability. The Food and Nutrition Security Conceptual Framework presented in

Figure 1 informed not only the selection of indicators for analysis, but also the design of field assessment instruments.

[12] CFSVA 2006-2009, a study by WFP (unpublished) on the causal analysis of chronic malnutrition in Rwanda based on the 2005 DHS
[13] Regularly conducted rounds of FNSMS (coordinated by MINAGRI) also point at poor food consumption and differences between livelihood zones.
[14] As the population of Rwanda is quickly growing, pressure on resources is continuously increasing. In addition the government is putting a lot of efforts in modernizing the country.
[15] Previous CFSVAs were conducted in 2006 and 2009.

This report first describes the state of food security and nutrition in Rwanda in 2012 and then follows the logic of the Food and Nutrition Security Conceptual Framework to identify determinants of food insecurity and malnutrition. Lastly, after looking at existent tools and mechanisms in place to tackle poverty, food insecurity and malnutrition in Rwanda, recommendations are provided for development partners regarding social safety nets, food security and nutrition interventions, including geographic and household level targeting criteria.

Figure 1: CFSVA and Nutrition Survey conceptual framework



Source: CFSVA guidelines, 2012

2.2.1 Food security

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security is divided into three components: food availability, food access and food utilization.

Food availability is the quantity of food that is physically present in a country or area through all forms of domestic production, commercial imports and food aid.

Food access represents the households' ability to regularly acquire adequate amounts of food through a combination of their own stock and home production, purchases, barter, gifts, borrowing or food aid.

Food utilization refers to: a) households' use of the food to which they have access, b) intra-household food distribution, and c) individuals' ability to absorb nutrients – the conversion efficiency of food by the body.

2.2.2 Nutritional status and nutritional security

Nutritional status is the balance between the intake of nutrients by an organism and their expenditure in the processes of growth, reproduction and health maintenance. Consequently malnutrition is any condition caused by excess or deficient nutrient intake.

Nutritional security is achieved when a household has secure physical, economic and environmental access to a balanced diet and safe drinking water, a sanitary environment, adequate health services and knowledgeable care to ensure adequate nutritional status for an active and healthy life at all times for all its members.

2.3 METHODOLOGY

Primary data collection took place over six weeks from early March to the end of April 2012. Two instruments were used to collect primary data: a key informant questionnaire administered to the

village head and other key informants in each of the sampled villages, and a household questionnaire administered to sample households, including an anthropometric section for women of reproductive age (15-49), children under five years, and a section on infant and young child feeding practices intended only for children between six months and two years.

The instruments were first developed in English and subsequently translated into Kinyarwanda. Personal Digital Assistants (PDAs) were used for the data collection.

All of the 30 districts in Rwanda were covered by teams of carefully selected enumerators. All possible steps were taken to ensure that the results accurately represent the food security and nutrition situation in Rwanda. Training of enumerators,[16] careful translation of the questionnaires and close supervision[17] of the data collection were conducted to reduce individual variation in how enumerators understood the questions in the survey instruments. The enumerators were also trained to facilitate interviewee recall and to collect accurate anthropometric data. Respondents were informed that no benefit was to be expected and that the interview was anonymous.[18]

To facilitate comparison with existing studies, the CFSVA and Nutrition Survey 2012 was designed to provide statistically representative and precise information at the district level. Urban and rural households were included as was the capital province Kigali. The sampling frame was based on the data from the recent EICV 3 (2010/2011) and was organized according to 30 districts. A two-stage cluster sample procedure was applied. In the first stage, 25 villages per district were randomly selected with probability proportional to population size. In the second stage, 10 households in each of the 25 villages in the 30 districts were selected for participation in the survey. A systematic random sampling technique was chosen for this stage.[19] In total 748 key informant interviews were conducted, 7498 households were administered the household questionnaire, and valid anthropometric measurements were taken for 7418 women and 4651 children. The Infant and Young Child Feeding (IYCF) module was submitted to mothers or caretakers of all children between six and 24 months (1613 children in total). The sample design and the very low rate of non-response[20] allowed the survey data to represent the food security situation at the time of the survey and can therefore be considered to be representative for Rwanda as well as at district level.

The standard CFSVA methodology uses the food consumption score (FCS) as a preferred single indicator of 'current' household food security. It has the advantage of being somewhat reproducible and comparable over time and location. The FCS calculation is standardized and describes diet (therefore can also be linked more closely with WFP food-type interventions). Various organizations in Rwanda including MINECOFIN, MINAGRI, the EU, and WB already use the FCS as a monitoring indicator. In order to demonstrate that the FCS indicator is an appropriate household level food security indicator for Rwanda, a validation analysis was conducted for the CFSVA and Nutrition Survey 2012 and the indicator was found to be correlated with other food access indicators such as wealth, per capita monthly income declared, year per capita expenditure, share of food item expenditure and others (see Annex 6).

The primary data analysis was complemented by secondary data analysis. A general review of food security literature in Rwanda was undertaken to inform survey design. In addition, the analysis builds on the results of similar surveys conducted in 2006 and 2009, on the more recently released EICV 3 and DHS 2010. A review of food market literature and data was carried out in March 2012

[16] 144 enumerators participated in a nine days training prior to data collection during which the enumerators were familiarized with the protocol and questionnaires used for the study. The training covered instructions on how to select respondents, conduct interviews and take anthropometric measurements. The training included field testing and practice sessions. After the training, the 120 best enumerators and team leaders were selected through a test and were sent to the field in teams of four including a team leader. Out of the 24 non selected enumerators six were later called to replace those enumerators who abandoned the work (mostly because of health/pregnancy related problems).

[17] Six national supervisors ensured that the study was conducted in a standardized manner.

[18] Also see annex on methodology for detailed quality assurance procedures that were applied to the survey.

[19] The detailed sampling strategy and data collection instruments are available in the annex.

[20] Only 2 households out of 7500.

to prepare for a more thorough investigation during the primary data collection and to inform the market section of the study. This information has been integrated into the report.

2.4 STUDY LIMITATIONS

2.4.1 Sample size and representativeness of key informant interviews

The sample size was not designed to produce very precise estimates for malnutrition prevalence at district level mainly because the primary goal of collecting the nutrition data was to analyse the *link* between food security and nutrition (and does not require very precise nutrition estimates) and also because the recently released 2010 DHS had estimated district level malnutrition prevalence. Nevertheless the survey provides unbiased estimates of the main malnutrition indicators.

Also, the information from the key informants was collected through a structured questionnaire but the sample was not designed to be statistically representative for villages in Rwanda; the information from the community questionnaire was therefore used for contextual information only.

2.4.2 The complexity of measuring food security

Food security and vulnerability are complex concepts to measure. The limitations for the use of the FCS as a food security indicator may include the fact that it is a very temporal specific indicator at the household level (it provides a snapshot of household food consumption in the seven days preceding the interview), that it only considers meals eaten at home, that it does not look at the individual food consumption, which implies a larger range of factors- including micronutrient consumption - and that it does not take into account the quantity of food items eaten.

2.4.3 Comparisons with previous CFSVA and nutrition surveys

When comparing the levels of food security in 2012, 2009 and 2006 the following points need to be taken into account: exact timing of the survey in the year, type of harvest (good vs. bad) that preceded the survey and differences in sampling.

Seasonality

For the CFSVA and Nutrition Survey 2012, data collection was conducted during the lean season (March-April) that followed a relatively good harvest. The 2009 survey was also conducted in a relatively good year although the data collection was done earlier in the year (February-March) which could account for a better overall food security situation. On the contrary, the 2006 CFSVA and Nutrition Survey was conducted in March-April 2006, during a lean period after a poor harvest. These differences were discussed when the trend analysis of the food security situation was conducted.

Differences in samples

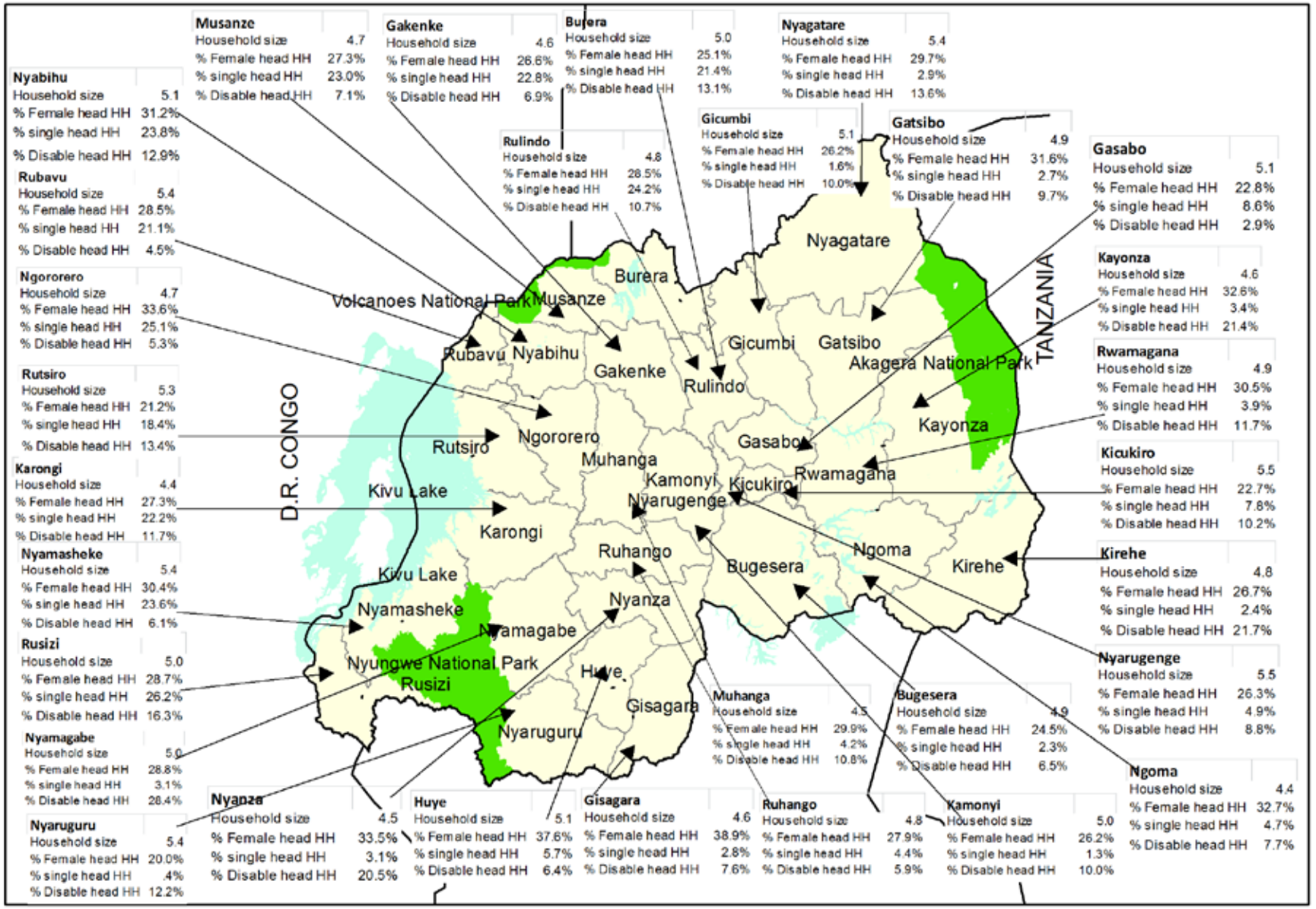
The CFSVA and Nutrition Survey 2012 was designed to produce estimates of food security indicators at district level and covered both urban and rural households. This was not the case for the two previous CFSVA and Nutrition Surveys; the 2006 study was conducted only among rural households of Rwanda whereas the 2009 sample excluded Kigali City and only included households with children under five years (which is common practice for nutrition surveys). Hence only households living outside of Kigali province with children under five years can be compared with the 2009 CFSVA and Nutrition Survey.

Other differences that do not affect comparability of the data

The sampling units have changed from enumeration zones in 2006 and 2009 to villages in 2012. Weight calculations for 2012 were based on projected population data from the EICV 3 while 2006 and 2009 calculations were based on projections of the 2002 census.

In addition, building on experience from previous surveys (including the 2009 CFSVA and Nutrition Survey as well as the FNSMS rounds) some questions were improved and asked in a slightly different way compared with the preceding surveys.

Map 1: CFSVA and Nutrition Survey 2012 sample and demographic characteristics by district



3 THE STATE OF FOOD SECURITY AND NUTRITION IN RWANDA IN 2012

The food security of any household or individual is typically determined by the interaction of a broad range of agro-environmental, socio-economic and biological factors. As with the concepts of health or social welfare, there is no single direct measure of food security.

This chapter describes the state of food security in Rwanda through the three distinct, but interrelated, dimensions of food availability, food access and individual food utilization (see definitions in section 2.2). This chapter also goes one step further and describes the nutritional status of children under five years old and women in reproductive age in the country using the standard indicators of weight for height, height for age, weight for age and mid upper arm circumference (MUAC) for children and body mass index (BMI) for (non-pregnant) women. MUAC was taken for all women in reproductive age.

3.1 INCREASING FOOD AVAILABILITY

Food availability represents the food that is physically present in the area of concern, through all forms of domestic production, commercial imports, reserves and food aid. This might be aggregated at regional, national, district or community level. Markets make an important contribution to the availability of food and the access to food year-round (both physically and economically). Sub nationally, for example between producing and non-producing areas, markets determine the movement of commodities from supply to demand and deliver them to end consumers.

This section of the report starts by giving a macro-picture of the market interaction with other food markets in the region. Secondly, it discusses food availability at national level and thirdly zooms in on the district level, elaborating on market functioning and price trends and differences between districts.

3.1.1 Regional interaction and cross border trade flows

Rwanda shares borders with four surrounding countries (Uganda, Tanzania, Burundi and Democratic Republic of Congo) and is integrated in the regional East African market. The two trade agreements that dominate East Africa's regional trade system are the East African Community (EAC)[21] and the Common Market for Eastern and Southern Africa (COMESA).[22] Trade within both the EAC region and the larger COMESA region represents a critical portion of imports and exports for all of the countries involved—in the range of 30–50%.[23]

In general, food can flow relatively freely across the borders within the Eastern African Customs Union, which was established in 2005, although there are still some non-tariff trade barriers.[24] Free flow of goods also applies to intra-regional trade although more exceptions apply, including a list of sensitive goods such as milk, maize and wheat that are excluded from the tax exemption. Although the steep increase in agricultural production might tilt the future balance in favour of exports (see further on), Rwanda still remains (formally) a net importer of food when all trade is

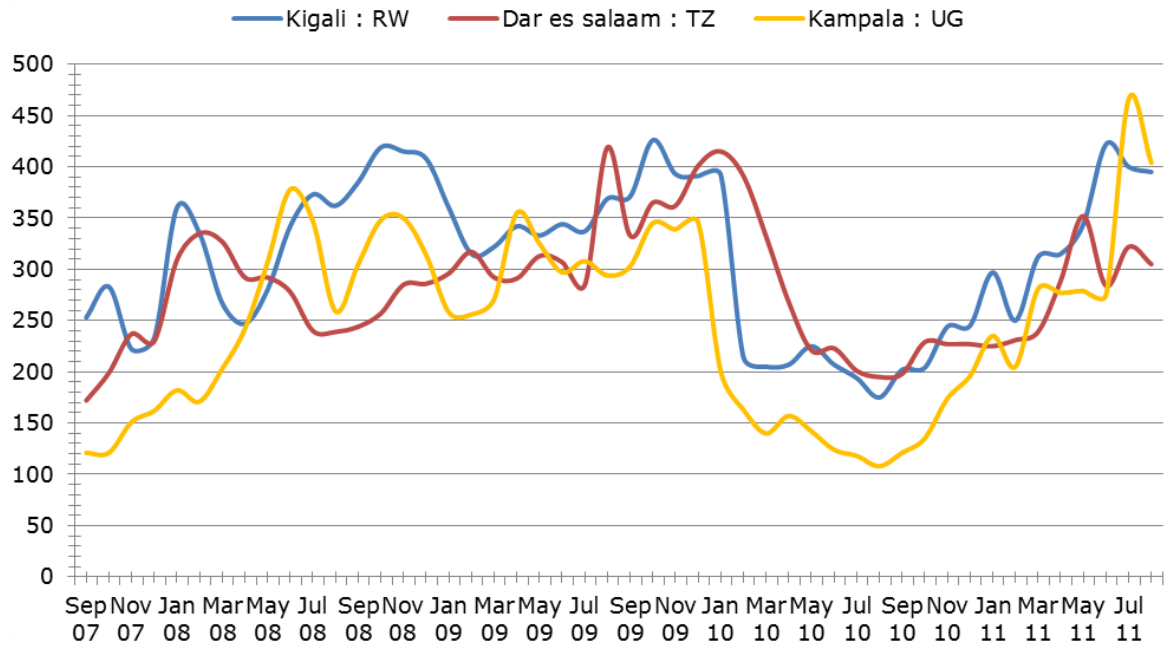
[21] Rwanda joined the East African Community in 2007. The member states of EAC are Burundi, Kenya, Rwanda, Tanzania, and Uganda.
[22] The member states of COMESA are Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, and Zimbabwe.
[23] USAID report: Cross-Border Trade in East African countries, 2009.
[24] 2008 survey of the East African Business Council.

considered. The cereal balance sheet as calculated by the Food and Agricultural Organisation (FAO) in September 2012 also indicates that Rwanda is a formal importer of cereals. [25]

Informal trade was estimated to represent 23% of total cross-border trade in 2010.[26] In 2011, according to the reports of the National Bank of Rwanda, Rwanda's informal exports exceeded informal imports, leaving the country with a positive trading balance. Livestock and food products are the main informally traded commodities.[27] Beans, maize and even wheat are some of the exported commodities while Rwanda informally imports rice. Overall Rwanda has a negative food trading balance with Tanzania and a positive trading balance with Burundi, DRC and Uganda.[28]

There is a good level of regional market price integration, indicating that prices in Rwanda are influenced by other regional markets and vice versa. The markets in capital cities are connected by tarmac roads and Figure 2 shows a clear co-variance of maize prices between Kigali, Kampala and also Dar es Salaam.

Figure 2: Regional maize prices between August 2007 - August 2011 (USD/t)



Source: Figure based on Regional Agricultural Trade Intelligence Network (RATIN)

3.1.2 Food production and availability

In general, although there are sub-national differences,[29] the Rwandan soil is fertile and the climate favourable, allowing for two, and in some places three, harvests a year. Rwandan agriculture is by and large almost exclusively rainfed with only 4% of households that farmed land in season A stating that they irrigated part of their land. So differences in rainfall patterns and timing of moisture availability (see Box 2), will influence the variety and type of crops that are grown across the country.

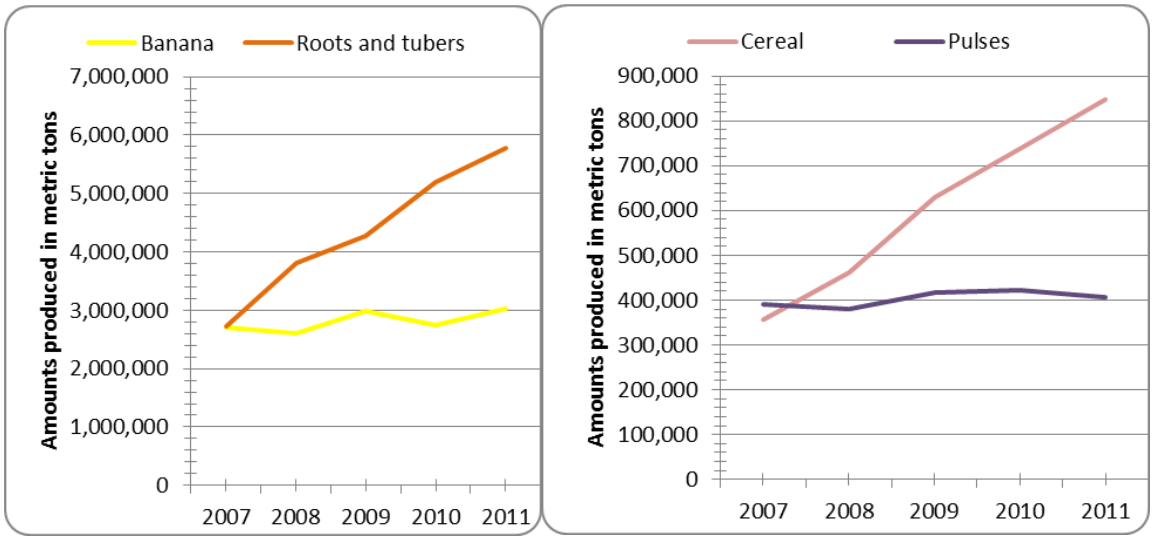
[25] http://www.fao.org/giews/english/ewi/cerealbs/3.htm#235 consulted on 13 Sept. 2012.
[26] National Bank of Rwanda, update on Informal cross-border trade, presentation given to MINICOM in Feb 2012.
[27] Informal Cross Border Trade Survey, the National Bank of Rwanda (NBR), 2011.
[28] Source: NBR, 2011.
[29] See section 4.3.4 p.58 on soil fertility and livelihood zones.

Crop production

The government has prioritized agricultural development, and the sector has witnessed an impressive improvement in productivity over the past decade, including substantial growth in staple food crops, particularly for cereals, roots and tubers. Land consolidation and input provision through the Crop Intensification Programme (CIP, launched in 2007) are reported to be the main contributors to smallholder productivity gains,[30] translating into continuously improving food production and availability in Rwanda. Figure 3 illustrates this increase in productivity of main crops.

Beans are the chief crops cultivated by Rwandan households (grown by 90% of households cultivating any land), followed by sweet potatoes (45%), maize (42%), cassava (40%), banana (28%), Irish potatoes (15%) and sorghum (13%). The CFSVA and Nutrition Survey 2012 identified geographical patterns in food production with more households involved in cultivation in the north and western provinces.

Figure 3: Production (in tons) of main staple crops (2007-2011)



Source: MINAGRI production data (in order of importance cereals include maize, sorghum, rice and wheat; roots and tubers include cassava, Irish potatoes, sweet potatoes, yam and taro and pulses include beans, soya and peas)

In terms of tonnage produced the main crops are cooking bananas, cassava, Irish potatoes and sweet potatoes.

The crop presence, defined as the district level proportion of households planting a given crop over the year, is shown in Map 2 and Map 3. Broadly, tubers and root crops (potatoes and cassava) predominate in the western half of the country, corresponding with longer growing periods and a lower tendency for a drier break between seasons, while cereals - such as sorghum - are confined to the drier eastern areas (given their lower water requirements). Bananas (cooking) are also confined to the east of the country. While beans are the most cultivated crop nationally, they are relatively more cultivated in the centre of the country, where there is a transition from drier to wetter areas. Maize can be found in the east of the country but also in the wetter areas of the north and west. Predominance of maize in the east can be explained by the government's Crop Intensification Project, but from an agronomical point of view it is somewhat surprising given its high sensitivity to moisture deficits during key stages of development.

There are no major differences between season A and season B regarding which crops households plant as the main crop, though there seems to be some substitution of maize/sorghum by beans

[30] For example the percentage of households that use improved seeds increased from 3% in 2006 to 34% in 2011 (EICV 2, 2006; EICV 3, 2011).

from one season to another – this is more noticeable in the most southeastern districts (Kayonza, Kirehe and Ngoma) where beans become even more dominant in season B. Since season B is shorter and ends in a dry period, it is safer to plant beans because they have a shorter development period than maize/sorghum and are less drought-sensitive.

The most important commodities from a consumption point of view are: sweet potatoes, cooking bananas, beans, maize, cassava and Irish potatoes (see Map 4 and Map 5 p.33).

The most important commodities from an income earning point of view are the following cash crops: coffee, tea and sorghum.[31] Households were asked to estimate the percentage of last season's food production that was sold at the market. On average and for all crops produced, households were selling 23% of their production, and consuming 71%. The rest was reported as either given away (2%) or spoiled/lost after harvest (3%). This confirms the findings of the EICV 3 (around 21% of the agricultural produce harvested was marketed[32]) and varies little from the findings of the 2009 CFSVA and Nutrition survey.[33] Unsurprisingly households generally sold more than half of their production of cash crops (tea, coffee, pineapple, sugar cane all over 85% sold) and fruits and vegetables (tomato 80% sold, passion fruit 60%, cabbage 58%) in addition to sorghum (54%) and rice (63%). Crops that households kept mostly for own consumption were the main consumed cereals, roots and tubers as well as beans, and cooking banana (see Table 2).

Table 2: Main crops grown in Rwanda and percentage sold to market

Crop	% HHs growing main crop in 2006(1)	% HHs growing main crop in 2009(1)	% HHs growing main crop in 2012(1)	Tons produced in 2011(2)	% sold to market in 2012(1)
Beans	83	88	90	332,892	12
Sweet potatoes	54	61	45	853,071	11
Maize	23	38	42	508,123	22
Cooking banana	-[34]	-[35]	28	3,057,895	30
Irish potatoes	-[36]	-[37]	15	2,177,164	32
Cassava	36	46	40	2,616,424	23
Sorghum	38	34	13	181,534	54

Source: Table based on data from
(1) CFSVA and Nutrition Survey 2006, 2009 and 2012, and
(2) MINAGRI production data

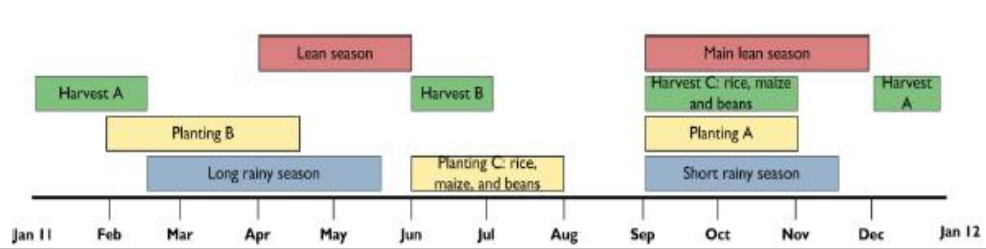
[31] While sorghum is not a typical cash crop, 23% of sorghum output is marketed; a significant higher percentage than for other food crops grown (see Table 2).
[32] The share of harvest sold is highest at Eastern Province (25%) and around 20% is the other provinces outside Kigali City (EICV 3). Depending on the type of crop considered this percentage can be a lot higher (97% for tea and coffee) or lower (between 9 and 12% for cassava, potatoes and beans).
[33] According to the CFSVA and Nutrition survey 2009, 'for the main crops cultivated, over 70% of the production is consumed'. Beans 86% consumed, sweet potatoes 86%, cassava 79%, maize 80% and sorghum 70%.
[34] Information not available.
[35] Information not available.
[36] Information not available.
[37] Information not available.

Box 2: Main cropping seasons in Rwanda

The moderate tropical climate of Rwanda is characterized by mild temperatures (20 degrees Celsius average). The average yearly rainfall is 1400 mm with important geographic variations. Precipitation is heaviest and most regular in the western and north-western areas, while the eastern region has less abundant and more erratic rains.

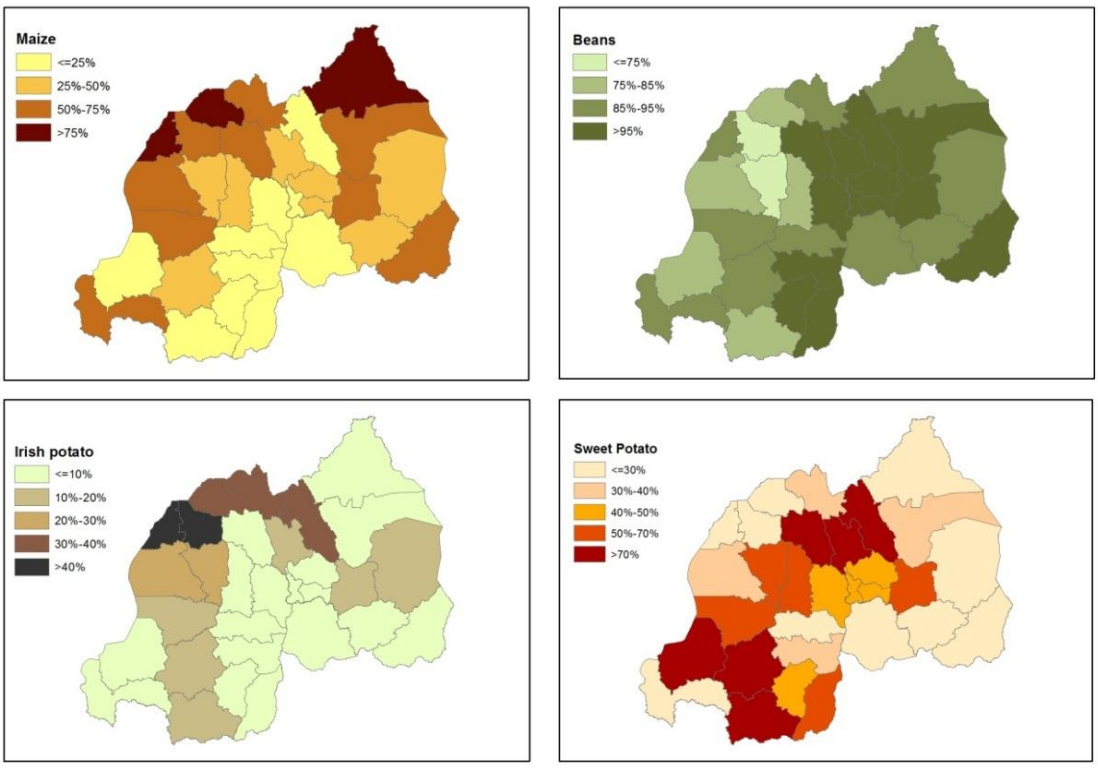
The rainfall pattern can be described as bimodal with a single rainfall season (lasting from September to June) within which there are two well defined rainfall peaks, one around November and another around April. There is no clear cut separation between the two rainfall peaks as in other East African regions with a proper dual season rainfall regime, such as Kenya or Somalia; there is just a drier minimum around February. However, the fact that the rainy season is fairly long (about 10 months), and has two fairly distinct peaks, leads to the existence of two distinct cropping seasons, described in agricultural terms as a dual/double agricultural season.

Households grow crops in two successive growing cycles generally separated into season A and season B. Season A extends generally from September to January and season B from March to June, with a drier interlude in February (when the season A harvests take place) and a marked dry period in July-August (when the season B harvest takes place). There's also a cropping season C, confined to marshland and recession agriculture, unrelated to the rainfall regime.



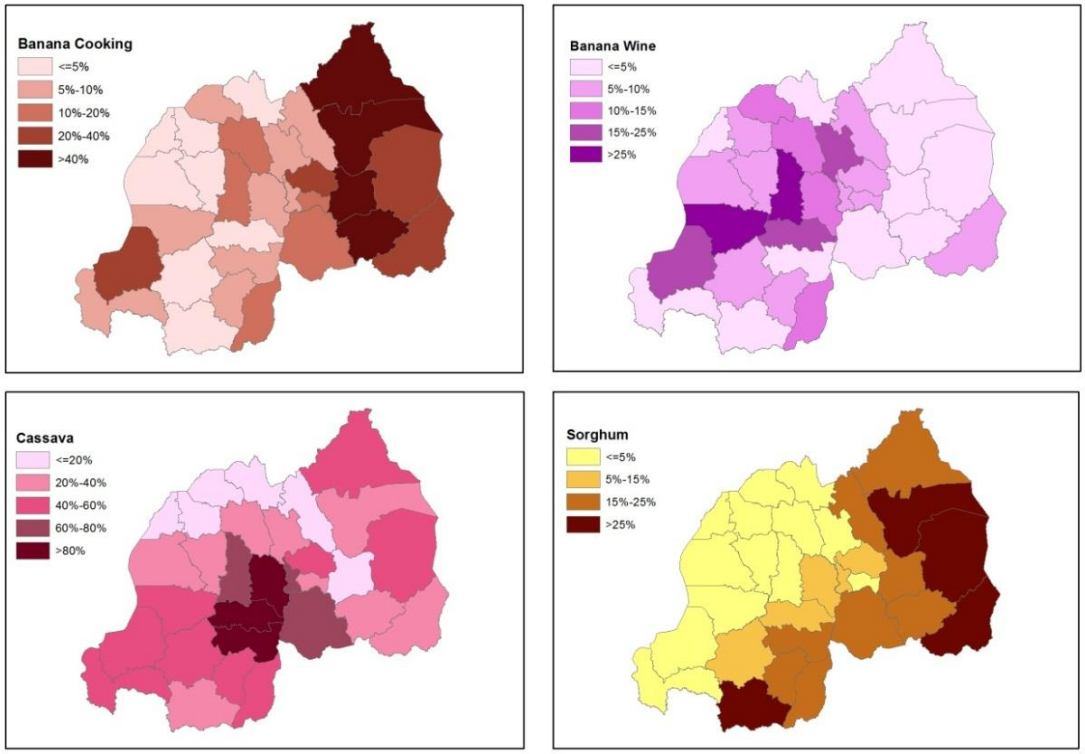
Source: WFP analysis, crop calendar from FEWS NET

Map 2: Crop presence for maize, beans, Irish potatoes and sweet potatoes



Source: CFSVA and Nutrition Survey, 2012

Map 3: Crop presence for bananas, banana wine, cassava and sorghum

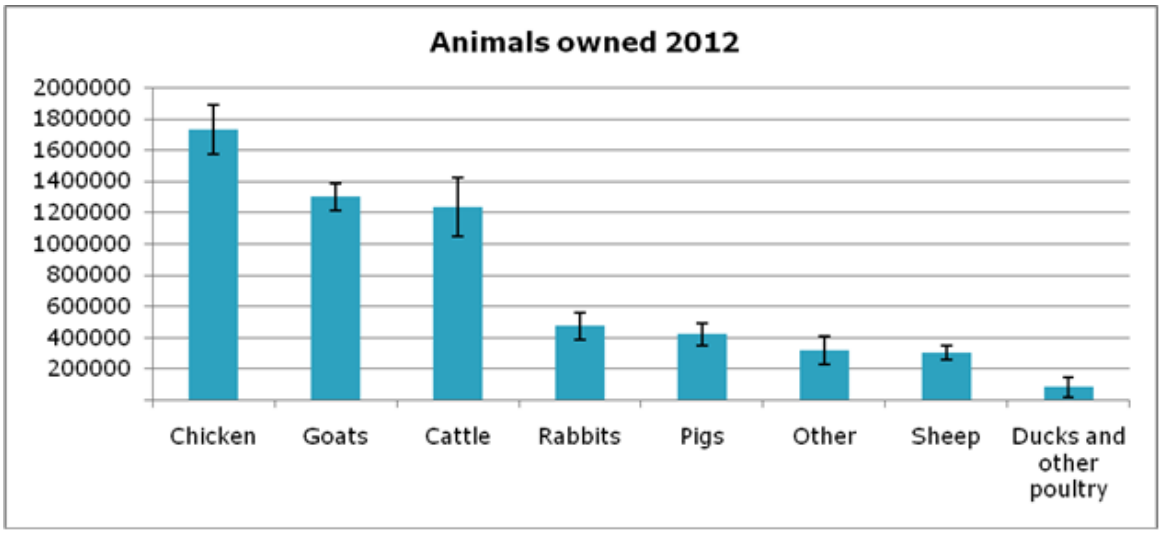


Source: CFSVA and Nutrition Survey, 2012

Livestock ownership

Animal production and the integration of livestock into smallholder farming is a key contributor to food security. Animal products are a good source of proteins and lipids and, in times of crisis, livestock functions as a shock absorber, contributing to the resilience of poor households. According to the CFSVA and Nutrition Survey 2012, 70% of all households in Rwanda own some type of livestock.[38]

Figure 4: Animals owned by households in 2012 - headcount



Source: CFSVA and Nutrition Survey, 2012

[38] 68% according to the EICV III,[38] Third Integrated Household Living Conditions Survey (EICV III), National Institute of Statistics (NISR), 2012.

In order to compare livestock ownership at household level irrespective of the species, the 'Tropical Livestock Unit' (TLU)[39] was used. Livestock ownership is widespread in rural Rwanda with 56% of households owning some type of livestock (30% own the equivalent of one cow or above, and 26% own less than the equivalent of a cow). On average households own the equivalent of 1 TLU (0.8 TLU being the equivalent of one cow).

There are no clear geographical patterns regarding the average number of livestock equivalent per household with the notable exception of Nyagatare district where the average number of TLU owned by livestock rearing households is about three times higher than any other district.

Unsurprisingly rural households are far more likely to own livestock than urban: 78% of households in urban areas do not rear any livestock vs. 38% in rural areas and 44% in peri-urban areas (same difference toned down a little can be observed between Kigali and the rest of the provinces).

3.1.3 Aggregate food availability in kilocalories

Adding up the nutritional value of food crops and animal products, the Ministry of Agriculture estimates that since 2008 Rwanda's average production per capita is above the international standard requirement of 2,100 kilocalories per adult (see Table 3). The picture at provincial and district level is relatively similar with the expected exception of urban areas and of places geographically less suitable for agricultural production. The overall production can be described as very carbohydrate based and deficient in lipids.

The most productive province in terms of total tonnage in 2011 is the western province, but in terms of per capita energy production, the eastern province is recorded to have produced the most calories and lipids per person, while the northern province produced the most proteins per person in 2011. Unsurprisingly, Kigali province has the lowest productivity as the food consumed there is supplied from elsewhere.

The three districts with the highest calculated production per capita in terms of Kilocalories in 2011 are Kirehe (3,822 Kcal), Nyagatare (3,172 Kcal) and Kamonyi (3,098 Kcal). The three districts with the lowest production per capita in terms of Kilocalories apart from Kigali City[40] are Nyamagabe (2,031 Kcal), Nyaruguru (2,128 Kcal) and Rutsiro (2,199 Kcal).

Table 3: Production of food crops and animal products per province in 2011

2011	Tons produced	Kcal/cap/day	Protein g/cap/day	Lipids g/cap/day
Kigali	90,153	244.5	7.5	3.5
North	2,403,319	3110.0	84.5	22.5
East	2,678,482	3416.0	74.5	29.5
West	3,351,007	3191.5	80.5	23.5
South	2,689,304	2957.5	58.0	23.5
Total/ Average	11,212,265	2583.9	61.0	20.5

Source: MINAGRI, 2011

[39] One TLU is equivalent to one cattle of 205kg at maintenance. The summative scale used the following standard weight: cattle: 0.8, goat: 0.1, pork: 0.3, poultry: 0.007, rabbit: 0.007. The coefficients have not been specifically validated for Rwanda.
[40] Kigali City is the lowest production area (424 Kcal per capita/day) as it is a mainly urban area.

3.2 MARKETS ARE GENERALLY EFFICIENT AND FAIR

3.2.1 Increasing household reliance on markets for food

The EICV 3 show that, on average, an increasing share of food consumed by households was procured from the market rather than from the households' own production in 2010-2011 compared with 2005-2006, indicating increased market reliance (see Table 4).

Table 4: Consumption patterns in 2010-2011

Category of consumption	Average value in real Prices (RwF/HH/year)	Share of total consumption	% change since 2005/2006
A. Food purchases	33,891	26.6%	+24%
B. Consumption of own food	20,880	15.8%	-6%
Total food consumption (A+B)	54,772	42,4%	+11%
Other/non-food expenditures	69,119	57,8%	+38%
Total	123,891	100%	+24%

Source: EICV 3, 2010-2011

For the CFSVA and Nutrition Survey 2012, households were asked to provide the main sources for each of the food items consumed during the seven days preceding their interview. The relative importance of various food sources to the overall diet of the household was estimated by combining the frequency of consumption and the sources.

Markets provide, on average, 65% of the food consumed by a household with own production contributing an average of 30%. Other sources including fishing, gathering, hunting, exchange, borrowing, gifts and food aid account for 5%. Unsurprisingly, the percentage of food from own production is higher in rural (33%) than in urban areas (10%). The market is the main source for rice (81%), groundnuts (67%), fish and meat (90% - except poultry: 50%), and milk (55%). Own production is the main source for roots and tubers - cassava (51%) and sweet potato (61%) - banana (63%), beans and peas (68%), cassava leaves (67%), and sunflower seeds (64%). For maize and fruits, market and own production play an equally important role.

While district markets around the country are well connected by road, translating into reasonably good market integration and price stability (see section 3.2.4), getting to and from the market is a challenge for many rural households. In fact, only 6% of households are served by a market facility within their village. The rest have to walk on average 1h and 15 min to another village to reach a market place. The districts in which households need to walk the furthest to reach a market are Rulindo (2h and 24 min), Kayonza (2h), Nyamasheke (1h and 55 min), Ngororero (1h and 50 min), Kirehe (1h and 48 min) and Rutsiro (1h and 36 min). Although most households do not have a market in their community 71% of the population are less than 5km from a main road with public transport. Almost three quarters of these roads (73%) are accessible year-round, while 27% are inaccessible during parts of the rainy season (one month on average).[41]

Economic access to food depends on household income as well as on food prices, which have almost doubled in nominal terms in the past 6 years (see section 3.2.3). In line with the global increase in food prices over this decade, the food price inflation is higher than that of non-food commodities.[42] In other words, households heavily dependent on markets for their food have been hit hardest by inflation.

41 The Second Integrated Household Living Conditions Survey (EICV 3 II), NISR, 2006.

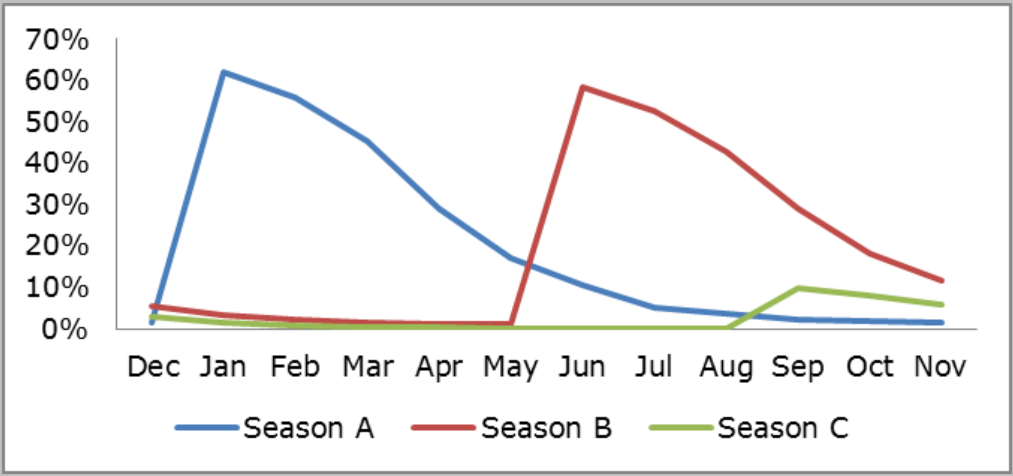
[42] Based on EICV 3 data NISR calculated a food and a non-food index. The food index is calculated by computing monthly province-level average prices for 17 main food commodities (covering 60% of household consumption) over the past ten years. The non-food index is calculated by computing monthly average data from 12 locations (the 12 main towns of the old provinces) of 41 commodities (corresponding to 41% of non-

Box 3: Seasonal household food stocks

Eighty five percent of households in Rwanda cultivated land during the 2012 season A, and according to EICV 3 estimates, in 2010-2011 only 10% of households cultivating any given crops would sell over half of that crop's harvest.[43] This means that households store most of the consumed crops at household level for their own consumption.

The longer the household food stock lasts, the better for a household's food security. When food stocks run out households become reliant on the market for food and are exposed to price increases. This explains why the 'food access insecurity seasons' (see section 3.3) overlap exactly with the periods in the year when the fewest households have food stocks from their own production. Figure 5 shows that around December/January more than 60% of all households in Rwanda have some food stocks from their (relatively good) season A harvest that took place in December/January. This percentage decreases to around 15% in May just before the season B harvest. In June, after season B harvest, almost 60% of households again have food stocks.

Figure 5: Household level food stocks



Source: CFSVA and Nutrition Survey, 2012

3.2.2 Market structure

In Rwanda markets generally function well and pricing is fair with an absence of excessive profit margins.[44] A 2011 market assessment conducted by WFP,[45] estimates that on average local farmers capture around 80% of the end market value, a relatively high percentage, and traders make an 8% profit on the end market value of a product. Other costs include transport, offloading and taxes.[46] Figure 6 details the maize value chain, a major crop in Rwanda. Other value chains are structured in a roughly similar fashion.

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food purchases). For the indexes, 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. The commodity weights used for the food price index were estimated based on the EICV 3 I and III 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. (NISR, 2012).

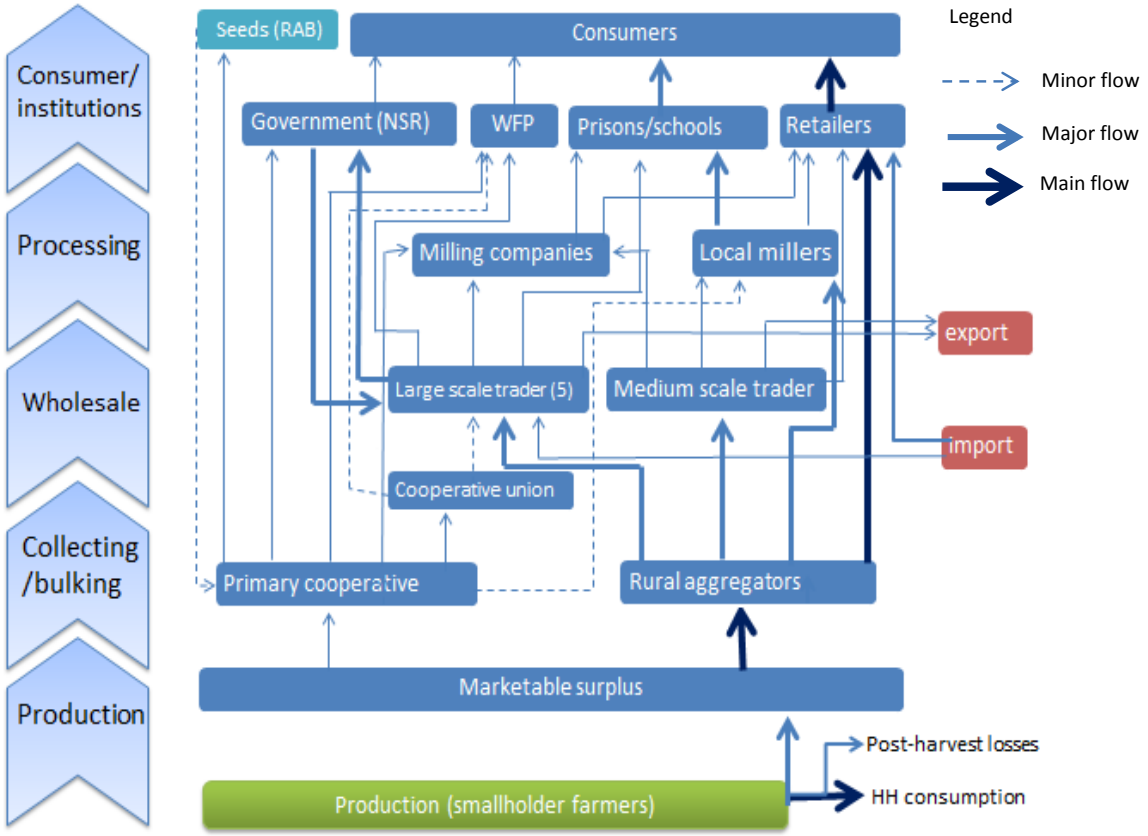
[43] Only 8% of households cultivating sweet potatoes sell more than half their harvest, 12 % for Irish potatoes, 8% for cassava, 9 beans, 12 cooking banana (EICV 3).

[44] According to WFP 2011 market study, markets do experience malignant practices like underweight bags and wrongly adjusted weighing scales, but this seems to be more of an exception than a rule. Exploitation of individual farmers by small scale traders are chiefly anecdotal.

[45] This data was collected during a trader survey conducted by WFP in 2011 ('Food or Cash' WFP, 2011). 26 traders in Kibuye, Byumba, Ngarama and surrounding markets were included in the survey.

[46] Transport costs to/from Kigali are around 20 RWF/kg depending on location. Other costs are 2 RWF/kg for offloading and 1 RWF/kg for taxes.

Figure 6: Maize value chain



Source: WFP market assessment, 2011

The maize market in Rwanda is characterized by the relative absence of brokers and the presence of direct linkages between rural aggregators and the Kigali consumer market. Likewise, it betrays a low capacity of small and medium traders, with a dominance of five large traders residing in Kigali, mainly dealing in maize, beans, sorghum and fertilizers. While there are only a limited number of traders operating in local markets, there do not appear to be any monopolies in place or price agreements between traders. Prices are generally determined by the dynamics of supply and demand. Due to the good infrastructure, pockets of demand are easily met with supply within days. As there is no large processing industry, the majority of the milling capacity is made up by cottage industry hammer-mills.

Finally, markets are easily identified as the government builds a concrete structure for each, giving them a more organized structure. District markets are characterized by a low number of active wholesalers and an important share of the commodities directly supplied by farmers themselves or rural assemblers. Traders typically buy their merchandise from smaller markets in rural areas or source from Nyabugogo market in Kigali and then rent a vehicle to transport it to one of the districts.

3.2.3 Price trends, seasonality and stability

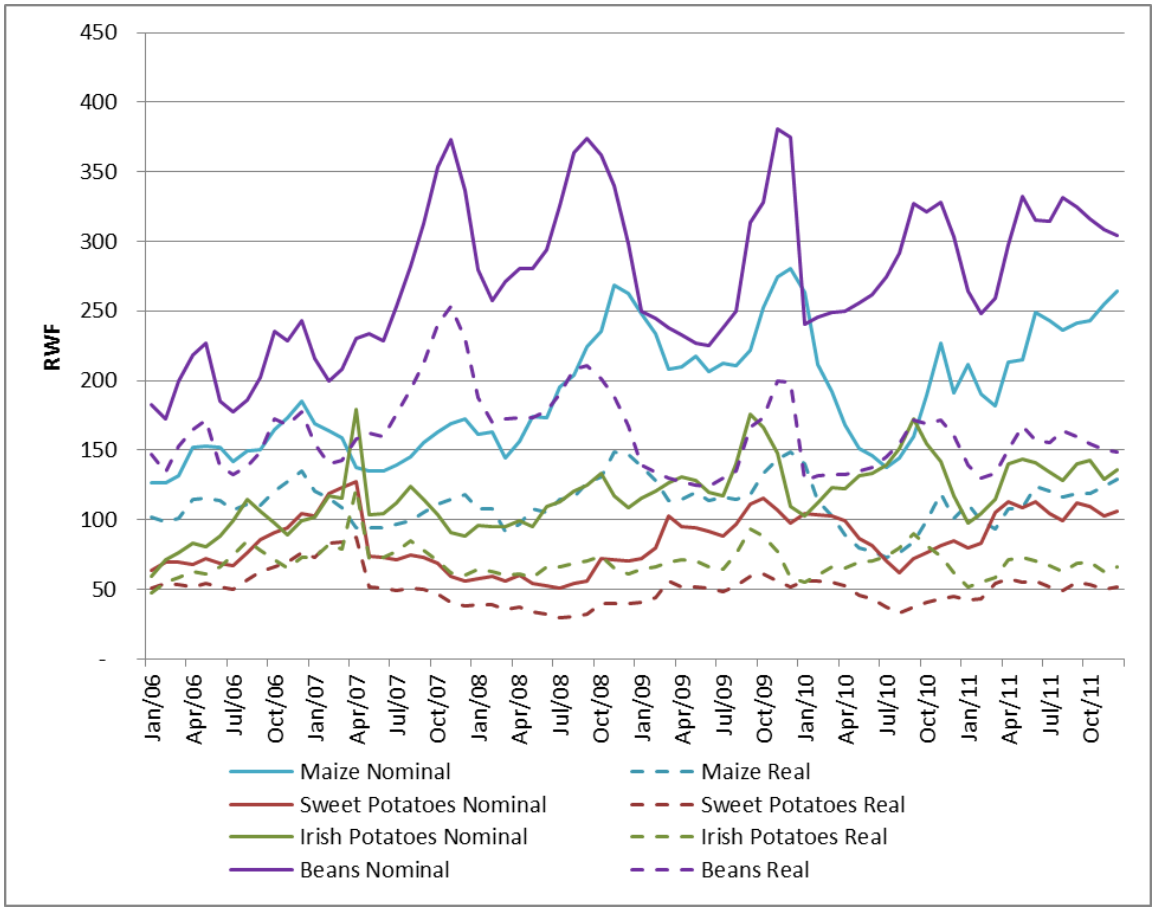
An important part of the functioning of markets is how they are able to regulate price differences and move commodities between markets according to supply and demand. This analysis looks at

price trends, seasonality[47] and stability. For the price analysis the main crops considered are beans, maize, cassava, Irish and sweet potatoes.[48]

Price trends

Figure 7 shows that nominal maize prices tend to increase at the end of each year. However, once nominal prices are deflated into real prices to take into account inflation, real prices appear quite stable with some exceptional spikes. Similarly, Irish and sweet potato real prices have remained relatively stable in the past six years. With regard to the same two-year period, real beans prices seem to be the most affected by yearly seasonality.

Figure 7: Nominal and real price trends of maize, beans, Irish and sweet potatoes (2006-2011)

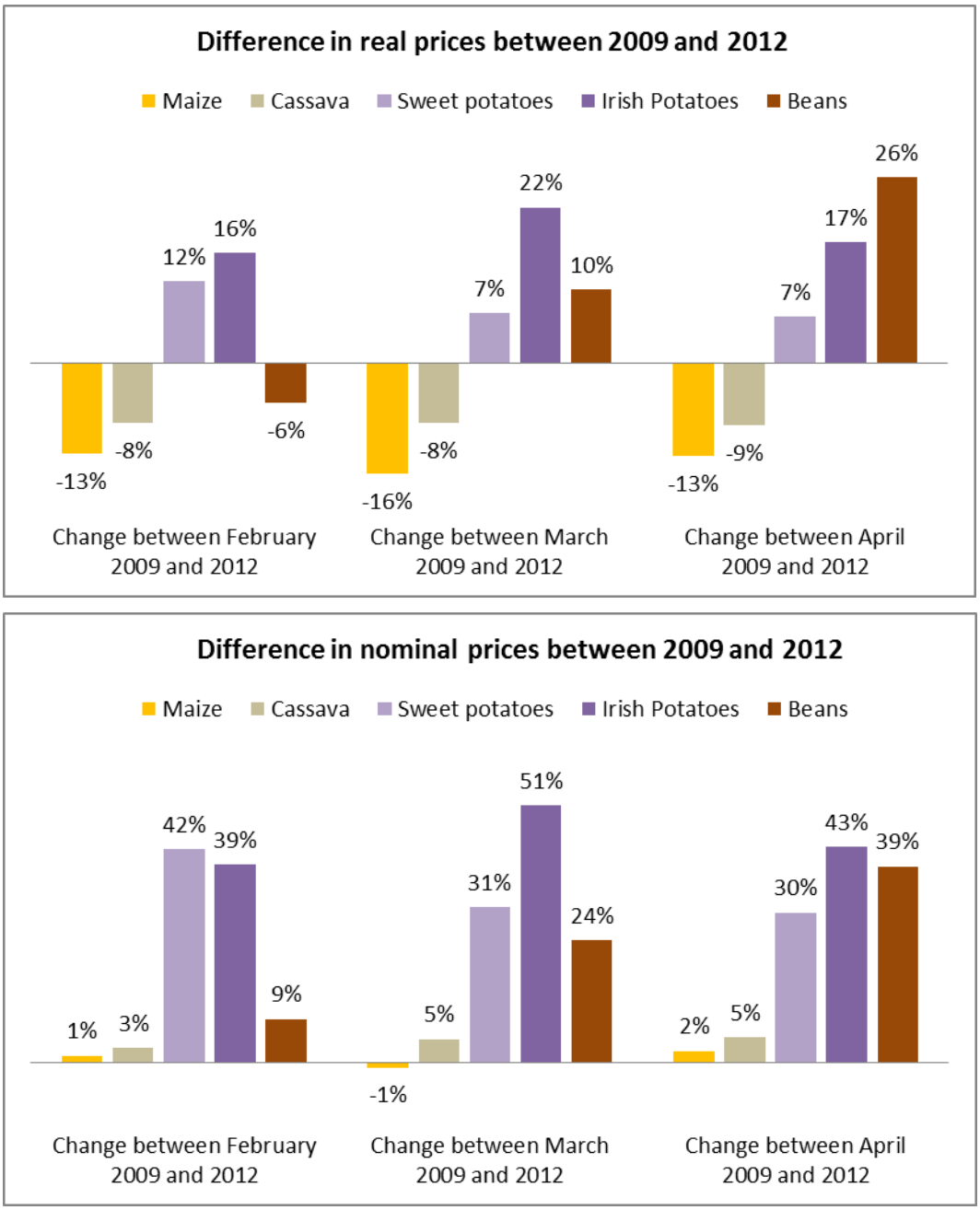


Source: Based on MINAGRI data, CPI=100 in Jan 2012

Compared to 2009, when the previous CFSVA and Nutrition Survey was conducted, in nominal terms, prices in 2012 were overall higher than in 2009 (see Figure 8). However, when deflated into real prices, prices in February, March and April were lower in 2012 for maize and cassava. On the contrary real prices for potatoes were higher in 2012 than in 2009 for the same three months. Interestingly, the real prices of beans were lower in February 2012 than in February 2009, but as the lean season progressed they increased compared with 2009. In March 2012 beans prices were 10% higher than in March 2009[49] and in April they were 26% higher.

[47] To analyse price seasonality, the average monthly price trends over the last 6 years for the commodities of maize, beans, Irish and sweet potatoes were analysed. Cassava and livestock prices are excluded from the analysis because they do not follow a similar annual bimodal pattern.
[48] Despite the significantly high production of bananas, this crop is left out of the analysis for a number of reasons: 1. Bananas are not only used for food consumption, but also to make wine and beer 2. Quantities include part of the plant therefore not reflecting actual food intake 3. Quantities and corresponding prices are difficult to determine as they are not sold per kg.
[49] Prices are corrected for inflation, in nominal terms.

Figure 8: Differences in real and nominal prices of main food commodities between 2009 and 2012



Source: based on MINAGRI price data and CPI data from NISR - (CPI=100 in Jan 2012)[50]

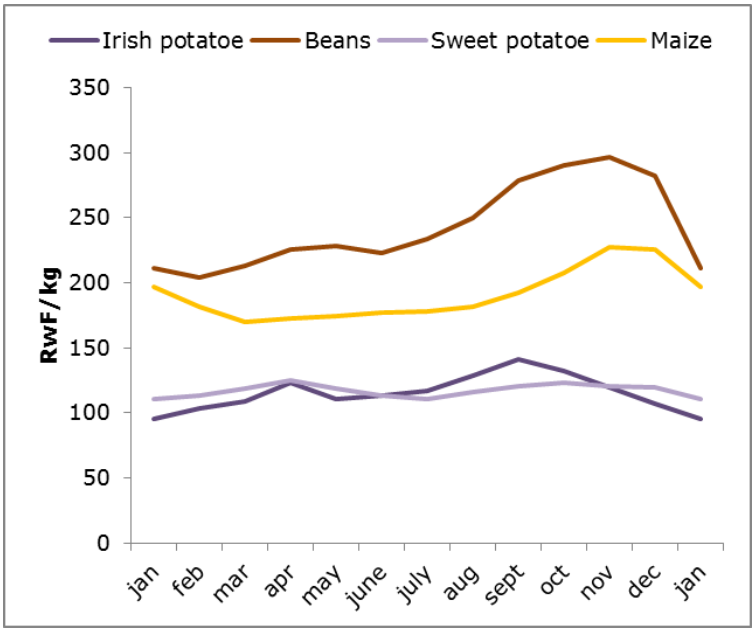
Price seasonality

Figure 9 depicts the average monthly price trends over the last six years for maize, beans, Irish and sweet potatoes. The general pattern is always an increase in prices up to the harvest and then a gradual drop. Nationally however, the price increase is much more marked in the run up to season A harvest (December-January) than to season B (June-July). In fact, Figure 9 shows increases of 27% in prices for beans and 28% for maize between July and November (the time between the two harvests) corresponding to the second peak of 'food access insecurity' (see section on food access p.29).

[50] The Consumer Price Index takes February 2009 as base (February 2009=100). The All Urban CPI is regarded as the headline index, producing the official inflation rate and therefore adopted in this study.

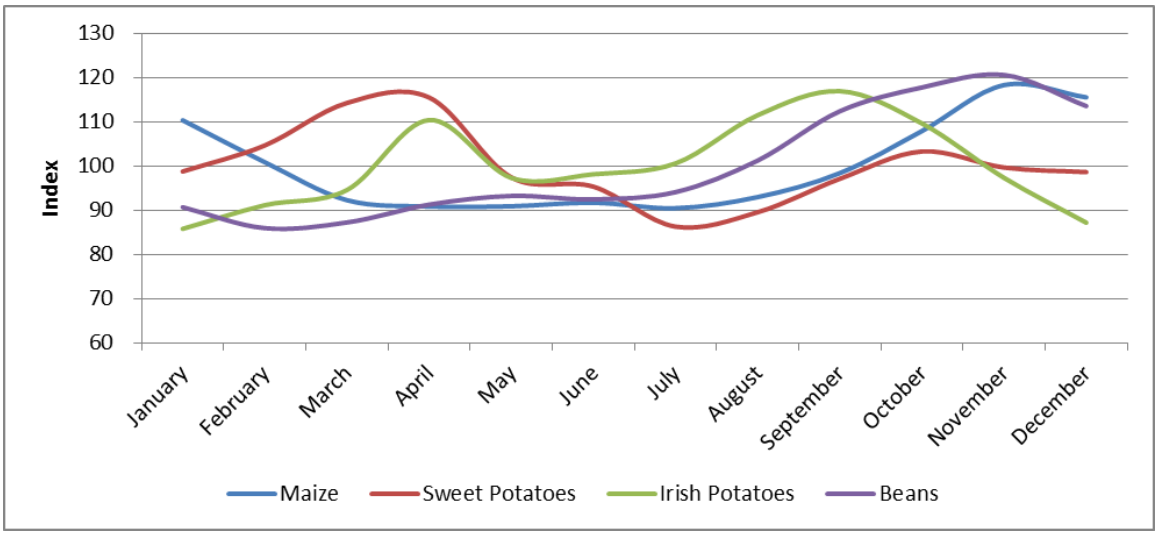
This is confirmed by the analysis of the Grand Seasonal Index (GSI).[51] Figure 10 shows that Irish potato prices present a bimodal pattern, with two increases in prices - one in April and one in September. Similarly, sweet potato prices spike in April, while for the remainder of the year they fluctuate less. Maize and bean prices both show quite steady prices over the year, with a remarkable increase during the last quarter, in the run up to the season A harvest (November-December).

Figure 9: Average 6 year monthly prices for selected commodities (2006-2011)



Source: based on MINAGRI price data, 2006-2011

Figure 10: Grand seasonal index for maize, potatoes and beans



Source: Calculations based on MINAGRI price data, 2006-2011

When combining this analysis with that of the food stocks (see Box 3) it becomes clear that before harvest and towards the end of the calendar year, farmers run out of food stocks and have to resort to the market for food when they will face relatively higher prices.

[51] The GSI is the average by month of the ratios between prices and their centred moving averages. It incorporates the full cycle of seasonal patterns and detects, based on historical values, the upper and lower bands where prices fluctuate across the year once common factors including inflation are smoothed out. The seasonality is quite pronounced for the four commodities.

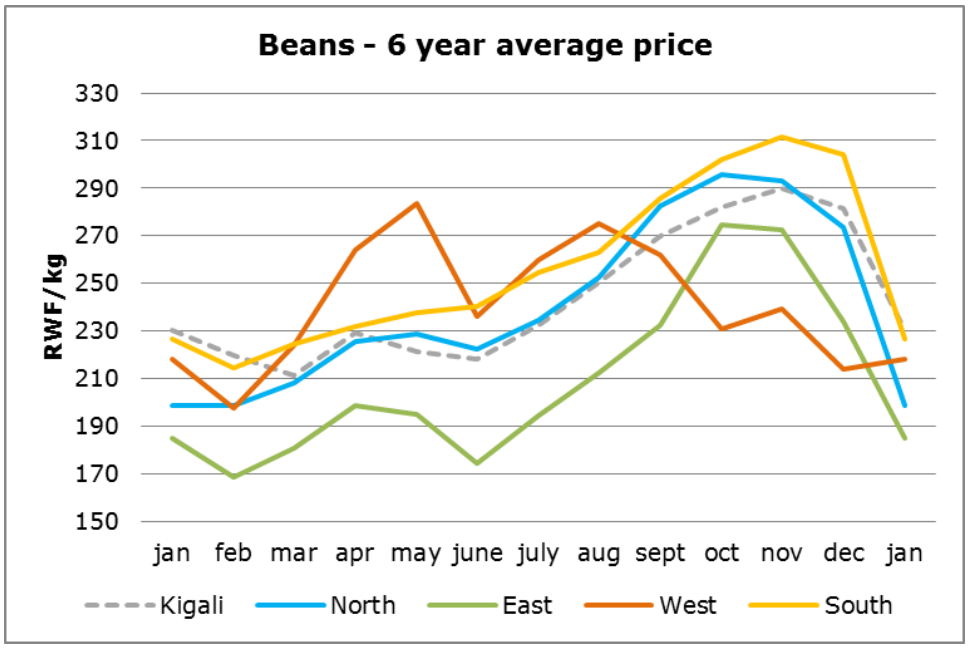
Regarding season B, and for maize especially, Figure 7 also shows that prices are fairly stable between January-July, indicating no seasonal price increases just before the season B harvest in June-July. The stable prices throughout the first part of the year have a positive effect on food security ensuring fair prices for both producers (at harvest) and consumers (during lean season). A possible reason for the lack of price seasonality for season B could be that maize is more a season A crop (for example in 2010, 13% of the land was allocated for maize cultivation in season A against 7% in season B).

Nevertheless, depending on the crops and provinces there are also seasonal price increases in the run up to the season B harvest. This is, for example, the case for bean prices in the western province (see Figure 11).

At a provincial level, bean prices in the southern province are regularly higher than elsewhere, possibly reflecting a production deficit combined with a lower measure of market integration. The eastern province, a major producer of beans, has lower prices almost all year round and seems to be most impacted by seasonal bean price fluctuations, especially just before the season A harvest (Oct-Nov) and dropping thereafter. The western province is unique with bean prices higher in the run up to the season B and C harvests and falling below those of other provinces before the season A harvest.

At subnational level, seasonal price patterns are also observed for other main crops[52] (maize, sweet and Irish potatoes). Again, the prices of these crops show seasonality patterns with prices increasing between February and April. This is the case for sweet and Irish potatoes in the southern province, and maize in Kigali City. At any given time, prices tend to be lower where the crops are mostly produced. For example, Irish potatoes are on average cheaper in the western and northern provinces, maize in the eastern province, while sweet potatoes are cheaper in the eastern, southern and western provinces.

Figure 11: Average bean prices in different provinces (2006-2011)



Source: Based on MINAGRI price data, 2006-2011

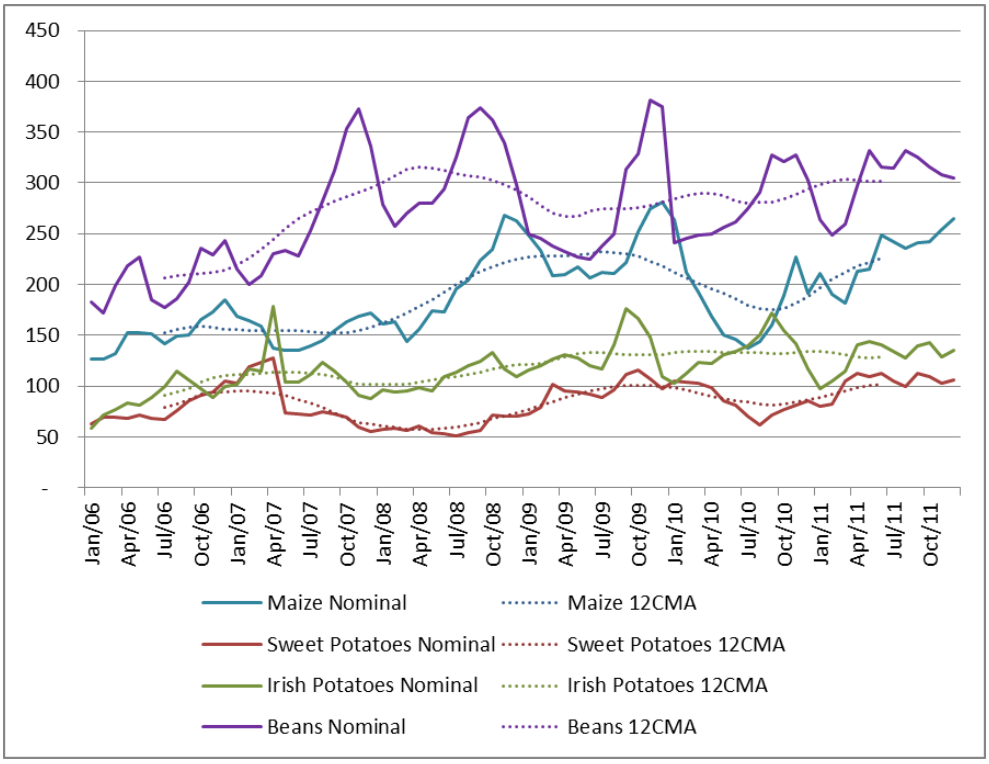
In short, although there are variations between crops and regions, prices of the main food crops in Rwanda vary seasonally; the general pattern is always an increase in prices up to the harvest and then a gradual drop. However, the price increase is much more marked in the run up to the season A harvest (December-January) than to the season B harvest (June-July).

[52] See graphs in Annex 7.

Price stability

Figure 12 shows both the nominal price of maize, sweet potatoes, Irish potatoes and beans and their 12-month moving averages, which represent long-term cycles once short-term fluctuations are smoothed out. When the seasonal component is smoothed away, Irish potato and sweet potato prices have been quite stable in the past few years, while beans and maize prices have been showing higher long-term volatility, in particular between 2007 and 2009. In the last months of 2011, only maize prices showed an increasing trend.

Figure 12: Nominal prices and centred moving average trends (in RWF/kg, 2006-2011)



Source: Based on MINAGRI price data, 2006-2011

3.2.4 Market integration

Apart from national price trends, market functioning depends on how different markets are integrated with each other. Market integration refers to co-movement in prices between different markets, reflecting a supply effectively meeting market demand throughout the country. Market integration is measured here (see Figure 14) by correlating monthly market prices between 2006-2011, resulting in a score between 0 and 1.[53]

Overall, markets are reasonably well integrated for maize. Most variation in scores can be explained by geographical distances and the quality of the transportation network. Kigali, the northern and the eastern provinces are the best connected, (also see Figure 13 that shows co-movement of prices between markets in these three provinces) probably because the East and North are the main maize producing areas and are well connected to the capital by road. Markets are least integrated between the western and eastern provinces; for instance the lowest integration is 0.33 between Kirehe (East) and Ngororero (West) districts and between Gisenyi (West) and Nyaruguru (South) districts and in both cases the markets are located in opposite parts of the country.

[53] A correlation of 1 between Kigali and Kirehe market means that if the price increases 50 RWF in Kirehe market, this is directly reflected by a 50 RWF price increase in Kigali market. A correlation of 0 between Kigali and Kirehe market means that there is no relation between the prices in Kigali and Kirehe and traders in one market are unresponsive to prices in the other.

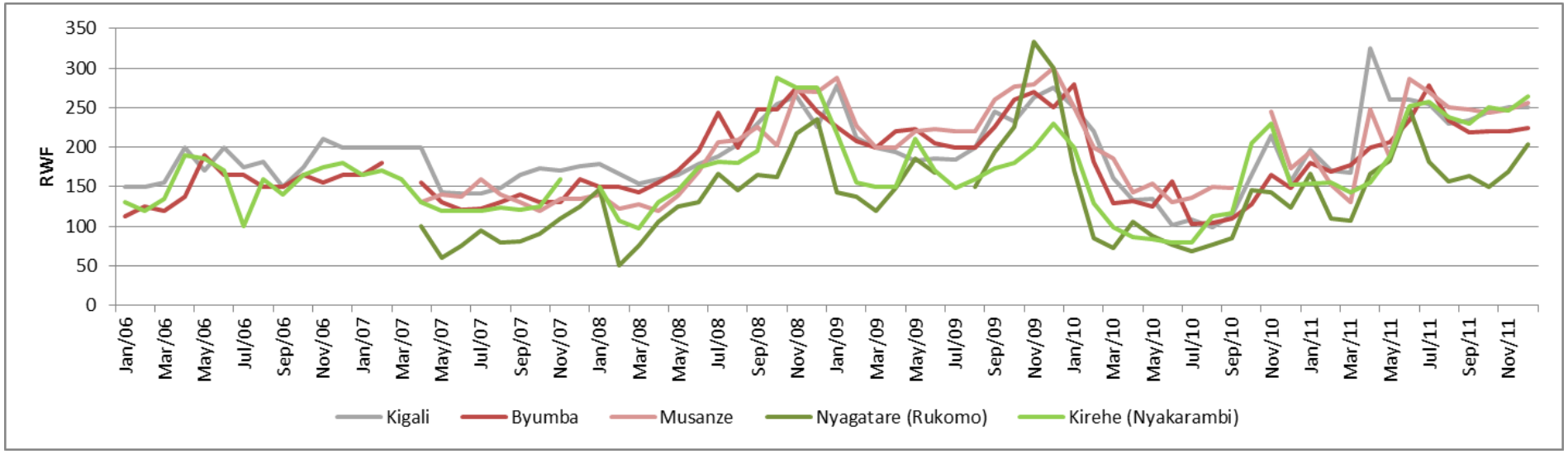
The markets in the southern province, where production is lowest, are neither well integrated with the rest of the country nor amongst each other. The picture for the western province is more diverse with some markets in the more food insecure areas less well connected (Ngororero) to the north and east. The Gisenyi market at the border with Congo is not well integrated with Kigali. A more in depth and cross border analysis would probably show stronger connections with prices in Congo. On the other hand Mukamira market in Nyabihu district (West) is relatively well integrated with the northern province markets (probably again a matter of proximity).

Markets in districts with higher percentages of food insecure households are nearly as integrated as the other markets, at least in the western province. For the southern province, lower levels of market integration were observed for Nyamagabe and Nyaruguru, whose district market (Ndago), has the lowest integration score of all markets. This probably reflects the fact that this market is less easily supplied by traders in a maize deficit area and prices tend to be generally higher, impeding the access of poorer households.

Looking at the market integration for other crops,[54] beans show a remarkably high level of market integration (0.8 on average), while sweet potatoes and Irish potatoes show low (0.48 and 0.64) levels, of integration between the different district markets. This can be explained by geographical differences in consumption patterns as beans are consumed equally throughout the country, while Irish potatoes are consumed predominantly in the north and less in the South and sweet potatoes the reverse - predominantly in the South and less in the North.

[54] See Annex 6.

Figure 13: Co-variations of maize nominal prices in provinces of Kigali (grey), northern (red) and eastern provinces (green) (prices in RWF)



Source: based on MINAGRI price data, 2006-2011

Figure 14: Correlation of monthly maize prices between provincial markets (2006-2011)

			Kigali	North		East		West				South					
										foodinsecure				food insecure			
			Kigali (Nyabogogo)	Byumba	Musanze	Nyagatare (Rukomo)	Kirehe (Nyakarambi)	Gisenyi	Kibuye (Rubengera)	Mukamira	Ngororero (Kabaya)	Butare	Muhanga	Nyamagabe (Gikongoro/ Gaserenda)	Nyaruguru (Ndago)		
Kigali		Kigali	1.00														
North		Byumba	0.81	1.00													
		Musanze	0.83	0.85	1.00												
East		Nyagatare (Rukomo)	0.75	0.81	0.83	1.00											
		Kirehe	0.77	0.76	0.79	0.74	1.00										
West		Gisenyi	0.44	0.53	0.71	0.54	0.53	1.00									
		Kibuye	0.52	0.58	0.62	0.59	0.44	0.66	1.00							Good	
	foodinsec	Mukamira	0.78	0.85	0.93	0.78	0.74	0.70	0.67	1.00						Medium	
	foodinsec	Ngororero	0.66	0.80	0.34	0.35	0.33	0.76	0.70	0.91	1.00					Low	
South		Butare	0.59	0.69	0.17	0.60	0.57	0.62	0.66	0.71	0.80	1.00					
		Muhanga	0.61	0.69	0.66	0.56	0.64	0.62	0.57	0.68	0.63	0.69	1.00				
	food insec	Nyamagabe	0.58	0.52	0.62	0.62	0.55	0.79	0.61	0.72	0.65	0.43	0.47	1.00			
	food insec	Nyaruguru	0.50	0.54	0.46	0.36	0.39	0.33	0.49	0.56	0.61	0.60	0.53	0.36	1.00		Total aver
		Average	0.65	0.70	0.65	0.63	0.61	0.60	0.59	0.75	0.63	0.59	0.61	0.58	0.48		0.62

Source: Calculations based on MINAGRI price data. For the analysis: scores between 0.75-1 were considered high market integration (green), scores between 0.5-0.75 (orange) medium and scores below 0.5 (red) low market integration or no market integration at all. The two largest markets were selected per province. In addition, the main markets in the four most food insecure districts were included in the analysis.[55]

[55] The four most food insecure districts were selected based on food consumption scores from the Comprehensive Food Security and Vulnerability Analysis 2009 results. For these districts the main food market was selected and included in the price analysis.

3.3 HALF OF HOUSEHOLDS HAVE DIFFICULTY ACCESSING FOOD

The CFSVA and Nutrition Survey 2012 household questionnaire asked whether households had enough food or money to buy food during the last 12 months, and if they did not, they were labelled as having 'food access issues'.

For the analysis below, food access issues lasting for at least six months of the year and described as 'usual' are considered chronic. Chronic food access insecurity can be characterized as a long-term or persistent inability to access food to meet minimum food consumption requirements. If food access issues were experienced for a total of less than six months a year, and they were not reported to be usual, they are considered to be a short-term or temporary inability to meet minimum food consumption requirements and qualified as 'acute food access issues'. Seasonal food access issues can be described as food access issues recurrent for less than six months a year and considered by households as 'usual'.

In total, almost half of all households do not have food access issues (49%). A fifth of all households reported seasonal food access problems, 17% acute and 14% chronic problems, adding up to a total of 51% of all households reporting some type of difficulty in accessing food in the 12 months preceding the survey.

For the one fifth of all households in Rwanda that mentioned having had seasonal food access problems, the shortages occurred in the lean seasons just before the two main harvests (from March to May and from September to November - see Box 2 p.15). Much of the seasonality in food insecurity can be linked to household level availability of food stocks (see Box 3 p.19), price trends (see section 3.2.3 p.20) and - for some livelihood groups - to the availability of work (see section 4.2.2). The households most exposed to seasonal food insecurity were the poorest and those relying most on seasonal work.

Households were asked how often they had used a list of five coping strategies in the seven days prior to the survey.[56] The information was used to compute a reduced coping strategy index (CSI) that took into account both the frequency and gravity of the mechanisms used.[57] Households that mentioned using the coping strategies were further regrouped into three terciles ('low', 'medium' and 'high') reflecting the relative severity of their coping strategy index. While half of households did not mention any coping strategies, the other half were re-categorised into three groups, each representing 16.5% of all households, having a 'low', 'medium' or 'high' CSI.

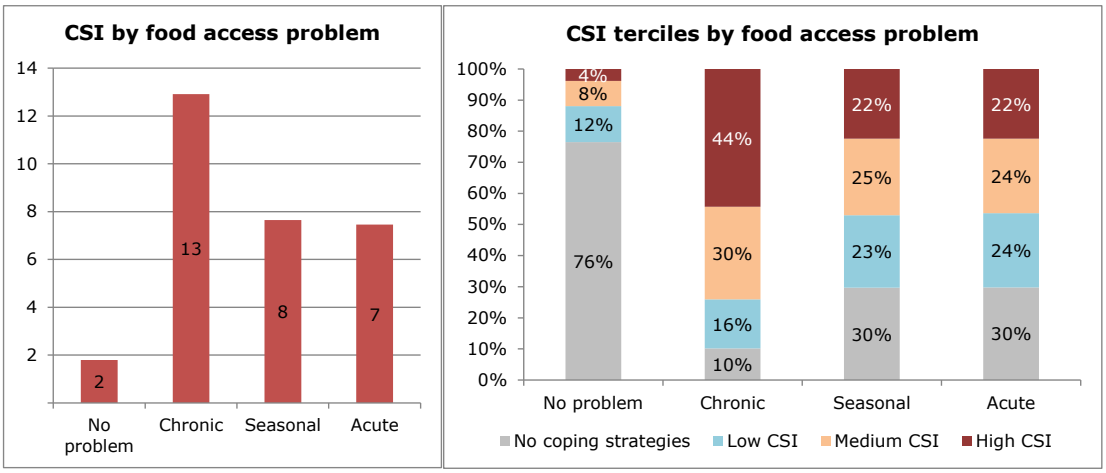
Figure 15 shows that the average coping strategy index for households with chronic food access issues was a lot higher than that of the other groups; 44% of households with chronic food access problems have a high CSI compared to 22% for the other households mentioning food access problems and 4% of those that did not mention any food access problems.[58] This suggests that households with chronic food access problems are more regularly reliant on severe coping strategies than other households (also see Figure 16). In other words households with seasonal or acute access problems can temporarily resolve their food access issues while households with chronic access issues are more likely to be at a last resort stage.

[56] The five coping strategies were 1) 'relying on less preferred and less expensive foods', 2) 'borrowing food or relying on help from friends or relatives', 3) 'limiting portion size at meal times', 4) 'restricting consumption by adults in order for small children to eat', and 5) 'reducing number of meals eaten in a day'.

[57] "Eating less-preferred/expensive foods", "limiting portion size at meal time" and "reducing the number of meals per day" have a severity score of 1. "Borrowing food or relying on help of friends/relatives" and "limiting adult intake in order for small children to eat" have a severity score of 2 and 3 respectively.

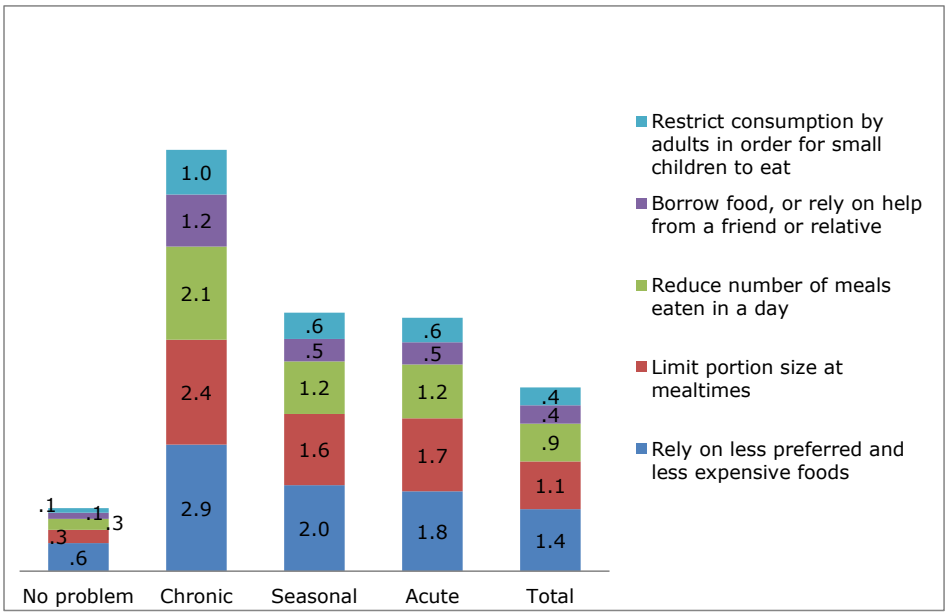
[58] Households with chronic food access issues had a CSI of 13 on average compared to two for households who did not have any access issues, and eight and seven for households with seasonal and acute issues respectively.

Figure 15: Food access groups, coping strategy index and coping strategy index terciles



Source: CFSVA and Nutrition Survey 2012

Figure 16: Average number of days coping strategies were used by households in the seven days preceding their interview, by type of food access problem reported



Source: CFSVA and Nutrition Survey 2012

3.4 ALMOST FOUR IN FIVE HOUSEHOLDS HAD ACCEPTABLE FOOD CONSUMPTION IN MARCH/APRIL 2012

The diet diversity score or "food consumption score" (FCS)[59] is an internationally used WFP standard score calculated by weighing the frequency of consumption (number of days per week) of different food groups consumed by a household during the seven days that preceded the interview. The different food items are reorganized into specific food groups. Consumption frequencies of food items belonging to the same group are added up and values above seven are recoded as seven.[60] The value obtained for each food group is multiplied by its weight. The food consumption score is the sum of the weighted food groups. Two thresholds (21 and 35) distinguish three different food consumption levels ('poor', 'borderline' and 'acceptable', see Table 5 and Figure 17).

[59] See for Annex 2 for the detailed calculation.
[60] As seven is the maximum number of days per week.

Table 5: Description of food consumption groups

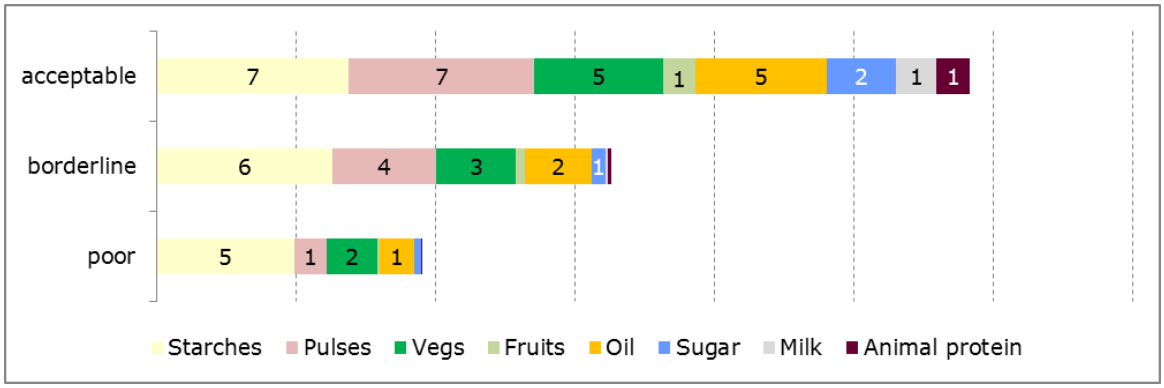
Food consumption group	Description	FCS cut-off point
Poor	These households are extremely food insecure: they consume starches (cereals, roots and tubers) five days a week, vegetables twice and pulses one day a week. Oil is consumed once a week on average and the rest of the food groups (especially animal protein) are barely consumed.	≤ 21
Borderline	These households are moderately food insecure: they have starches and vegetable based diets with vegetable protein intake around four days a week. Compared to households with poor food consumption, they consume starches, vegetables and oil one more day a week, and pulses three more days a week.	21.5-35
Acceptable	These households are food secure: they have sufficient diversity and potential for adequate nutrient intake through regular consumption of foods with nutrient density and quality. They are the only households to consume some animal proteins (on average one day of meat and one day of milk a week). They also consume starches and pulses every day, and vegetables and oil five days a week.	> 35

Source: CFSVA and Nutrition Survey, 2012

In March-April 2012, 79% of all households in Rwanda had acceptable food consumption (1,717,000 households); the rest (over one in five) either had borderline (17% or 378,000 households) or poor food consumption (4% or 82,000 households). In total an estimated 460,000 households in Rwanda had unacceptable food consumption in March/April 2012.

The Rwandan diet is based on staples and vegetables, with FCS increasing when households consume more oil (fats) and pulses (vegetable proteins). The consumption of fat appears to reach a substantial frequency levels (at least 3-4 days/week) only when the total dietary pattern is very rich, with daily consumption of staples, vegetables, animal products, and consumption of all the other four food groups around 3-4 days/week.

Figure 17: Number of days in a week different food groups are consumed, by household food consumption group



Source: CFSVA and Nutrition Survey, 2012

As illustrated by Map 4 and Map 5, there are geographical patterns in the way food items are consumed in the country. Protein intake is relatively high in Kigali City, in addition, milk, meat and eggs are most consumed in the east of the country that is also famous for its livestock production. Fish is most consumed along Lake Kivu. Maize and cooking banana are mostly consumed in the East, cassava in the South, sweet potatoes in the North and along the Congo Nile Crest. Pulses are widely consumed everywhere, but relatively less along Lake Kivu.

Box 4: Comparing levels of food consumption with neighbouring countries[61]

Even though one needs to be aware of limitations of comparing levels of food consumption between countries, Table 5 below reports the latest available national percentages of households with acceptable, borderline and poor food consumption for countries neighbouring Rwanda.

With 79% of households with unacceptable food consumption in the lean season nationwide, Rwanda's food consumption situation is comparable with that of Tanzania in 2010 and of Uganda in 2012. Comparatively the food security situation depicted is considerably better than that of neighbouring Burundi (2008) even after harvest, and the Democratic Republic of Congo.

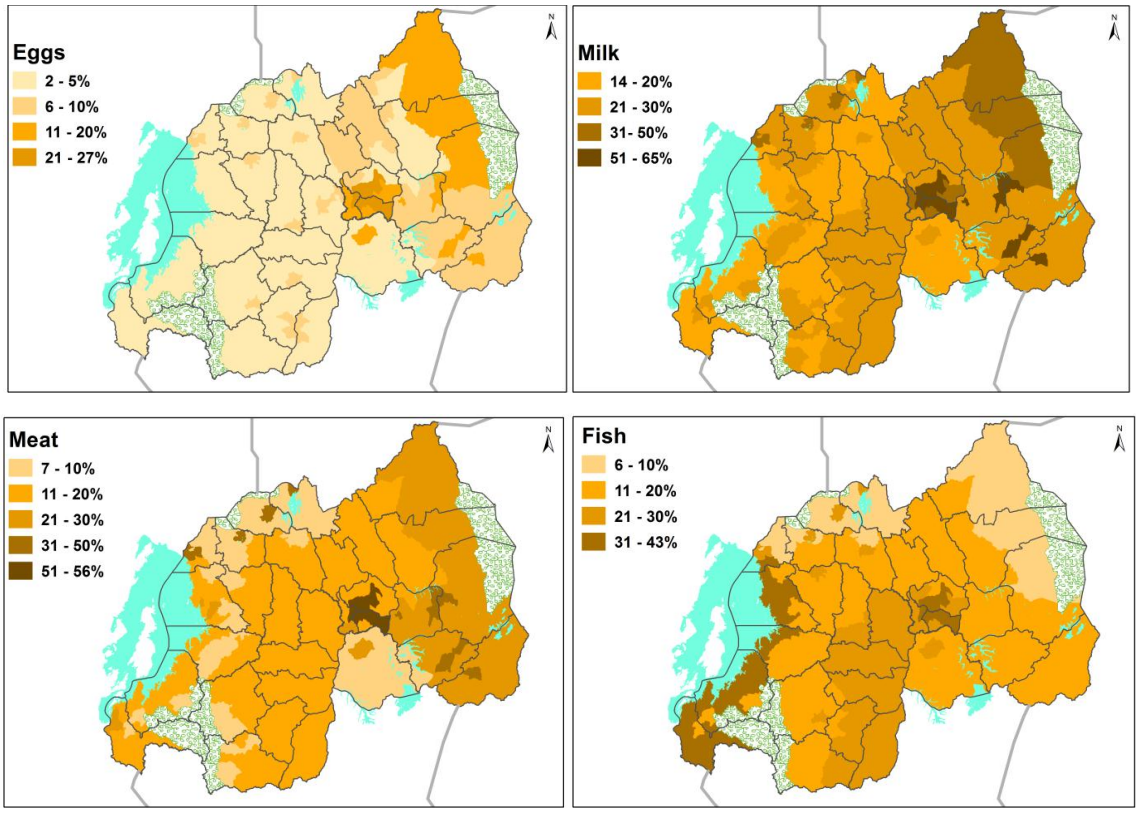
Table 6: FCS in countries neighbouring Rwanda

Country	Year of CFSVA publication	Period of data collection	% hh with acceptable FC	% hh with borderline FC	% hh with poor FC	Comments
Kenya	2012	Aug-Sept 2010	87%	8%	5%	Only densely populated urban areas
Rwanda	2012	March - April 2012 (lean season)	79%	17%	4%	
Tanzania	2010	Nov 2009 - Jan 2010 (lean season)	77%	19%	4%	
Uganda	2009	Oct - Nov 2008 (after harvest)	72%	21%	6%	
Uganda	2012	2010, whole year	80%	16%	5%	Data aggregated by households interviewed over the course of the year should 'smooth' over any seasonal changes
Burundi	2008	Jun-Jul 2008 (after harvest)	72%	23%	5%	
Congo DRC	2008	Jul 2007 and Feb 2008	64%	30%	6%	Data collection was done in two phases

Source: WFP CFSVAs

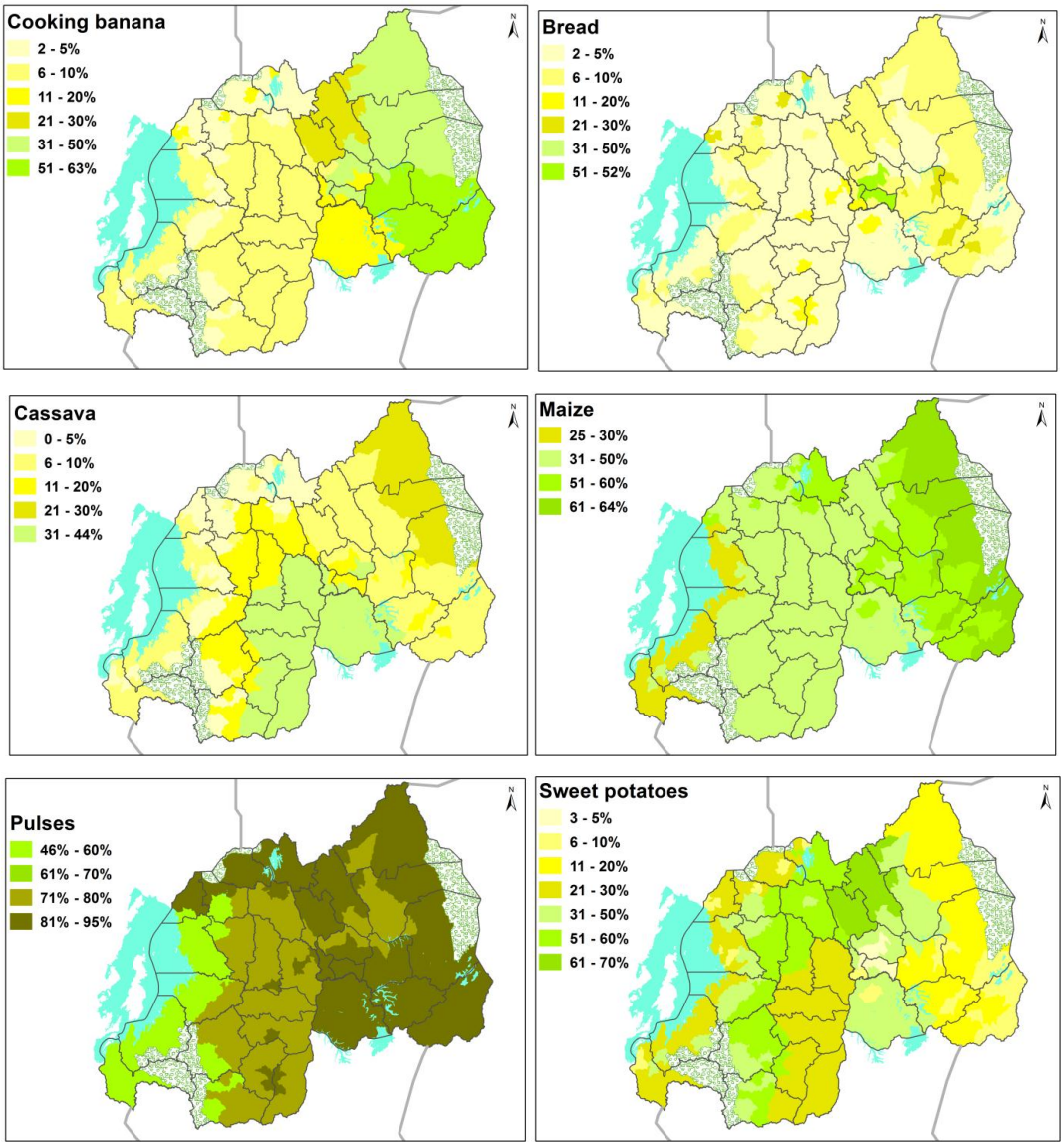
[61] Limitations of international comparisons include that the calculation of food consumption score is heavily dependent on cultural dietary practices, that the national figures hide subnational disparities which can be very big especially when countries are very large and diverse, and that the measure of the food consumption score is very dependent on the timing of the data collection. One country may score better than another because the data was collected in a period of plenty while in the other country it was done in a lean season or after a bad harvest.

Map 4: Percentage of households consuming eggs, milk, meat and fish at least once per week



Source: CFSVA and Nutrition Survey, 2012

Map 5: Percentage of households consuming cooking banana, bread, cassava, maize, pulses and sweet potatoes at least four times per week



Source: CFSVA and Nutrition Survey, 2012

Box 5: Likely, but not confirmed, improvements in household food consumption since 2009

When looking at food consumption as described by the food consumption score, and while adjusting the calculations in order to maintain comparability with 2006 and 2009, food consumption has drastically improved since 2006 but does not appear to have improved a lot between 2009 and 2012. In statistical terms - considering 95% confidence intervals - the results of the 2012 CFSVA and Nutrition survey are not significantly different from those of the 2009 assessment when considering percentages of households with poor, borderline and acceptable food consumption (see Figure *18*). That said, it is important to discuss some of the factors that need to be taken into account when comparing the estimated shares of food secure and insecure households between 2009 and 2012.[62]

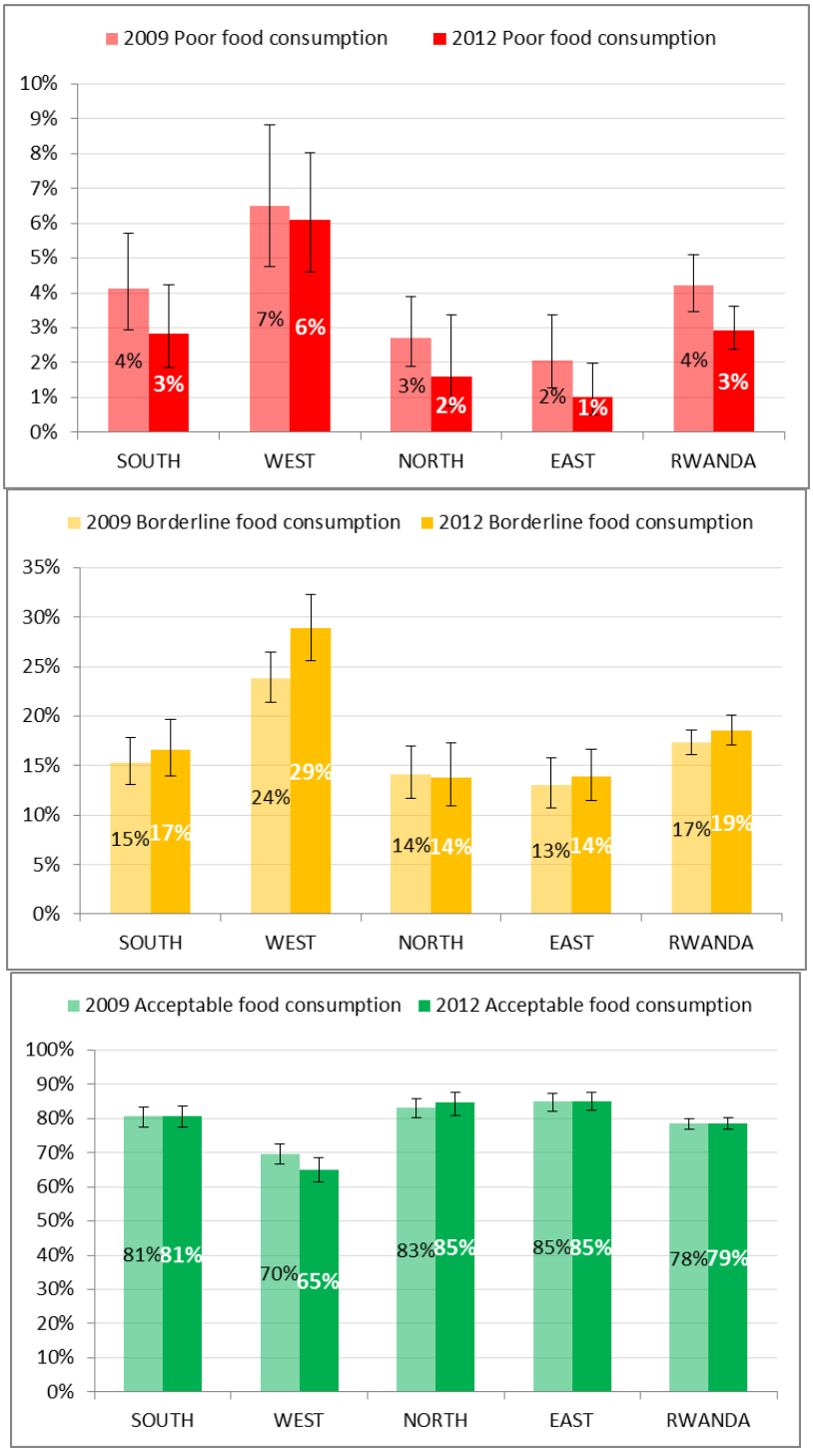
As already mentioned, the household survey provides only a snapshot of the food security situation at the time of the survey, and seasonality in Rwanda plays a very important role, especially in determining the levels of food stocks available for a household at a given time. Much of the CFSVA and Nutrition Survey 2012 data collection took place a month later in the year than that of 2009. For many households this represents a critical moment in the lean season. If one refers to Figure 5 p. 19, there is a drop of around 15 percentage points between March and April in the estimated percentage of households having food stocks from the previous harvests.

In other words, if the survey had taken place one month earlier in the year, the results would have been more comparable in terms of seasonality, and it is likely that household food consumption would have shown more significant improvements since 2009.

In fact, *even though the improvements are not significant*, the CFSVA and Nutrition Survey 2012 suggests that the estimates of the percentage of households with poor food consumption have decreased by one percentage point while the percentage of households that can be considered to be food secure has remained roughly the same, with perhaps a slight increase in the estimate of households with borderline food consumption. Looking at the provincial level,[63] results seem to indicate that the only increases - if any - in the percentage of food insecure households are to be attributed to a higher percentage of households with borderline food consumption. The situation in the western province appears to be slightly worse than in 2009 with increases in the share of households with borderline food consumption, whereas in other provinces the differences are minimal. At sub provincial level no clear patterns emerge in terms of differences between 2009 and 2012.

[62] Besides the limitations in comparability mentioned in the methodology section of the report.
[63] Differences are again not statistically significant.

Figure 18: Percentage of households in each food consumption group in 2009 and 2012 (CI: 95%)[64]



Source: CFSVA and Nutrition Survey, 2009 and 2012

[64] For comparability sake the data excludes households living in Kigali province and those with no children under five; this explains why percentages are slightly different from the ones presented on p.31.

3.5 ACCEPTABLE LEVELS OF ACUTE MALNUTRITION BUT STILL ALARMINGLY HIGH RATES OF CHRONIC MALNUTRITION FOR CHILDREN UNDER FIVE

A child's full potential for survival, normal growth, and cognitive development is predetermined by conditions in intra-uterine life beginning at conception. Post-natal conditions determine whether that potential is achieved. Malnourished children cannot fulfil their development potential. Because stunted growth in childhood is a risk factor for increased mortality, poor cognitive and physical development and other impairments, stunted children may do badly in school and have low productivity in adulthood; as a result they pass on poverty, food insecurity, malnutrition and deprivation to future generations.

According to the 2010 DHS, more than one third (38%) of children age 6-59 months are anaemic.[65] Anaemia is highest among children under 12 months old (69-70%) and declines with age (falling to 25% amongst children aged 48-59 months). It is higher in boys (41%) than girls (35%). Children of uneducated mothers and those from poor households are more likely to be anaemic (43% in lowest wealth quintile compared to 36% in each of the three highest quintiles). The highest regional prevalence of anaemia is found in the eastern province (43%) and lowest prevalence in the northern province (31%).

For the CFSVA and Nutrition Survey 2012, 4651 children under five years old were measured for their age, weight and height or length in order to calculate levels of stunting, wasting and underweight.[66] These three nutritional indicators are expressed in standard deviation (SD) units (z-score) from the median of the 2006 WHO reference standards, with cut-offs set at -2 SD and -3 SD.[67] The main purpose of collecting nutrition data was to explore linkages between food security and malnutrition. Still, the survey provides unbiased estimates of the main malnutrition indicators. The results of the CFSVA and Nutrition Survey 2012 are relatively precise at provincial and country level; at district level the estimates are less precise but where needed confidence intervals are given. The calculated prevalences for all three indicators are very much in line with the 2010 DHS results.[68] They also confirm the estimates of malnutrition provided by the Food and Nutrition Security Monitoring System (FNSMS) rounds (September 2010, March 2011 and September 2011).

As shown by Table 7, in Rwanda, the rate of acute malnutrition (or wasting) measured by weight for height and confirmed by MUAC measurements is relatively low at 3.6% (CI 3.1-4.3%) and is within 'acceptable'[69] limits.[70,71] On the contrary, and despite the success in reducing poverty levels, levels of chronic malnutrition (stunting) among children between 6-59 months old has remained 'very high'[72] over the last 20 years: 49% in 1992, 51% in 2005, 44% in 2010[73] and 43%

[65] 24% mild, 14% moderate , 1% severe.
[66] In general, stunting (height-for-age z-score = HAZ) reflects an assessment of body growth and is often referred to as chronic malnutrition. Wasting (weight-for-height z-score = WHZ) is an indicator for acute malnutrition or thinness, whereas underweight (weight-for-age z-score = WAZ) is a measurement of both acute and chronic malnutrition. While wasting can be the result of an acute insufficiency, mainly a calorie-reduced diet or acute disease (commonly diarrhoea), several nutrient deficiencies probably occur simultaneously in growth-stunted children.
[67] Cases with unreasonable results were excluded (flagged) from the analysis for each specific indicator. Some degree of height rounding was observed. The errors in measurement are likely to increase the standard deviation of the z-scores, and will also decrease the strength of observed associations between nutritional status and other indicators, particularly when observing the mean z-scores. However, if the rounding/heaping errors are randomly biased up or down, the effect on observed prevalence will be less.
[68] The results confirm those of the DHS; no significant differences in levels of malnutrition could be observed between the two surveys.
[69] WHO,1995. Cut-off values for public health significance. http://www.who.int/nutgrowthdb/en. Wasting below 5% is considered 'acceptable'.
[70] These percentages include children diagnosed with oedema. The prevalence of oedema in the sample was higher than expected.
[71] Acute malnutrition can fluctuate seasonally or from one year to the other but in Rwanda the rates of acute malnutrition remain stable. Stunting is usually less likely to change dramatically.
[72] WHO,1995. Cut-off values for public health significance. http://www.who.int/nutgrowthdb/en. Stunting above 40% is considered 'very high'. The stunting prevalence can be qualified as 'critical' according to the 'Measuring and interpreting malnutrition and mortality manual (WFP, 2005)'.

in 2012 (CI: 42.7-45.2%).[74] Although it looks like there is tendency towards a decrease in stunting since 2005, Rwanda's rate of chronic malnutrition is one of the highest in the region.[75]

At 12% prevalence, levels of underweight, measured as weight for age - reflecting both chronic and acute malnutrition, are 'poor' (12%, CI: 10.9-13.2%).[76]

Table 7: Prevalence of malnutrition among children under five years

	Moderate			Severe			Global			Total Count
	%	95% CI		%	95% CI		%	95% CI		
		Low	Up		Low	Up		Low	Up	
Stunting	28.1%	26.7%	29.6%	15.3%	14.1%	16.6%	43.4%	41.7%	45.2%	4384
Underweight	9.3%	8.4%	10.3%	2.7%	2.2%	3.3%	12.0%	10.9%	13.2%	4414
Wasting	1.8%	1.4%	2.3%	1.9%	1.5%	2.3%	3.6%	3.1%	4.3%	4382

Source: CFSVA and Nutrition Survey, 2012

3.6 WOMEN'S NUTRITIONAL STATUS

According to the 2010 DHS, 17% of women of reproductive age are anaemic (14% mild, 3% moderate, less than 1% severe). Anaemia is more prevalent in women with more than four children, among those who have no education and those who are poor. There is no significant difference between rural and urban women. As with children, a high prevalence of anaemia in women is found in the eastern province and low in the northern.

*Box 6: Cut off values used for the calculations of women malnutrition (*not valid for pregnant women).*

Stunting	Height < 145 cm
Underweight*	Weight < 45 kg
Wasting (BMI)*	BMI= 18.5 -24.9 Kg m -2
GRADE I	BMI = 17.0-18.4 Kg m -2 (Mildly thin)
GRADE II	BMI = 16.0-16.9 Kg m -2 (Moderately thin)
GRADE III	BMI < 16 Kg m -2 (Severely thin)
Overweight (BMI)*	BMI > 25 Kg m -2
Wasting (MUAC)	MUAC < 221 mm
SEVERE:	MUAC < 214 mm
For pregnant women	MUAC < 221

In each household sampled for the CFSVA and Nutrition Survey 2012, enumerators measured weight and height of all non-pregnant women between 15 and 49 years old, and the MUAC of all women between 15 and 49 years old. Four indicators were used to evaluate women's nutritional status: height (for stunting of all women), weight (for underweight of non-pregnant women), the BMI (for wasting of non-pregnant women) and MUAC (for wasting of all women). Among the sampled women, 6904 non-pregnant women could be assigned a valid height, weight and BMI and 7418 women between 15 and 49 years old could be assigned a valid MUAC.[77] Levels of malnutrition among women were calculated using the cut off values presented in Box 6.

With 4% of women of reproductive age stunted, 17% overweight and 7% wasted, the results of the CFSVA and Nutrition Survey 2012 largely reflect those of the DHS 2010 in which 3% of women

[73] DHS 2010; Note that the figures before 2006 are difficult to compare with the ones after 2006 unless they are translated into WHO new standards adopted in 2006 (more than 2 SD below the median).
[74] According to the CFSVA and Nutrition Survey results 2012.
[75] WFP presentation at the Nutrition Summit, November 2011.
[76] WHO,1995. Cut-off values for public health significance. http://www.who.int/nutgrowthdb/en. Following WHO standards according to the 'Measuring and interpreting malnutrition and mortality manual (WFP, 2005).'
[77] BMI is not suitable for pregnant women due to weight changes in pregnancy; for pregnant women MUAC is used to estimate wasting.

of reproductive age were stunted, 16% overweight and 7% wasted.[78] The CFSVA and Nutrition Survey 2012 further found that 5% of pregnant women are wasted (MUAC).

Box 7: Summary - The state of food security and nutrition in Rwanda in 2012

Food production is increasing in Rwanda, markets are functioning relatively well and food is flowing easily within and outside the country thanks to the well-connected road network and market infrastructure in Rwanda.

Markets constitute the first source of food for households, provide, on average, 65% of the food consumed by a household; followed by household own production contributing an average of 30%. A substantial amount of household expenses are spent on food (48%). While district markets around the country are well connected by road, translating into reasonably good market integration and price stability, for some rural households it is difficult to get to and from the market.

Although there are variations between crops and regions, prices of the main food crops in Rwanda vary seasonally, the general pattern is always an increase in prices up to the harvest and then a gradual drop. However, the price increase is much more marked in the run up to the season A harvest that takes place in December-January, than to the season B harvest (June-July).

Seasonal price variations of staple crops are an important constraint to household access to food, especially during the lean seasons when household food stocks have run out and more people are market dependent. Around December/January more than 60% of all households in Rwanda had some food stocks from their (relatively good) 2012 season A harvest. This percentage decreases to around 15% in May just before the season B harvest. In June, after season B harvest, almost 60% of households again have food stocks.

One fifth (20%) of all households mentioned recurrent seasonal problems providing food to their families during the year (seasonal food access problems), 17% of all households experienced unusual difficulties at some point during the year in providing their families with food (acute food access problems), and 14% encounter these problems most of the year (chronic food access problems). This adds up to a total of 51% of all households reporting some type of difficulty in accessing food in the 12 months preceding the survey.

In March/April 2012, just a few months before the season B harvest, around 1,717,000 households, representing 79% of all households in Rwanda, had acceptable food consumption. The rest of the households (more than one in five - 21% - about 460,000) had unacceptable food consumption and could be considered to be food insecure. These either had poor food consumption (82,000 households, representing 4% of all households) or borderline food consumption patterns (378,000 households, 17%). This shows clear improvement since the 2006 CFSVA and seems to indicate a slight, although not confirmed, improvement in household food consumption since the last CFSVA and Nutrition survey was conducted in February-March 2009.

Acute malnutrition among children between six months and five years is the only nutrition indicator within 'acceptable' limits (3.6%). The prevalence of chronic malnutrition (indicated by stunting) among children between six months and five years is 43% and has remained 'very high' in Rwanda over the last 20 years. The prevalence of underweight, which reflects both chronic and acute malnutrition, is 'poor' (12%). Among women of reproductive age 4% are stunted, 17% overweight and 7% wasted. In addition, 5% of pregnant women are wasted (MUAC).

[78] Percentage of wasted women was also measured in the 2009 CFSVA and Nutrition survey and the results were very similar.

4 UNDERSTANDING THE ISSUES BEHIND POOR FOOD CONSUMPTION AND CHRONIC MALNUTRITION IN RWANDA

Food production is increasing and food is flowing relatively easily within and outside the country. Yet food access is problematic for half of all households in Rwanda. At least one fifth of Rwandan households had poor food consumption in March/April 2012 and 43% of children under five are chronically malnourished (46% in rural areas). This chapter looks at why some households have poor food consumption or have members of their households malnourished and others not. It discusses the parameters that were found to have significant causal relations as identified by the CFSVA and Nutrition Survey 2012 analysis. General Linear Model (GLM) and multivariate logistic regressions were used to isolate the key underlying factors affecting food consumption and nutrition in Rwanda.

After correcting for all the other variables in the model, the variables found to be statistically significant to explain household food consumption are:

- Location (livelihood zones, urban/rural, distance to the main road, distance to the nearest market)
- Household livelihoods and wealth (livelihood groups, number of income activities, household wealth)
- Agriculture (size of land cultivated in season A, crop diversity, ownership of livestock, cultivating a kitchen garden, whether the household still had food in stock from the last harvest in April)
- Household demographics (education of the household head, age of the head of household, household size, crowding)

The variables found to be statistically significant to explain child stunting are:

- Location (urban/rural, livelihood zones, distance to nearest hospital, slope)
- Child age, sex and size at birth
- Mother's age, level of education, nutrition status (stunting)
- Household wealth, crowding index
- Child food consumption (for children between 12 and 23 months)

Factors that are known to influence malnutrition outcomes were included in the stunting model to avoid confounding effects. They include child access to health services and source and treatment of water consumed in the household. They are described in Box 8. A separate model was run for children between 12 and 23 months to isolate the effect of their consumption and feeding practices. The details of all the models are provided in Annex 11.

Table 8 gives an overview of these variables as well as their effect (positive, negative or no demonstrated effect) on either food consumption score or stunting. In the following paragraphs these variables are contextualized and discussed following the logic of the overall framework presented in the first part of this report. They are grouped into: individual level factors/immediate causes (section 4.1 What are the individual factors that determine child stunting?), household level/underlying causes (section 4.2 What households are food insecure or have stunted children?) and community level factors/basic causes (section 4.3 Where do the food insecure households and the malnourished children live?).

Table 8: Effect of variables found to be statistically significant to explain household food consumption and child stunting[79]

Level	Factor	HH Food Consumption	Child stunting
Individual	Child sex	NA	- (boys)
	Size of child at birth[80]	NA	- (smaller)
	Child age	NA	- (older child)
	Child food consumption[81]	NA	+ (dairy), - (bouillie, beans)
	Child health and care practices[82]	NA	0
Mother	Stunted	NA	-
	Age	NA	- (younger mother)
Household	Age of head	- (older)	0
	Education of head	+ (educated)	+ (mother with secondary education)
	Livelihoods	- (agriculturalists low income, casual workers), + (nr of activities)	0
	Agriculture	-(smaller plot) + (livestock, nr crops, kitchen garden) + (food from harvest available in April)	0
	HH size	+ (large hh)	0
	Wealth	- (poor)	- (poor), -(lower ubudehe categories)
	Crowdedness	- (crowded hh)	- (crowded hh)
	Hygiene[83]	0	0
Community	Place of residence	+(Urban), - (lake Kivu and Congo Nile crest)	+ (Urban), - (North, Lake Kivu)
	Distance to facilities	- (>distance to main road, market)	- (>distance to hospital)
	Slope	0	- (>land not suitable)

Source: CFSVA and Nutrition Survey, 2012

[79] 'NA': not applicable; '0': no demonstrated effect; '-' indicates a negative effect of the variable in brackets; '+' indicates a positive effect of the variable in brackets.
[80] Measure by birth weight.
[81] For children between 12 and 23 months.
[82] Because the survey was geared towards food security and not health or hygiene practices in the households, the model did not allow demonstrating the essential role of health and hygiene in ensuring nutrition security for children. This does not preclude that these - and probably other factors as well - certainly have an influence on child development and stunting.
[83] Ibid.

4.1 WHAT ARE THE INDIVIDUAL FACTORS THAT DETERMINE CHILD STUNTING?

The conceptual framework around which this CFSVA and Nutrition Survey 2012 (see Figure 1) is built suggests two immediate causes of malnutrition: inadequate dietary intake and unsatisfactory health. The stunting analysis model included these variables and also accounted for non-contextual variables that are known to impact strongly on the nutritional status of the children. At individual level, the model only found the following variables to be significant predictors of child chronic malnutrition: size of child at birth,[84] a child's age, sex, food consumption (12-23 month olds), as well as the mother's age, level of stunting and education.

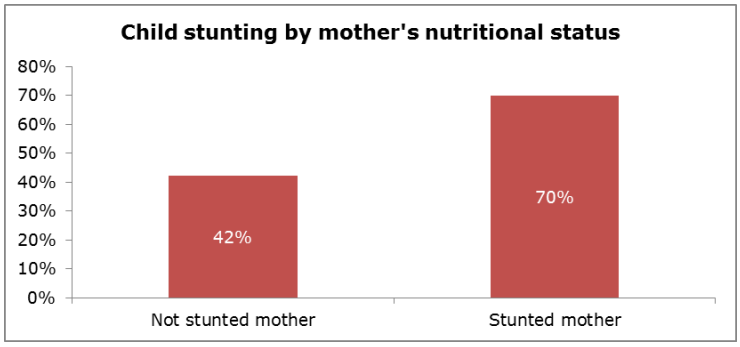
4.1.1 Intergenerational cycle of chronic malnutrition

Stunting is described as the outcome of a failure to receive adequate nutrition over an extended period and is also affected by recurrent or chronic illness.[85] In addition, mothers' health and nutritional status are extremely important for the intra-uterine growth development of children. Poor nutritional status of mothers impairs the physical and cognitive development of the children even before they are born.

The CFSVA and Nutrition Survey 2012 results show that stunted mothers are more likely to have stunted children (see Figure 19). Mothers who have completed secondary school are much less likely to have stunted children (see Figure 20), confirming the findings of the 2010 DHS, which found that stunting prevalence was 52% among children whose mother had no education, falling to 45% among children whose mother had been to primary school and only 23% if the mother had completed secondary school.[86]

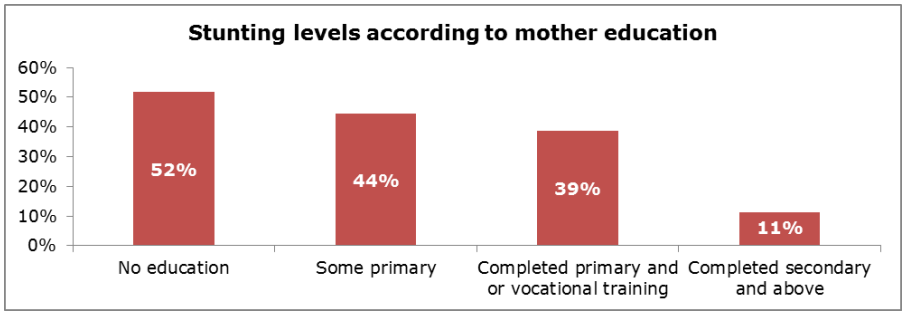
The younger the mother the more likely her children are to be stunted.

Figure 19: Rates of child stunting by mother's nutritional status



Source: CFSVA and Nutrition Survey, 2012

Figure 20: Rates of stunting by level of mother's education



Source: CFSVA and Nutrition Survey, 2012

[84] Measured by birth weight.
[85] DHS 2010.
[86] DHS 2010.

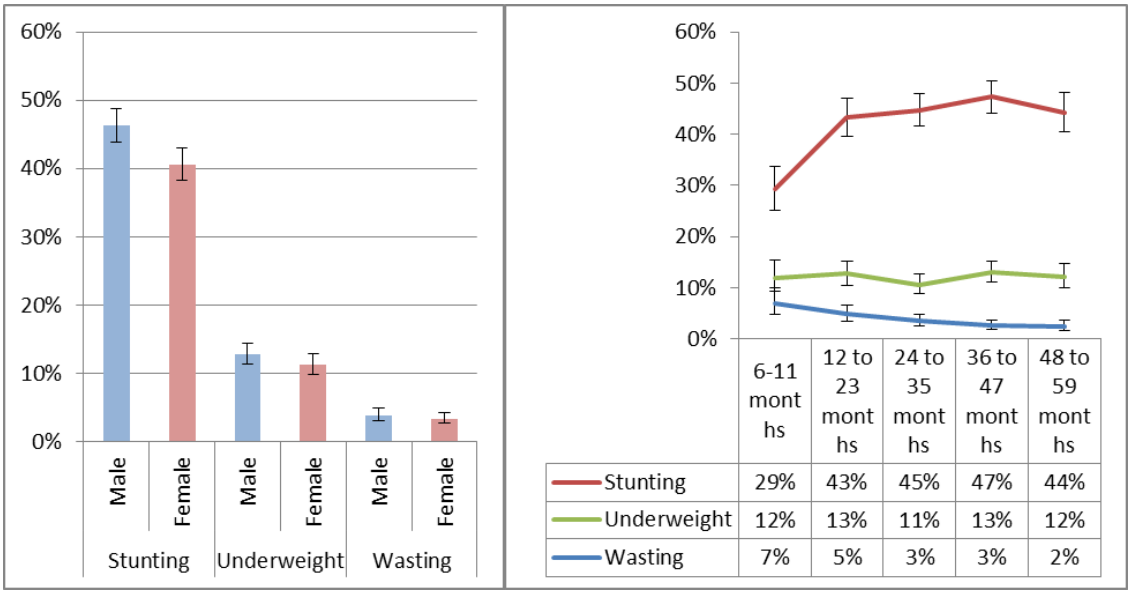
4.1.2 Child sex, size at birth and age

Among Rwandan children under five years old, boys were found to be significantly more stunted than girls (see Figure 21). This had also been one of the findings of the 2010 DHS. However, the analysis of the CFSVA and Nutrition Survey 2012 data does not elicit the reasons behind this gender divide.

What the analysis does reveal is that chronic undernutrition is associated with a child's size at birth.[87] The smaller the newborn, the more likely it is to be stunted later on, confirming that the process of chronic undernutrition already starts in the mother's womb. After birth, stunting increases with age, particularly after the first year: children aged 12-23 months are more likely to be stunted than children aged 6-11 months emphasising the importance of appropriate weaning practices.

Underweight prevalence is relatively stable over the five years of early childhood, while wasting levels decrease slightly after the first two years of age (see Figure 21). All these findings are in line with those from the 2010 DHS survey.

Figure 21: Prevalence of underweight, wasting and stunting for children aged 6-59 months, by sex and by age groups (CI: 95%)



	6-11 months	12 to 23 months	24 to 35 months	36 to 47 months	48 to 59 months
Stunting	29%	43%	45%	47%	44%
Underweight	12%	13%	11%	13%	12%
Wasting	7%	5%	3%	3%	2%

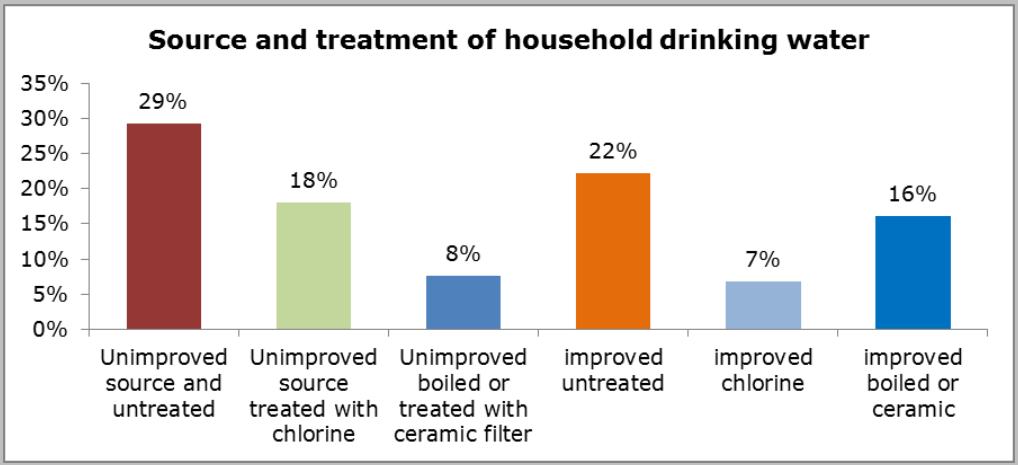
Source: CFSVA and Nutrition Survey, 2012

[87] Estimated by its weight.

Box 8: Confounding factors included in the analysis

The stunting model included variables that were not found to be statistically significant predictors of stunting but that in other contexts are known to influence levels of stunting.

These 'confounders' included variables that described child access to health services ('Was the child sick in the last two weeks, and if so did he or she go to a health facility?', 'Did the child receive any deworming tablets in the past six months?'), and - at household level – the source and treatment of drinking water.



When correcting for all other variables in the model, these variables were no longer significant predictors of stunting of children under five in Rwanda. Nevertheless, they did show significant relationships at the bivariate level: children who had been sick in the past two weeks and who had not visited a health facility were relatively more stunted than both those who had not been sick and those who had been sick but went to a health facility. Children who had received deworming tablets in the last six months also seemed to be less stunted than others, as were those whose households boiled water before drinking.

4.1.3 Individual food consumption of children between 12 and 23 months

The model run for children between one and two years old, shows that in addition to the age, sex, birth weight of the child, as well as the stunting and education of the mother, the types of food that had been consumed by the child the day before, which can be assumed as a proxy for the food consumed during the last 12 months, are significant predictors of their stunting. In particular, children between one and two years old who had consumed milk products, are significantly less stunted than other children of the same age category. On the contrary those who had consumed cereal porridge ('*bouillie*') or beans are significantly more stunted than others (see Figure 22). This possibly reflects the importance of dairy products for the development of the children at that age and the fact that the child has higher dietary diversity overall when dairy is included in his or her diet. The fact that children consuming *bouillie* or beans are more stunted than others may be reflecting the poor nutritional value of the *bouillie* as well as the less adequate diet and caring practices provided by those households feeding their children from the common 'household pot'.[88]

[88] The children might not be getting the diet that is adapted to their age.

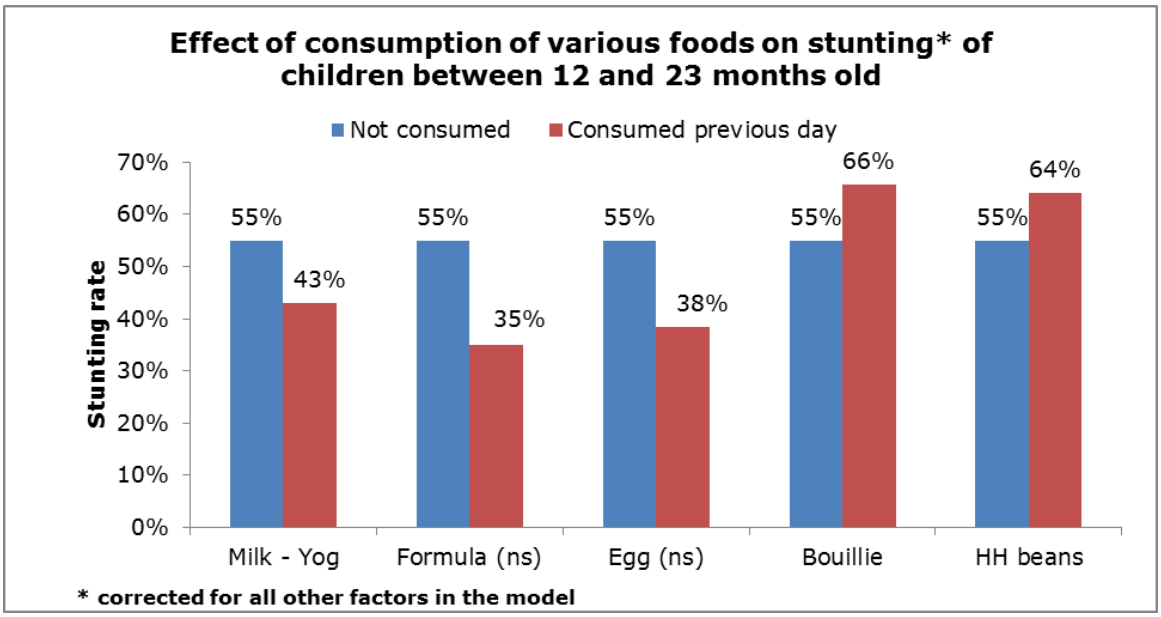
Table 9: Percentage of 12 - 23 month olds consuming certain food items the day before the survey

Food item	Share of children aged 12-23 months having consumed the items the day before
Milk products	20%
Infant formula	2%
Porridge	65%
Eggs	3%
Beans	52%

Source: CFSVA and Nutrition Survey, 2012

At the bivariate level, eggs and infant formula were found to have a positive effect on chronic malnutrition. However, when correcting for all other factors in the model they were not found to be significant, probably because the effect of the infant formula and eggs was difficult to determine since only 2% and 3% respectively of children were reported to have consumed them on the previous day (see Table 9).

Figure 22: Effect of consumption of various foods on stunting of children aged 12-23 months[89]



Source: CFSVA and Nutrition Survey, 2012

[89] The types of foods that had been consumed by the child the day before the survey, are assumed as a proxy for the food consumed during the last 12 months. The label '(ns)' in the table indicates that the difference was not found to be statistically significant. Other variables included in the model as 'confounding factors were child consumed meat the day before and child consumed tubers the day before.

Box 9: Summary - Immediate causes of high levels of stunting in Rwanda

The CFSVA and Nutrition survey 2012 reveals the following factors as individual/immediate causes of stunting in children under five years:

- Young mothers, mothers who have not completed secondary education and mothers who are stunted themselves are more likely to have stunted children.
- Individual factors: the smaller the baby at birth, the more likely it is to be stunted later on. After birth, stunting levels increase with age, particularly after the first year. In Rwanda, boys are more stunted than girls.
- Child food consumption: The types of foods consumed by children[90] the day before the survey, which can be assumed as a proxy for the food consumed during the last 12 months, were significant predictors of their stunting. In particular, children between one and two years old who had consumed milk products, were significantly less stunted than other children of the same age category.

4.2 WHAT HOUSEHOLDS ARE FOOD INSECURE OR HAVE STUNTED CHILDREN?

This section looks into the underlying household level factors that determine household food consumption and child stunting.

4.2.1 Poor households

Lower ubudehe categories[91]

Since 2006, the government of Rwanda has generalized a system of classifying all Rwandan households into six categories that reflect their poverty. The categories should be based on criteria related to food insecurity and malnutrition. The broad description of each category is provided in Table 10.

Table 10: Description of ubudehe categories

Category	Description
1: Umutindi nyakujya (those in abject poverty)	Those who need to beg to survive. They have no land or livestock and lack shelter, adequate clothing and food. They are often sick and have no access to medical care. Their children are malnourished and they cannot afford to send them to school.
2: Umutindi (the very poor)	The main difference between the umutindi and the umutindi nyakujya is that this group is physically capable of working on land owned by others, although they themselves have either no land or very small landholdings, and no livestock.
3: Umukene (the poor)	These households have some land and housing. They live on their own labour and produce, and have no savings. They can eat, even if the food is not very nutritious. However they do not have a surplus to sell in the market. Their children do not always go to school and they often have no access to healthcare.
4: Umukene wifashije (the resourceful poor)	This group shares many of the characteristics of the umukene but, in addition, they have small ruminants and their children go to primary school.
5: Umukungu (the food rich)	This group has larger landholdings with fertile soil and enough to eat. They have livestock, often have paid jobs, and can access healthcare.
6: Umukire (the money rich)	This group has land and livestock, and often has salaried jobs. They have good housing, often own a vehicle, and have enough money to lend and get credit from banks. Many migrate to urban centres.

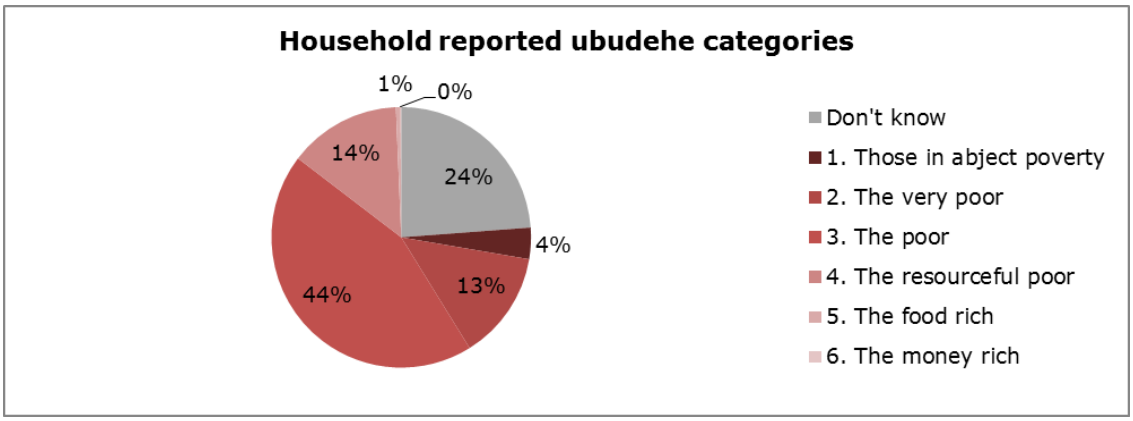
Source: Adapted from MINALOC

[90] Children between 12 and 23 months.

[91] While the survey was on-going, MINALOC was readjusting the ubudehe categories. It is possible that in some cases households did not report their 'latest status' as registered by MINALOC or chose not to answer this question. The new ubudehe categories were not available at the time of the analysis of the CFSVA and Nutrition Survey data, so the reported ubudehe categories were analysed. These findings should be handled with care and confirmed with more accurate data as soon as the up-to-date household classification is available.

During the CFSVA and Nutrition Survey 2012, households were asked to report their ubudehe classification; as shown by Figure 23, 24% did not know their category, 44% said they were in category three ('the poor') while 17% were in the two lowest categories (4% 'abject poverty' and 13% 'very poor').[92]

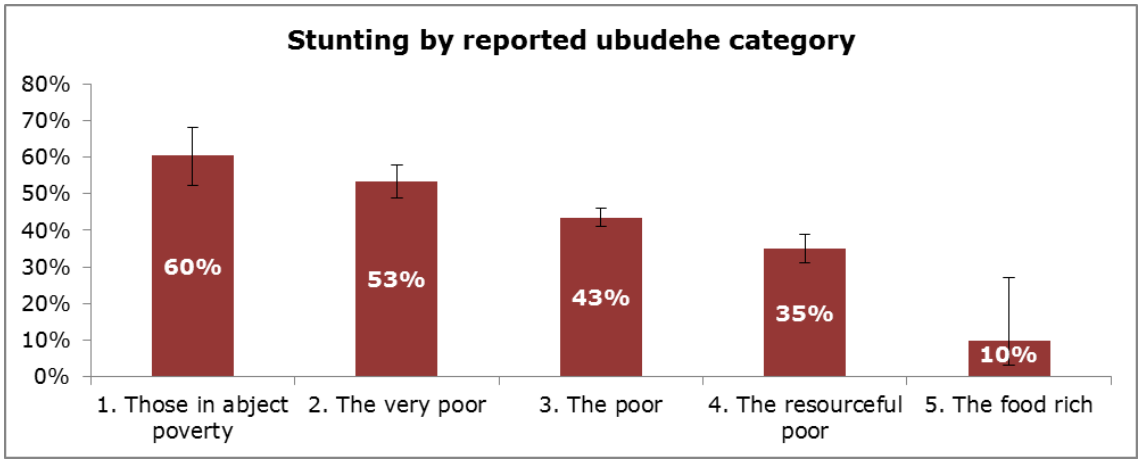
Figure 23: Household reported ubudehe categories



Source: CFSVA and Nutrition Survey, 2012

Regression analysis shows that the rates of stunting are higher for the lower ubudehe categories (see Figure 24).

Figure 24: Estimated rates of stunting for each (reported) ubudehe category (CI: 95%)

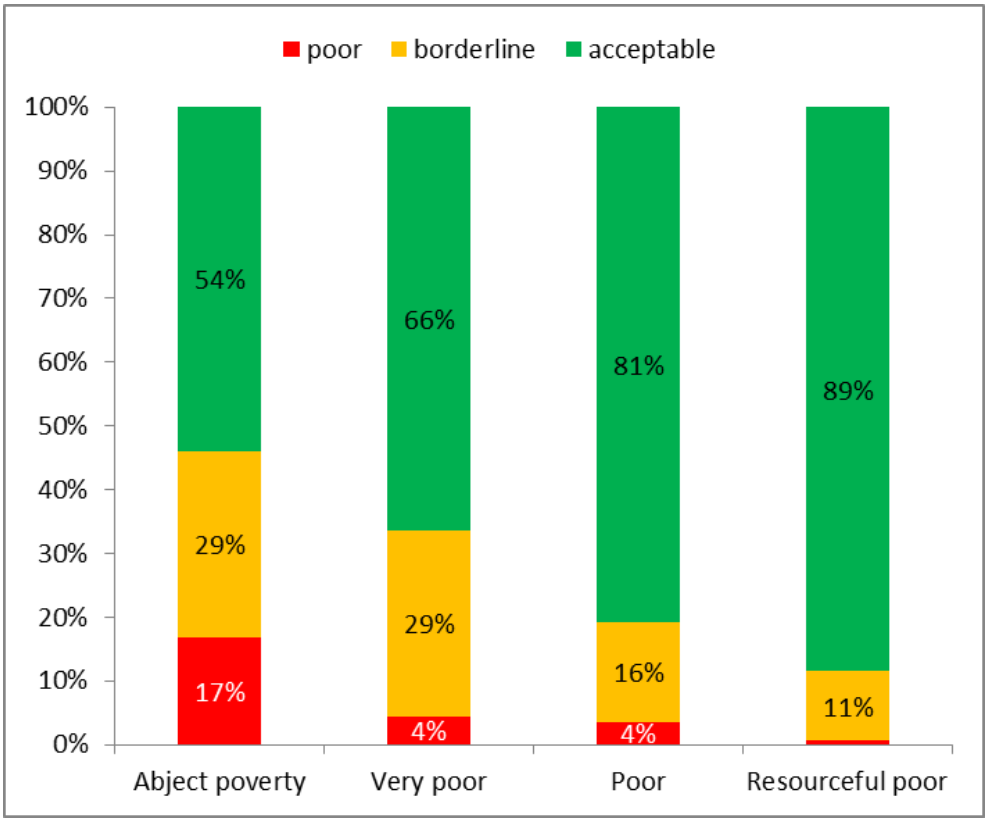


Source: CFSVA and Nutrition Survey, 2012

In addition, even though this was not confirmed by the regression analysis and has to be verified with the actual ubudehe categorization, it seems that there is a relatively good correspondence between the lowest two ubudehe categories and the lowest food consumption groups. As can be seen in Figure 25, households with poor and borderline food consumption are overrepresented in the lower ubudehe categories. Seventy percent of the households with unacceptable food consumption are in the lowest three ubudehe categories, the rest did not know their category (20%) and only 8% of households with unacceptable food consumption are in category four ('the resourceful poor'). Similarly, households reporting acute food access issues are mostly in the first three ubudehe categories (71%) with an additional 24% who did not know what category they belonged to.

[92] See section 6.2.1 p.87.

Figure 25: Percentage of households in each food consumption group, by (reported) ubudehe category



Source: CFSVA and Nutrition Survey, 2012

Households in the lowest wealth quintiles

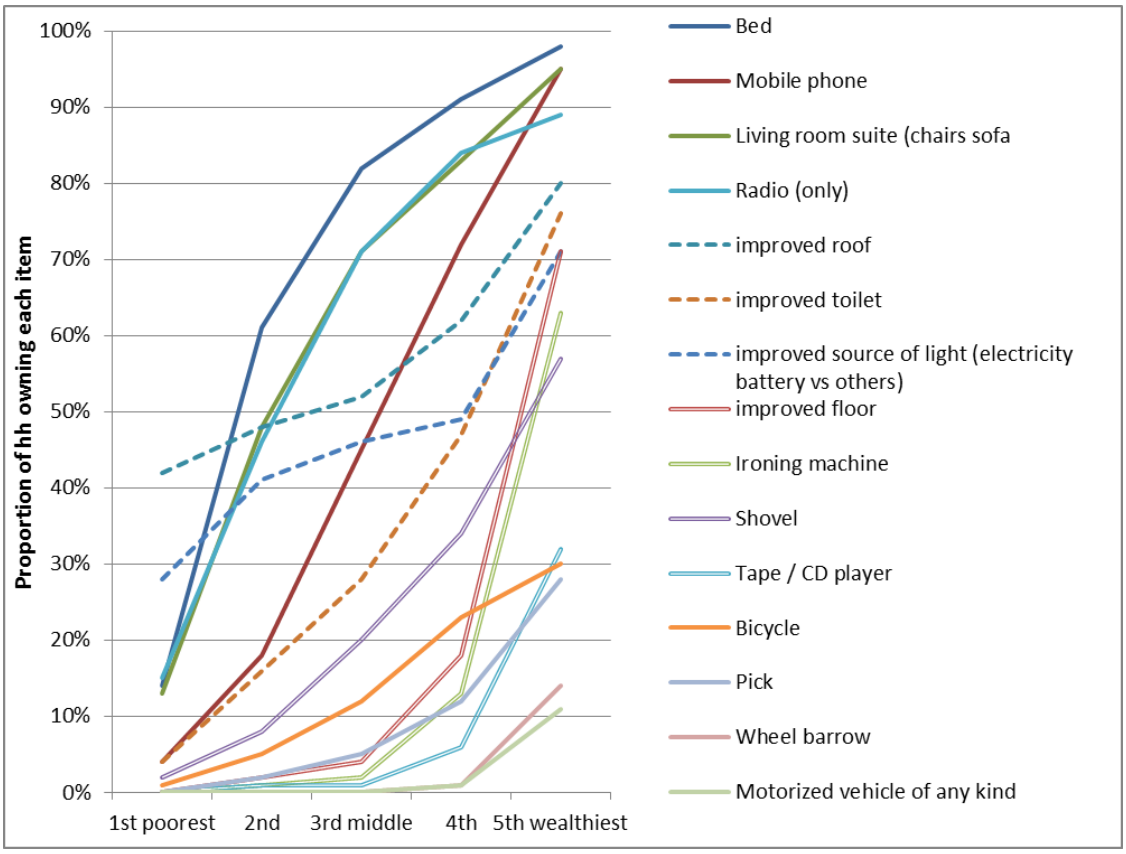
In order to approximate household wealth, the CFSVA and Nutrition Survey 2012 constructed a wealth index and categorized the households into five wealth quintiles, each representing 20% of the Rwandan population.

The wealth index is a composite index that combines the ownership of key assets; for this survey the wealth index took into account the ownership of the following items: improved source of light (electricity, battery vs. others), improved roof, improved floor, improved toilet, shovel, pick, wheelbarrow, iron, radio (only), tape/CD player, mobile phone, living room suite (chairs sofa), bed, bicycle, motorized vehicle of any kind (see Figure 26).

The CFSVA and Nutrition Survey 2012 regression analysis demonstrates a strong association between wealth and both food security and nutrition indicators. The poorer the household the lower its predicted FCS and the more likely it was to have poor or borderline food consumption. The two poorest wealth quintiles account for 73% of households with poor food consumption, 64% of households with unacceptable food consumption and 63% of households with acute access problems. Similarly the poorer a child's household, the more likely she/he is to be stunted.

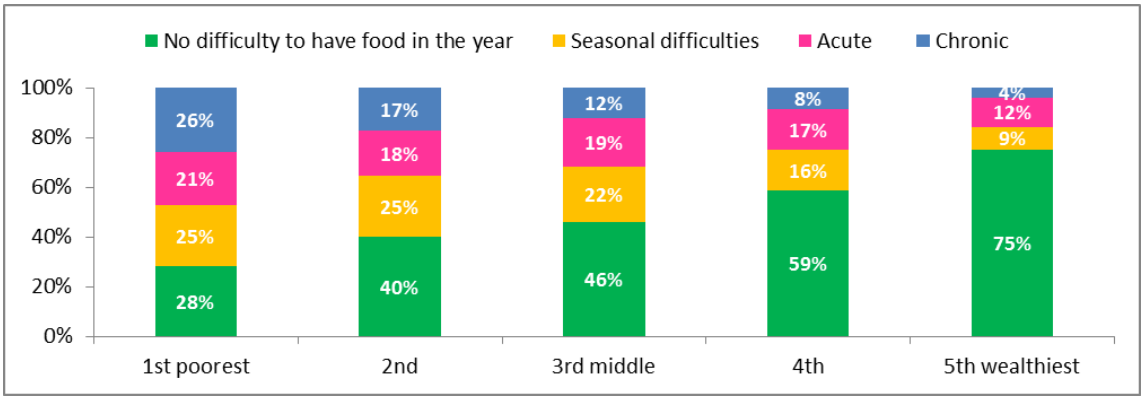
Figure 27 shows that in the poorest wealth quintile the share of households reporting chronic food access problems is more than six times higher than in the richest wealth quintile. Acute access problems are also more represented in the lowest wealth quintiles, while acute difficulties seem to be relatively more evenly distributed (still with lower percentage in the richer categories).

Figure 26: Percentage of households owning each asset, by wealth quintile



Source: CFSVA and Nutrition Survey, 2012

Figure 27: Percentage of households reporting seasonal, acute and chronic difficulties in accessing food, by wealth quintile



Source: CFSVA and Nutrition Survey, 2012

Crowded households

While larger households have a higher predicted FCS, crowded households (based on the size of the household and the number of rooms in the house) are less likely to be food secure and their children are less likely to be stunted. This suggests that large households living in adequately sized houses suffer less from poor food consumption and malnutrition than households cramped in small homes, reflecting another dimension of poverty not captured by the household wealth index discussed above.

Box 10: Reminder of poverty trends in Rwanda

According to official government statistics, the share of poor[93] households has decreased by 21% over five years from 57% in 2005/2006 to 45% in 2010-2011. In rural areas, the percentage of poor households dropped from 62% to 49%. Extreme poverty decreased even more significantly from 37% in 2005/2006 to 24% in 2011 (35% decrease) nationwide, while it fell from 40% to 26% (33% decrease) in rural areas over the same period.

Poverty reduction seems to have benefitted the poorest; between 2005/2006 and 2010/2011 inequality[94] fell to below the levels of 10 years ago in all provinces. The northern and the eastern provinces have seen the greatest improvement with reductions in poverty rates of 33% and 28% respectively. The western province saw poverty reduced by 22% and the southern province by 14%. According to the EICV 3, poverty decreases over the past five years have particularly benefited those reliant on non-farm wages or self-employment work or transfers. The main reasons for the poverty reduction identified by the EICV 3 are: improved agricultural production, increasing agro-business and increased availability of non-farm employment.

Despite all these improvements, poverty in Rwanda still remains widespread, affecting almost one in two (45%) households. Rural areas have by far the highest percentage of poor and extreme poor (22% poor in urban areas and 49% poor in rural areas). The southern and western provinces have the highest percentages of poverty in Rwanda at 56% and 48% respectively. The poverty levels remain much higher among households depending mainly on farm wage labour, followed by those working in agriculture.

Average expenditure increased (in real terms) from 90,601 RWF per capita per year in 2000/2001 to 123,891 RWF in 2010/2011. Expenditure is lowest in the western province at 92,892 RWF per capita per year and highest in Kigali City at 324,844 RWF per capita per year, followed by the northern province at 109,995 RWF in 2011. Expenditure in rural areas averages around 98,896 RWF (up from 66,902 RWF in 2000).

Source: EICV 3

4.2.2 Households relying on less diverse livelihoods

Households with less livelihood activities

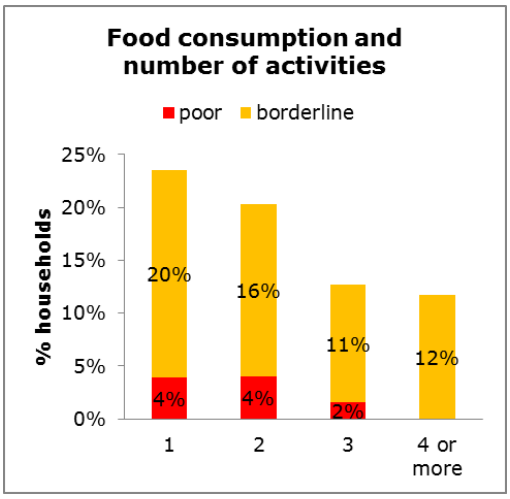
Households were asked how many livelihood activities their household depend on: almost half of Rwandan households (49%) rely on two activities, 43% on one activity (mostly agriculture), and 8% on three. Households that mentioned four or more activities as well as those not mentioning any livelihood activity at all represent less than 1% of all Rwandan households.

The regression analysis shows that having a higher number of livelihood activities is significantly associated with better food consumption. Households with three livelihood activities have a markedly higher food consumption score than those with fewer, and are much less likely to have poor or borderline food consumption (see Figure 28).

[93] The poverty line defines a level of household consumption per adult below which a household is considered to be poor. The national poverty line is based on a basket of food commodities sufficient to provide 2500 kcal per adult and to meet basic non-food requirements (defined as 64,000 RWF per adult per year in 2001, 90,000 RWF in 2006, and 118,000 RWF in 2011). An extreme poverty line of 45,000 RWF per adult per year was established in 2001, set at 63,500 RWF in 2006, and 83,000 RWF in 2011. This threshold is based on the level of expenditure needed to consume the basic food basket.

[94] Inequality is here represented by the Gini coefficient. Between 2000 and 2005 it had increased from 0.47 in 2000 to 0.51 in 2005, especially in rural areas. These were high levels of inequality by global standards. According to the last EICV 3 report the Gini coefficient has decreased everywhere between 2005 and 2010, with levels below those of 10 years ago.

Figure 28: Unacceptable food consumption by number of household livelihood activities



Source: CFSVA and Nutrition Survey, 2012

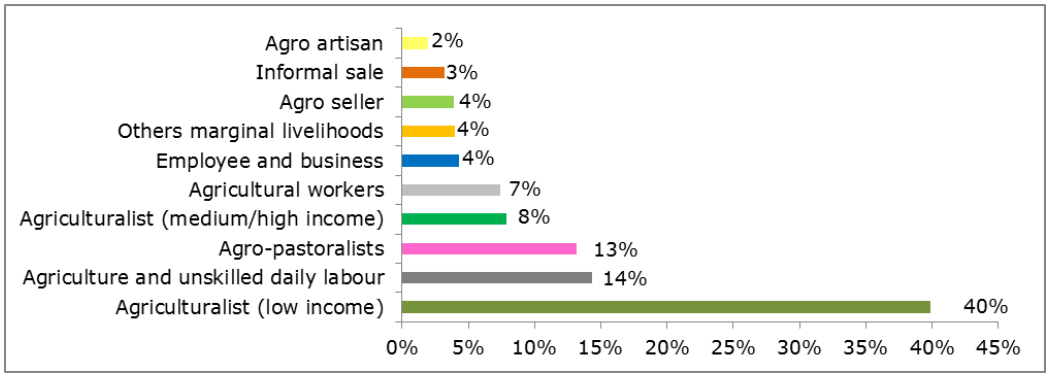
Low income agriculturalists, casual and unskilled workers

Principal component and cluster analyses were used to group households that share similar patterns of activities and the relative importance of those activities to the overall household livelihood. They were further regrouped so that groups were as comparable as possible to the 2009 CFSVA and Nutrition Survey. This resulted in a total of nine livelihood groups: (1) agriculturalists (2) agriculture and unskilled daily labourers, (3) agro-pastoralists, (4) agricultural workers, (5) employees and business, (6) agro sellers, (7) others marginal livelihoods, (8) informal sellers, (9) agro artisans. Since the group of agriculturalists was very large it was further separated into two livelihood groups: 'agriculturalists low income' (calculated based on a per capita expenditure below 118,000 RWF – the national poverty line), and 'agriculturalists medium and high income', with per capita expenditure above the national poverty line. Figure 29 shows the percentage of Rwandan households belonging to each livelihood group. Overall 40% of the households in Rwanda can be classified as being 'low income' agriculturalists, 14% of households rely on both agriculture and unskilled daily labour, while 13% rely on agriculture and livestock raising.

The groups were distributed differently among urban, rural and peri-urban areas with those highly reliant on agriculture more represented in rural areas while those more dependent on salaries, sales and trade were more present in urban areas. Table 11 gives the main characteristics of each livelihood group as well as its relative importance in urban, peri-urban and rural villages.

The results of the regression analysis show that low income agriculturalists, agricultural workers, agriculture and unskilled daily labourers (among the main livelihood activities in the country, see Table 11) have a lower predicted FCS than households that are reliant on employment and business, agro-pastoralism, agriculture with medium/high income, selling of agriculture products or those involved in informal selling (also see Figure 30).

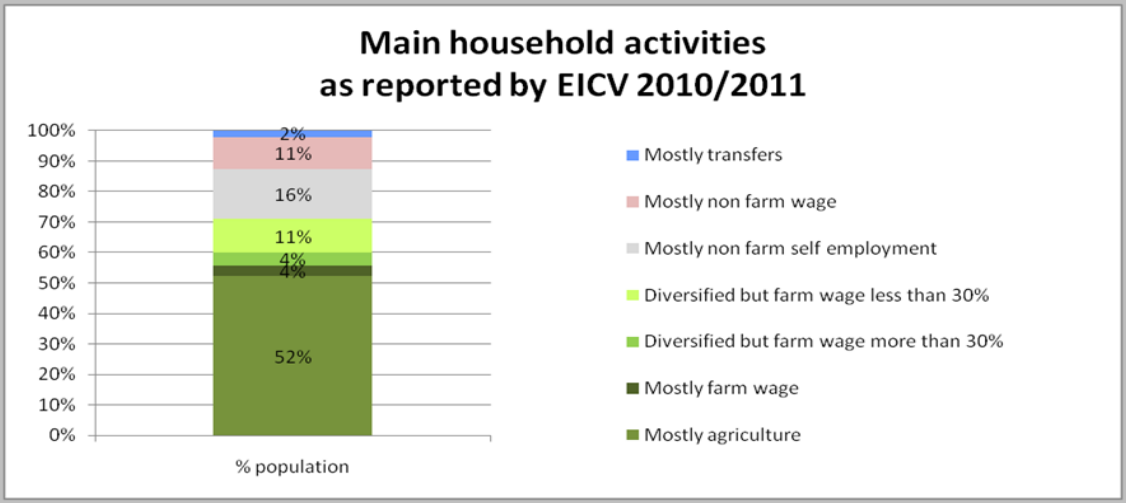
Figure 29: Percentage of Rwandan households in each livelihood group



Source: CFSVA and Nutrition Survey, 2012

Box 11: EICV 3 Livelihood groups

The EICV 3 confirms that employment in Rwanda still centres around agriculture, with 85% of all working adults cultivating their own farm; 11% of households are mostly involved in non-farm wage labour and 16% in independent non-farm businesses.[95] For the poorest quintile of the population, even though it was found to be increasing, the percentage of households engaging off-farm employment was lower, indicating that, off-farm employment is still marginal in terms of people involved and mostly concerns the richer households.



Source: EICV 3

[95] The Third Integrated Household Living Conditions Survey (EICV 3), NISR, 2012.

Table 11: Description of livelihood groups

Livelihood group Percentages of households each livelihood group represents in Rwanda, and per village urban/rural status	Description, based on average characteristics of the group	% hh in two lowest wealth quintiles
Agriculturalists (low income) Rwanda: 40%; Urban: 5%; Rural: 44%; Semi/peri-urban: 42%	Households depending nearly uniquely on agriculture to sustain their livelihood (the relative contribution of the activity to the overall livelihood of the household is estimated at 92%). They have the lowest average yearly per capita expenditure (44,000 RWF). This group has the highest proportion of households conducting only one activity (64%). 90% of the agriculturalist households are in rural areas.	**50%**
Agriculture and unskilled daily labourers Rwanda: 14%; Urban: 23%; Rural: 13%; Semi/peri-urban: 15%	Households depending on unskilled labour (paid in cash or in-kind) which accounts for 72% of the livelihood. Agriculture remains important and accounts for 26% of the livelihood. The average yearly per capita expenditure is the third lowest at 84,000 RWF.	**52%**
Agro-pastoralists Rwanda: 13%; Urban: 1%; Rural: 15%; Semi/peri-urban: 12%	Agro-pastoralists on average generate 65% of their livelihood from agriculture, and a third from the exploitation of livestock. Their average annual per capita expenditure is 142,000 RWF, slightly above the average for the entire sample. 9% of the agro-pastoralist households live in a rural setting.	**22%**
Agriculturalists (medium/high income) Rwanda: 8%; Urban: 4%; Rural: 8%; Semi/peri-urban: 8%	Like low income agriculturalists, these households depend predominantly on agriculture for their livelihood (89%). However, their annual per capita expenditure of 264,000 RWF is well above that of the low income agriculturalists. 86% of the agriculturalist households are in rural areas.	**22%**
Agricultural workers Rwanda: 7%; Urban: 2%; Rural: 8%; Semi/peri-urban: 8%	Households depending on agricultural work (paid in cash or in-kind) which accounts for 69% of the livelihood. Agriculture remains important and accounts for 28% of the livelihood. The average yearly per capita expenditure is the second lowest at 56,000 RWF. 87% of agricultural workers are in rural areas.	**69%**
Employees and business Rwanda: 4%; Urban: 25%; Rural: 2%; Semi/peri-urban: 4%	This group has the highest annual per capita expenditure at 708,000 RWF and depends predominantly on salaries from their work as civil servants, employees, NGO/UN staff, and pensions for their livelihood (56%), and 23% on skilled labour. They also continue some agricultural production which accounts for 10% of their livelihood on average. It is a predominantly urban type of livelihood - 64% of them live in urban areas.	**3%**
Agro sellers Rwanda: 4%; Urban: 6%; Rural: 4%; Semi/peri-urban: 3%	Households dependent mostly on the commerce of agricultural, livestock and other (hunting/fishing) products (57%), on agriculture (35%) and have an average annual per capita expenditure of 250,000 RWF.	**15%**
Other marginal livelihoods Rwanda: 4%; Urban: 13%; Rural: 3%; Semi/peri-urban: 4%	The marginal livelihood group mixes several profiles that are characterized by a limited role of agriculture (contribution to the livelihood averages 15%), and additional marginal activities including assistance, remittances, transport and unspecified other activities. Even though an important share of these households are poor and have unacceptable food consumption, their average annual per capita expenditure is 255,000 RWF - well above the survey average - reflecting the high expenditure of the rich households in this livelihood group. 35% of households in this category are in urban areas.	**36%**
Informal sellers Rwanda: 3%; Urban: 15%; Rural: 2%; Semi/peri-urban: 2%	Households with an average 75% of their livelihood generated by petty/small trade, the rest coming predominantly from agriculture (18%). The average annual per capita expenditure is the second highest, at 353,000 RWF. More than half of the households depending on informal sales live in villages classified as urban.	**9%**
Agro artisans Rwanda: 2% Urban: 6%; Rural: 1%; Semi/peri-urban: 1%	On average, agro-artisans generate 69% of their livelihood from artisanal work and most of the rest from agriculture (23%). Their average annual income is estimated at 184,000 RWF. 34% of agro-artisans are in urban areas.	**18%**

Source: CFSVA and Nutrition Survey, 2012

When looking at food security and nutrition related indicators, households relying on low income agriculture, and casual work (agricultural or other) clearly are worse off than others. Together the three livelihood groups ('Agriculturalists low income', 'Agriculture and unskilled daily labour', and 'Agricultural workers') represent 62% of households in Rwanda but make up 88% of households with unacceptable food consumption, 70% of households with stunted children, 75% of households with seasonal access issues and 78% of households with acute food access issues.

More than one in four households depending on low income agriculture had unacceptable food consumption in March/April 2012, in addition 50% of 'Agriculturalists low income' report food access problems, most of them seasonal (25%).

Market dependency varies across livelihood profiles. While agriculturalists-low income and medium-high income, agro-pastoralists depend on their own production to provide roughly 50% of their food, with purchases accounting for 45% to 48%, market dependency is higher for agro-labourers (59%), with own production accounting for only 34% of the food they consume.

Households depending on casual labour (agricultural and non-agricultural) represent only 22% of all households but total 42% of households with acute food access problems. Almost a third (30%) of them have either poor or borderline food consumption. Table 12 shows that households relying on casual labour have relatively low per capita expenditures and higher share of food expenditures,[96] making them more heavily reliant on the market and more vulnerable to price increases.

Food access issues are more severe for households relying on casual labour: more than one in four households relying on agricultural work or unskilled daily labour experience chronic food access issues. For these households it is normal to face difficulties providing food for their families for more than six months a year. In addition, households dependent on casual labour are less able to generate income especially in July and August, making it even more difficult for them to access food in those months and resulting in more than one fourth of them reporting seasonal food access issues.

Table 12: Per capita household expenditures and share of food expenditures, by livelihood group

Livelihood groups	Total monthly household expenditures (RWF)	Per capita expenditure (RWF/year)	Share food expenditure[97]
Agriculturalist (low income)	RWF 17,850	RWF 44,244	49%
Agro-pastoralists	RWF 61,073	RWF 142,024	36%
Agriculture and unskilled daily labour	RWF 29,926	RWF 84,458	59%
Agricultural workers	RWF 19,958	RWF 56,023	63%
Informal sale	RWF 150,185	RWF 352,650	43%
Employee and business	RWF 301,052	RWF 707,844	39%
Agro seller	RWF 136,510	RWF 250,099	40%
Agro artisan	RWF 81,412	RWF 184,299	46%
Others marginal livelihoods	RWF 98,867	RWF 254,733	52%
Agriculturalist (medium/high income)	RWF 91,212	RWF 263,518	31%
TOTAL	RWF 56,738	RWF 138,542	48%[98]

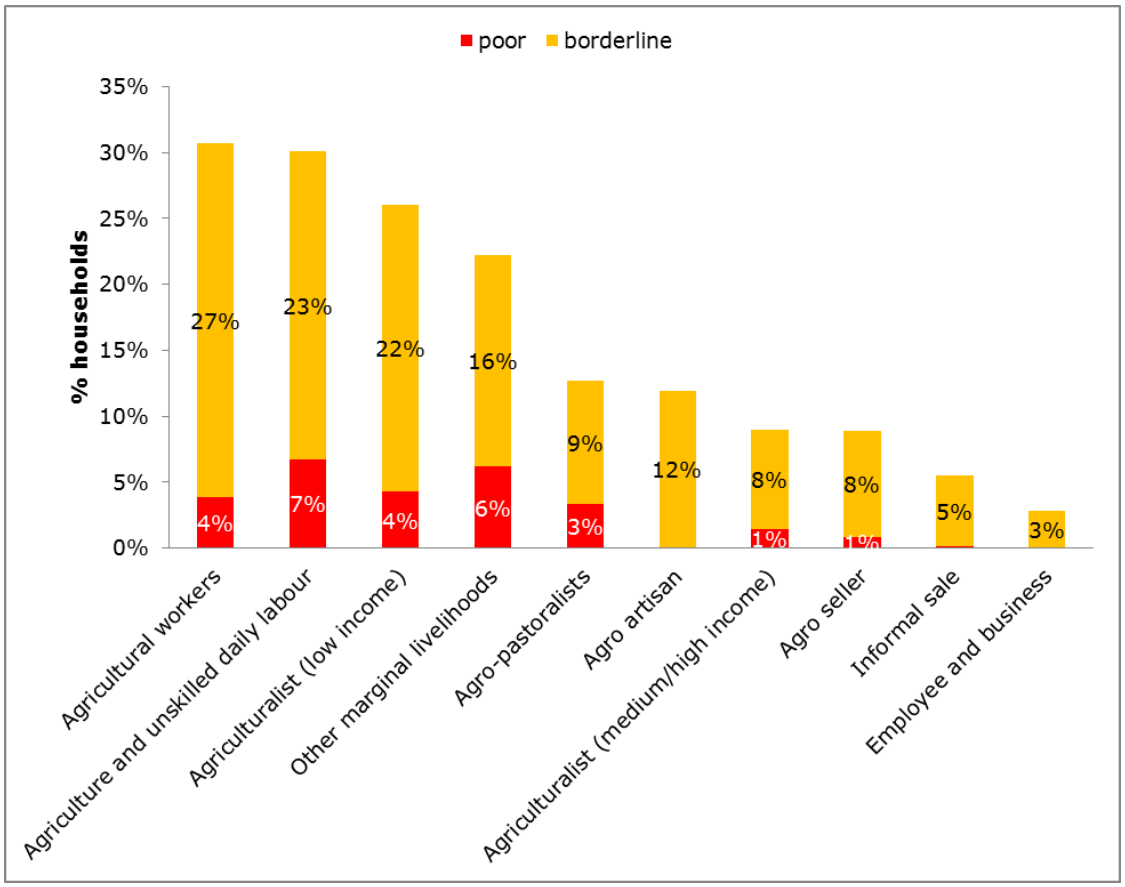
Source: CFSVA and Nutrition Survey, 2012

[96] The CFSVA and Nutrition Survey did not include the share of own production in the calculations of the share of food expenditure. If it had been the case one would expect the share of expenditures on food items to have been even higher for the households whose livelihoods rely on agricultural production, thereby allowing us to confidently make the above statement.

[97] In this analysis food consumed from own production was not included in the % calculation. If it had been, the difference in share from own production would be even higher for those households with high reliance on own production.

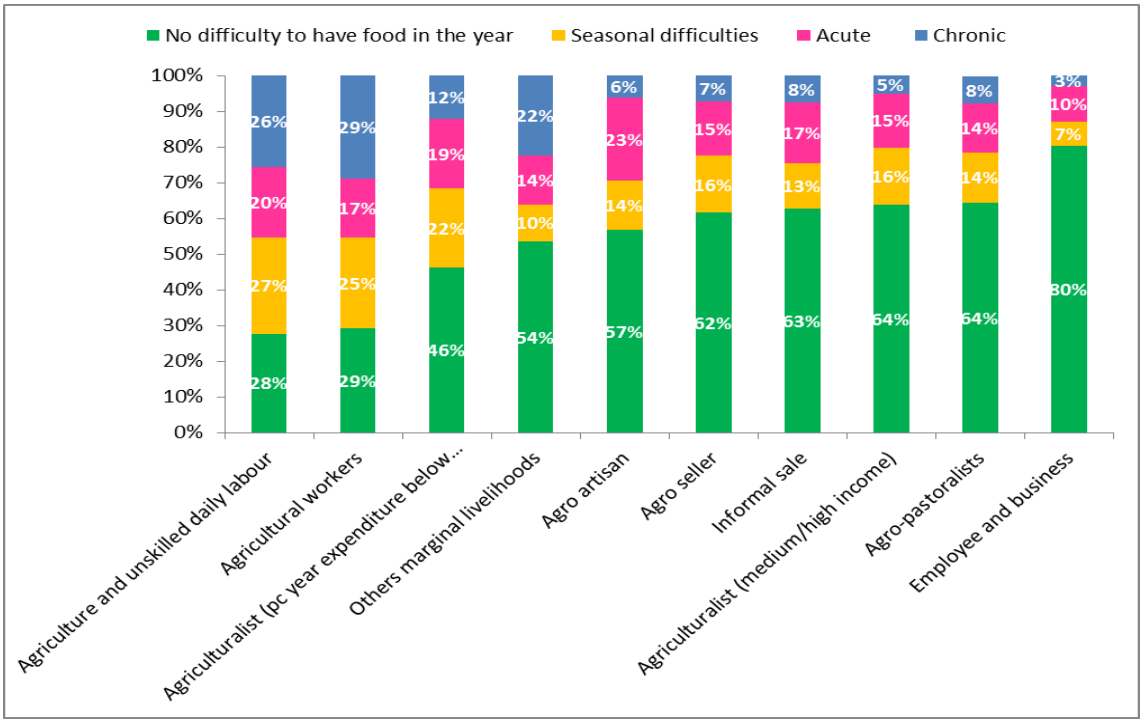
[98] According to the EICV 3, Rwandan households spent 42.4% of their total consumption on food items in 2010-2011, down from 47.8% in 2000/2001. Source: The evolution of Poverty in Rwanda from 2000 to 2011: results from the household surveys (EICV 3), NISR, 2012.

Figure 30: Average share of households with poor and borderline food consumption, by livelihood group



Source: CFSVA and Nutrition Survey, 2012

Figure 31: Food access issues and livelihoods



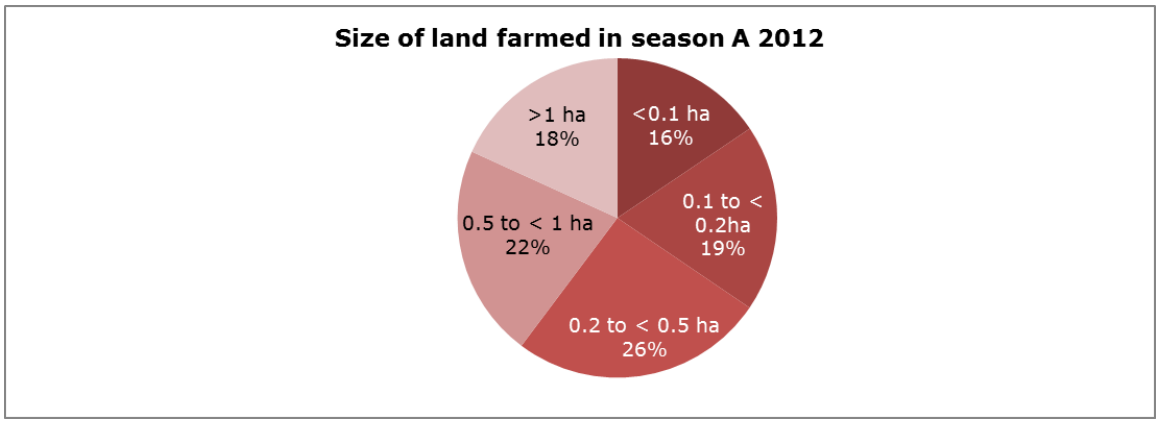
Source: CFSVA and Nutrition Survey, 2012

Households cultivating small plots of land

Access to land is vital for the livelihoods of most rural households in Rwanda and a factor of historical importance. Demographic pressure and underdevelopment of the agricultural sector have resulted in small, semi-subsistence, and increasingly fragmented farms.

According to the survey, households that are not cultivating any land at all have significantly better food consumption than others, showing that households not involved in agriculture *at all* are relatively better off than those who are. Unsurprisingly these households are mostly urban or peri-urban (63% in total). However when focusing on rural households those few households that are not involved in agriculture (7% of all rural households) are relatively worse off - food consumption wise - than the other rural households, with 33% having either poor or borderline food consumption.

Figure 32: Percentage of households farming land in season A 2012, by land size

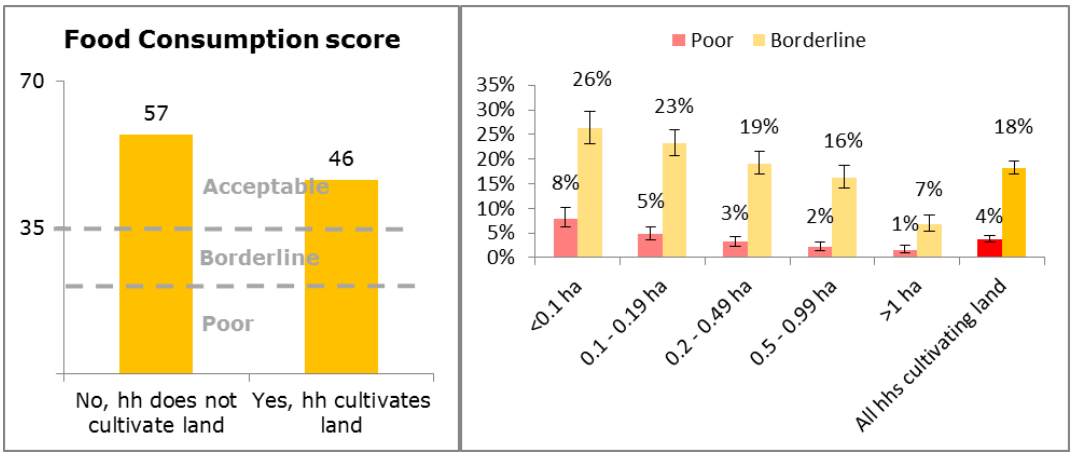


Source: CFSVA and Nutrition Survey, 2012

For households involved in agriculture and land cultivation, the regression analysis shows that the smaller the plot of land cultivated the higher the likelihood of having a low food consumption score. Eighty five percent of households in Rwanda cultivated land in season A 2012. Out of these only 40% cultivated more than half a hectare (see Figure 32) and 26% between 0.2 and 0.5 ha. The remaining farming households (35%) cultivated less than 0.2 ha of land in the 2012 season A.

In rural areas, 55% of farming households cultivated less than 0.5ha. These households account for 70% of rural households with poor food consumption, 73% of households with access problems and 67% of rural households with unacceptable food consumption (poor and borderline). 84% of rural households that have poor food consumption either farm no land or farm less than 0.5ha.

Figure 33: Average FCS by land cultivation in season A 2012 and share of households with unacceptable food consumption, by land size

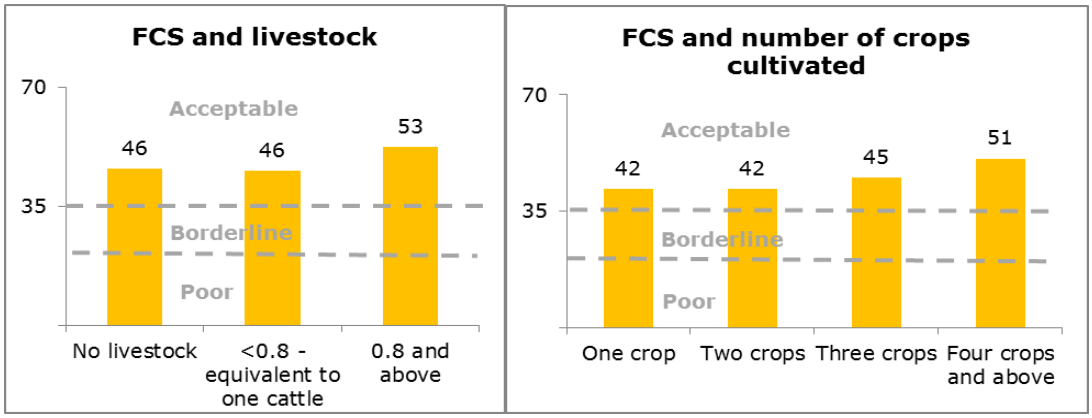


Source: CFSVA and Nutrition Survey, 2012

Households with less diverse agricultural activities

The regression analysis demonstrates that the more crops a household cultivated in season A the more likely it is to be have better food consumption. According to the 2012 survey findings, households reporting acceptable food consumption cultivate an average of three crops, while those with poor food consumption cultivate two (see Figure 33, Figure 34 and Figure 35). Similarly, as illustrated by Figure 35, the regression analysis also shows that livestock ownership was associated with higher levels of food security.

Figure 34: FCS by number of livestock owned and number of crops cultivated

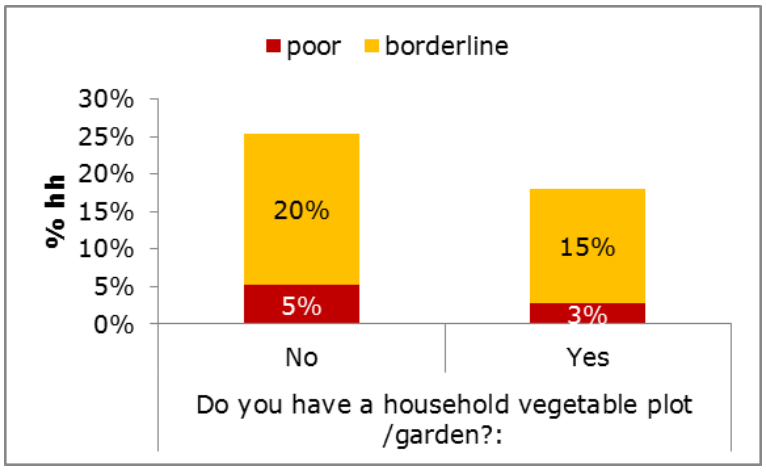


Source: CFSVA and Nutrition Survey, 2012

More than half of households (58%) have a vegetable garden. These households show significantly better food consumption patterns than those who do not, with only 18% of them having unacceptable food consumption compared with 25% of the households who do not own a vegetable garden (again demonstrated by the regression model).

Almost a third (29%) of households still had food stocks from their previous harvest available in April. These households had significantly higher FCS than those that did not, emphasising yet again the importance of access to food for household food security (see section 3.3).

Figure 35: Food consumption groups and cultivation of a household vegetable garden



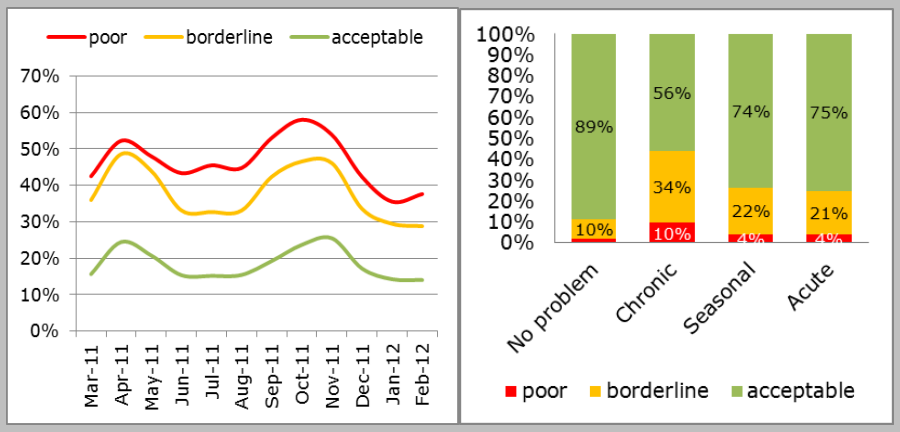
Source: CFSVA and Nutrition Survey, 2012

Box 12: Households with food access problems, especially chronic are those with worst food consumption

Figure 36 shows the percentage of households reporting food access problems for each of the 12 months preceding the interview, and - for each type of reported food access issue - the share of households with poor, borderline and acceptable food consumption at the time of the survey.

Households that do not report any food access issues in the year are less likely to have poor or borderline food consumption than the average Rwandan household; 89% of households not reporting any food access problems in the year have acceptable food consumption compared with 79% for Rwanda. Households reporting chronic food access problems on the other hand have a much lower percentage of households with acceptable food consumption (56%) and much higher share of households with borderline and poor food consumption (34% compared to 17% nationally for borderline, and 10% compared to 4% nationally for poor).

Figure 36: Households reporting difficulty in having enough food in the last 12 months, by food consumption group



Source: CFSVA and Nutrition Survey, 2012

4.2.3 Vulnerable households

Households headed by the uneducated

As is further explained in chapter 5, great progress has been made in Rwanda in extending education to all. Primary school completion has now reached 73% (78% for girls). However with a net enrolment rate of 21%, access to secondary education still lags way behind primary and did not reach the 40% target the government had set itself for 2010.[99]

The regression analysis shows that the higher the education level of the household head, the higher the households predicted FCS, and the lower the likelihood of the household having unacceptable food consumption (see Figure 37). This once again demonstrates the vital importance of improving education and literacy levels of both men and women in Rwanda.

According to the EICV 3, 18% of men and 23% of women are illiterate, highlighting the persistence of gender inequalities in Rwanda in 2012. The CFSVA and Nutrition Survey 2012 only considers the literacy levels of household heads, and therefore estimates lower declared levels of literacy. The gender gap evidenced by the EICV 3 is confirmed (and widened, see Table 13): while some 33% of male heads of households are unable to read or write, the proportion rises to 66% for women heads of household. It is worth emphasising that only one quarter of household heads have completed primary school and a meagre two percent secondary.

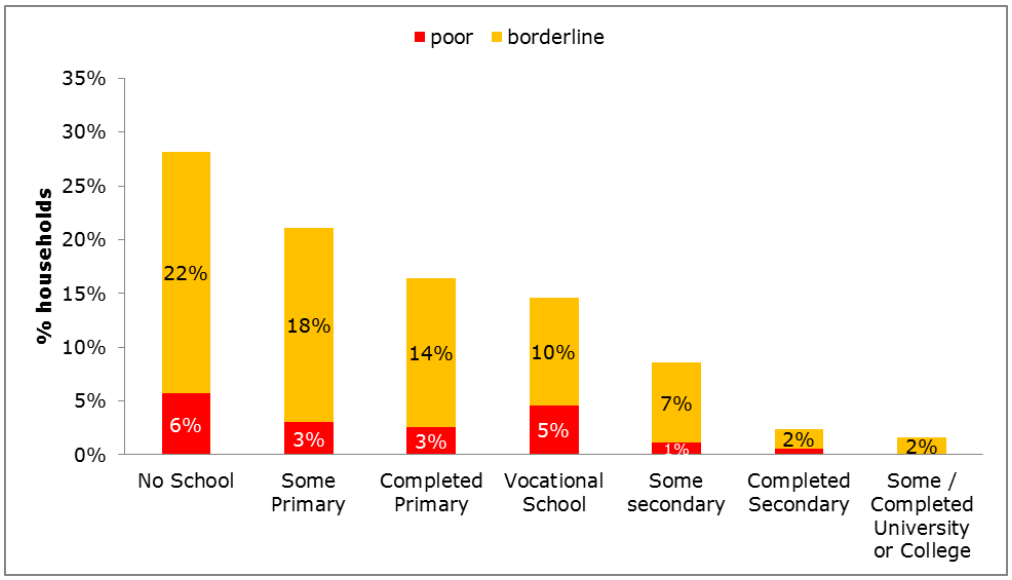
[99] EICV 3.

Table 13: Literacy and level of education of household head[100]

	Male	Female	Average
Head of household can read and write (Yes)	66.7%	33.6%	57.2%
No school	28.0%	58.1%	36.6%
Some primary	30.8%	20.4%	27.9%
Completed primary	29.5%	14.5%	25.2%
Some secondary	5.5%	3.1%	4.8%
Vocational school	2.1%	2.3%	2.2%
Completed secondary	2.3%	1.2%	2.0%
Some / Completed university or college	1.7%	.4%	1.3%

Source: CFSVA and Nutrition Survey, 2012

Figure 37: Percentage of households with poor and borderline food consumption, by level of education of head of household



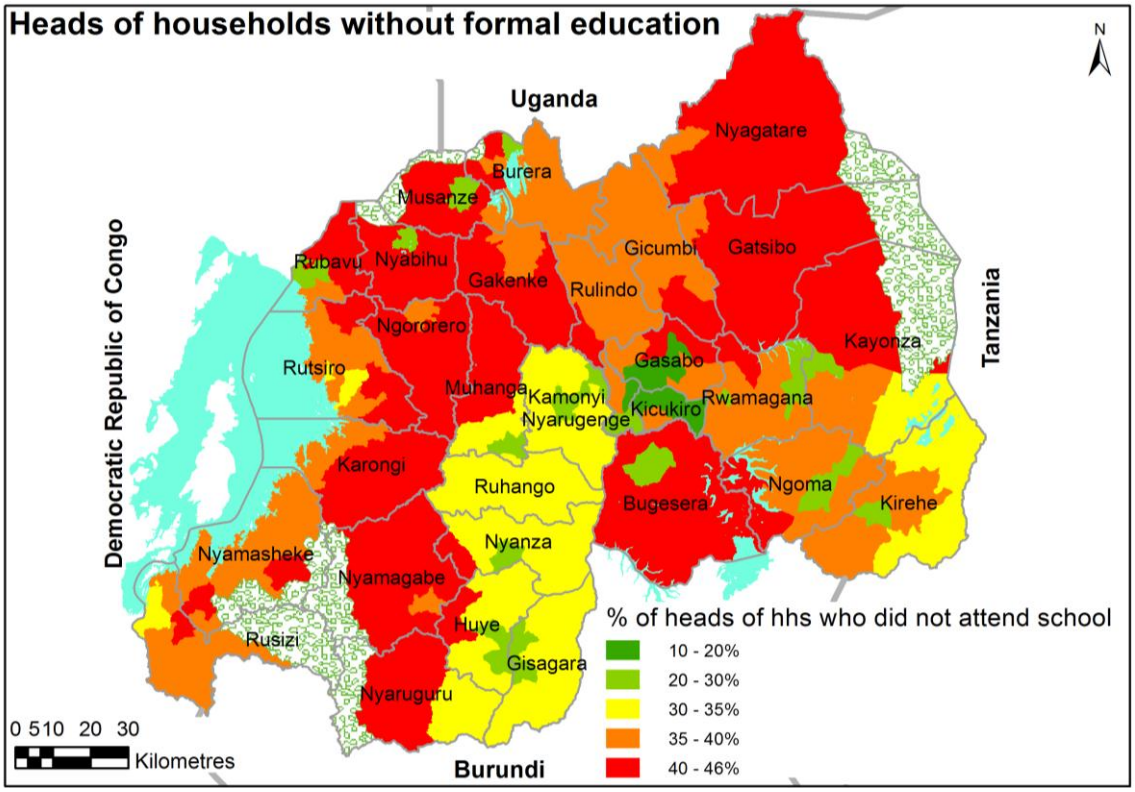
Source: CFSVA and Nutrition Survey, 2012

Households whose heads cannot read or write make up 40% of the overall population and 58% of households with poor food consumption (60% in rural areas). Similarly, while 37% of household heads have no education at all, they represent 49% of households with unacceptable food consumption, 56% of households with poor food consumption and 52% of households with acute problems accessing food. The distribution of households whose heads did not receive any formal education is presented in Map 6.

Lower literacy or education levels of the household head do not seem to influence the level of child stunting in the household. However, as already mentioned, the level of education of the mother is very important (see section 4.1.1).

[100] These percentages do not take into account the presumably higher literacy among the younger generation who are not yet heading households but reflect the lower literacy among many female heads of household who are elderly widows.

Map 6: Proportion of households whose head did not receive any formal education



Source: CFSVA and Nutrition Survey, 2012

Households headed by the elderly

According to the EICV 3, 42% of the population in Rwanda is below 15 years of age and the dependency ratio (number of young dependents for the working age group) has decreased from 0.9 in 2004 to 0.75 in 2011. As a consequence of the genocide, the proportion of women in the middle age group is higher (about 55%), resulting in a high number of female headed households (29% in rural areas according to the CFSVA and Nutrition Survey 2012).[101] More than one in ten households (11%) are headed by a disabled person.

The regression analysis demonstrated that households with an older head have a lower predicted FCS; 28% of households with poor food consumption were headed by people over 60. Even though at the bivariate level households headed by women as well as households headed by single heads of households (in particular widows), and disabled heads of households[102] have on average a lower food consumption score than others, when considered together with other indicators in the model, they are not predictors of the household food security or of child stunting. Possibly the vulnerability of these households is already captured by other indicators in the model such as poverty and the age of the household head (at 54 years the average age of female heads of household is some 10 years higher than male).[103]

[101] 34% according to the DHS 2010.
[102] Disabled heads of households constitute 11% of the population and 16% of those with poor food consumption and food access issues.
[103] Almost one third (29%) of households in Rwanda are headed by women, yet they represent 36% of the households with unacceptable food consumption, and 39% of households with acute food access problems. Interestingly however, households that are headed by women only represent 17% of the households with stunted children, suggesting that even if women headed households are more likely to have poor food consumption, they are not necessarily more prone to having stunted children under five. One of the reasons for this is probably that many of these households are headed by widows, who would be older and therefore less likely to have children under five that could be stunted. In fact further analysis shows that over one fifth (21%) of all Rwandan households are headed by a person over 60 years old, and unsurprisingly these households only represent 10% of the households with stunted children under 5.

Box 13: Summary - Who are the food insecure and the malnourished?

In Rwanda, households not involved in agriculture *at all,* often living in urban areas, are relatively better off than those that are involved. However, 85% of households in Rwanda cultivate land and rely on agriculture or livestock as a main (and often only) livelihood activity. For many of these households, access to productive land is a problem: some 60% cultivate plots smaller than half a hectare (26% below 0.2 ha). Among households involved in agriculture and cultivating land, the smaller the cultivated plot the more likely they are to have a low food consumption score.

The more crops a household cultivated in season A the more likely it is to be food secure. The same goes for households engaged in a higher number of livelihood activities. Similarly, having a household kitchen garden and owning livestock are associated with higher levels of food security. Households who still had food stocks in April had a higher predicted FCS.

Low income agriculturalists, agricultural workers and unskilled daily labourers (among the main livelihood activities in the country) have a lower food consumption score than households reliant on employment and business, agro-pastoralism, agriculture with medium/high income, selling of agriculture products and those involved in informal selling.

The higher the level of education of the household head, the lower the likelihood of the household being food insecure. Households with an older head of household and crowded households (based on the size of the household and the number of rooms in the house) are more likely to be food insecure.

Stunted children were more likely to live in poor, crowded households of the lower ubudehe categories.

4.3 WHERE DO THE FOOD INSECURE HOUSEHOLDS AND THE MALNOURISHED CHILDREN LIVE?

The conceptual framework presented at the beginning of this report (see Figure 1 in section 2.2) highlights that contextual factors such as human, socio-economic and environmental resources as well agro-ecological conditions can contribute to food insecurity and malnutrition at household and individual level. This section focuses on those contextual factors and identifies where the food insecure households and the malnourished children live.

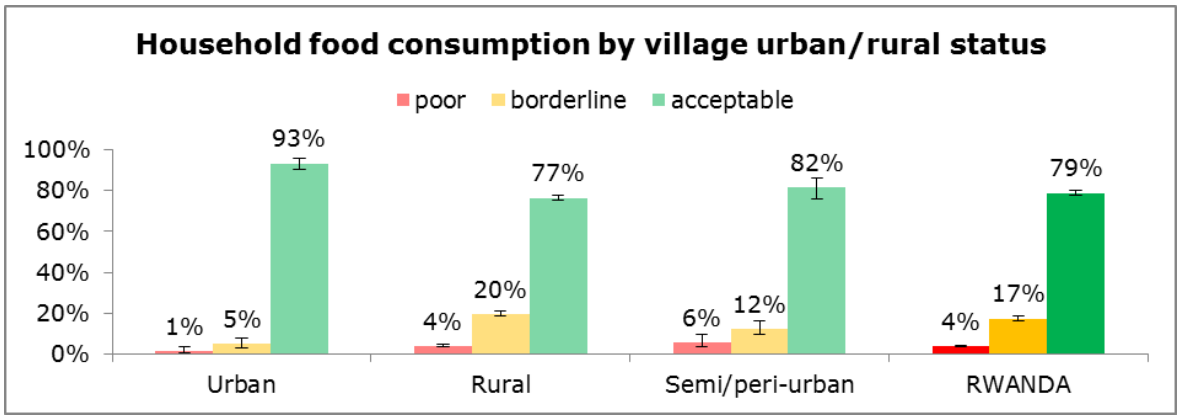
4.3.1 Rural areas

Rwanda's population is predominantly rural, with an increasing but small urban population (5% in 1999; 16.7% in 2002; 19% in 2010).[104] According to the CFSVA and Nutrition Survey results, 80% of households live in rural villages, 11% in urban villages and 9% in peri-urban villages.

Both the EICV 3 and the DHS 2010 clearly highlighted higher levels of poverty and malnutrition in rural areas compared with urban. The CFSVA and Nutrition Survey 2012 used the new classification provided by the National Institute of Statistics that was also used for the 2012 National Population Census. In this classification there are three types of villages: urban, rural and semi (or peri-) urban. These three classifications are not exactly the same as the ones used in the EICV 3 2010-2011 and DHS 2010, but the findings of the CFSVA and Nutrition Survey 2012 confirm that the urban/rural variable is a predictor for both poor household food consumption as well as child stunting, with significantly higher levels of food insecurity and chronic under-nutrition in rural and peri-urban areas than urban (see Figure 39).

Households living in rural areas are more likely to have poor food consumption and malnourished children (see Figure 39 and Figure 38); an overwhelming 89% of households with unacceptable food consumption in March/April 2012, were living in rural villages as were 84% of households with stunted under-fives.

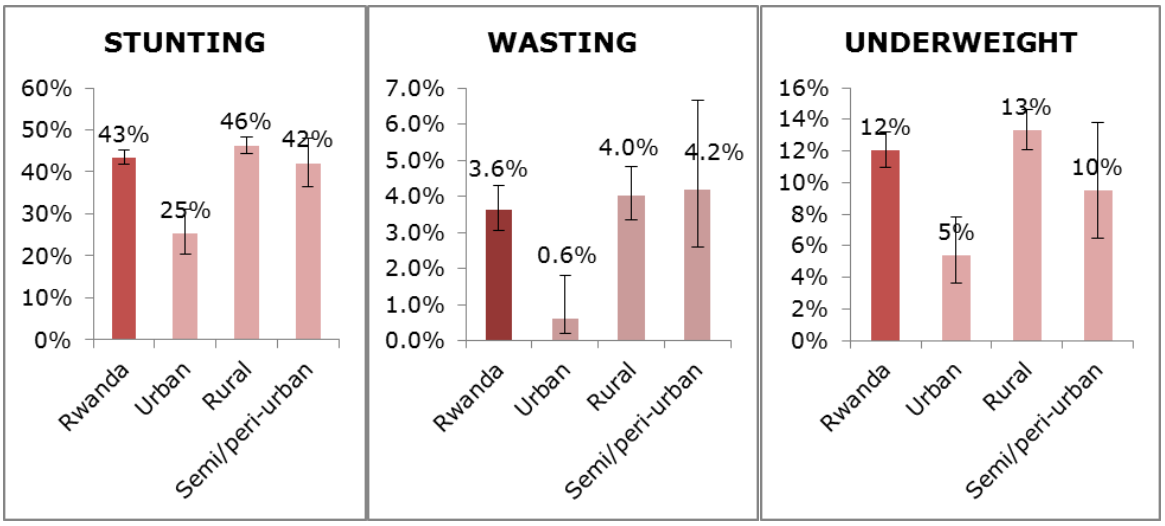
Figure 38: The urban rural divide: food consumption (CI: 95%)



Source: CFSVA and Nutrition Survey, 2012

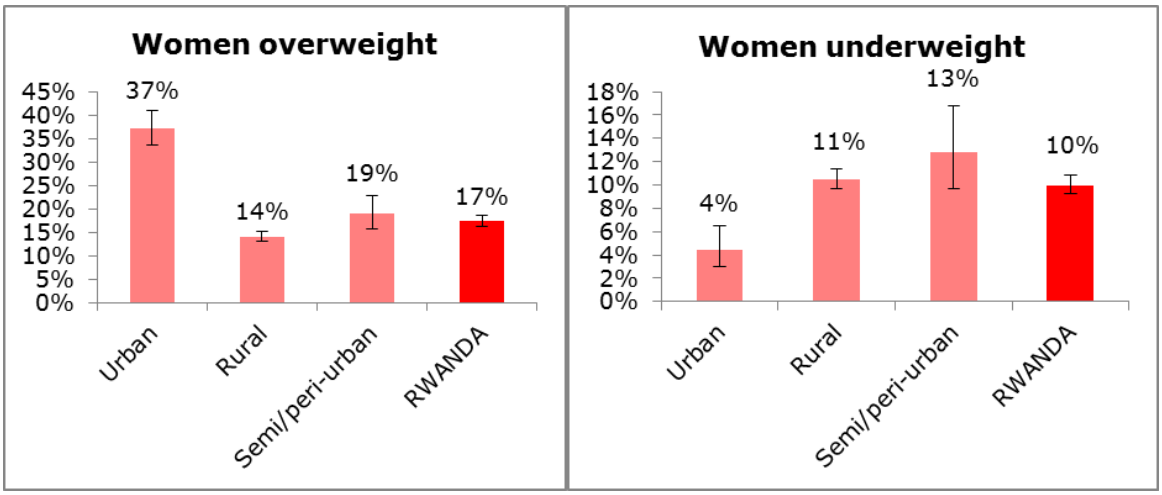
[104] http://databank.worldbank.org/.

Figure 39: The urban rural divide: child nutrition (CI: 95%)



Source: CFSVA and Nutrition Survey, 2012

Figure 40: The urban rural divide: nutrition of women in reproductive age (CI: 95%)



Source: CFSVA and Nutrition Survey, 2012

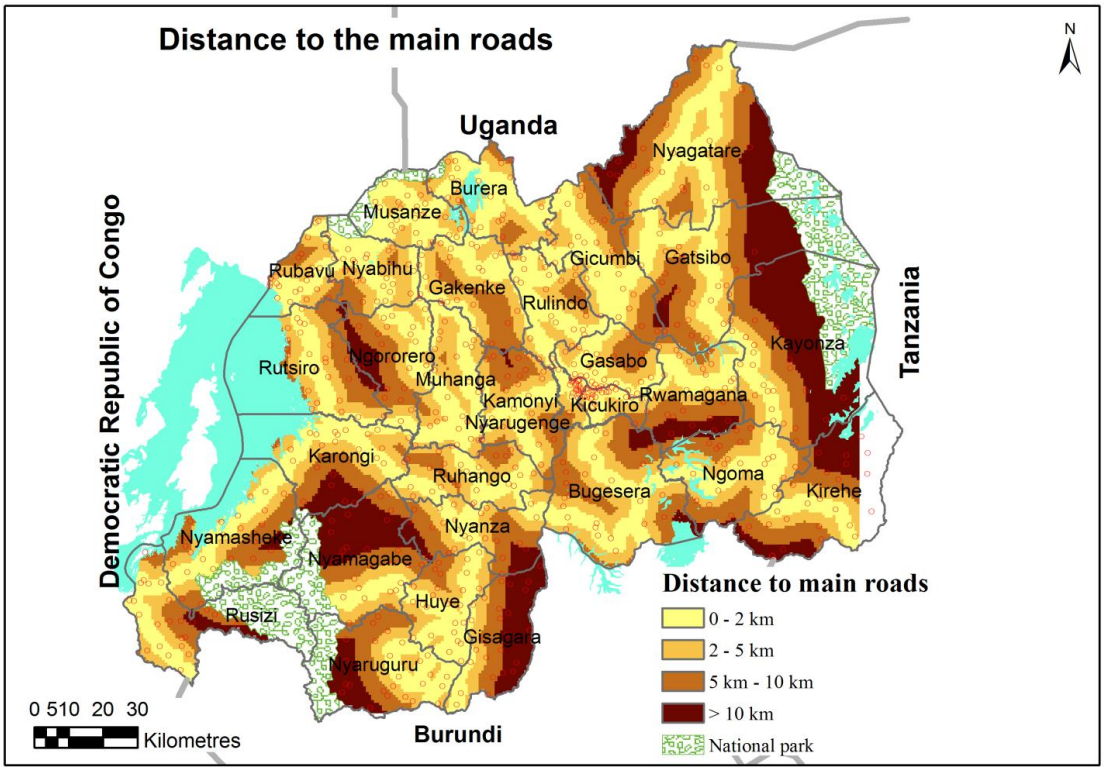
4.3.2 Isolated from roads and services

In order to better analyse constraints related to accessibility, the distance to the main roads used regularly by cars, and public transport, were used as a proxy to assess village accessibility.[105] The distances were classified as follows: 0 – 2 km= close to main road; 2 – 5km= relatively close; 5 – 10 km= far; > 10 km= very far. Map 7 shows the distribution of main road accessibility in Rwanda.

Based on the classification above; districts where households are more distant from main roads are Rusizi, Nyamasheke, Karongi, Rutsiro, Ngororero (western province), Nyaruguru, Nyamagabe (southern province), Gakenke, Rulindo and Gicumbi (northern province), as well as Kayonza and Kirehe (eastern province). In these districts, a high proportion of households are living in villages located more than 5 km from a main road.

[105] The distance to the main road was calculated using the Euclidian distance from the main roads in the spatial analyst tools of ArcGIS software.

Map 7: Road accessibility in Rwanda



Source: VAM WFP, 2012 based on the national road network dataset

Even though, when compared with other countries in the region, road network connectivity and conditions are good in Rwanda, still the regression analysis indicates that household access to roads is a significant predictor for food consumption. In fact, the further a household is from the main road and from services such as a market, the more likely it is to have a lower food consumption score (see Table 14). Similarly, children who were living further away from a hospital were significantly more likely to be stunted (shown by the regression model).

Table 14: Time (in minutes) to access the nearest facilities out of the village, by households

		Time to health facility (min)	Time to the market (min)
FCS category	Poor	81	82
	Borderline	77	86
	Acceptable	67	75
Wealth quintile	1st poorest	78	87
	2nd	76	86
	3rd middle	73	81
	4th	66	75
	5th wealthiest	51	55
Type of village	Urban	32	31
	Rural	75	85
	Semi/peri-urban	60	64

Source: CFSVA and Nutrition Survey, 2012

4.3.3 Steeply sloping land

Land degradation in Rwanda - often referred to as the country of a thousand hills - is characterised by soil erosion and declining soil fertility and is driven by unsustainable land use practices, namely deforestation, and over cultivation, often on steep slopes without appropriate soil conservation measures.

The western highlands that reach over 4,500 m, divide the country between the Nile and the Congo basin. West of the highlands, altitudes rapidly decrease to reach Lake Kivu that forms the

western border of Rwanda. East of the highlands, the Great East African Plateau (app. 950m altitude), is characterized by swamps and lakes.

MINAGRI uses the following classification on the suitability of the land based on sloping levels of the terrain:

Table 15: Agriculture suitability based on slopes

Slope	Suitability	Comment
0 – 6%	Suitable	The erosion hazard is not creating any serious problem
0 – 16%	Suitable	Cut-off drain is proposed to intercept the surface run-off from the higher slopes of the catchment
16 – 40%	High slope	Radical terraces recommended in order to be cultivated
40 – 60%	Very high slope	Depending on soil depth can be cultivated with radical terraces
>60%	Not suitable	Recommended for forest planting

Source: MINAGRI, 2010 Based on FAO slope classification

Even though it was impossible to determine the soil and topographical characteristics of the exact plots cultivated by households, an attempt was made, for the CFSVA and Nutrition Survey 2012, to spatially analyse topography, soil erosion[106] and soil fertility[107] and to link them with household food security. All the indicators were found to be significant predictors of the food consumption score as well as stunting at the bivariate level, but when correcting for other factors in the models, only the 'percentage of slopes not suitable' in the cell where the household's village was located turned out to be a predictor for chronic malnutrition.

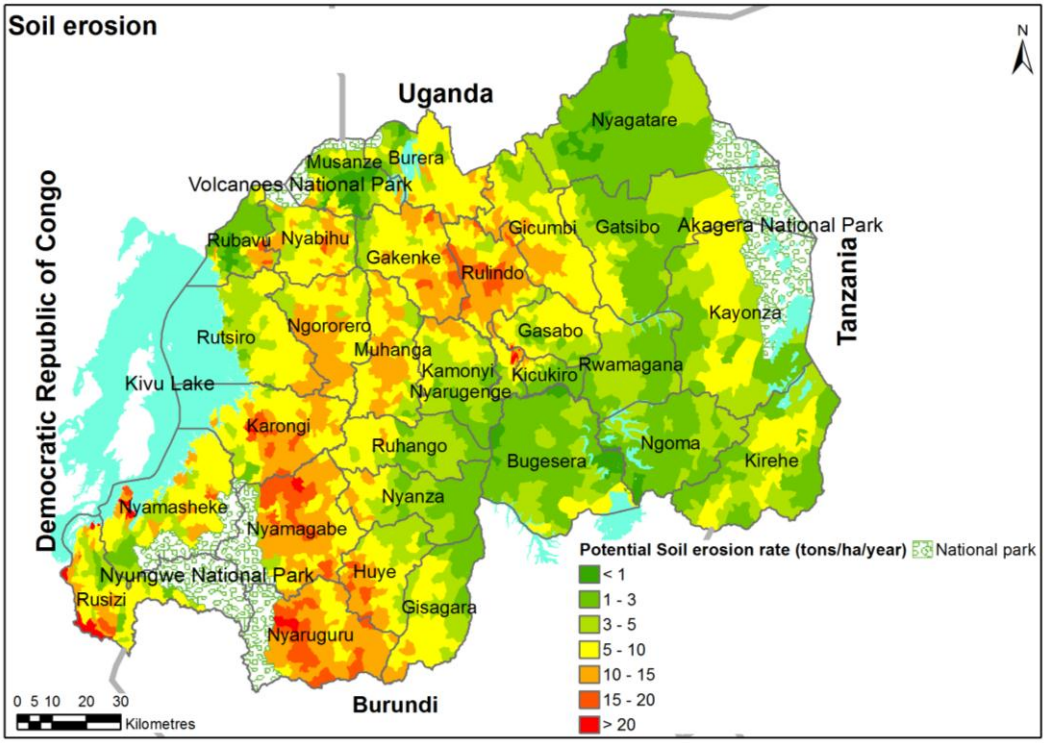
Of the 85% of households that cultivated land during the 2012 season A, just half are farming soils that are suitable for cultivation (slope <16%) while 10% are cultivating on slopes steeper than 40% and theoretically not suitable for agriculture. Most of these steep lands are located in the western province and in the districts of Nyaruguru, Nyamagabe, Muhanga (southern province), Gakenke, Rulindo and Gicumbi (northern province). These are districts characterized by high rates of soil erosion (erosion over 10 tons/ha/year) and a low soil fertility index (around 0.3 compared with around 0.7 in the eastern part of the country, see Map 8).

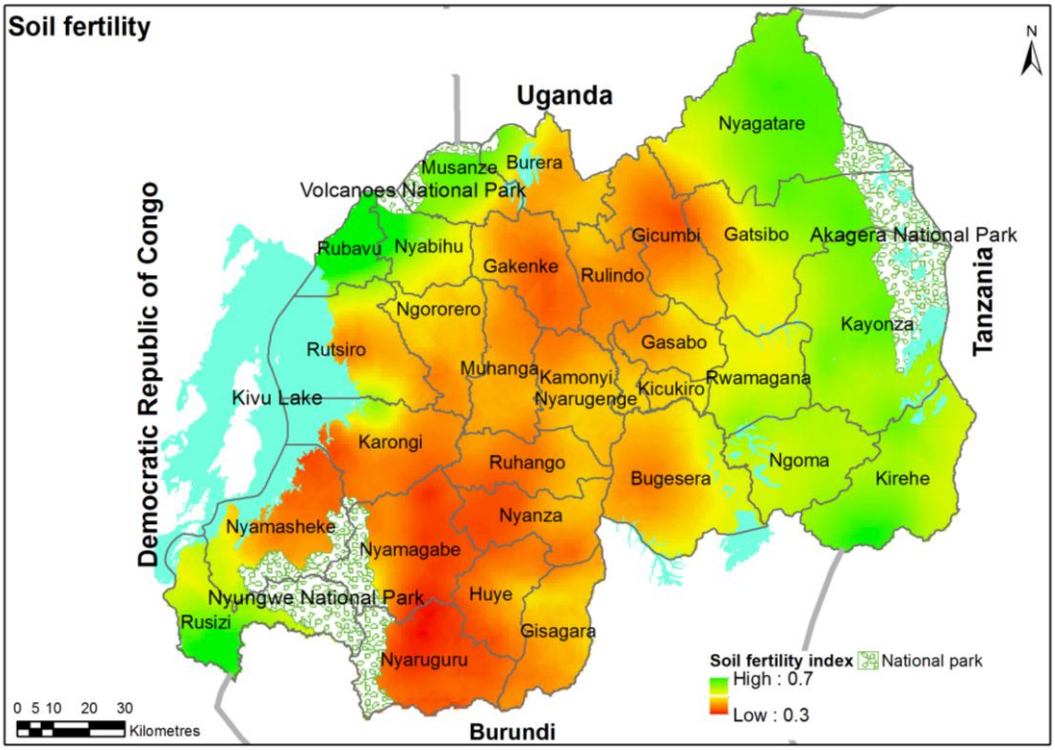
Over half (57%) of land-cultivating households use some type of soil erosion control measure. Ditches only are the main measure employed (46% of cultivating households) followed by planting trees and grasses (32%).

[106] Modelling soil erosion was achieved using the Universal Soil Loss Equation (USLE). The USLE is composed of six factors to predict the long-term average annual soil loss (A). The equation includes the rainfall erosivity factor (R), the soil erodibility factor (K), the topographic factors (L and S) and the cropping management factors (C and P). The equation takes the simple product form:
A= R x LS x CP.

[107] Calculation of soil fertility index combines relevant soil characteristics – nutrients, pH, and organic matter.

Map 8: Potential soil erosion and soil fertility





4.3.4 High rates of stunting and food insecurity coincide in western Rwanda

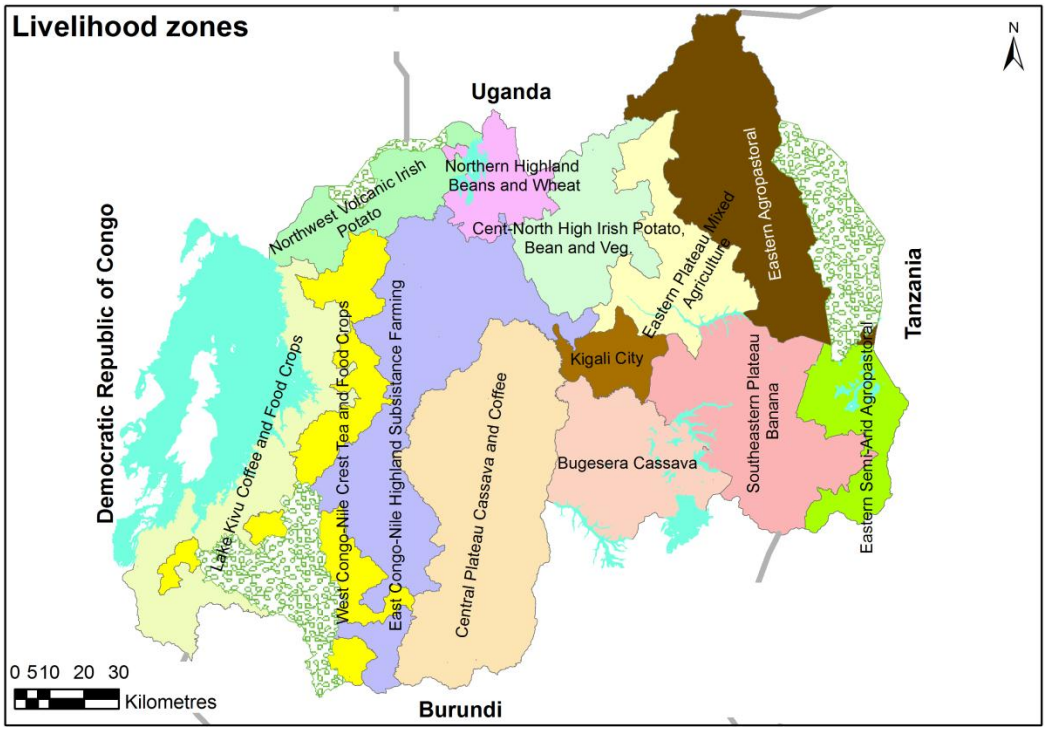
Between May 2011 and July 2012, FEWS NET - with the participation of government and partners - carried out the revision of the Rwanda national livelihood zones (see Map 9) using a rapid livelihoods assessment approach based on the Household Economy Analysis (HEA) that aims to identify and describe trends and patterns in livelihoods. The process resulted in the identification of 12 livelihood zones (described in Annex 9):

(1) Lake Kivu Coffee Zone; (2) West Congo-Nile Crest Tea Zone; (3) Northwest Volcanic Irish Potato Zone; (4) East Congo-Nile Highland Farming Zone; (5) Central Plateau Cassava and Coffee Zone; (6) Northern Highlands Beans and Wheat Zone; (7) Central-Northern Highlands Irish potato, Beans and Vegetable Zone; (8) Bugesera Cassava Zone; (9) Eastern Plateau Mixed Agriculture Zone; (10) Southeastern Plateau Banana Zone; (11) Eastern Agro-Pastoral Zone; (12) Eastern Semi-Arid Agro-Pastoral Zone.

Households cultivating land along the Congo-Nile crest have to deal with less fertile soils and soils that are vulnerable to erosion. Vulnerability to soil erosion is high in the districts of Nyaruguru, Huye, Nyamagabe and Muhanga (southern province), Karongi, Ngororero, Rusizi, Nyamasheke and Nyabihu (western province), Rulindo, Gakenke, Gicumbi and Burera (northern province). Areas with poor soil fertility are almost in the same areas as those vulnerable to soil erosion. Districts with low soil fertility index are Nyamasheke, Karongi, Rutsiro and Ngororero (western province), Burera, Gicumbi, Rulindo, Gakenke (northern province), Bugesera (eastern province), all districts of Kigali City and the southern province.

In the regression analysis the FEWS NET livelihood zones were found to be significant predictors of both household food consumption and chronic malnutrition in children under five.

Map 9: FEWS NET livelihood zones



Source: Based on information provided by FEWS NET

Households in western and southern livelihood zones face greater food insecurity

The rural areas of the livelihood zones bordering Lake Kivu and West of the Congo Nile Crest have the highest percentages of households with unacceptable food consumption (42% and 43% respectively) followed by the East Congo Nile Crest (29%).

The West Congo-Nile Crest Tea zone is a mountainous area where 2% of the residents cultivate tea and a large share of households (28%) rely on labour associated with tea production. Coffee is produced by 16% of the households in the Lake Kivu coffee zone and 19% of households there depend on casual labour for their livelihood. The households in those areas are relatively isolated from the main road, living in villages where the surrounding land is highly sloping (on average more than 70% of land is classified as unsuitable for cultivation because slopes are above 16% gradient) and the soil relatively infertile compared with other zones. They are home to 29% of all Rwandan households and 33% of rural households, yet they host half of the rural households with unacceptable food consumption (poor and borderline) and 39% of households that mentioned food access problems in the year. Map 10 shows the distribution of households with unacceptable food consumption; it is very similar to that of the 2009 CFSVA and Nutrition survey, in which the areas along the Congo Nile Crest had the highest proportion of households in the poor FCS group.

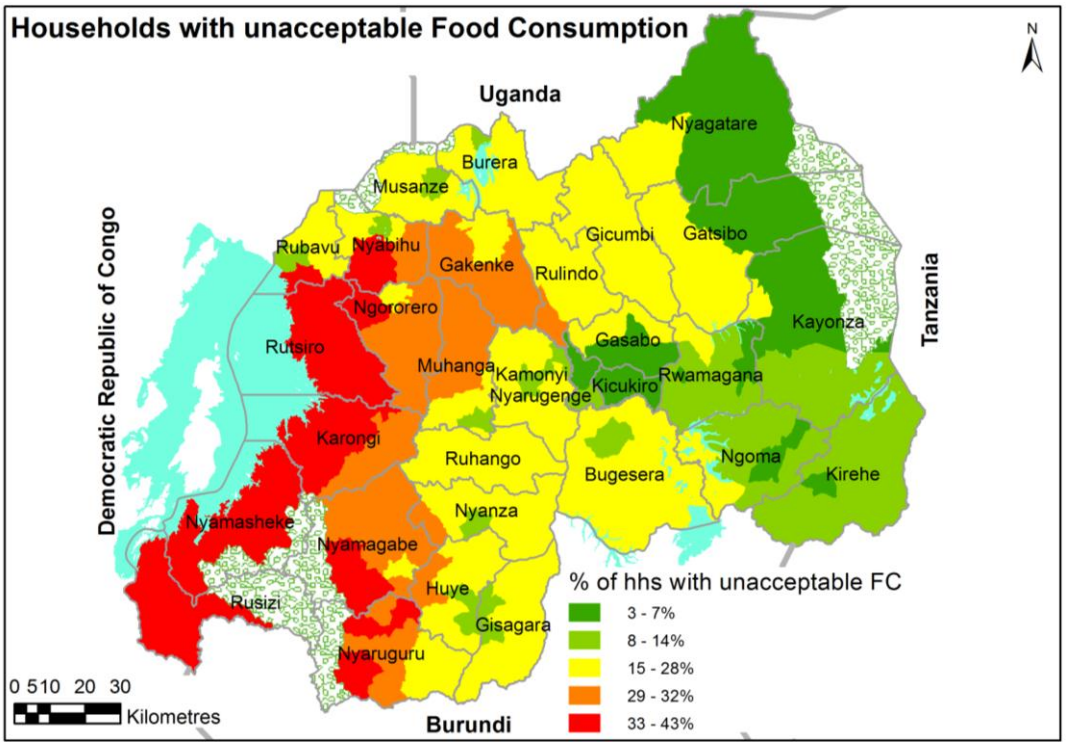
On the other hand, the most food secure zones, besides Kigali, are the Eastern Agro Pastoral zones and the South Eastern Plateau Banana zone, with over 90% of households there having acceptable food consumption. These livelihood zones are characterized by lower population density, less steep slopes and more fertile soils.

Table 16 displays the values of the main indicators that were found to be significant predictors of the FCS for each livelihood zone, and highlights in colour the values that are extreme in these areas (green shades for values that are relatively better than elsewhere in the country and red for those that are relatively worse).

It shows that in the zone bordering Lake Kivu, crop diversity is relatively lower, fewer households still had food from their last harvest available in April and on average they live farther from markets. Households living along the Congo Nile Crest (East and West) are also more cut-off from facilities (markets in this case), experience high rates of poverty, and a high percentage of them are low income farmers (especially on the eastern side of the Crest).

In Kigali, where food consumption is the best, levels of poverty are the lowest, households are close to the main facilities, heads of households are younger and better educated. In the also better-off eastern areas of the country crop diversity is higher, land holdings larger, more households have food from their last harvest still available in April, and many households grow kitchen gardens.

Map 10: Distribution of households with unacceptable food consumption (poor and borderline)



Source: CFSVA and Nutrition Survey, 2012

Table 16: Understanding food insecurity by livelihood zone[108]

Livelihood zone		Unacceptable food consumption	Human Capital			Livelihoods strategies									Poverty			Remoteness	
			Age head of household	Household size	Household head without education	Number of sources of income	Unskilled / agricultural albour	Low income farmers	Marginal livelihoods	Farming households with more than .5 ha	at least 4 crops	HH with home gardens	HH with food from own harvest in April	Livestock ownership	Lowest 2 wealth quintilespoor	Abject / Very Poor (Ubudehe)	Crowding index	Distance to a main road	Time to market (minutes)
Kigali City	Urban	**3%**	43.2	5.5	10%	1.3	20%	0%	18%	40%	24%	37%	4%	0.4	5%	6%	2.5	0.6	31
	Semi-Urban	**3%**	46.9	5.4	38%	1.4	23%	45%	5%	23%	48%	49%	38%	0.4	24%	29%	2.3	2.2	64
Lake Kivu	Semi-Urban	**43%**	47.9	5.3	41%	1.6	19%	39%	3%	46%	28%	58%	23%	0.4	28%	14%	1.8	1.3	79
	Rural	**42%**	46.8	5.1	39%	1.8	20%	43%	2%	44%	26%	57%	19%	0.4	31%	16%	2.1	3.7	90
West Congo-Nile Crest	Rural	**43%**	46.8	5.0	45%	1.8	28%	36%	3%	32%	33%	56%	26%	0.5	49%	17%	2.4	4.2	92
Northwest Volcanic	Urban	**12%**	44.5	5.8	23%	1.5	21%	9%	7%	41%	5%	60%	9%	0.3	11%	14%	2.0	0.9	24
	Rural	**20%**	46.2	5.1	41%	1.7	32%	24%	4%	31%	13%	65%	21%	0.5	35%	19%	2.1	2.2	71
East Congo-Nile Highland	Rural	**29%**	47.9	4.7	40%	1.7	19%	52%	3%	34%	41%	62%	31%	0.7	50%	19%	2.2	3.9	87
Central Plateau	Semi-Urban	**13%**	47.2	4.7	29%	1.6	22%	54%	3%	28%	58%	64%	34%	0.5	44%	15%	2.1	1.9	54
	Rural	**20%**	47.8	4.8	34%	1.6	21%	51%	2%	38%	48%	55%	30%	0.6	49%	20%	2.3	4.5	62
Northern Highland	Rural	**22%**	46.4	4.7	39%	1.6	16%	50%	3%	42%	19%	67%	44%	0.5	62%	8%	2.1	2.3	79
Central-Northern Highland	Rural	**19%**	49.7	4.9	40%	1.9	29%	36%	5%	37%	28%	67%	28%	0.7	34%	9%	2.2	3.2	105
Bugesera	Rural	**23%**	45.7	4.7	42%	1.3	15%	59%	3%	29%	23%	35%	25%	0.6	53%	17%	2.3	3.6	71
Eastern Plateau	Rural	**19%**	47.3	4.8	47%	1.7	19%	48%	2%	52%	52%	67%	43%	0.6	45%	20%	2.2	4.3	65
Southeastern Plateau	Semi-Urban	**6%**	46.7	4.9	36%	1.7	18%	36%	5%	38%	40%	56%	37%	0.6	26%	23%	2.2	0.7	68
	Rural	**11%**	48.0	4.6	40%	1.6	16%	39%	4%	46%	40%	62%	45%	0.6	31%	15%	2.2	5.5	65
Eastern Agropastoral	Rural	**7%**	47.1	5.5	43%	1.9	20%	34%	5%	63%	47%	66%	43%	1.8	42%	12%	2.5	6.7	106
Eastern Semi-Arid Agropastoral	Rural	**11%**	43.9	4.9	33%	1.6	14%	39%	1%	55%	37%	86%	57%	0.5	49%	8%	2.5	10.9	144
Rwanda	Average	**21%**	47.0	5.0	36%	1.6	21%	39%	4%	39%	37%	58%	29%	0.6	38%	16%	2.2	3.6	72

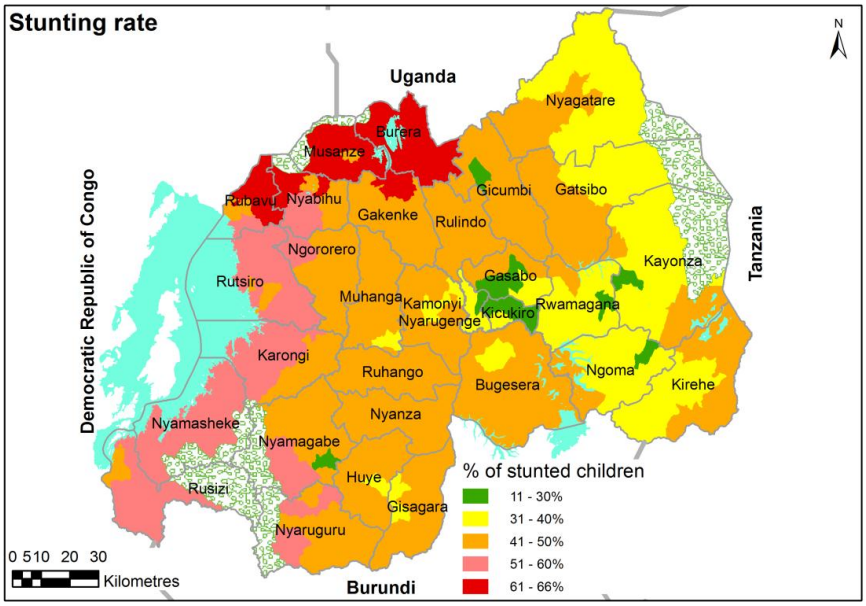
Source: CFSVA and Nutrition Survey, 2012

[108] Cell colour coding: Shades of green indicate indicators relatively good for food security compared to the national average (the darker the better), Shades of red around indicators that are relatively bad for food security compared to the national average (the darker the worse).

Children in the northern and in the western livelihood zones are more stunted

The northern livelihood zones have the worse stunting rates of the country, exceeding 60% in rural areas followed by areas bordering Lake Kivu where in rural areas where the prevalence of stunting is estimated at 51%, and along the Congo Nile Crest (50%) (see Map 11).

Map 11: Distribution of stunting



Source: CFSVA and Nutrition Survey, 2012

Table 17 displays the values of the main indicators that through modelling were found to be significant predictors of stunting for each livelihood zone, and highlights in colour the values that are extreme in these areas (green shades for values that are relatively better than elsewhere in the country and red for those that are relatively worse).

According to Table 17, the only factors included in the regression model that could explain the high rates of stunting in the Northwest Volcanic rural areas would be inappropriate feeding practices of children between 12 and 23 months (78% of children are fed un-nutritious 'bouillie', the highest percentage in Rwanda), and the relatively high percentage of uneducated mothers (30% compared to 23% nationally).

More explanatory factors come up for the northern highland areas, where mothers are on average much younger and less educated than elsewhere in the country (33% uneducated compared to a national average of 23%) and levels of poverty are among the highest in Rwanda (58% of children in the lowest two wealth quintiles compared to a national average of 40%). Child feeding practices are worse than in other areas, with no children between 12 and 23 months receiving any milk products known to be essential for the development of children that age (while the national average is 20% of children being fed milk products). Land in the northern highland areas is more sloping and therefore less suitable for agriculture.

Kigali City is the province where prevalence of stunting is by far the lowest (19% in urban areas and 32% in rural areas). Table 17 suggests that this is due to the low rate of poverty, especially in urban areas, overall better educated mothers, closer services (in this case hospitals), and much more adequate feeding practices for children between 12 and 23 months than in the rest of the country, with high percentages of children consuming formula, milk products, eggs, and less being fed from the common household pot (beans).

Because the survey was geared towards food security and not health or hygiene practices in the households, the model did not allow for demonstrating the essential role of health and hygiene in ensuring nutrition security for children. This does not preclude that these - and probably other factors as well - certainly have an influence on child development and stunting. These should be researched more deeply, especially in the northern areas where low education and poor feeding practices alone cannot explain why stunting affects three in five children.

Table 17: Understanding malnutrition by livelihood zone[109]

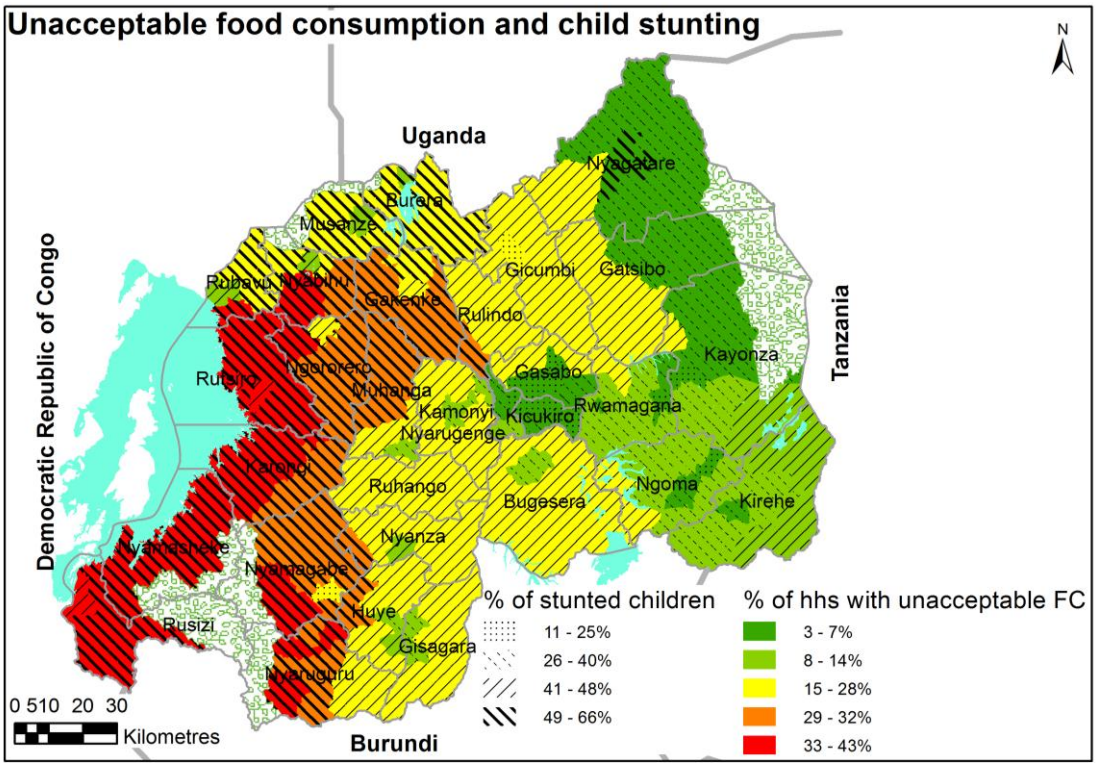
Livelihood zone		Stunting rate	Small birthsize	Mother			Household					Exclusive breastfding	Child Diet					
				Age	Stunted	Uneducated	Abject / Very Poor Ubudehe	2 poorest wealth quintiles	Crowding index	Not suitable slopes %	Distance to hospital (minutes)		Formula	Milk - products	Eggs	Beans (hh pot)	Tubers	Bouillie
Kigali City	Urban	**19%**	13%	31	1%	5%	6%	5%	3.1	4%	35	57%	9%	37%	5%	33%	46%	71%
	Semi-Urban	**32%**	29%	32	0%	23%	29%	28%	2.6	15%	78	63%	8%	33%	8%	58%	58%	75%
Lake Kivu	Semi-Urban	**44%**	14%	33	6%	10%	14%	29%	2.0	7%	43	59%	0%	9%	0%	36%	36%	55%
	Rural	**50%**	20%	31	2%	17%	16%	26%	2.4	10%	60	66%	1%	8%	2%	39%	38%	74%
West Congo-Nile Crest	Rural	**51%**	7%	31	2%	29%	17%	43%	2.8	17%	75	58%	0%	10%	3%	46%	71%	54%
Northwest Volcanic	Urban	**40%**	6%	32	0%	10%	14%	11%	2.3	6%	28	83%	0%	50%	0%	67%	83%	67%
	Rural	**61%**	9%	31	1%	30%	19%	31%	2.4	7%	57	73%	2%	22%	2%	44%	54%	78%
East Congo-Nile Highland	Rural	**50%**	14%	32	4%	22%	19%	50%	2.6	21%	77	73%	0%	14%	5%	62%	63%	56%
Central Plateau	Semi-Urban	**39%**	19%	33	1%	16%	15%	50%	2.5	3%	58	65%	0%	21%	7%	29%	57%	57%
	Rural	**42%**	15%	32	2%	26%	20%	49%	2.8	6%	69	58%	3%	30%	3%	36%	52%	62%
Northern Highland	Rural	**60%**	14%	29	1%	33%	8%	58%	2.5	29%	78	66%	0%	0%	0%	43%	33%	52%
Central-Northern Highland	Rural	**44%**	17%	31	1%	27%	9%	32%	2.6	28%	73	70%	0%	10%	0%	58%	58%	60%
Bugesera	Rural	**48%**	14%	31	4%	36%	17%	59%	2.7	0%	54	65%	0%	21%	0%	71%	87%	61%
Eastern Plateau	Rural	**43%**	14%	31	1%	16%	20%	45%	2.7	6%	63	77%	0%	14%	0%	70%	56%	72%
Southeastern Plateau	Semi-Urban	**40%**	11%	31	2%	40%	23%	37%	2.7	3%	71	72%	9%	27%	9%	73%	45%	73%
	Rural	**35%**	17%	32	2%	19%	15%	28%	2.6	4%	65	77%	1%	22%	3%	74%	57%	64%
Eastern Agropastoral	Rural	**38%**	18%	32	1%	35%	12%	48%	2.8	4%	102	54%	3%	16%	0%	51%	38%	68%
Eastern Semi-Arid Agropastoral	Rural	**45%**	15%	32	0%	37%	8%	57%	3.2	4%	129	55%	6%	11%	0%	83%	56%	67%
Rwanda	average	**43%**	**15%**	**32**	**2%**	**23%**	**16%**	**40%**	**2.7**	**10%**	**65.7**	**66%**	**2%**	**20%**	**3%**	**51%**	**54%**	**65%**

Source: CFSVA and Nutrition Survey, 2012

[109] Green indicates relatively good compared to the national average; red relatively bad compared to the national average.

As shown by Map 12, that overlays prevalence of unacceptable food consumption with stunting, the areas with the highest rates of households with unacceptable food consumption are also those with the highest prevalence of stunting, except in the northern volcanic areas, which have very high stunting but average percentages of households with poor food consumption.

Map 12: Distribution of unacceptable food consumption and stunting



Source: CFSVA and Nutrition Survey, 2012

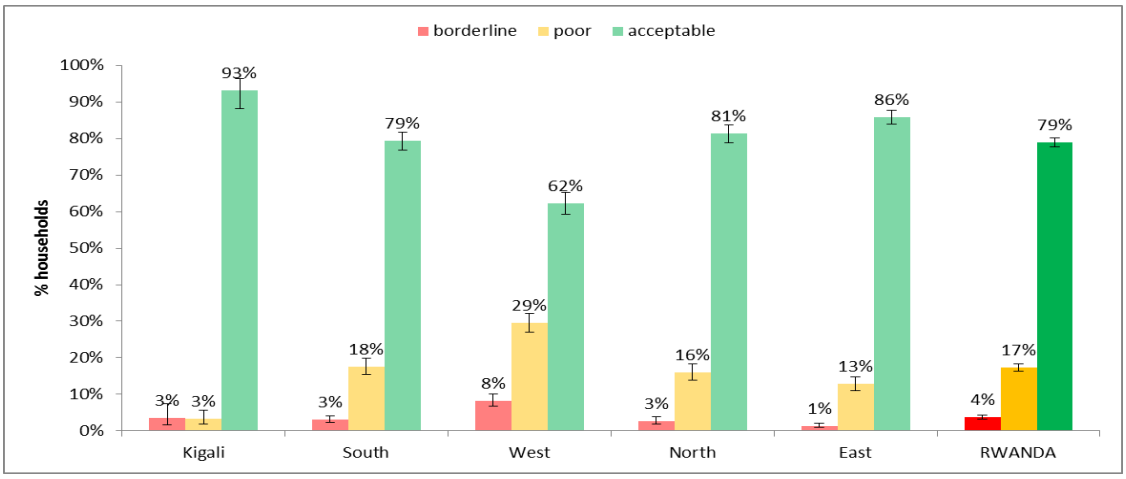
Provincial distribution of food insecurity

Some 65% of all rural households with unacceptable food consumption and over half (53%) of rural households with stunted children live in the western and southern provinces.

Rates of acceptable food consumption are lowest in the western province followed by the southern province. The province with the highest share of households with acceptable food consumption is by far Kigali (between 88% and 96% households have acceptable food consumption) followed by the eastern province (between 84% and 88%, see Figure 41).

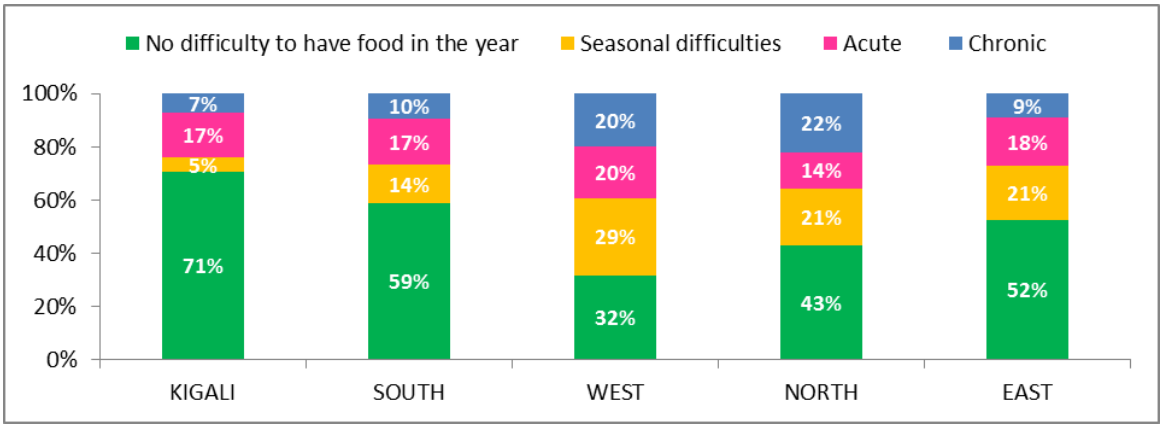
The western province accounts for the largest numbers and highest rates of food insecure households. Although it is home to less than a quarter of all Rwandan households, half of all households with poor food consumption live there, as do 38% of those with borderline food consumption, 30% of those reporting any food access issues and 28% of households with one or more stunted children under five. Between 59% and 65% of households there have acceptable food consumption (compared with 79% nationally), and only one third of households reported *not* having had any problems in providing food for their household in the 12 months preceding the survey. Seasonal food access issues were reported there by 29% of the households, a higher proportion than any other province (see Figure 42).

Figure 41: Household levels of food consumption in Rwanda in March/April 2012 (CI: 95%)



Source: CFSVA and Nutrition Survey, 2012

Figure 42: Percentage of households reporting seasonal, acute and chronic difficulties in accessing food, by province



Source: CFSVA and Nutrition Survey, 2012

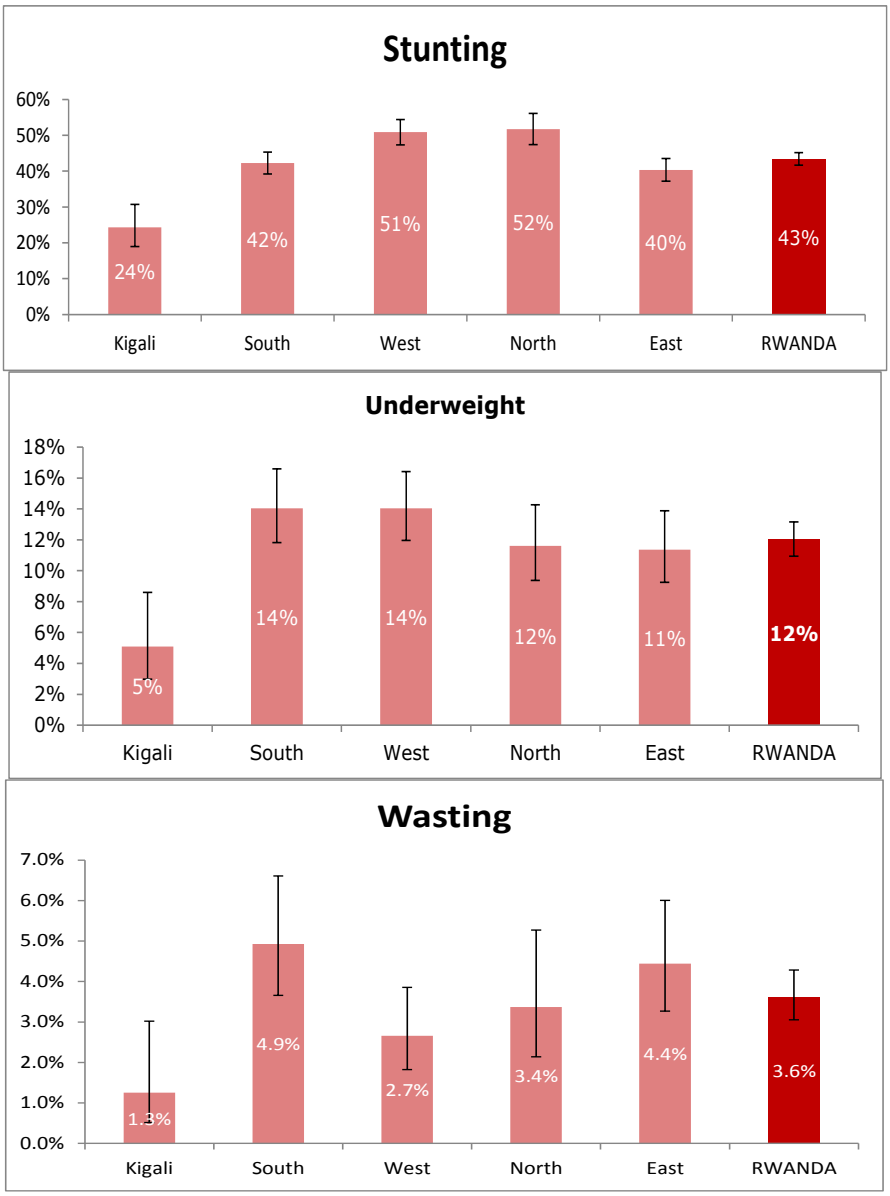
Households that reported acute food access issues are more prevalent in the northern and western provinces (22% and 20% of households respectively) compared with other provinces. The lowest percentage is in Kigali City (7%).

Provincial distribution of malnutrition

Figure 43 illustrates that child stunting is highest in the northern and western provinces where more than half of children are stunted, and lowest in Kigali (fewer than one in four). Underweight is significantly lower in Kigali than in other provinces. Wasting is highest in the southern and eastern provinces and lowest in Kigali.

The rates of malnutrition for women of reproductive age by province are given in Annex 3. The survey results are in line with those of the 2010 DHS, showing that women in Kigali are more likely to be overweight than elsewhere, but all other malnutrition indicators seem to be lower there (although the differences are not significant for this survey).

Figure 43: Rates of malnutrition for children aged between 6-59 months, by province (CI 95%)



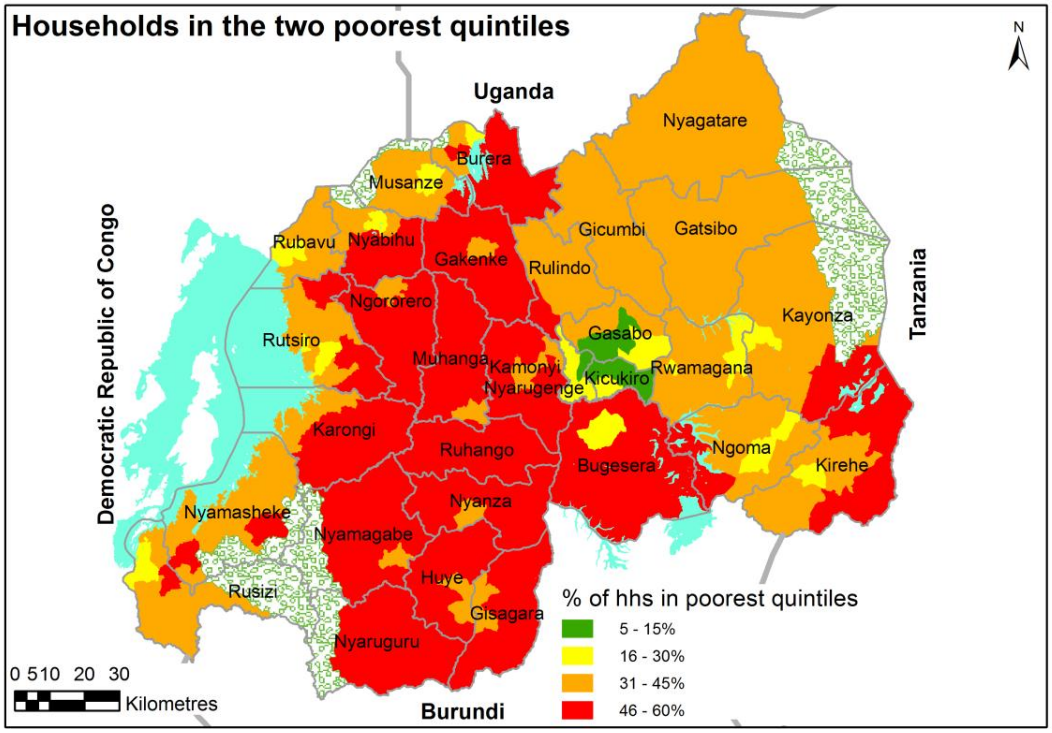
Source: CFSVA and Nutrition Survey, 2012

Food insecurity generally mirrors poverty at district level

The district level distribution of poor food consumption and stunting is very similar but not identical to that of poverty (see Map 13 and Table 18). Districts with the highest share of households with poor food consumption (excluding the borderline) are in the western and southern provinces. 70% of households with poor or borderline food consumption are in 13 districts that host half of all rural households. They are Ngororero, Rutsiro, Karongi, Rusizi, Gatsibo, Nyamasheke, Nyamagabe, Bugesera, Nyanza, Burera, Gakenke, Rubavu and Rulindo.

In 12 districts (Musanze, Gatsibo, Ngororero, Gicumbi, Rubavu, Rusizi, Bugesera, Gisagara, Karongi, Nyamasheke, Burera and Ngoma) more than half (an estimated 52%) of under-fives are stunted. These 12 districts host an estimated 46% of all Rwandese children under five years old.

Map 13: Distribution of households in the poorest two wealth quintiles



Source: CFSVA and Nutrition Survey, 2012

Box 14: Summary - Where do the food insecure and the malnourished live?

The rural areas of the livelihood zones bordering Lake Kivu and West of the Congo Nile Crest have the highest percentages of households with unacceptable food consumption (42% and 43% respectively) followed by the East Congo Nile Crest (29%). The northern livelihood zones have the worst stunting rates of the country, exceeding 60% in rural areas followed by areas bordering Lake Kivu where in rural areas where the prevalence of stunting is estimated at 51%, and along the Congo Nile Crest (50%).

The province where the proportion of households with acceptable food consumption is highest is by far Kigali[110] followed by the eastern province.[111] The highest prevalence of stunting is in the northern[112] and western[113] provinces followed by the southern[114] and eastern.[115] Kigali has the lowest estimated prevalence of stunting of all provinces.[116]

Areas with the highest rates of households with poor food consumption are also the areas where the prevalence of stunting is highest except in the northern volcanic areas which have very high stunting but average percentages of households with poor food consumption.

The district level distribution of poor food consumption is very similar to that of poverty: districts with the highest share of households with poor food consumption are in the western and southern provinces.

[110] With between 88% and 96% households with acceptable food consumption.
[111] Between 84% and 88% households with acceptable food consumption.
[112] (51.7%, CI 47.4-56.1%).
[113] (50.9%, CI 47.3-54.4%).
[114] (42.2%, CI 39.2-45.3%).
[115] (40.3%, CI 37,2-43.5%).
[116] (24.4%, CI 18.9-30.7%).

Table 18: Estimated percentage and number of households by food consumption group in Rwanda, by province and by district

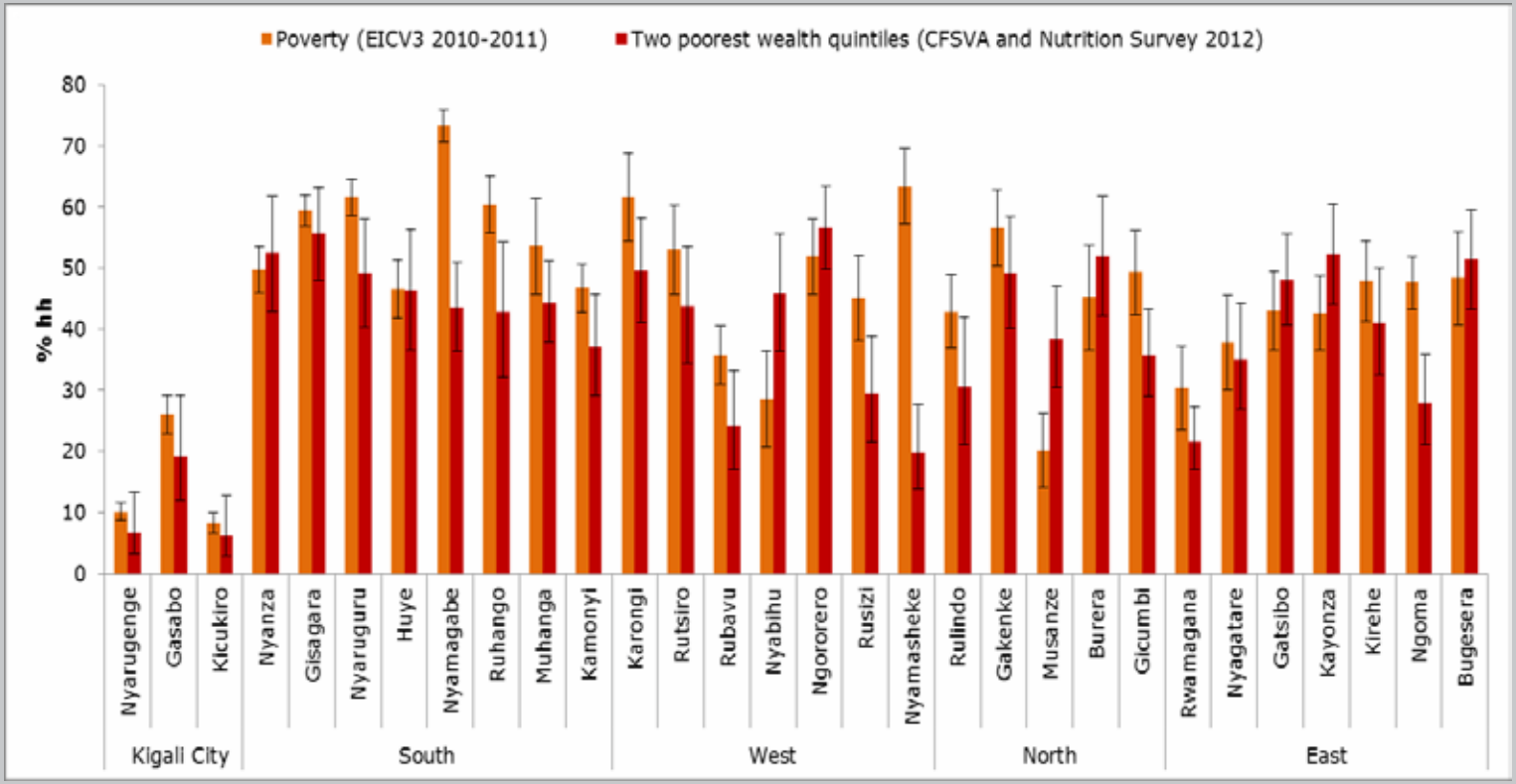
		FCS category						
		Poor		Borderline		Acceptable		Total
		%	Households	%	Households	%	Households	Households
RWANDA		4%	82,090	17%	377,947	79%	1,716,822	2,176,859
Province	KIGALI	3%	7,249	3%	6,917	93%	196,026	210,192
	SOUTH	3%	15,884	18%	90,865	79%	410,627	517,375
	WEST	8%	40,684	29%	144,883	62%	306,072	491,640
	NORTH	3%	10,811	16%	64,107	81%	326,990	401,909
	EAST	1%	7,461	13%	71,175	86%	477,107	555,743
District	Nyarugenge	0%	0	2%	871	98%	48,894	49,765
	Gasabo	7%	6,931	4%	3,929	90%	95,707	106,568
	Kicukiro	1%	318	4%	2,117	95%	51,425	53,860
	Nyanza	3%	2,401	21%	15,992	76%	56,857	75,250
	Gisagara	1%	386	16%	11,832	83%	60,139	72,357
	Nyaruguru	7%	3,756	15%	8,085	78%	42,810	54,651
	Huye	0%	0	8%	4,772	92%	56,905	61,677
	Nyamagabe	6%	3,750	26%	15,490	68%	41,209	60,449
	Ruhango	5%	3,131	18%	12,154	77%	51,102	66,387
	Muhanga	3%	1,665	23%	14,291	74%	46,484	62,440
	Kamonyi	1%	794	13%	8,249	86%	55,121	64,164
	Karongi	12%	9,682	25%	20,180	63%	51,857	81,719
	Rutsiro	14%	8,473	39%	23,927	47%	29,177	61,576
	Rubavu	6%	4,542	22%	15,945	72%	52,469	72,956
	Nyabihu	5%	2,532	13%	7,361	82%	46,036	55,928
	Ngororero	9%	6,818	35%	25,983	56%	42,374	75,174
	Rusizi	5%	3,840	41%	31,099	54%	40,637	75,577
	Nyamasheke	7%	4,798	30%	20,390	63%	43,523	68,710
	Rulindo	2%	1,172	23%	12,846	75%	42,563	56,581
	Gakenke	3%	1,932	22%	16,013	76%	56,225	74,169
	Musanze	2%	2,131	9%	8,371	88%	80,307	90,810
	Burera	7%	4,675	19%	13,178	74%	52,144	69,997
	Gicumbi	1%	902	12%	13,699	87%	95,751	110,352
	Rwamagana	1%	881	7%	4,337	92%	58,341	63,558
	Nyagatare	0%	0	2%	1,243	98%	76,824	78,067
	Gatsibo	3%	2,669	24%	24,332	74%	75,387	102,387
	Kayonza	1%	600	9%	6,403	91%	67,605	74,608
	Kirehe	1%	731	11%	8,894	88%	70,649	80,274
	Ngoma	2%	1,279	10%	7,598	88%	67,652	76,529
	Bugesera	2%	1,302	23%	18,369	76%	60,649	80,320

Source: CFSVA and Nutrition Survey, 2012

Box 15: Comparing the district distribution of poor households (according to EICV 3) and percentage of households in the two poorest wealth quintiles (according to CFSVA and Nutrition Survey 2012)

As shown by Figure 44, even though the data was collected at different times and the indicators are based on a completely different methodology, both the EICV 3 poverty indicator and CFSVA and Nutrition Survey 2012 wealth index show very similar patterns in district level distribution of poverty,[117] confirming that poverty is largely a rural phenomenon and that a higher share of poor households can be found in the southern province than in all other provinces.

Figure 44: Percentage of poor households (according to EICV 3) and percentage of households in the two poorest wealth quintiles (according to CFSVA and Nutrition Survey 2012) per district.



Source: EICV 3 for poverty estimates and CFSVA and Nutrition Survey 2012 for households in the poorest wealth quintiles

[117] Note that wealth quintiles are based on asset wealth, whereas the EICV 3 poverty calculations are based on consumption figures. Considering that they are not calculated in the same way or over the same period the observed differences between the two indicators can be considered quite small.

5 HOW SHOCKS IMPACT FOOD SECURITY

5.1 RISK AND VULNERABILITY APPROACH

The objective of a food security risk analysis is to identify populations and regions likely to experience serious declines in their future food security status because of the effects of a particular hazard. Within the context of the 2012 Rwanda CFSVA and Nutrition Survey, risk analysis combines hazard analysis with vulnerability analysis. The nature and extent of potential hazards and existing conditions of vulnerability that together could harm exposed people, property, services, livelihoods and the environment on which they depend are analysed and evaluated.

The purpose of a vulnerability analysis is to estimate reasonably well how many households in a certain area would become food insecure if a specific hazard occurred in that area. The first task in conducting a vulnerability analysis is to assess the types of shocks communities and households are typically exposed to and how effective their strategies for managing risk are.

Household livelihood strategies and outcomes, including food security, are influenced by the environment in which people live. Within this environment, critical trends (e.g. population growth, national and international economic trends, governance and technological changes), seasonal cycles (of prices, production, livelihood strategies) and shocks (natural and man-made) frame the vulnerability context.[118]

Box 16: Definitions useful for food security risk analysis[119]

Food security risk analysis: A methodology to determine the nature and extent of risk to food security by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a threat to household food security.

Hazard/shock: The potential to cause harm; also, the probability of a potentially damaging phenomenon occurring within a given time period and area. A hazard can be expressed mathematically as the probability of occurrence of an event of certain intensity, in a specific site, and during a determined period of exposure.

Hazard/shock analysis: Identification, study and monitoring of any hazard/shock to determine its potential, origin, characteristics and behaviour.

Vulnerability to food insecurity: The conditions that increase the susceptibility of a household to the effect of hazards on its food security. Vulnerability is a function of a household's exposure to a specific hazard (e.g. flood, drought) and its coping capacity (or the direct impact of the hazard on the household, mitigated by its coping capacity).

Coping capacity: The means by which a household uses available resources to face adverse consequences that could lead to a decrease in household level food security.

Risk to food insecurity: The probability of food insecurity resulting from interactions between a natural or human-induced hazard and vulnerable conditions. The probability of a loss of food security depends on the hazard, vulnerability of households, and the number of households in the affected area. This relationship can be represented by the following equation:
$R = H \bullet Pop \bullet Vul$

Where: *R* is the risk for food insecurity (in number of hh/year in a sub-area)
H is the hazard, which depends on the probability of a given hazard of a certain intensity in that area (in percentage)
Pop is the population living in a the area (in number of hh)
Vul is the vulnerability of the population (a function of the exposure of lives and livelihoods and household resilience with regard to the effects on their food security) (as a percentage of all hhs in the sub-area)

[118] DFID (1999) Sustainable Livelihood Guidance Sheet, Department for International Development.
[119] Source: adapted from the United Nations International Strategy for Disaster Reduction (UN-ISDR) terminology.

5.2 MAIN SHOCKS

A shock is any event that may affect the food security and the nutrition status of a household. For analysis sake the described shocks we categorized as either covariate[120] (affecting the community) or idiosyncratic[121] (at household level).

The shock inventory, presented in Table 19, identifies the types of shocks that have a possibility of occurring in a given area of the country. For this report the list of shocks was based on secondary information provided by MIDIMAR on hazards/risks most likely to produce the shocks that incur the most severe impacts at household level. This information was completed with household and community level information collected during the CFSVA and Nutrition Survey 2012.

The household questionnaire of the CFSVA and Nutrition Survey 2012 asked if households had been exposed to any unusual situation during the last year that affected their ability to provide for themselves, eat in the manner they were accustomed to, or affected what the households owned. Nationally, 38% of the sampled households experienced such situations, peaking at 54% in the western province. In other provinces the share of households mentioning a shock was lower (21% in Kigali and between 32% and 36% in the other three provinces). Shocks were reported more in rural areas (41%) than urban or peri urban areas (26% and 25% respectively). Districts where more than 50% of households reported a shock are Ngororero (81%), Rutsiro (78%), Nyabihu (66%), Kirehe (64%), Gatsibo (62%), and Karongi (54%).

Table 19: Community and household level shocks

Covariate (community level) shocks	Idiosyncratic (household level) shocks
Natural hazard induced disasters:	Loss or reduced income for a household member
Hydro meteorological disasters	Serious illness or accident of household member
Rainfall deficit/irregular rains, prolonged dry spell	Death of the head of the household
Floods	Death of a working household member
Landslides and mudslides	Death of other household member
Hailstones	Theft of productive resources
Geophysical disasters	Fires
Earthquake	
Volcanic activity	
Biological disasters[122]	
Unusually high level of crop pests and disease	
Unusually high level of livestock diseases	
Unusually high level of human disease/epidemic[123]	
Socio-economic shocks	
Insecurity/violence	
Unusually high prices for food	
Unusually high cost of agricultural inputs (seed, fertilizer etc)	

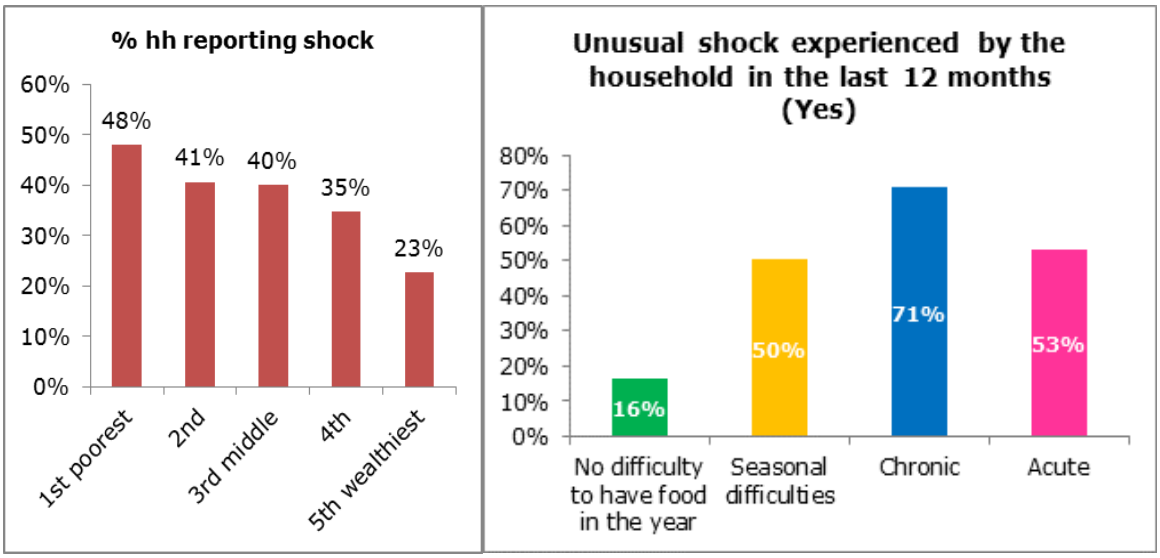
Source: MIDIMAR and CFSVA and Nutrition Survey, 2012

Among livelihood groups, low income agriculturalists and agro-pastoralists reported most shocks, (48% and 46% respectively), followed by 38% of unskilled daily labourers and 37% of agricultural workers. Only 14% of medium to high income agriculturalists reported having experienced a shock that affected their ability to provide for their households. Since it is unlikely that the high income agriculturalists experienced fewer shocks than other households this low percentage probably indicates that the shocks did not affect their ability to provide for their households. This hypothesis

[120] Covariate shock or disaster: a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. (Adapted from UNSIDR definitions for Disaster Risk Reduction, 2009).
[121] Idiosyncratic shock or household level shock: event with a negative impact on nutrition status and/or food security of the household. (Adapted from the WFP EFSA handbook second edition's definition).
[122] Epidemics are considered as Biological Hazards (UNISDR Terminology for Disaster Risk Reduction). This classification follows the definitions of Natural Disaster by the UN Office for the Coordination of Humanitarian Affairs, "natural disasters can be divided into three specific groups: hydro meteorological disasters, geophysical disasters and biological disasters".
[123] Epidemic is a biological hazard (as per UNISDR definition, 2009).

is supported by Figure 45 which shows that richer households reported fewer shocks than poorer. It also indicates that the wealth quintile is a good proxy for the household coping capacity.

Figure 45: Share of households reporting shocks in the 12 months preceding the interview, by reported food access problems and wealth quintiles



Source: CFSVA and Nutrition Survey, 2012

Table 20 shows that the most commonly reported shocks are related to illness, accident, inability to work and death of a household member (reported by 15% of all households, or 39% of households that reported a shock) followed by rainfall deficits, irregular rains or dry spells (8% of all households). All the other shocks were reported by less than 5% of all households and included floods (2%) and unusually high prices of food (1% of all households).

The types of main shocks reported by a household obviously depend on the household livelihood. For example, households relying on agricultural or livestock production tend to report the climate related shocks they experienced, while households relying on labour or other more urban activities tend to report more shocks related to the inability of a household member to work.

The distribution of the reported shocks, as well as the types of households reporting them, again indicates that households in the western province have more difficulties in their daily lives. In fact, the western province accounts for one third of all the households reporting at least one shock. The shocks that were most reported in the western province are climate related (36% of households reporting at least one shock) or involve the illness/accident of one of their household members (30% of the households reporting at least one shock).

It also confirms that rural households, poorer households and those headed by women and disabled people are experiencing more difficulties in their daily lives. Almost three quarters (71%) of households that had to deal with chronic difficulties in accessing food had experienced at least one shock in the year preceding the interview, which is higher than for households that reported having seasonal or acute issues with getting food (see Figure 45).

5.2.1 Household shocks

Illness, death and accident of a household member[124] were the main idiosyncratic shocks that affected 39% of households mentioning a shock. Households that reported these shocks tend to rely more on non-agricultural livelihoods and live in urban areas (70% of the households that mentioned a shock in urban areas said it was related to illness, death or accident of one of their household members, compared with 40% in rural areas). The districts of Nyarugenge, Ngoma, Gasabo, Kicukiro, Nyagatare, Kamonyi, Rusizi and Kayonza reported the highest prevalence of illness, death or accident of a household member affecting them.

5.2.2 Community level shocks

The high dependence on agriculture coupled with hilly topography and high annual precipitation rates, overexploitation of the natural environment and farming methods that are ill adapted to steep slopes result in climate related disasters such as rainfall deficit (perceived as drought), torrential rains and floods, being the main disasters suffered by the Rwandan population. In addition, the Rwanda Environment Management Authority (REMA) cites earthquakes, volcanic eruptions and epidemics among the main disasters which have occurred throughout the country in the past 10 years. The following have been prevalent: drought resulting in famine (1999 and 2003 droughts affected more than 800,000 people), earthquakes (2007), floods (flash floods are recurrent in Rwanda and cause widespread losses especially when associated with landslides), environmental degradation and fire outbreaks (mainly in rural areas and national parks).[125]

In addition, because of its location in the Great Lake region (and especially its border with DRC) Rwanda faces the serious threat of mass movements. In 2002, following the explosion of the Nyaragongo volcano (in the DRC) more than 300,000 Congolese refugees crossed the border to seek safety. Given the fact that the DRC border city of Goma has grown a lot since then, were the volcano to erupt again (which scientists consider likely) more than a million people would be seeking refuge elsewhere. At the time of writing more than 15,000 people had crossed the border from DRC because of the instability there and more are expected given continued insecurity in Eastern DRC.

Table 20: Percentage of households reporting main shock in 12 months preceding the interview (100% is the total households reporting any type of shock)

	% households
HOUSEHOLD LEVEL SHOCK	
Household member illness, death, loss of employment	39%
Insecurity/violence	1%
Theft of productive resources	1%
Loss of land	1%
Other household shocks	5%
COMMUNITY LEVEL SHOCK	
Rainfall deficit/irregular rains, prolonged dry spell	21%
Floods	7%
Hail	7%
Landslides and mudslides	5%
Heavy rains	5%
Unusually high prices of food	2%
Unusually high level of crop pests and disease	2%
Other community shocks	3%

Source: MIDIMAR and CFSVA and Nutrition Survey, 2012

[124] Serious illness or accident of household member, loss or reduced employment/income for a household member, death of other household member, death a working household member, death of the head of the household.
[125] REMA, State of Environment and outlook, 2009.

The main hazards addressed within the scope of this CFSVA and Nutrition Survey 2012 are those that were most frequently brought up by interviewed households and those that are known to have an effect on household food access, and therefore food security for which sufficient data is available. These are rainfall deficit, floods and high food prices.

5.3 RESILIENCE AND CAPACITY TO COPE WITH SHOCKS

Coping strategies are "rational and calculated responses to minimize the intensity or duration of crises, to maximize limited resources, and to preserve long term livelihood security" (Adams et al. 1998). Households rely on different coping strategies according to their individual characteristics. Not only is the pre-shock food security level important in determining how the household will react to the shock but it will also determine how and to what extent the household will be affected by it.

Households reporting shocks also indicated what they did to recover from the experience. The most reported coping strategies overall (irrespective of the shock) were "increased casual labour" (21% of households), "rely on less expensive or less preferred foods" (16%), "reduce number of meals eaten per day" (11%) and "spent savings" (10%).

When looking in more detail at the type of shock, the above patterns are generally followed by most of the households dealing with climatic and household member related shocks. However, when coping with higher food prices households tend to resort more to "relying on less expensive or less preferred foods" (23%), "reducing the number of meals eaten per day" (33%) and "increasing casual labour" (14%).

Table 21: Negative effects of identified hazards on food security

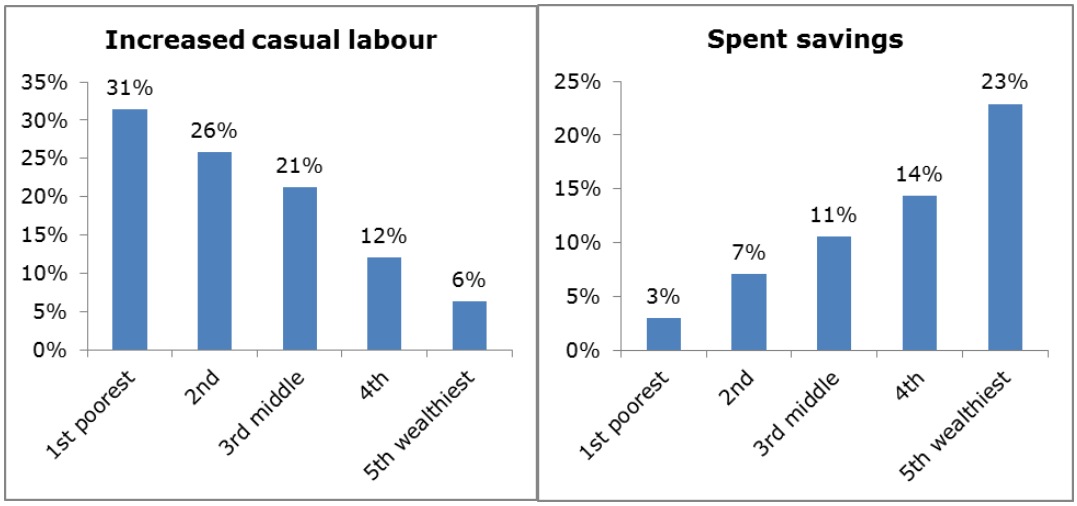
Hazard/shock	Main immediate effect	Effect on food availability and access	Effect on food consumption
Rainfall deficit	Loss of harvest Loss of food stocks	Decreased staple food availability Decreased staple food access from own production, for sale and consumption Decreased food access from purchase due to increased market food prices, decreased sales	Decreased amounts of food consumed due to decreased availability and or increased prices Lower quality of diet by choice (coping) and/or availability
Flood	Loss of harvest Loss of food stocks Loss of infrastructure (roads, market places…) Loss of assets	Decreased staple food availability Decreased staple food access from own production, for sale and consumption Decreased food access from purchase due to increased market food prices, decreased sales Decreased employment opportunities	
Market food price rise	Deterioration of terms of trade for livestock or labour Loss of purchasing power	Decreased food access from purchase due to increased market food prices	

Source: adapted to Rwanda from CFSVA guidelines, 2009

Obviously the levels of household wealth influence the way a household responds (see Figure 46): the poorest households resort more to increasing casual labour (31%), and reducing the number of meals in a day (11%) while the richest households are more likely to spend their savings (23%), or borrow money (11%). One method that is common across all wealth groups is to rely on less expensive food. It is the main strategy for the richest households (22%) and the second most used strategy for the poorest households (11%).

Over 40% of households relying on casual labour[126] resort to increasing casual labour to cope with a shock, while, unsurprisingly, only 4% of employees and business men do this. Households involved in marginal livelihoods rely most on friends, relatives and eating fewer meals per day.[127]

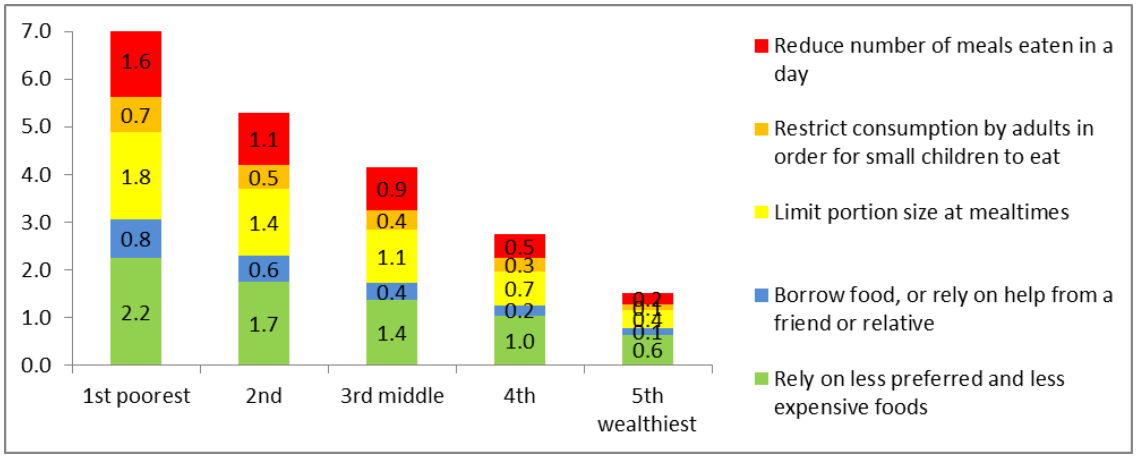
Figure 46: Percentage of households adopting 'increased casual labour' and 'spend savings' as coping strategy, by wealth quintile



Source: CFSVA and Nutrition Survey, 2012

The analysis of the 'reduced coping strategy index' again shows that the poorer the household the more likely it is to adopt more severe coping mechanisms (higher CSI), and whereas all households sometimes rely on less preferred and less expensive foods, only poor households reduce the number of meals eaten in a day, limit portion size at mealtimes or restrict consumption by adults so that small children can eat (see Figure 47).

Figure 47: Number of days in the week during which coping strategies are used by households in each wealth quintile

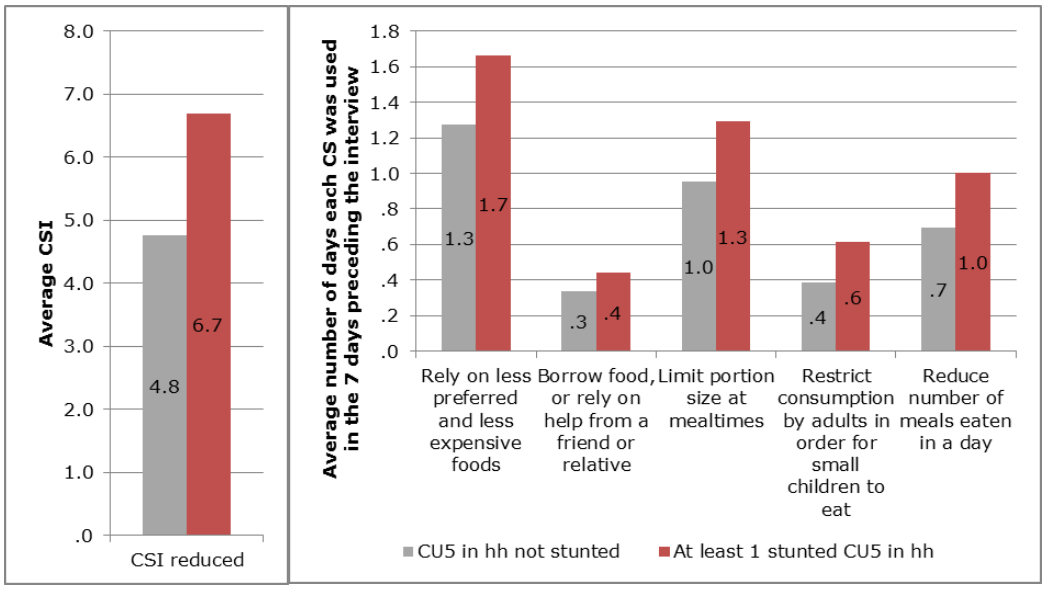


Source: CFSVA and Nutrition Survey, 2012

The CSI of households with stunted children is significantly higher than that of households with children under five who are not stunted (see Figure 48). Similarly, the CSI of households with unacceptable food consumption is significantly higher than that of households with acceptable food consumption (see Figure 49).

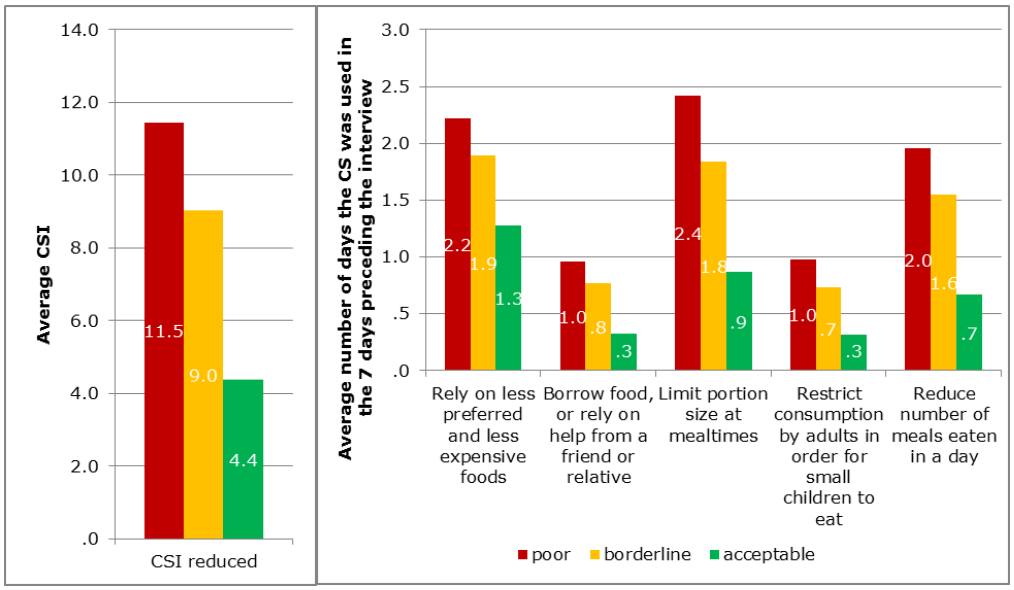
[126] 44% for "agricultural workers" and 42% for "agriculture and daily labour."
[127] When confronted with a shock, 11% have household members eat at relatives' or neighbours', 13% borrow food or rely on help from friends or relatives and 16% reduce the number of meals eaten in a day.

Figure 48: Average CSI and use of coping strategies in households with and without stunted children (only considering households with children under 5 (CU5))



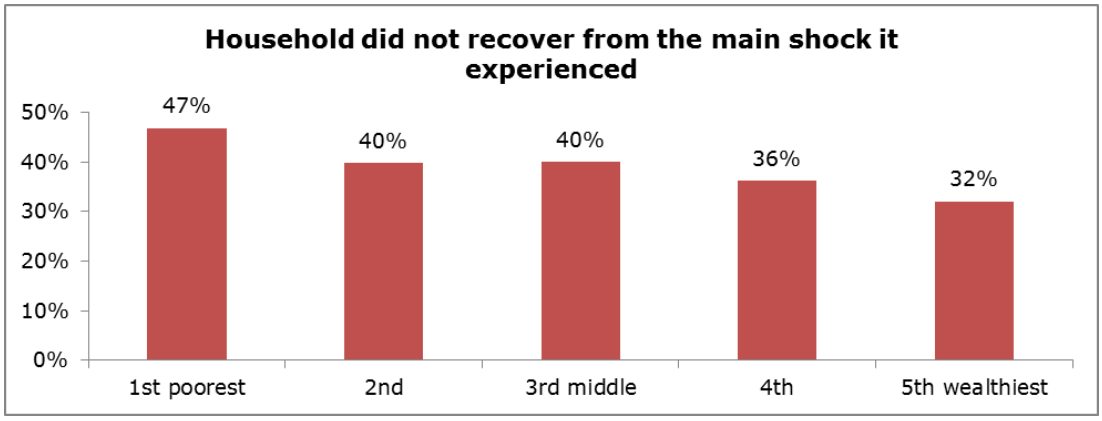
Source: CFSVA and Nutrition Survey, 2012

Figure 49: Average CSI and use of coping strategies in households by food consumption group



Source: CFSVA and Nutrition Survey, 2012

Figure 50: Share of households not having recovered from shock by wealth quintile



Source: CFSVA and Nutrition Survey, 2012

Since not all households reported adopting any coping strategies, and since the coping strategy index and the wealth index are strongly correlated it was decided for the analysis in the following three sections (see 5.4, 5.5 and 5.6) to use the wealth index as a proxy for household capacity to cope with shocks. The assumption is that poorer households are less resilient than wealthier households to any shock. As Figure 50 illustrates, this is further supported by a higher percentage of poor households not having recovered from the main shock they experienced in the 12 months preceding the survey: 47% for the households in the lowest wealth quintile versus 32% for those in the wealthiest.

5.4 RAINFALL DEFICIT AND ERRATIC RAINFALL

Rainfall deficit, irregular rains and dry spells came in second place among reported shocks experienced by the sampled households. They were most frequently reported in the southern province (Muhanga: 56% of households reporting a shock reported rainfall deficit to be the main one; Nyamagabe: 33%; Nyanza: 31%), the eastern province (Kirehe: 34%, Rwamagana: 32%; Kayonza: 31%) and the western province (Nyabihu: 31%). The higher risk of rainfall deficit in the south and eastern provinces is confirmed by geographical analysis conducted by WFP using a historical dataset of Water Requirement Satisfaction Index (WRSI).[128] Meanwhile all the eastern districts are most vulnerable to moderate rainfall deficit as well as Kigali City and the eastern zone of the southern province, especially Bugesera district (see Map 14).

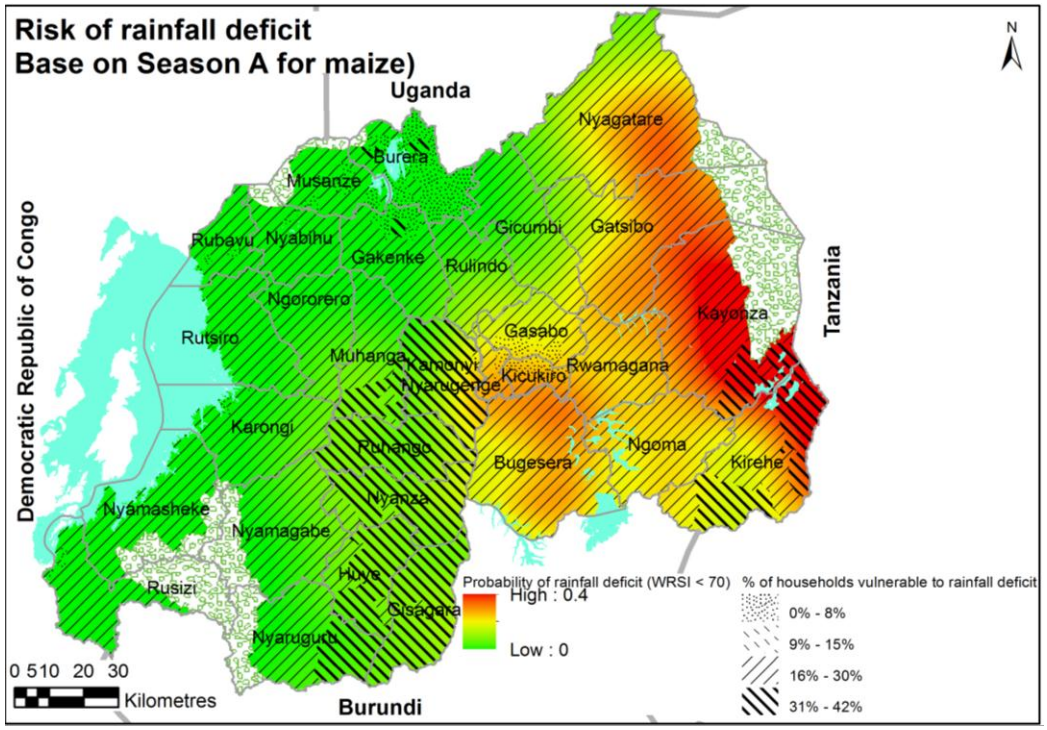
Rainfall deficit was most reported by households relying on agriculture and livestock related livelihoods. Medium and high income agriculturalists were the most affected (28% of households mentioning a shock), followed by agriculturalists low income (25%), agro-pastoralists (23%) and agricultural workers (22%). Households that experienced rainfall deficit were asked about the impact of the shock. The majority of them said it negatively affected their income (94%) and their ability to provide food for their household members (98%). Eighty one percent declared that it resulted in the loss of assets. Almost two in five (37%) households indicated that they had not recovered from the perceived rainfall deficit, and a quarter that they had only partially recovered.

Households at high risk of becoming food insecure because of rainfall deficits are, as indicated above, those whose livelihoods are exposed to rainfall shortages (mainly those relying on agriculture or livestock) living in higher risk areas, and those that have a lower capacity to cope with them (low resilience). In order to estimate/identify this population, the approach described in the WFP CFSVA guidelines was used. It combines the WRSI with population data, livelihood and wealth index indicators from the CFSVA and Nutrition Survey.

The contribution of agriculture and livestock related activities to the household livelihood was used to define the level of exposure to rainfall deficit (e.g. a low contribution of agriculture to the livelihood means that the household is less likely to be affected by a rainfall deficit compared to those who heavily depend on agriculture). Table 22 outlines the cut-offs used to identify different levels of exposure.

[128] The WRSI for maize is used as a proxy indicator for rainfall deficit prone areas. See detailed methodology on how the WRSI was calculated in Annex 12.

Map 14: Risk-of and vulnerability-to rainfall deficit for maize growing in season A



Source: WFP VAM analysis, 2012

Table 22: Cut-offs for level of exposure to rainfall deficit

Activity	Contribution to livelihood	Level of exposure
Related to agriculture and livestock	≤10%	Very low
	>10%≤20%	Low
	>20%≤30%	Medium
	>30%≤40%	High
	>40%≤100%	Very high

Source: CFSVA and Nutrition Survey, 2012

The food insecurity risk is highest in the Eastern Semi-Arid Agro-Pastoral zone, where agriculture dependency is high and poverty levels high making households less resilient. Here a medium rainfall deficit occurs every four growing seasons. There is a similar, but lesser risk for negative impact on food security in the Eastern Agro Pastoral zone, the South-Eastern Plateau, the Eastern Plateau, Bugesera and even the peri-urban and rural areas of Kigali. If a major rainfall deficit were to affect all those zones (which happens on average every 4-5 years), an additional 170,000 households would become food insecure, joining the ranks of the 90,000 pre-existing food insecure households in those areas.

The numbers and percentages of households vulnerable to food insecurity because of medium rainfall deficit are detailed in Table 23.

Table 23: Risk for food security from medium rainfall deficit in season A

Livelihood zone	Probability for rainfall deficit (WRSI<70) seas. A		Food insecure households (poor+borderline food consumption)		Food secure households VULNERABLE to rainfall deficit (WRSI<70)		Total food insecure households in case of rainfall deficit (WRSI<70)	
Kigali City	19%	Urban	4,675	3%	622	0%	5,297	4%
		Peri-urban	422	2%	5,794	24%	6,216	26%
		Rural	301	6%	1,141	21%	1,443	27%
Lake Kivu Coffee	0%	Urban	1,721	18%	219	3%	1,940	21%
		Peri-urban	9,252	41%	2,227	10%	11,478	51%
		Rural	74,453	41%	31,154	17%	105,606	58%
West Congo-Nile Crest Tea	0%	Rural	49,936	42%	21,985	19%	71,921	61%
Northwest Volcanic Irish Potato	0%	Urban	6,723	15%	1,996	5%	8,718	20%
		Peri-urban	1,307	14%	2,461	26%	3,767	40%
		Rural	27,430	20%	33,283	25%	60,712	45%
East Congo-Nile Highland Subsistence Farming	2%	Urban	225	10%	-	0%	225	10%
		Peri-urban	5,878	24%	4,284	17%	10,163	41%
		Rural	81,419	30%	81,593	30%	163,012	60%
Central Plateau Cassava and Coffee	7%	Urban	1,211	7%	1,350	8%	2,561	15%
		Peri-urban	6,391	13%	14,442	29%	20,833	42%
		Rural	60,879	20%	95,235	31%	156,115	51%
Northern Highland Beans and Wheat	0%	Peri-urban	2,024	36%	1,194	20%	3,218	56%
		Rural	13,628	22%	25,240	40%	38,868	61%
Central-Northern Highland Potato, Beans and Veg.	3%	Urban	929	10%	929	10%	1,858	20%
		Rural	26,217	18%	34,789	24%	61,006	42%
Bugesera Cassava	20%	Urban	-	0%	-	0%	-	0%
		Peri-urban	1,068	11%	2,279	24%	3,346	36%
		Rural	19,727	23%	25,083	29%	44,810	51%
Eastern Plateau Mixed Agriculture	17%	Peri-urban	6,129	50%	1,155	10%	7,284	60%
		Rural	28,240	20%	41,698	29%	69,938	49%
Southeastern Plateau Banana	20%	Urban	567	6%	-	0%	567	6%
		Peri-urban	1,508	6%	6,700	27%	8,208	33%
		Rural	18,419	11%	43,914	26%	62,333	37%
Eastern Agropastoral	23%	Peri-urban	-	0%	940	19%	940	19%
		Rural	5,498	6%	24,848	29%	30,346	36%
Eastern Semi-Arid Agropastoral	24%	Rural	3,860	10%	15,835	42%	19,695	53%
RWANDA		Urban	16,051	7%	5,116	2%	21,167	9%
		Peri-urban	33,978	18%	41,475	22%	75,453	40%
		Rural	410,007	23%	475,798	27%	885,805	51%
		Total	**460,037**	**21%**	**522,388**	**24%**	**982,425**	**45%**

Source: CFSVA and Nutrition Survey, 2012

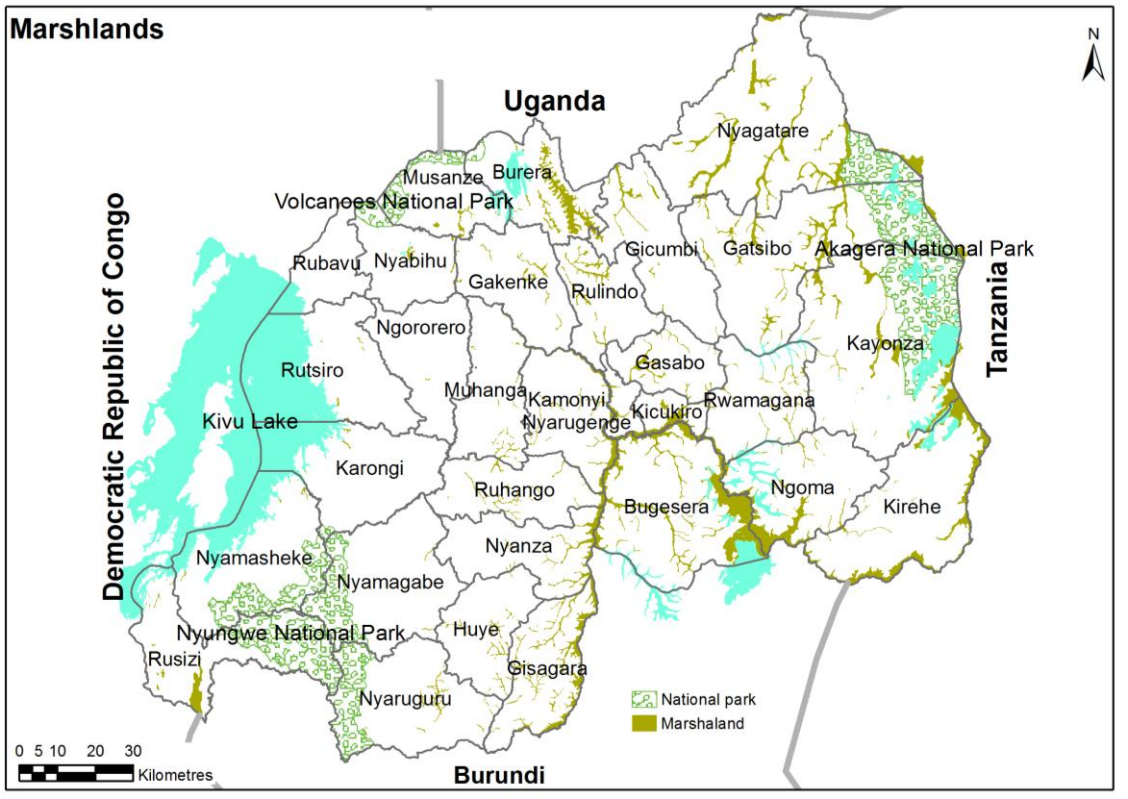
5.5 FLOODS

Deforestation and poor agricultural practices cause soil erosion, rock falls, landslides and floods, which destroy crops, houses and other infrastructure (roads, bridges and schools) and often kill or injure people and animals.

Flash floods and landslides are frequent during the rainy seasons in the steep areas of the north-western part of the country, especially in Rubavu, Nyabihu and Musanze districts when the ground is saturated and water either cannot run off, or cannot run off quickly enough to stop accumulating.

Riverine floods are more frequent in the marshlands of the country - low lying areas along major streams and lakes - and occur when run-off from sustained and heavy rainfall exceeds the capacity of a river's channel. Although households having access to marshland have the opportunity to cultivate during season C (dry season), their increased exposure to floods means important areas of crops cultivated in those marshlands are destroyed. The CFSVA and Nutrition Survey 2012 data confirms this distribution; whereas in the whole country 8% of households declared that they had been affected by floods, the proportion was much higher in marshland districts (see Map 15) which include Bugesera (50%), Musanze (24%), Ngororero (22%), Nyanza (16%), Nyaruguru (15%), Huye (13%) and Gisagara (11%).

Map 15: Distribution of marshlands in Rwanda



Source: Data from CGIS-NUR

For the CFSVA and Nutrition Survey analysis, only riverine floods are taken into account. Marshland areas were considered to be at risk of flooding. Households exposed to flooding were again those whose livelihoods relied heavily on agriculture and livestock. And again the poorest households (poorest two quintiles) were considered the least resilient to floods.

When considering factors described above, 19% of all households in Rwanda are vulnerable to floods with 29% of them in the southern province, 26% in the western and only 2% in Kigali City. Among them 29% of households already have borderline food consumption patterns, so they are likely to fall into poor food consumption patterns should their livelihood be affected.

5.6 INCREASES IN STAPLE FOOD PRICES

Given the concern about a global food price crisis, the CFSVA and Nutrition Survey 2012 looks into food price increases even though they were mentioned as a shock by just 2% of households mentioning a shock. The percentage was much higher for households in urban areas (11%) and for households that normally rely on the market as their food source. It was mostly reported in the urban districts of of Kicukiro (6%), Nyarugenge (3%) and Gasabo (13%) where most households are market reliant as well as in the following districts with infertile soils and a high percentage of food insecure households: Rusizi (9%), Kamonyi (7%), Musanze (6%), Huye (5%), Nyabihu (5%), Nyamasheke (3%), Nyamagabe (3%), Gisagara (3%), Gakenke (2%) and Karongi (2%).

To analyse how price increases impact on household vulnerability to food insecurity, increases in bean prices are used since they are a staple food both produced and consumed by households throughout Rwanda. According to the data collected during the CFSVA and Nutrition Survey 2012, households in Rwanda spent on average almost one third (29%) of their monthly food expenditures on beans. Households at risk of becoming food insecure because of increases in bean prices are poor and reliant on markets for beans, and living in areas where price increases are more likely (see Map 16).

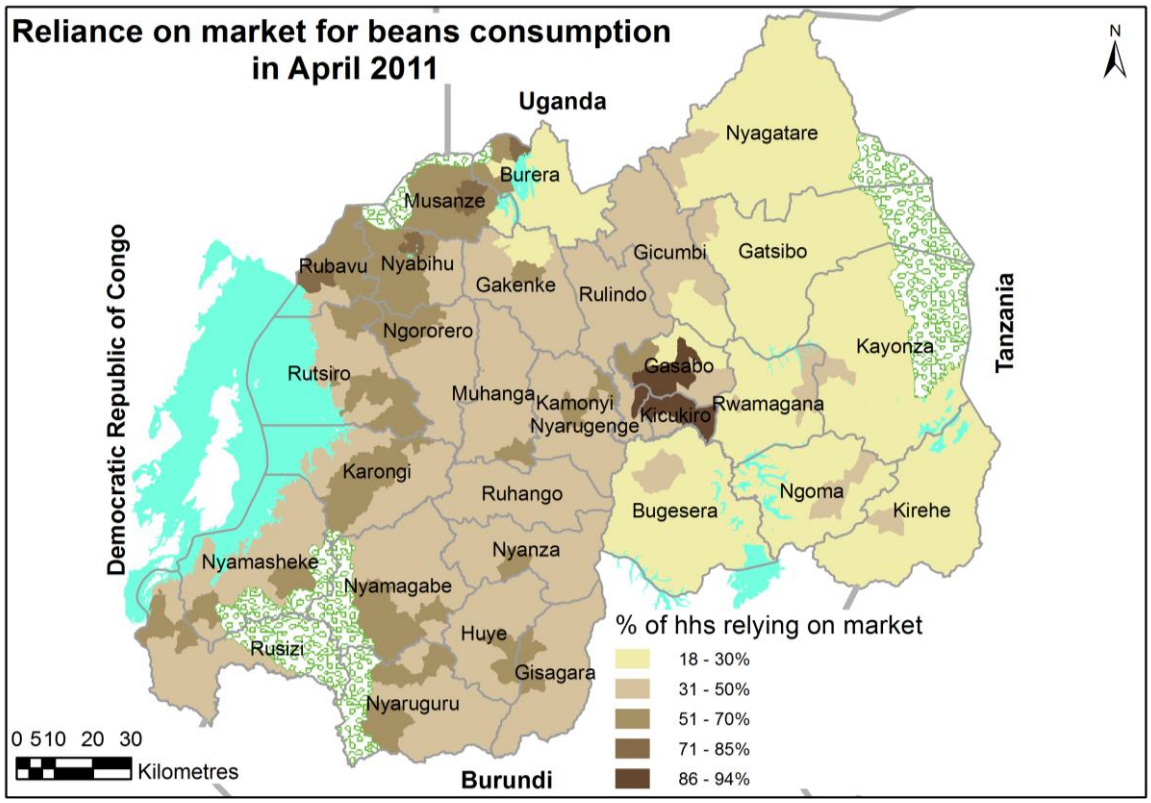
As mentioned in the section on food prices, bean prices are on average highest in November, when the districts of Gatisbo (eastern province), Rulindo and Gakenke (northern province) reported a high percentage of households relying on markets.[129]

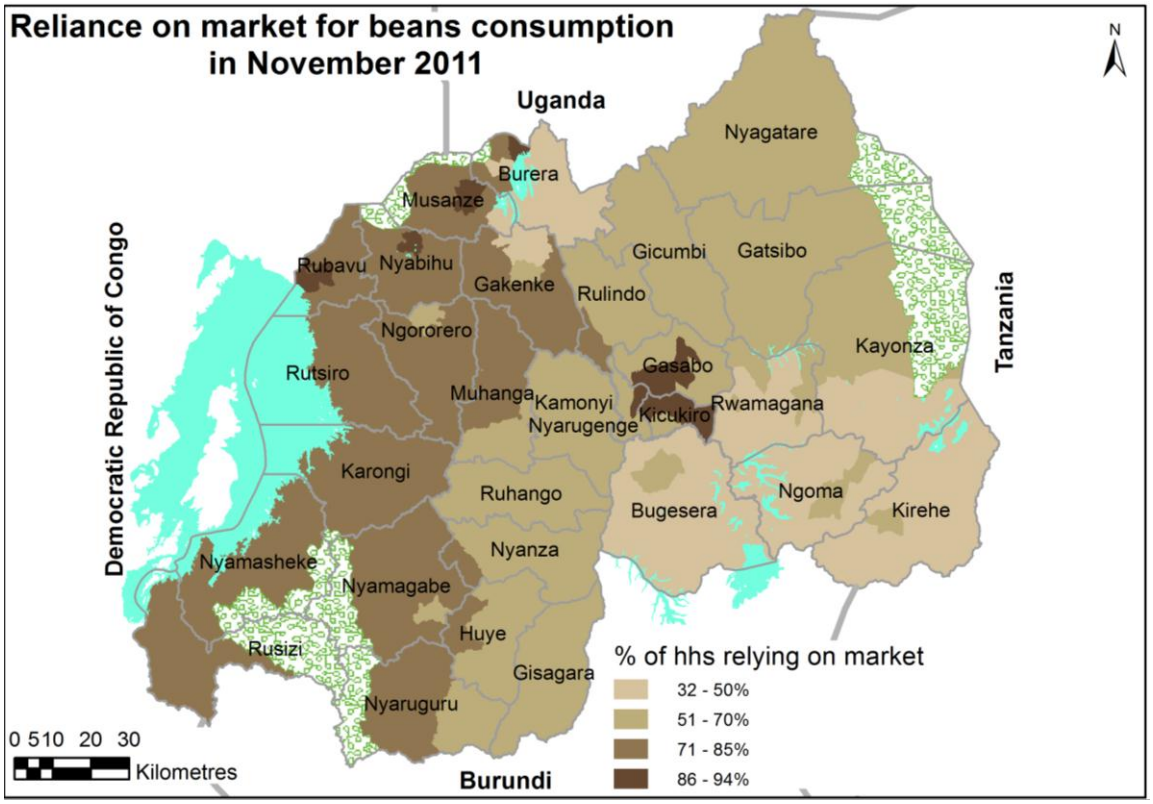
Households in the lowest two wealth quintiles that relied on the market as a main source of beans constituted 27% of Rwandan households (21% of them in the eastern and 57% in the southern and western provinces.) Of those 29% already had borderline food consumption (7% poor) in March-April 2012, indicating that their food security could be severely impacted since their resilience to shocks is low.

In the western province bean prices tend to be highest in April, at which time – using the same criteria as described above – 19% of households can be considered to be vulnerable to price increases. 41% of western households already had unacceptable food consumption in March-April 2012 (10% poor food consumption and 31% borderline) so their food security would be further compromised by the price rise.

[129] For the CFSVA and Nutrition Survey 2012 households had to report for each month of the year where they sourced their beans (either own production, purchase or food aid).

Map 16: Percentage of households in each district relying on markets as main source of beans, in April and in November





Source: CFSVA and Nutrition Survey, 2012

Box 17: Summary - Shocks to food security

Nationally, 38% of households in Rwanda mentioned having experienced an unusual situation during the last year that affected their ability to provide for themselves, eat in the manner they were accustomed to, or what they owned. The most commonly reported shocks were related to illness, accident, inability to work or even death of a household member (reported by 15% of all households, or 39% of households that reported a shock) followed by rainfall deficits, irregular rains or dry spells (8% of all households). All the other shocks were reported by fewer than 5% of all households and included floods (2%) and unusually high prices of food (1% of all households).

The distribution of the reported shocks as well as the types of households reporting show that households residing in the western province, rural households, poorer households, households relying on low income agriculture and agro-pastoralists, as well as those headed by women and disabled people, are experiencing more difficulties in their daily lives.

The coping strategy index and the wealth index are strongly correlated. The most reported coping strategies overall (irrespective of the shock) were "increased casual labour" (21% of households), "relying on less expensive or less preferred foods" (16%), "reducing the number of meals eaten per day" (11%) and "spending savings" (10%).

If a major rainfall deficit were to affect the eastern province (which happens on average every 4-5 years), an additional 170,000 households would be at risk of becoming food insecure.

Furthermore almost one fifth (19%) of Rwandan households can be considered vulnerable to floods and again one fifth to increases in bean prices.

6 WHAT IS BEING DONE? KEY TOOLS AND MECHANISMS IN PLACE TO ADDRESS POVERTY, MALNUTRITION AND FOOD INSECURITY IN RWANDA

Rwanda has made great strides towards attaining the Millenium Development Goals (MDGs) and other global targets for improving the quality of life of its people. The government has put in place a number of key policy tools and mechanisms that have laid the ground work for these achievements, outlining policies and strategies and providing a framework within which development/aid agencies have to operate.

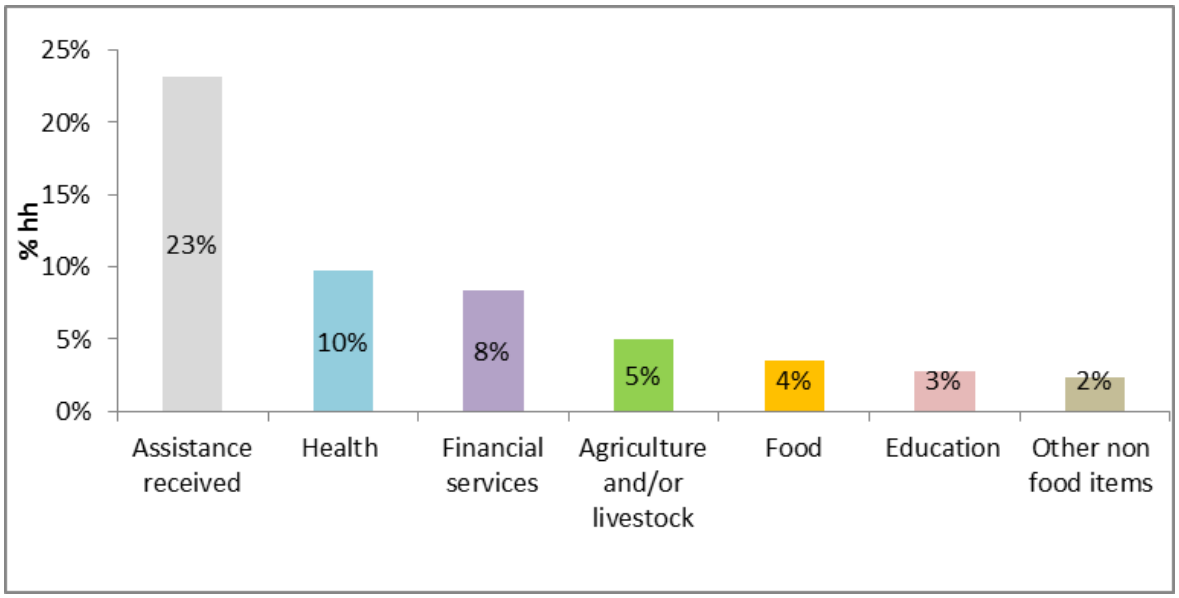
This part of the report describes the key tools and mechanisms that support the goals of preventing households from falling into poverty, protecting the livelihoods of those in poverty and assisting households to emerge from it. It integrates the households' perception of what assistance was provided to them, and who were the providers of that assistance. Some general conclusions are drawn regarding the coverage and overall targeting of the assistance. However the purpose of the survey was not to look into the impacts of any of the schemes, so the analysis does not look into the amount or quality of assistance provided (e.g. cash disbursed, food distributed, etc.).

6.1 ASSISTANCE RECEIVED

6.1.1 Main types of assistance

During the CFSVA and Nutrition Survey 2012, households were asked if they had received any kind of assistance, and, if so, what type and its source. The assistance received was categorized into food assistance, direct transfers and financial services, agriculture and/or livestock support, education, health and other non-food assistance (see Table 24). Almost a quarter (23%) of households reported some type of assistance in the 12 months preceding the survey, 10% health assistance, 8% financial transfers and services, 5% agriculture and livestock support, 4% reported having received food assistance, 3% education and 2% other types of non-food assistance (see Figure 51).

Figure 51: Share of households in Rwanda reporting having received different types of assistance



Source: CFSVA and Nutrition Survey, 2012

Table 24: Types of assistance received and sources

Type of assistance	Detailed assistance	Possible sources of assistance
Food aid	Food for school children Food for pregnant and breastfeeding women Food for work Food for training One cup of milk per child Free food distributions Treatment of malnutrition (through supplementary or therapeutic feeding) Other food assistance programmes	Government WFP Other UN agencies NGO Mosques and churches Community Other Don't know
Financial transfers and services	Social security/caisse sociale VUP direct support VUP public works VUP access to financial services Ubudehe credit scheme/loan (individual or group) Access to credit/loans for agricultural/livestock related activities Access to credit/loans for non-agricultural/livestock related activities Direct transfers (other than VUP)	
Agriculture and livestock support	Agricultural input assistance (tools, seeds, fertilizer, etc.) Training and technical assistance in agricultural/livestock practices Provision of large livestock (eg. cow) Provision of small livestock (eg. chicken, rabbits) Fish ponds Veterinary services	
Education	School materials etc	
Health	Medical services	
Other non-food assistance	Construction/building materials Water and/or sanitation	

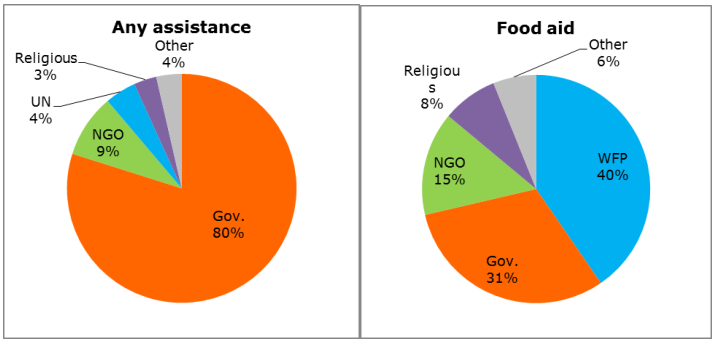
Source: CFSVA and Nutrition Survey, 2012

6.1.2 Main sources of assistance

Government efforts to assist the neediest in Rwanda are supported by the international community and complemented by activities of partner organisations, mainly donors, NGOs and the UN.

Figure 52 shows that the government of Rwanda is by far the largest provider of assistance (80% of the responses, and usually over 75% for the different types of assistance), followed at a distance by NGOs (with 9% of the responses) and the UN (4%, largely WFP). Religious institutions, such as mosques and churches, also provide some assistance (3%). For most types of assistance the relative importance of the providers are roughly in line with this, except for education (for which NGOs are mentioned as the most important providers at 42%), and food aid (WFP 40%, excluding the food given by friends and relatives).

Figure 52: Sources of assistance mentioned by households



Source: CFSVA and Nutrition Survey, 2012

Box 18: The importance of friends and relatives

The analysis presented in this chapter excludes the assistance provided by friends and relatives. If included, friends and relatives come second to the government in providing assistance. This is more marked in urban than in rural areas. In urban areas the main sources of assistance are government (70%), followed by friends and relatives (13%), NGOs (9%) and religious institutions (5%). In rural areas the sources are the same, only the percentages change with more weight given to the government (80%), and less to friends and relatives (7%), NGOs (6%) and religious institutions (2%).

The percentage of households receiving food aid almost doubles (from 4% to 7% nationally) if one includes the support from relatives. Similarly the share of households receiving 'free food' quadruples from 1% to 4%. In urban areas, friends and relatives constitute the source of food assistance in 70% of cases, compared with 46% in rural areas, reflecting at the same time the importance of the social network in Rwanda and the absence of other sources of food assistance in urban areas. For other types of assistance, the inclusion or exclusion of support from friends and relatives does not change the assistance reported as drastically.

According to the EICV 3, income from transfer (family and friends) has also seen an important increase over the past five years. According to the CFSVA and Nutrition Survey 2012 data, 6% of households reported remittances in the last 12 months. Remittances were especially important for the 'other marginal livelihoods' group where they contributed to 19% of the livelihoods. Among households that received remittances from their relatives during the 12 months preceding the survey, 35% of them received up to 10,000 RWF, 27% from 10,000 to 20,000 RWF, 16% from 20,000 to 50,000 and 22% more than 50,000 RWF. Households receiving more than 50,000 RWF in the last 12 months were mostly households in higher wealth categories (78% were in the highest wealth quintile).

6.1.3 Geographical coverage of assistance

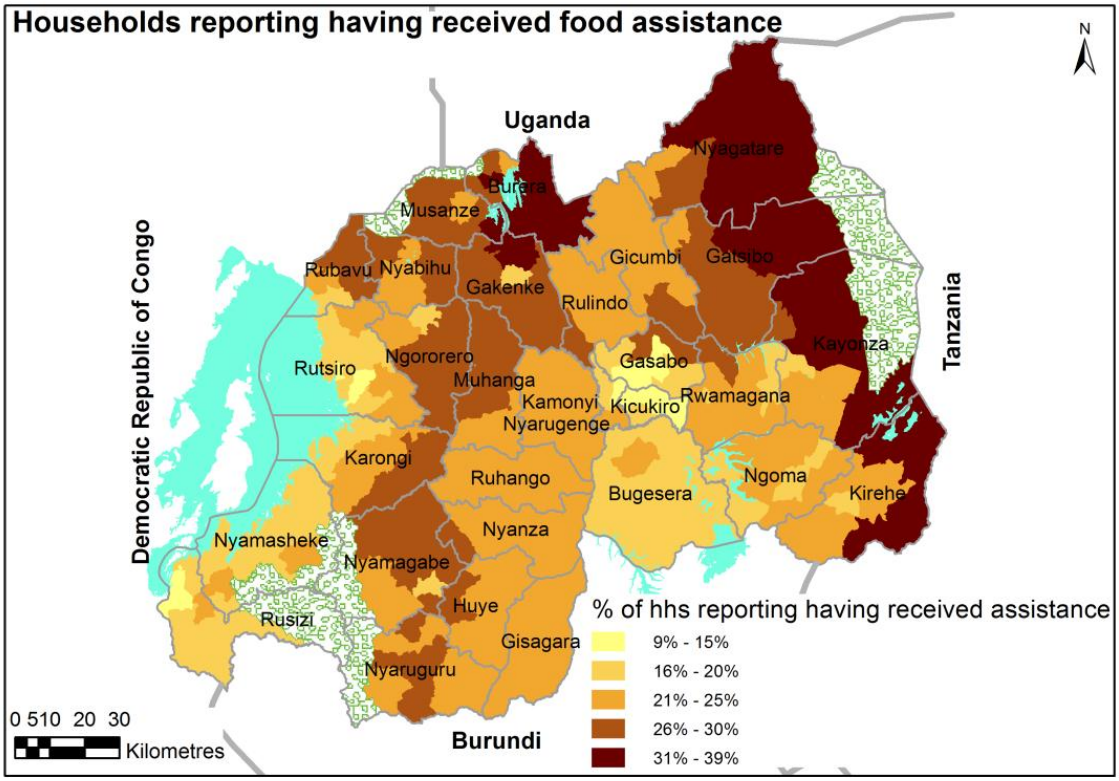
Map 17 shows the percentage of households reporting some type of assistance, excluding support from friends and relatives.

Coverage of all types of assistance combined is relatively equally distributed over the provinces with the exception of Kigali province where only 13% of households were covered, compared with 23% nationally. The coverage is relatively higher in the northern province (27% of households reported some assistance), and the lowest in the western province est (21%).

At district level, the highest levels of coverage were reported in Musanze, Gisagara and Kayonza where over 40% of all households reported receiving some kind of assistance. In Musanze this is due to higher reported support to agriculture and livestock rearing, in Kayonza higher levels of food aid (school feeding, see later on) and in Gisagara higher levels of health support. Apart from Kigali province, the lowest levels of assistance were reported in the districts of Rusizi (12%), Nyabihu and Kamonyi (both 13%).

Kigali accounts for the least households receiving assistance (only 5%) reflecting its lower population and the lower coverage mentioned above. In contrast, the eastern province hosts 28% of all households reporting any assistance. Direct transfers and financial support, food assistance as well as education and other non-food assistance were more reported in the eastern province.

Map 17: Distribution of households reporting having received some type of assistance



Source: CFSVA and Nutrition Survey, 2012

6.1.4 Targeting

The wealthier or more food secure the household, the less assistance they reported having received.

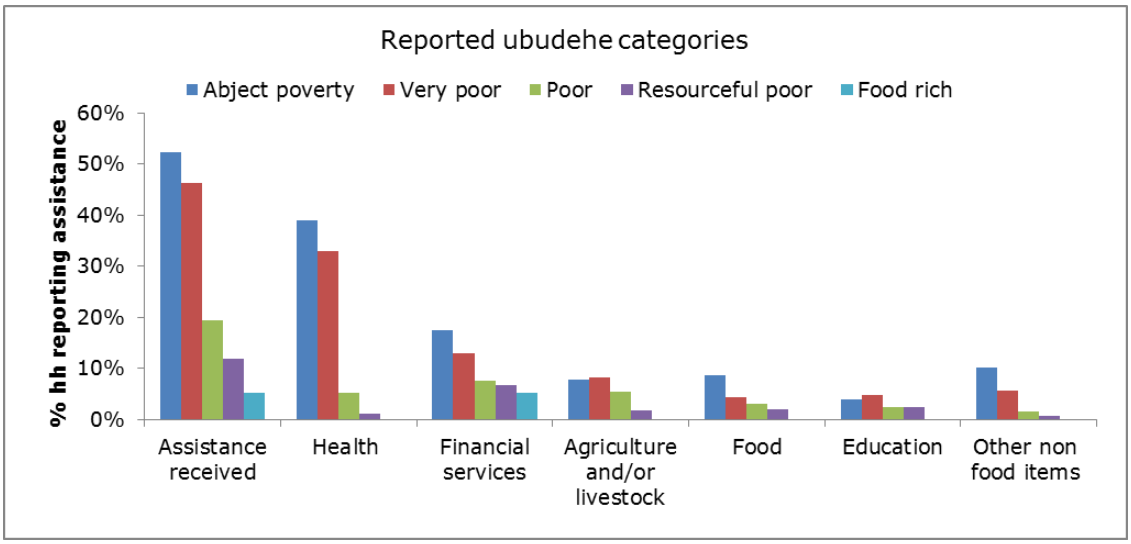
As expected and shown by Figure 53, a very strong descriptor of the targeting of assistance is the household ubudehe category (also see section 6.2.1). Around half of the households that reported being in the two lowest ubudehe categories ('those living in abject poverty' and 'the very poor') reported some type of assistance compared with 12% in the fourth category ('the resourceful poor') and 5% in the fifth category ('the food rich').

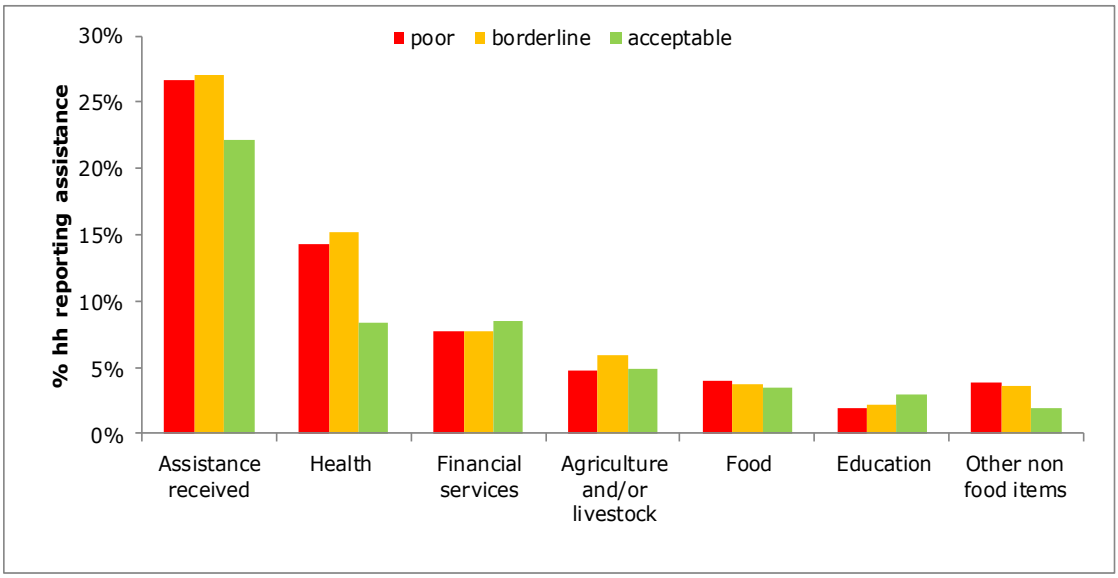
The differences regarding the type of assistance received for unacceptable and acceptable food consumption groups are much less marked: 27% of the poor and borderline consumption groups received some type of assistance compared with 22% of households with acceptable food consumption.

Considering livelihoods, those households relying mainly on casual work have higher rates of assistance than those better off households involved in non-farm activities (33% for agricultural workers, 10% for employees and businesses). The type of support received also differs by livelihood with more agricultural support provided to farmers and livestock raisers, while agricultural and unskilled labourers are better covered in terms of health support (around 20%).

Households in the poorest two wealth quintiles represent half of households receiving food assistance while those in the wealthiest quintile represent 10%, indicating that food assistance is mainly targeting the poorest, most vulnerable households that have difficulties in accessing food. Households that mentioned having food access problems in the year (acute, seasonal or chronic) account for 74% of all households receiving food assistance, even though they represent only half of all households.

Figure 53: Percentage of households receiving assistance, by reported ubudehe categories and household food consumption groups





Source: CFSVA and Nutrition Survey, 2012

6.2 GOVERNMENT LED SOCIAL PROTECTION

The government's 'National Social Protection Strategy 2011' describes the purpose of the social protection sector as being to ensure that, *all poor and vulnerable people are guaranteed a minimum income and access to core public services, those who can work are provided with the means of escaping poverty, and that increasing numbers of people are able to access risk sharing mechanisms that protect them from crisis and shocks.*[130] To achieve this, the government delivers a core set of social protection programmes through the Ministry of Local Government (MINALOC). In addition, there are initiatives run by other ministries. These include the Girinka 'One cow per poor family' programme of MINAGRI, the free basic education programme, subsidised subscriptions for mutual health insurance, and in-kind social care services run by the Ministry of Gender and Family Promotion (MIGEPROF). Rwanda also has a limited system of contributory social protection mechanisms that enable people in formal employment to access medical care and an old-age pension.

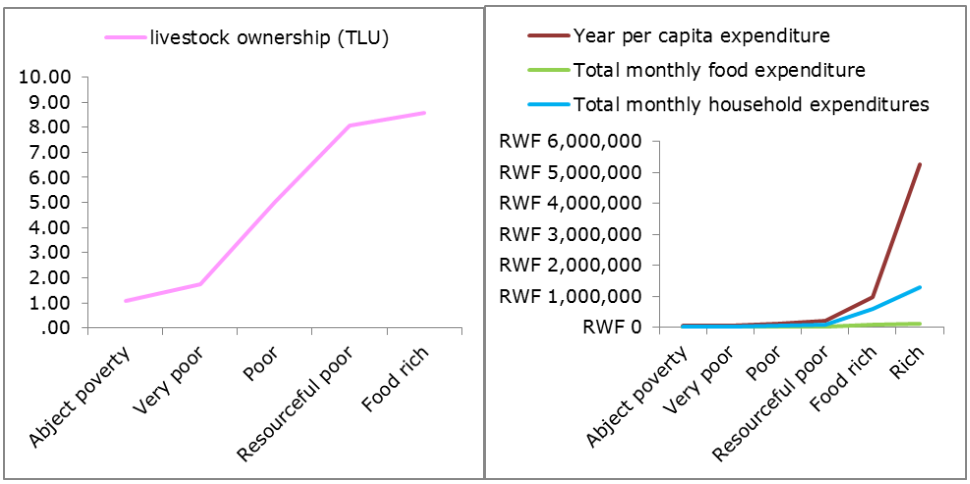
[130] MINALOC, 2011.

6.2.1 Ubudehe programme to help the vulnerable and very poor households

In 2001 the Ministries of Local Government and Finance launched the Ubudehe programme to help the vulnerable and very poor households. It was rolled out country-wide in 2006. The programme finances interventions targeting either entire communities (umudugudu projects) or an individual household. Support is provided for agriculture, livestock, construction of markets, electrification, schools and water supply. Households are categorized by their communities into six ubudehe categories based on household level poverty.

Households were asked to report their ubudehe status and almost 76% of interviewed households could provide it (see section 4.2.1 p. 46). The community-based household ubudehe categories are supposed to be strongly linked to lack of land, poor soils, rainfall deficit/weather and lack of livestock (see Figure 54). The analysis of the reported ubudehe categories against those criteria shows that they are reflected in the categories. Judging by the reported ubudehe categories the system of identifying the poor and food insecure households seems to be effective and confirms the 2010 analysis of the World Bank according to which "the 'ubudehe' poor households have significantly lower per capita consumption than the 'ubudehe' non-poor households."

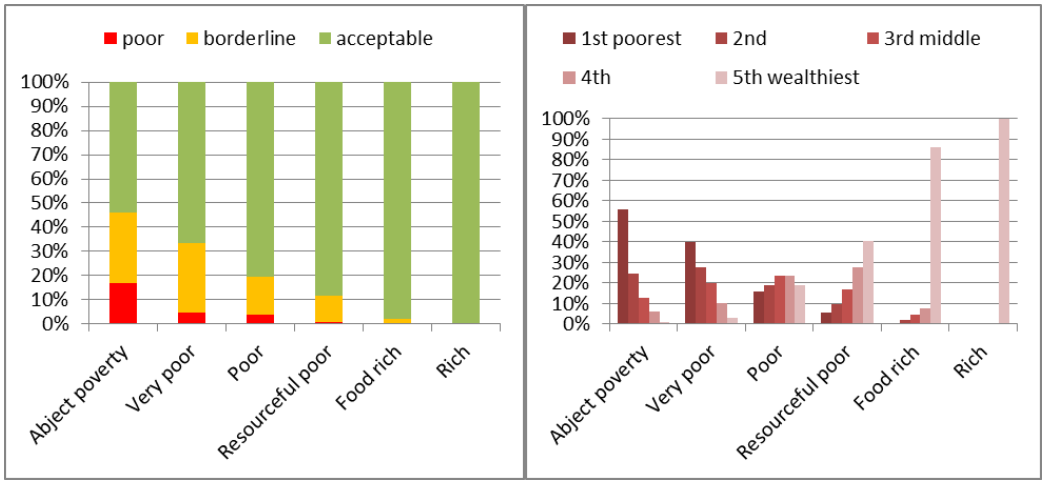
Figure 54: Household livestock ownership and expenditures, by self-reported ubudehe category



Source: CFSVA and Nutrition Survey, 2012

However, as shown by Figure 55, it is very likely that the system can still be improved by correcting both inclusion and exclusion errors; some poor or food insecure households appeared to be classified as rich, while some richer households are classified as poor. As mentioned above, this needs to be confirmed with the analysis of the revised 2012 ubudehe household categories.

Figure 55: Household food consumption group and wealth quintile, by self-reported ubudehe category



Source: CFSVA and Nutrition Survey, 2012

6.2.2 Vision 2020 Umurenge Programme (VUP)

The main social protection programme run by MINALOC, and a flagship of the Economic Development and Poverty Reduction Strategy (EDPRS) 2008–2012, is the Vision 2020 Umurenge Programme (VUP). Its objective is to reduce extreme poverty in targeted Imirenge (sectors) of Rwanda. It has three pillars: a programme of public works for very poor households that are able to work ('VUP public works');[131] a cash transfer for very poor households with no labour capacity ('VUP direct support');[132] and a programme of financial services ('VUP financial services'),[133] of which the main instrument so far has been the microcredit scheme, the Ubudehe Credit Scheme, that provides small loans at low interest rates to individuals or groups.

The targeting of the VUP programme takes place at two levels: sector and household. All 30 districts across Rwanda are targeted. Within each district, sectors are ranked by local authorities through a participatory approach considering food security, water access, distance to education, distance to health centre, level of village settlement (Umudugu-zation). The sector that is perceived as the poorest is targeted first, followed by the second poorest, and so on until the entire district is covered. At the time of writing this report, four sectors had been prioritized in each district. Looking at the distribution of the poorest wealth quintiles within the VUP level sectors it does not appear that the highest priority districts are those with a higher percentage of poor households, or that households with poorer food consumption patterns are more represented in the priority VUP sectors when compared with the others. This probably reflects the fact that, so far, the prioritization of the districts has been done within provinces and therefore it is very relative, with poorer districts selected as high priority in the eastern province still wealthier than lower priority districts in the southern or western provinces. Since July 2012 however, the system has been scaled up and corrected. The EICV 3 ranking of the districts was used to prioritize the poorest districts and the ubudehe classification was used to identify the priority sectors. In the poorest districts 4 or even 5 additional sectors were prioritised while in the richer districts no new sectors were prioritised for the scale up.

At household level, according to VUP guidance, direct services should only be provided to households from ubudehe categories 1 and 2 with no working-able member; public works are intended for households from categories 1 and 2 with at least one working-able member; and all ubudehe categories can access financial services. The guidelines seem to be roughly followed in the implementation: according to household level reports of assistance, the coverage of VUP direct support and public works is highest for the households from lowest ubudehe classes while financial services, loans and caisse sociale are also accessible to 'the resourceful poor and above categories' (ubudehe category 5, see Figure 56).

The types of financial assistance reported by most households are VUP public works (3%) followed by the ubudehe credit scheme (2%) and VUP access to financial services (2%). These schemes are more present in VUP priority sectors, but households living in the highest priority VUP sectors do not necessarily have better access to VUP services than those in lower priority districts (see Figure 57).

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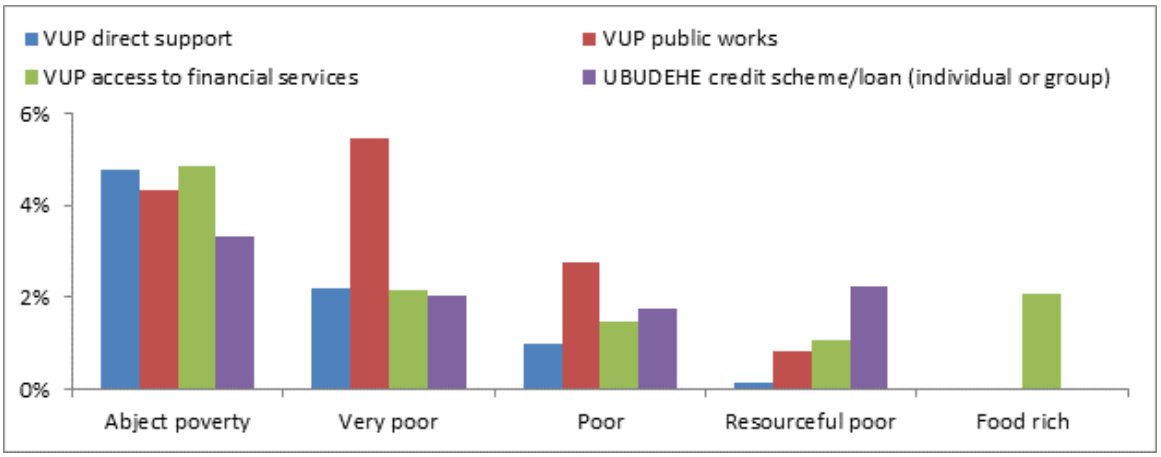
[131] Public Works (PW) was launched in May 2008 and offers temporary work on community infrastructure projects (mainly terracing, anti-erosion ditches, and road rehabilitation) at a locally determined wage rate, to one member of extremely poor households that have adult labour capacity.

[132] Direct Support (DS) was launched second in January 2009 and provides regular unconditional cash transfers, calibrated by household size, to all extremely poor households in targeted Imirenge that have no adult member who is able to work.

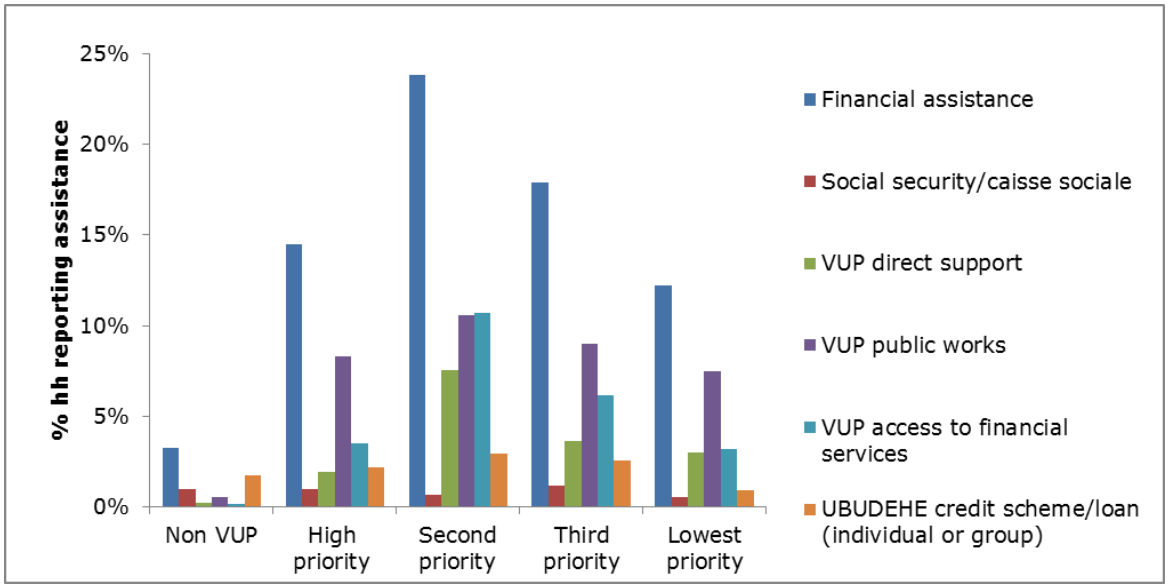
[133] Financial Services launched most recently in January 2010 has three sub-components: access to credit, beneficiary training (e.g. financial literacy), and a challenge fund (matching grant facility whereby local people raise a portion of the capital costs and VUP matches this with grant funds). Cutting across all these sub-components is linking beneficiaries to the financial system and providing them with access to savings facilities. Bank accounts were opened for all participants when the VUP was launched. Loans can be taken out by individuals, groups, or cooperatives for any livelihood activity that is approved by the local loan committee. Loans must be repaid within one year, and an interest rate of 2% is levied – well below commercial interest rates for credit.

Figure 56: Households reporting VUP assistance, by self-reported ubudehe category



Source: CFSVA and Nutrition Survey, 2012

Figure 57: Percentage of households reporting financial assistance, by type of VUP sector



Source: CFSVA and Nutrition Survey, 2012

Even though VUP is the main component of the social protection strategy in Rwanda, MINALOC also runs two other social assistance schemes - the Genocide Survivors Support and Assistance Fund (FARG), and the Rwanda Demobilisation and Reintegration Commission (RDRC) that provide beneficiaries with cash transfers and support in accessing education and health services. In addition, MIGEPROF and the global fund support orphans and vulnerable children. These programmes are included in the assistance schemes described above, but not detailed, because the CFSVA and Nutrition Survey 2012 only attempted to specifically identify the VUP schemes.

6.3 LIVELIHOODS, AGRICULTURE AND LIVESTOCK SUPPORT

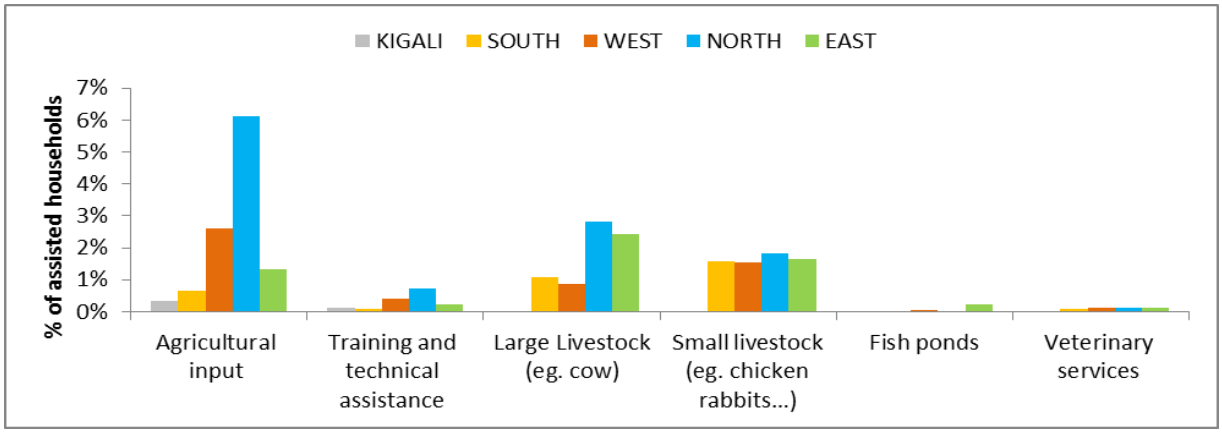
Overall the most commonly mentioned support in agriculture and livestock is the provision of agricultural inputs as well as livestock. These are mostly provided by the government (mentioned by 78% of the households reporting livestock and agriculture assistance in Rwanda), and appear to be largely concentrated in the northern province, which accounts for 40% of all households mentioning some agricultural or livestock support. This reflects the high number of agricultural support projects in those areas, especially in Musanze, a district that hosts over one fifth of all households receiving any agricultural support and where 23% of households report having received agricultural inputs. NGOs are the second source of agriculture and livestock services after the government.

The Government has adopted a policy of land consolidation and regionalization of crops in a bid to move away from the small, semi-subsistence, and increasingly fragmented farms that characterize agriculture in Rwanda. The strategy is to combine plots from different households and all cultivate the same crop (usually maize but also other crops such as wheat or sorghum) with the rationale of saving costs and increasing yields. The strategy of MINAGRI is to continue to raise rural incomes and thereby reduce poverty, through crop intensification, ranging from irrigation to animal husbandry. So far, according to the CFSVA and Nutrition Survey 2012, this government policy has affected a quarter (24%) of farming households with on average 60% of cultivated land consolidated. The share of land consolidated increases for those farming smaller plots: some 80% of land is consolidated for those cultivating less than 0.1 ha.

In the past years, the government has been emphasizing access to other mostly non-farm employment. Still, agriculture remains the backbone of the Rwandan economy. MINAGRI promotes livestock rearing through development programmes such as disease control, artificial insemination, hatchery development, One Cow Per Poor Family, fish farming and small-ruminants development.[134] This is believed to have resulted in significant increases in the animal populations across Rwanda.

The One Cow programme was set up in 2006 with the aim of improving nutrition and soil productivity. A project focusing on small livestock health, productivity and expansion complements the programme. According to Figure 58, overall 2% of households reported having received a large animal in the 12 months preceding the surveys and 1% a small animal.[135] The provision of large livestock was reported in Gicumbi (7% of households), Kirehe (5%) and Bugesera (4%) districts. Small livestock provision was chiefly reported in Nyamagabe district (6% of households) followed by Nyamasheke, Musanze, Gatsibo and Kirehe (3% of households) districts. The survey data indicate that very few households reported any training/technical assistance, fish ponds or veterinary services.

Figure 58: Household agricultural and livestock assistance, by province



Source: CFSVA and Nutrition Survey, 2012

The targeting of the agricultural assistance seems to follow the reported ubudehe categories with a slightly higher percentage of households in the lower ubudehe classes reporting agricultural assistance (both inputs and livestock). However when looking at the wealth quintiles and the levels of household food consumption, there is no indication that agricultural assistance is reaching the poorest or most food insecure as a priority.

[134] Ministry of Agriculture & Animal Resources Annual Report FY 2010/2011.
[135] Figures reported by the EICV 3 2010/2011 are much higher but it is unclear as to what period they refer: 4% of rural households received a cow under the One Cow Programme, mainly in the eastern province, while 10% of rural households received an animal from an NGO or social protection scheme.

6.4 EDUCATION SUPPORT

The Ministry of Education (MINEDUC) proudly reports on the great progress that has been made in Rwanda in extending education to all over the past five years. During this time the poor in particular seem to have benefited greatly from improved access to education.[136] The current policy is free universal education to the end of the ninth year (primary and lower secondary education), with plans to raise this to 12 years of education (higher secondary). Net enrolment in primary schools, although not up to the 100% target for 2010 are very high in Rwanda compared with neighbouring countries with an overall net enrolment rate of 95%[137] in 2010. Teachers are now teaching in English as well as French and of course in Kinyarwanda. Primary school completion has now reached 79% (82% for girls) – but that still leaves 20% of children not yet completing primary school, so literacy and vocational training are top priorities.[138]

With a net enrolment rate of 23% (see Table 25), access to secondary education still lags behind primary and does not reach the 40% target the government had set itself for 2010. Secondary school is still paid for by families, for some of which the fees can be very hefty, and this is contributing to inequality. Access to secondary school among children in the highest quintile is four times higher than access among children in the lowest quintile (though inequality has fallen from a rate of 10 times higher in 2006). While enrolment rates for boys and girls are similar for secondary school, attendance rates are disparate: for every two boys attending secondary school, there is only one girl.[139]

Table 25: Enrolment rates

	Boys (%)	Girls (%)	Total (%)
Net enrolment rate primary education	94	97	95
Net enrolment rate secondary education	22	24	23

Source: MINEDUC, 2011

The generalized subsidized support such as free basic education for all was not reported by households, which explains the low percentage of reported education assistance (only 3%).

6.5 MULTISECTORAL STRATEGY TO ELIMINATE MALNUTRITION

Fighting chronic malnutrition is high on the government's agenda with MINISANTE coordinating the efforts to develop and implement policies and strategies addressing the causes of malnutrition in Rwanda. In April 2009, the Rwandan Government launched the National Emergency Plan to eliminate malnutrition, which was anchored in the National Nutrition Policy of 2007. This led to the National Multi-sectoral Strategy to Eliminate Malnutrition 2010-2013. The primary objective of the current strategy is to reduce all forms of malnutrition by 30% by 2013. This also led to efforts by MINAGRI to draft an action plan to contribute to the implementation of the National Multi-sectoral Strategy to Eliminate Malnutrition in Rwanda. There are many interventions targeting malnutrition across the country, coordinated by MINISANTE and implemented by different partners. These include health worker training, kitchen gardening, cooking and nutrition demonstrations, community based nutrition programme (CBNP), etc. These interventions are mainly designed to combat acute malnutrition while fewer interventions are in place to prevent chronic malnutrition.

6.6 HEALTH

According to the household reporting in the CFSVA and Nutrition Survey 2012, most health support is concentrated in the southern province (33% of households receive health support) and in particular in Gisagara district (11%). According to the EICV 3, the trend of *mutuelle de santé* coverage is quite positive with 78% of households having health insurance (compared to 68% in

[136] MINEDUC Report, 2010/11.
[137] MINEDUC Report, 2010/11.
[138] MINEDUC Report, 2010/11.
[139] EICV 3.

2007). At individual level, however, gender disparities in coverage occur with 67% of women compared to 71% of men being insured.[140]

6.7 FOOD ASSISTANCE

Four percent of Rwandan households received some sort of food assistance in the 12 months prior to the survey. As mentioned earlier this percentage rises to 7% when including support from friends and relatives. The bulk of the food assistance consists of food for school children (from WFP) in Huye, Kayonza, Nyamagabe and Kirehe.[141] Other types of food assistance include therapeutic and supplementary feeding (1% of households in the eastern and western provinces), one cup of milk per child (1% of households in the West) and free food distributions in the eastern (2% of households), northern and southern provinces (1%).

More than 70% of the households receiving food aid are in the eastern and southern provinces. Huye, Kayonza and Kirehe districts alone account for 40% of these, reflecting the presence there of WFP school feeding activities.

In terms of targeting, the data only suggests a slightly higher coverage of the poorest ubudehe categories and the lowest wealth quintiles but does not indicate that food insecure households are the focus of the food assistance. This is probably because of the strong geographical concentration of food aid (and in particular school feeding) in areas that are no longer the most food insecure or the poorest in Rwanda.[142]

Box 19: Summary - What is being done in Rwanda to address food insecurity and malnutrition?

In Rwanda a number of initiatives are already in place to address food insecurity and malnutrition. These include the MINALOC led Ubudehe programme to help the vulnerable and very poor households and Vision 2020 Umurenge Programme (VUP). The MINAGRI has programmes in place to support livelihoods, agriculture and livestock. Education is high on the government agenda as is malnutrition; the Ministries of Health and Agriculture are implementing the Rwandan Multi-sectoral strategy to eliminate malnutrition in Rwanda.

Almost one in four (23%) households reported having received some type of assistance in the 12 months preceding the survey: 10% reported health assistance, 8% financial transfers and services, 5% agriculture and livestock support, 4% food assistance, 3% education and 2% other types of non-food assistance. The government of Rwanda is by far the largest provider of assistance (80% of the responses, and usually over 75% for the different types of assistance), followed at a distance by NGOs (with 9% of the responses) and the UN (4%, largely WFP). Coverage of all types of assistance combined is relatively equally distributed over the provinces with the exception of Kigali province where only 13% of households were covered, versus 23% nationally. The coverage is relatively higher in the northern province (where 27% of households reported some assistance), and the lowest in the western province (21%).

As expected, a very strong descriptor of the targeting of assistance is the household ubudehe category. The wealthier or more food secure the household, the less assistance it reported having received. Even though the analysis of the reported ubudehe categories shows that they are strongly linked to poverty, food insecurity, malnutrition, lack of land, poor soils, rainfall deficit/weather and lack of livestock, the system can still be improved by the correcting of both inclusion and exclusion errors. The highest VUP priority districts are not necessarily those with a higher percentage of poor households, or of households with poorer food consumption patterns and food assistance is poorly targeted.

[140] MINISANTE annual report 2010/11.
[141] Unsurprisingly school feeding was most mentioned in the districts where WFP is most present and most successful in involving communities with its school feeding programme.
[142] The coverage of the school feeding was set up just after a major drought that struck the East and South of Rwanda.

7 THE WAY FORWARD TO TACKLE FOOD INSECURITY AND MALNUTRITION

This report has shown that food insecurity and malnutrition in Rwanda has many causes which can only be addressed through a multi-sector approach. Food insecurity and malnutrition are linked with household poverty and livelihoods, agriculture and lack of education. Efforts in all these sectors, within a policy environment that puts food security and malnutrition at the centre stage will be necessary to continue reducing the alarming levels of chronic malnutrition among Rwandan children and providing food security for all.

It is not sufficient to focus only on poverty reduction. Food insecurity and malnutrition need to be explicitly addressed.

7.1 CONCLUSION

Food production is increasing in Rwanda, markets are functioning relatively well and food is flowing easily within and outside the country thanks to the well-connected road network and market infrastructure.

Still, more than half (51%) of all households reported some type of difficulty in accessing food in the year preceding the survey: one fifth of all households reported seasonal food access problems, and in March/April 2012, over one in five households (21%) had unacceptable food consumption and could be considered food insecure. They either had poor food consumption (representing 4% of all households) or borderline food consumption (17%). This shows clear improvement since the 2006 CFSVA and seems to indicate a slight, although not confirmed, improvement in household food consumption since the last CFSVA and Nutrition survey was conducted in February-March 2009.

Percentages of households with unacceptable food consumption are especially high in the rural areas bordering Lake Kivu (above 40%) and along the Congo Nile Crest, where soils are less fertile and the land more susceptible to erosion. The western province accounts for the largest numbers and highest rates of food insecure households (37%). Kigali has by far the highest proportion of households with acceptable food consumption (93%) followed by the eastern province (86%), which is relatively better off than other provinces but most prone to rainfall deficit. If a major rainfall deficit were to affect the eastern province (which happens every 4-5 years) an additional 170,000 households would become food insecure.

Food insecure households are typically poor, rural households, living in small crowded homes, depending on low income agriculture and casual labour. They rely on a small number of livelihood activities; they often have no kitchen garden and their household food stocks are not sufficient to last through the lean season until the next harvest. The farther households are located from a main road or market, the more likely they are to be food insecure. Food insecure households are more likely to be headed by a lowly educated, elderly person. Food insecure households involved in agriculture and land cultivation are likely to farm small plots of land (less than 0.5 ha).

Conversely, households relying on more diversified activities, and especially urban households not involved in agricultural production, are better off in terms of food security. The more crops a household cultivates and the more livestock it owns the more likely it is to be food secure.

Acute malnutrition among children between six months and five years is the only nutrition indicator within 'acceptable' limits (3.6%). The prevalence of underweight, which reflects both chronic and acute malnutrition, is 'poor' at 12%. The prevalence of chronic malnutrition (stunting) among children between six months and five years has remained 'very high' over the last 20 years and still stands at 43%. The northern livelihood zones have the highest rates of stunting, exceeding 60% in rural areas, followed by rural areas bordering Lake Kivu (51% stunting), and along the Congo Nile Crest (50%). At provincial level, the northern and western provinces have the highest rates of stunting with over half of all children between six months and five years of age stunted. Stunting is lowest in Kigali (24%).

Boys are more stunted than girls. The smaller the baby at birth, the more likely it is to be stunted later on, and stunting increases with age. Stunted children are more likely to live in poor, crowded, rural households that are farther away from services (hospital), often on steeply sloping land. They have young, lowly educated mothers who are themselves stunted. Child feeding practices of children between 12 and 23 months - in particular the types of foods consumed by children - are significant predictors of their stunting. In particular, children between one and two years old who had consumed milk products were significantly less stunted than other children of the same age category.

7.2 RECOMMENDATIONS

Recommendations are given here on the refining of safety net and social protection targeting, improving household living conditions, livelihoods, increasing and diversifying agricultural production at household level and enhancing community resilience to food and nutrition insecurity. Lastly, recommendations are provided on food security monitoring to keep track of progress and inform decision makers about potential threats.

Since the scope of the CFSVA and Nutrition Survey 2012 was not to analyse the health component in relation to food insecurity and malnutrition, no recommendations regarding health are given here. Nevertheless health interventions are essential to ensure adequate food security and nutrition.

7.2.1 Improve coverage and targeting of assistance and social protection safety nets

Main finding	Suggested intervention	Primary target groups
Food insecure and malnourished households are relatively well captured by the ubudehe classification system: 70% of households with unacceptable food consumption and 58% of households with malnourished children are in the lowest three ubudehe categories.	The current ubudehe system can be built on and serve as a targeting tool for expanded social safety nets. Refine the targeting criteria allowing for more inclusion of the most vulnerable, poor food consumption and nutritionally insecure households in the ubudehe classes.	Country.
Reported assistance is reaching 27% of households with unacceptable food consumption and 25% of households with chronically malnourished children under five.	Expand social safety nets to reduce exclusion of malnourished and food insecure households and continue to increase key social protection instruments' coverage of the extreme poor and vulnerable by taking geographical distribution of food insecurity and malnutrition into account in scale up plans.	Poor, food insecure and malnourished households.
20% of all households reported seasonal problems in accessing food in the 12 months preceding the survey.	Scale up and implement seasonal interventions (e.g. seasonal safety nets, off farm employment opportunities) to help those households experiencing seasonal food insecurity and ensure that transfer programmes take seasonal peaks of food insecurity into account.	Seasonal food insecure households.
Rates of stunting are highest in the North. 65% of the rural households with unacceptable food consumption and over half (53%) of the rural households with stunted children are in the western and southern provinces. The three livelihood zones along the Congo Nile Crest host half of the rural households with unacceptable food consumption (poor and borderline) and about one third of the rural households with stunted children.	Geographical targeting of the next selection of VUP sectors should focus on those districts that have the highest numbers of food insecure and malnourished people. Create synergies with complementary programmes that promote nutrition and food security. Encourage retargeting of food assistance programmes to districts with high levels of food insecurity and malnutrition.	Zones along the Congo-Nile Crest and bordering Lake Kivu for both food security and stunting, as well as North for stunting.

7.2.2 Improve household living conditions, livelihood strategies and tackle poverty

Main finding	Suggested intervention	Primary target groups
Statistical analysis shows that household level poverty is associated with both food insecurity and child stunting.	Reduce poverty by all possible means, through well targeted and designed safety nets and pro-poor growth initiatives.	Country.
Rural households struggling with food insecurity often live in villages that are further away from infrastructure such as roads, schools, markets and health centres.	Rural infrastructure development, especially in areas with high food insecurity.	Remote rural villages.
Households relying on more diversified activities, and especially urban households not involved in agricultural production are better off in terms of food security. On the contrary, households relying only on subsistence agriculture and farming small plots (<0.5ha) in areas of fragile land are more vulnerable to food insecurity.	Promote alternative livelihood development programmes, develop and diversify livelihood opportunities, especially non-agricultural employment where possible.	Zones along the Congo-Nile Crest and bordering Lake Kivu.

7.2.3 Improve and diversify agricultural production

Main finding	Suggested intervention	Primary target groups
Households that still had food stocks at the time of the survey had better food consumption. Own production contributed on average to 30% of the food consumed in the household.	Support productivity at household level so as to increase the time household food stocks last and maximize benefits for the small landholders.	Country, especially rural areas.
Statistical analysis shows that kitchen gardens, higher crop diversity and livestock ownership are associated with greater household food security.	Encourage kitchen gardens, diversity in crop production and support appropriate livestock rearing.	Country, especially rural areas.
On average and for all crops produced, households are selling 23% of their production, and consuming 71%. Wealthier farmers who also rely on sales of agricultural product have better food security.	Increase local agricultural production as well as sales of agricultural produce and marketing to stimulate farmer income. Encourage local purchases of surplus maize and/or other commodities by government and food aid agencies.	Cooperatives, small scale commercial farmers.
Poor soil fertility, soil erosion, steeps slopes characterize areas with higher levels of unacceptable food consumption and stunting.	Promote best productive and sustainable practices (e.g. soil fertility enhancement and anti-erosion measures).	Areas where soil erosion and low soil fertility are a problem.

7.2.4 Improve community resilience to food and nutrition insecurity

Main finding	Suggested intervention	Primary target groups
Low education and illiteracy are among the underlying causes of food insecurity and malnutrition in Rwanda.	Education beyond primary level and continuation of country-wide programme to bring education and literacy to all people.	Lowly educated and illiterate.
Women (especially heads of households) are lagging behind in literacy and education. This puts them at a disadvantage in ensuring food and nutrition security for themselves and their families.	Provide basic adult literacy classes for illiterate women and continue to improve educational outcomes for girls.	Rural women where the gender gap is particularly big.
Rainfall deficit (in Rwanda perceived as drought) is one of the main shocks to food security in Rwanda. If a major rainfall deficit were to affect the East (which happens every 4-5 years) an additional 170,000 households would become food insecure.	Enhance community resilience to rainfall deficit.	Areas prone to rainfall deficit (East and South).
Markets are an important source of food providing on average 65% of the food consumed by a household.	Monitor food price inflation and consider putting in place safety nets in the event of a price crisis.	Country.

7.2.5 Improve child food consumption

Main finding	Suggested intervention	Primary target groups
Inadequate child food intake is one of the causes of child stunting.	Advocate for better child nutrition encouraging intake of animal proteins (milk, eggs) as well as fortified foods.	Country.

7.2.6 Food security and nutrition monitoring and analysis

Main finding	Suggested intervention	Primary target groups
Monitoring of the food security and nutrition situation is required. It will also improve understanding of seasonal food insecurity patterns.	Continue regular monitoring of household food insecurity across regions and seasons.	Government decision makers and donor/UN agencies.
Rainfall deficit, high food prices and floods can affect household food security and nutrition in Rwanda.	Continue monitoring rainfall excess and deficit and its effect on crop production as well as prices in Rwanda to anticipate possible shocks at household level.	Government decision makers and donor/UN agencies.
The impact of transition in the agricultural sector (such as the CIP), and of social protection initiatives on livelihood strategies, food security and nutrition is not well known.	Monitor the impact of transitions in the agricultural sector and of social protection initiatives on livelihoods, food security and nutrition.	Government decision makers and donor/UN agencies.
Analysis of links between food security, nutrition and reported household ubudehe categories should be confirmed with the actual ubudehe categories.	Re-analyse links between food security, nutrition and reported household ubudehe categories when updated categories are available.	Decision makers in the Government of Rwanda and all stakeholders involved in social security.

ANNEXES (INCLUDED IN THE CD-ROM)

Annex 1: Data tables

Annex 2: Definitions and computation of main indicators

Annex 3: Prevalence of malnutrition among women in reproductive age by province

Annex 4: List of enumerators and supervisors

Annex 5: Check lists and questionnaires

Annex 6: Validation of the food consumption score as a proxy indicator for food security

Annex 7: Market integration of beans, sweet and Irish potatoes

Annex 8: Seasonal price patterns for maize, sweet potato and Irish potato

Annex 9: Description of FEWS NET livelihood zones

Annex 10: Detailed methodology

Annex 11: Methodology and results of the General Linear regression and Logistic regression models

Annex 12: Water Requirement and Satisfaction Index methodology

Annex 13: References

MINAGRI
NISR

WFP
World Food Programme
wfp.org

MINALOC
MIDIMAR
MINISANTE
MIGEPROF

United Nations
RWANDA
Unity in Diversity

World Vision

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Canadian International Development Agency
Agence canadienne de développement international

FEWS NET
FAMINE EARLY WARNING SYSTEMS NETWORK