Photo credit: WFP/Jonathan Eng

Fill the Nutrient Gap
Rwanda

REPORT

WFP
World Food Programme

NECDP
GAHUNDA MBONEZAMIKURIRE Y'ABANA BATO

unicef
for every child

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The summary report can be found here: http://www.wfp.org/fillthenutrientgap

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List of Acronyms

CotD	Cost of the Diet
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CHW	Community Health Worker
CIP	Crop Intensification Programme
DALYs	Disability Adjusted Life Years
EICV 4	Integrated Household Living Conditions Survey 4
FFS	Farmer Field School
FBF	Fortified Blended Food
FCS	Food Consumption Score
FNG	Fill the Nutrient Gap
FSN	Food and Nutrition Security
GIRINKA	One Cow per Poor Family Programme
HCI	Human Capital Index
IFA	Iron and Folic Acid
IFPRI	International Food Policy Research Institute
IHME	The Institute for Health Metrics and Evaluation
IYCF	Infant and Young Child Feeding
LP	Linear Programming
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MINAGRI	Ministry of Agriculture
MINEDUC	Ministry of Education
MMF	Minimum Meal Frequency
MNP	Multiple Micronutrient Powders
MMT	Multiple Micronutrient Tablet
NECDP	National Early Child Development Program
PLW	Pregnant and Lactating Women
PSTA III	Third Strategic Plan for the Transformation of Agriculture in Rwanda
RDHS	Rwanda Demographic and Health Survey
RWF	Rwandan Franc
TMREL	Theoretical Minimum-Risk Exposure Level
UN	United Nations
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
WFP	World Food Programme

Introduction

Rwanda is a densely populated, land locked country with a rapidly growing and urbanising population of which 41 percent are below the age of 15 years (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). The Government of Rwanda recognizes the importance of nutrition in achieving national economic and social development goals and is committed to strengthening food and nutrition-specific interventions that address immediate causes of food insecurity and malnutrition.

Despite this, malnutrition is widespread across Rwanda – 38 percent of children under 5 are stunted, and 37 percent are anaemic. Many children are therefore unlikely to reach their full mental and physical potential. The burden varies by region and progress has been hampered by several factors including: widespread poverty despite economic growth; low agricultural productivity and over-reliance on staple food crops; food price fluctuations that disproportionally impact the poorest; unaffordability of nutritious foods; and gender inequalities in decision-making power, time-use, and sexual and reproductive rights. Addressing malnutrition in a sustainable manner in Rwanda should take a gender-sensitive lifecycle approach that engages men and women with a special focus on the most nutritionally vulnerable: children under 2 years of age, adolescent girls, and pregnant and lactating women (PLW). It must include a range of context-specific, targeted interventions that engage stakeholders across multiple sectors.

Malnutrition has two direct causes: inadequate nutrient intake and disease. As its name specifies, the Fill the Nutrient Gap (FNG) assessment focuses on gaps in nutrient intake to inform a country's national policies and actions that can be taken to improve nutrition among their population, with a focus on the most vulnerable (Bose et al. 2019). The FNG assesses the extent to which people have choices. It considers the availability, physical access and affordability of nutritious foods required for adequate nutrient intake. It seeks to understand why people make the food choices they do. Finally, it identifies context-appropriate interventions that can be implemented by different sectors to enable people to choose more nutritious foods, and hence fill nutrient gaps.

The assessment comprises two components:

- A country-specific review of secondary data and information on factors that reflect or affect dietary intake. This includes malnutrition trends over time, characteristics of the food system and food environment, and population behaviour related to food and feeding.
- An assessment of the extent to which economic barriers prevent adequate nutrient intake. This uses the Cost of the Diet (CotD) linear programming software

developed by Save the Children (UK), and includes modelling of the economic impact of possible interventions to increase nutrient intake and fill nutrient gaps.

Malnutrition cannot be addressed by one sector alone. FNG is designed to inform multisectoral decision-making and therefore engages stakeholders from all sectors including food, health, agriculture, education, and social protection systems throughout the assessment.

It is the stakeholders who define the scope and focus of the assessment. They contribute data and sources of information for identification of context-specific barriers and entry points and develop a shared understanding of the issues and possible solutions. They then identify appropriate nutrition-specific and nutrition-sensitive interventions that can be implemented by different sectors using their existing delivery platforms. These could be social safety nets, food processing and markets, antenatal care, school feeding programmes and others.

The FNG assessment has been developed by the WFP with technical support from: The University of California Davis; the International Food Policy Research Institute (IFPRI, Washington DC); Epicentre (Paris); Harvard University (Boston); Mahidol University (Bangkok); Save the Children (UK); and UNICEF. At the end of 2018, the FNG had been conducted in 17 countries and started in another 8.

The overarching objective of the Fill the Nutrient Gap (FNG) in Rwanda was to bring stakeholders together to identify and prioritize context-specific policies and programmes across food, health and social protection systems and other relevant sectors with the aim of improving nutrient intakes of target groups. The results from the FNG at national level are to be used to inform and complement the new National Nutrition Policy, among other evidence-based strategic documents. The FNG team in the WFP country office identified a need for an additional FNG analysis that would be used to inform WFP and stakeholder programmes in refugee camps.

Method

FNG Process in Rwanda

The FNG process in Rwanda ran from November 2017 to October 2018. The analysis comprised a comprehensive literature review of available secondary data sources in combination with linear programming (LP) using the CotD software. The aim was to understand context-specific barriers to adequate nutrient intake and to model potential

interventions to improve access to nutrients, particularly from nutritious foods that can fill the existing gap.

The National FNG assessment was led by the National Early Child Development Program (NECDP) with technical assistance from the World Food Programme (WFP) country office, regional bureau and Rome headquarters, and the United Nations Children's Fund (UNICEF) Rwanda which provided technical and financial support. At the start of the process, the Rwanda FNG team met with stakeholders from government, non-government, United Nations (UN), academia and the donor community. Here the FNG process was introduced, secondary data sources were collated and possible interventions, entry points and transfer mechanisms were identified to test in the CotD modelling. Over 110 data sources were identified and reviewed. The CotD analysis intervention modelling was then carried out and the findings were presented internally to all programme staff, then to the National Food and Nutrition and Water, Sanitation and Hygiene Technical Working Group chaired by NECDP. Finally, they were presented to the wider stakeholder group as part of a workshop to formulate recommendations.

A full list of the stakeholders who were engaged throughout the FNG process can be found in Annex 1. The detailed FNG process in Rwanda is illustrated in Figure 1.

Figure 1. The FNG process followed in Rwanda.
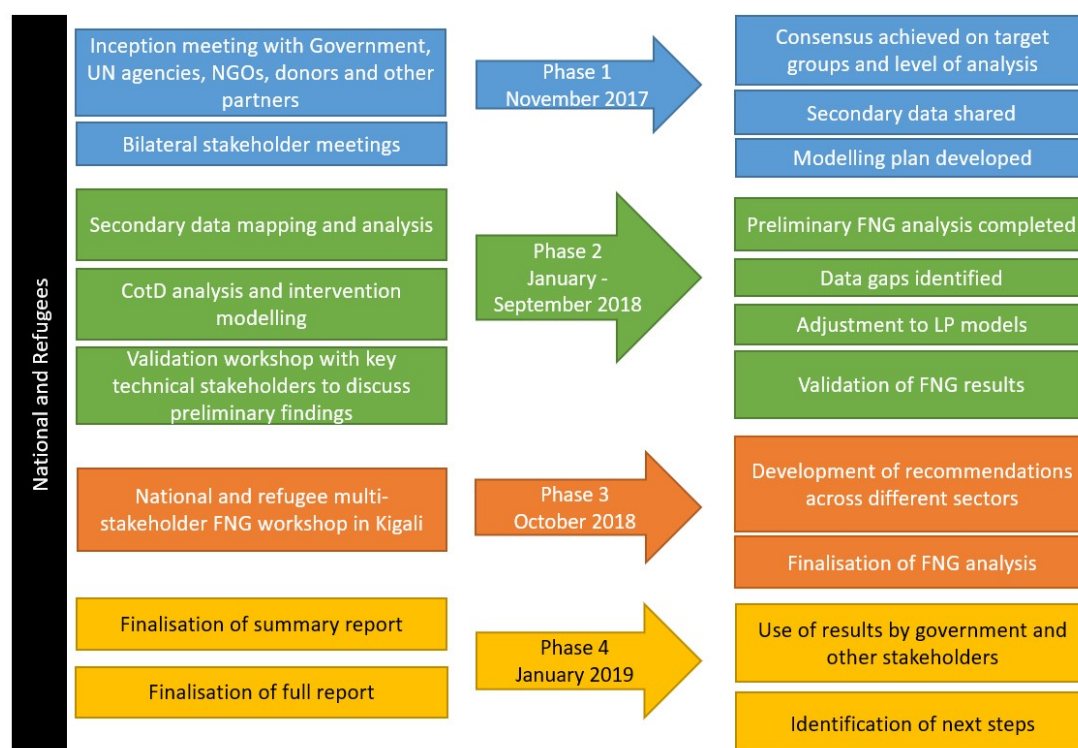
Collation and Analysis of Secondary Data

The FNG framework for analysis depicted in Figure 2 helps to consolidate and analyse existing secondary data at country level based on the following categories:

Malnutrition Characteristics: review prevalence data of malnutrition characteristics (Stunting, Wasting, Anaemia, Underweight, Overweight) and if possible data on certain Micronutrient Deficiencies. If relevant, seasonal patterns of various nutritional problems within populations can be considered. Malnutrition characteristics are reviewed in the initial stage to define priority groups for the analysis.

Enabling Policy Environment: analyse if the policy environment adequately facilitates access and availability of nutritious foods for the population by identifying possible gaps in national policy, and national legal or regulatory frameworks related to access and availability. Enforcement of these policies and regulations is a key part of the analysis; for example, while there may be a mandatory national fortification policy, compliance of this policy may be low in reality. This section is crucial in identifying current or potential entry points for nutrition interventions.

<u>Availability of Nutritious Foods:</u> review information on local availability of nutritious foods (natural and fortified) as well as on local production and processing capacity to assess whether it would be possible to meet nutrient needs from locally available foods.

<u>Access to Nutritious Foods:</u> determine if the target populations have access to nutritious foods in both lean and non-lean seasons, in urban vs rural areas etc. Also gain a better understanding of the adequacy of nutrient intake at the household level and the ability of households to cope with potential shocks.

<u>Nutrient Intake:</u> examine likely or confirmed gaps in nutrient intake at the individual/target group level, in particular related to Infant and Young Child Feeding (IYCF) practices and the coverage of supplementation and/or fortification programmes. Each age group has different nutrient requirements (e.g. a 6-11 month old child requires complementary foods, in addition to breastmilk, with much higher nutrient density, such as more mg of iron and zinc per 100 kcal, than an adult male).

<u>Local Practices:</u> identify socioeconomic and cultural factors influencing food purchasing patterns and feeding practices that currently act as a barrier to adequate nutrient intake or could in the future limit the effectiveness of certain food-based interventions, particularly among target groups of interest. Information gathered with tools such as ProPAN can be very useful to gain insights into local preferences and behaviours, which can inform strategies such as Social and Behaviour Change Communication (SBCC) to improve feeding practices. Focus Ethnographic Studies or Focus Group Discussions carried out by local academia or NGOs can provide key insights into this often overlooked area of analysis.

<u>Cost Optimization:</u> by utilising the CotD, the minimum cost of a locally available nutritious diet was estimated. An insight was also gained into what proportion of the population can afford the diet in different geographic areas or among social safety net beneficiaries compared to non-beneficiaries. The tool was also used to model possible intervention options that might improve affordability, such as introduction of fortified foods and/or Specialised Nutritious Foods (SNFs) through market channels or social protection programmes, and cash transfers.

Figure 2. FNG Framework for situation analysis and decision making.
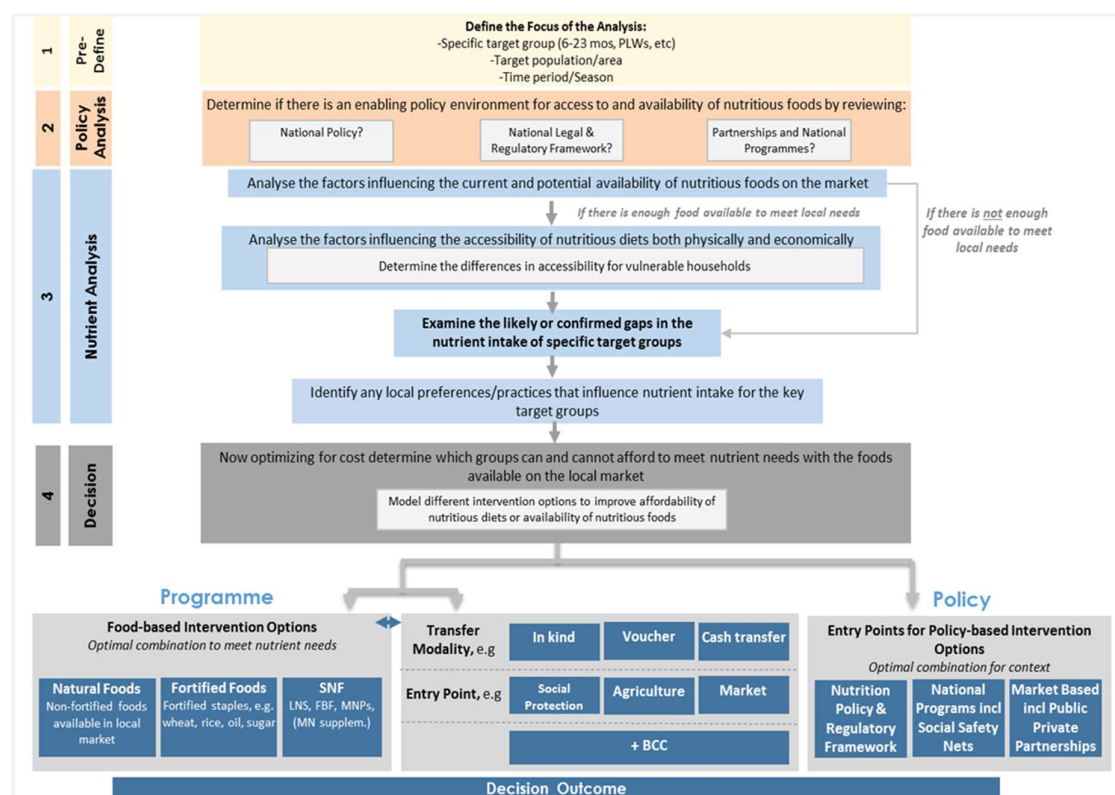
Between November 2017 and August 2018, the secondary data analysis was carried out by the FNG team. A data mapping template was developed to assist the identification and review of different information sources relevant to the FNG analysis and to highlight areas where data had not been found. Data sources were identified, mapped and reviewed over three main stages:

1. <u>Consultation with National Stakeholders:</u> Prior to and during the November mission to Rwanda, information about the data requirements for the FNG analysis and the FNG data mapping template were shared with the WFP country office and national stakeholders, who, in turn, shared relevant datasets, reports, articles, and documents on standards and regulations with the FNG team.

2. <u>Literature Search:</u> In addition to obtaining data through national stakeholders, a web-based literature search was carried out to identify any further articles or reports relevant to the FNG analysis and to provide a contextual overview of the nutrition situation in Rwanda. PubMed and Google Scholar were used to search for data from

studies in academic journals, institutional reports, and working paper series published in the last 10 years.

3. <u>Follow up on identified data gaps:</u> Once the data mapping spreadsheet had been populated with information sources from stakeholders and the literature review, data gaps, in terms of themes, areas of the country or population groups, could be identified. The FNG team then shared this list during the multi-stakeholder preliminary findings presentation to inquire whether any additional information sources could be shared. A further, targeted literature search focussing on these specific gaps was also conducted.

Through consultation with national and international stakeholders and a review of relevant literature, 110 data sources for the national level analysis and 40 data sources for the refugees were identified and reviewed. This review identified a number of data gaps that were unable to be filled, as detailed in the 'Data Gaps' section.

Cost of the Diet Assessment

The CotD software uses linear programming to understand the extent to which poverty, food availability and prices may affect the ability of people to meet their nutrient needs (Deptford et al. 2017). Using price data collected from markets or from secondary sources, the software calculates the amount and combination of local foods that are needed to provide individuals or households with their average needs for energy and their recommended intakes of protein, fat and micronutrients[1] at the lowest possible cost. These diets are calculated within defined constraints to prevent the inclusion of unrealistic types or amounts of food and the provision of excessive amounts of nutrients.

At a national level, the CotD analysis was undertaken for Kigali City and each of the provinces (East, West, North and South) at a rural and urban level. Intervention modelling was conducted for Kigali City and the four provinces at a rural level, which was chosen in consultation with national stakeholders to represent the diversity of the national nutrition situation as well as access to and availability of nutritious foods.

Food Price Data

As part of the FNG national process in Rwanda, food price data from the National Institute of Statistics Rwanda for 83 commodities were provided at provincial level. To

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[1] As defined by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). The need for 9 vitamins and 4 minerals is included.

align the price data with the food expenditure data[2] from the 2014 Integrated Household Living Conditions Survey (EICV 4), the period of the price data used was from October 2013 - October 2014 (National Institute of Statistics of Rwanda 2015). The cost of the diet was analysed for four seasons in the year. Price data for the month in the beginning of the season was used as a proxy for the price of the season. The seasonal breakdown used was as follows:

Season 1: November 2013 – January 2014

Season 2: February 2014 – April 2014

Season 3: May 2014 – July 2014

Season 4: August 2014 – October 2014

Household Size and Composition

The average household size according to the EICV 4 was 4.6 (National Institute of Statistics of Rwanda 2015). A household size of 5 was therefore used for the CotD analysis. The household composition used was based upon the target groups for the FNG analysis as identified by key stakeholders. The household included a breastfed child 12-23 months of age, a lactating woman and an adolescent girl (14-15 years old) – the three primary target groups impacting the critical window of the first 1000 days of life – as well as a child 6-7 years of age and an adult man. For this analysis the 12-23 month old child is to be used as a proxy for children 6-23 months, the child 6-7 years as a proxy for a school aged child and the lactating woman as a proxy for a pregnant and a lactating woman (PLW).

Staple – Adjusted Nutritious Diet

The FNG approach defines the Staple Adjusted Nutritious Diet: the lowest cost diet that meets recommended intakes for energy, protein, fat and 13 micronutrients, with inclusion of the main staple foods and excluding the taboo foods. Staple foods are defined as foods that are generally eaten every day by all household members. Taboo foods are defined as foods which are not consumed for cultural or religious reasons but not due to not liking them. This diet is not intended to reflect what individuals or households are currently eating, nor should it be used to develop food-based recommendations or dietary guidelines.

The EICV 4 was used to determine staple preferences for 2013 - 2014 and these were reviewed and agreed by stakeholders in the technical working group (National Institute of Statistics of Rwanda 2015). Table 1 summarises the staples chosen for each province.

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[2] Used to estimate affordability (see section below)

Beans were included in all areas in combination with potato, maize flour, sweet potato or matoke deepening on the province. Two portions of the staple foods were included for all household members per day, except for the child aged 12–23 months, who received one portion a day. No taboo foods were identified and thus, no foods were excluded from the analysis. The nutritious diet was the diet that included those staples and other foods that together meet the nutrient needs.

Table 1. The staple preferences used to calculate the nutritious diet for the national FNG analysis.

	Provinces								
	Kigali	South Urban	South Rural	West Urban	West Rural	North Urban	North Rural	East Urban	East Rural
Beans	X	X	X	X	X	X	X	X	X
Irish potato	X	X		X		X		X	
Maize flour							X		
Sweet potato			X		X				
Matoke									X

Affordability Analysis

The cost of the nutritious diet becomes a more meaningful figure when compared with the money that households currently spend on food. This facilitates an understanding of what percentage of households within the population can or cannot afford the nutritious diet. To estimate affordability, percentiles of per capita monthly food expenditure data were generated at the provincial level (including urban and rural) using EICV 4 data (National Institute of Statistics of Rwanda 2015). These per capita figures were multiplied by the number of individuals in a typical household (5) to estimate monthly household food expenditure.

Intervention Modelling

To improve affordability of the nutritious diet, a number of interventions were modelled targeting the key vulnerable groups: children aged 6-23 months, adolescent girls and PLW. Interventions were also modelled targeting school aged children and the household overall. These interventions were identified primarily through consultations with national stakeholders as well as from the analysis of the secondary data and were modelled in Kigali City and the four provinces at a rural level for the national level analysis.

The models included:
- Improving access to local nutritious foods through kitchen garden and smallholder livestock interventions.

- Fortification and biofortification of staple foods.
- Improving access to Specialised Nutritious Foods for specific target groups.
- Micronutrient supplementation.
- Determining adequate cash transfer values for vulnerable households targeted through social safety net programmes (national level).

The modelled interventions were theoretical and would need to be accompanied by complementary behaviour change interventions to stimulate nutritious choices. The modelling plans for the national level analyses can be found in Annex 2. The nutrient composition per 100g for the specialised nutritious foods, blended flours, nutritional supplements, fortified and biofortified foods modelled can be found in Annex 3. The underlying assumptions made for all models can be found in Annex 4 and the modelling results by province can be found in Annex 5.

Key Findings

1. *Household Food Security and Diet*

Despite significant improvements, malnutrition remains the top disease risk factor in Rwanda. Although most households are food secure, diets are dominated by staple foods. To achieve nutrition security, diets must diversify and also include animal source foods.

Food Security

The Institute for Health Metrics and Evaluation (IHME) listed malnutrition as the top driver of death and disability[3] in Rwanda in 2017 (Institute for Health Metrics and Evaluation 2017). This has remained unchanged for the last 10 years. The 2018 Comprehensive Food Security Vulnerability Assessment (CFSVA) found that although most Rwandan households are food secure[4], improvements between 2015 and 2018 have been limited: 81 percent were food secure in 2018 versus 80 percent in 2015 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

Figure 3 shows that households in the Western province are the least food secure (70 percent), despite showing the greatest improvement from 2015 to 2018. Households in Kigali City are the most food-secure (98 percent), whilst households in the Northern provinces experienced the least change in food security from 2015 to 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

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[3] As measured in disability-adjusted life years (DALYs). This measure is used to give an indication of overall burden of disease. One DALY represents the loss of the equivalent of one year of full health. Using DALYs, the burden of diseases that cause premature death, but little disability can be compared to that of diseases that do not cause death but do cause disability.

[4] Food security is based on a household's current status of food consumption and coping capacity. The food consumption score is used to classify the households into food consumption groups. Coping capacity domain employs indicators which measure households' economic vulnerability and asset depletion, namely food expenditure shares and livelihood coping strategies respectively. Each of the three indicators is converted into a four-point scale and for each indicator households are given a score from one to four. By taking the average of the scores from the two domains: current food consumption and coping capacity, these scores are combined into a summary indicator, called the Food Security Index, which represents overall food security status.

Figure 3. The percentage of households which were classified as food insecure in 2015 and in 2018 by province (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).
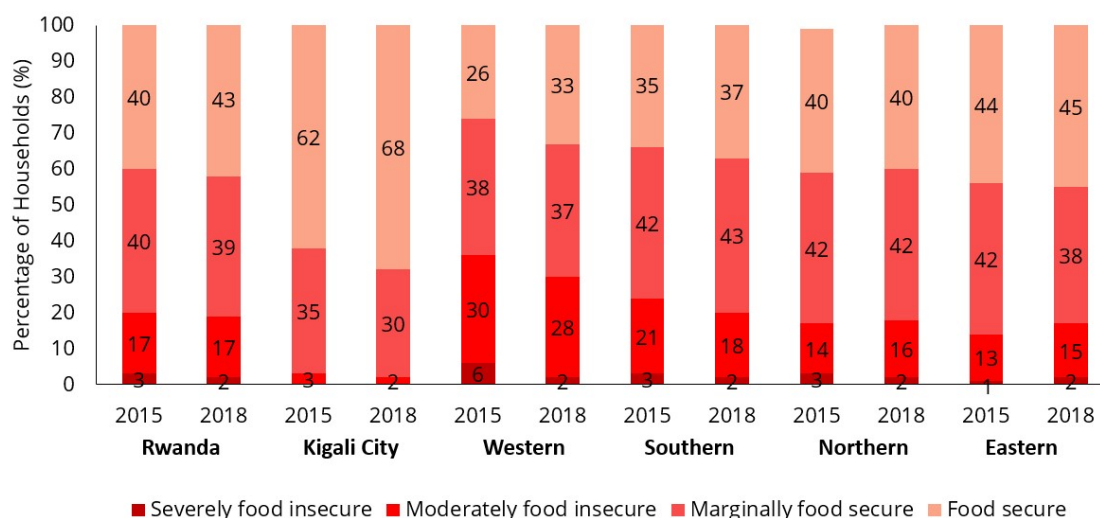
Figures 4 and 5 show the percentage of households which were classified as food insecure from 2015 to 2018. These figures show that food security has improved in 18 districts with the greatest improvements in: Bugesera (19 percentage points), Nyabihu (13 percentage points), Nyamasheke (13 percentage points), Nyamagabe (13 percentage points), Nyanza (13 percentage points) and Nyaruguru (13 percentage points) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018). These improvements have been attributed to an increase in Food Consumption Scores[5] (FCS) and household resilience. Economic access, in particular, has significantly improved with an increase of 20 percent of households overall, who are spending less than 50 percent of their budget on food (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

However, food insecurity rose in 12 districts, with the highest increase experienced in Kayonza (22 percent) and Ngororero (17 percent). Rutsiro district is also very food insecure and this has remained unchanged since 2015 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018). These increases, as well as the high food insecurity that generally resides in the West of the country is attributed to the increased frequency and severity of natural disasters as a result of the El Niño Southern Oscillation events

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[5] Food consumption score: WFP's indicator for measuring food insecurity, used to define categories of household food insecurity. It is calculated using the frequency of consumption of different food groups by a household during the 7 days before the survey.

(Ministry of Disaster Management and Refugee Affairs 2015). This has led to households implementing 'crisis' and 'emergency' livelihood coping strategies such as harvesting immature crops, decreasing expenditure on productive inputs and begging, which in turn impacts on their ability to cope with future shocks (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

In 2016, Rwanda experienced a severe long-term drought where over 23,448 hectares of crops were destroyed, affecting 47,306 families (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). The impact of this has been longstanding, particularly in Kayonza district where the 2018 CFSVA found that 10 percent of households reported begging as a coping strategy (Ministry of Disaster Management and Refugee Affairs 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). Conversely the West of the country has been affected by recurrent flooding. Between January and the end of April 2018, heavy rains and floods damaged crops on 4,560 hectares, killed 705 livestock, and destroyed around 10,000 houses (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). Consequently, in 2018, fifty seven percent of households in Ngororero reported using crisis coping strategies (Ministry of Disaster Management and Refugee Affairs 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018)[6].

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[6] See the key message 8 for more details on how shocks impact food security and dietary intake.

Figures 4 and 5. The percentage of households which were classified as food insecure in 2015 (left) and in 2018 (right) by district (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).
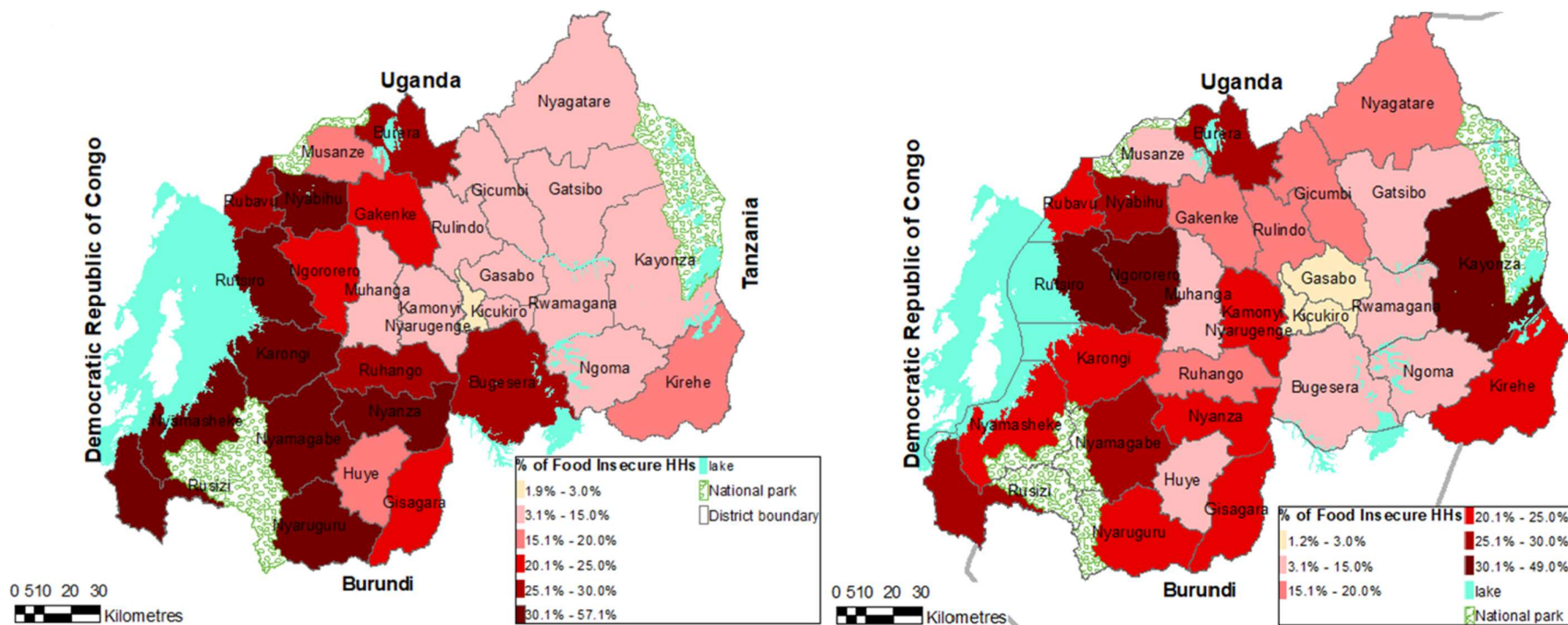
Household Food Consumption

According to the 2018 CFSVA, 76 percent of Rwandan households have an acceptable FCS. These results have not differed significantly since 2009, remaining between 74 percent and 79 percent (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018). Improvements in FCS have been observed particularly in the North, South and West of the country in the period 2015-2018. Despite this, Figure 6 shows that the West has the highest percentage of households with an average poor or borderline FCS at 7 percent and 32 percent respectively.

Figure 6. FCS by province from 2015 to 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).
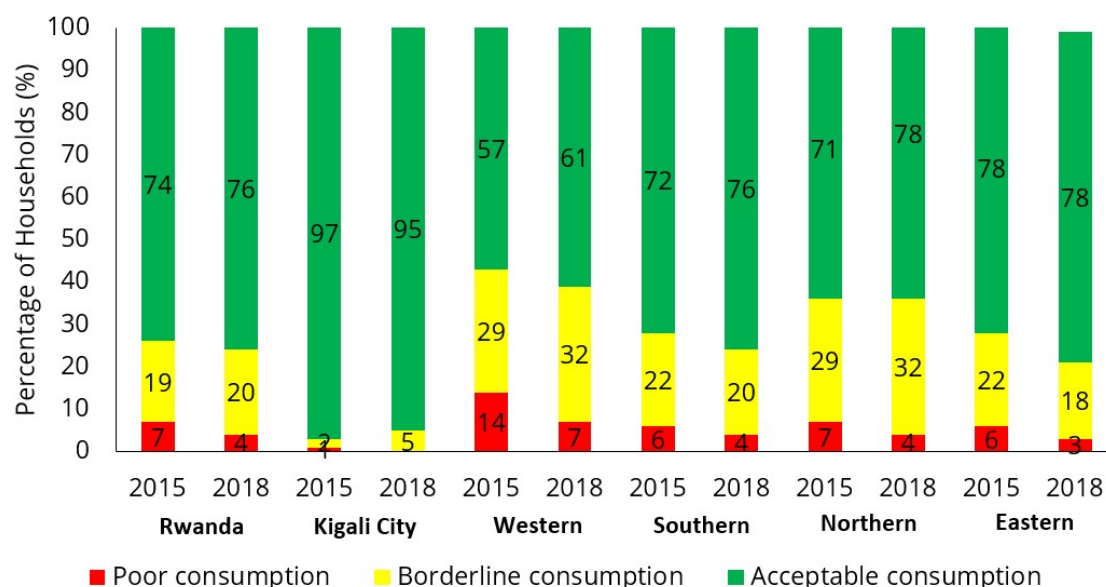
The 2018 CFSVA found that at a district level, food consumption had improved in 17 of the 30 districts from 2015 to 2018. Figure 7[7] shows a similar district level pattern with FCS as with overall food insecurity. Rutsiro district had the highest percentage (62) of households with inadequate food consumption (both poor and borderline consumption). Food consumption also deteriorated in Kayonza district from 16 percent in inadequate food consumption in 2015 to 28 percent in 2018 and in Ngororero district from 32 percent in 2015 to 51 percent in 2018, likely due to the climatic shocks experienced during this period (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

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[7] Food consumption by district was not available in the 2015 CFSVA to create a map for comparison.

Figure 7. The percentage of households with inadequate (both poor and borderline) FCS by district in 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).
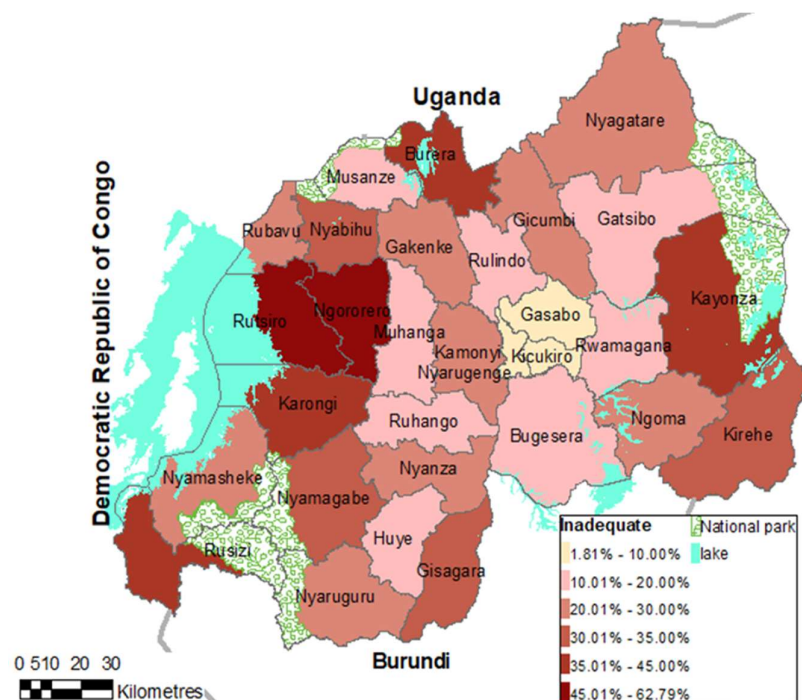
Figure 8 shows that the CFSVAs from 2012, 2015 and 2018 have found that household's diets consist mainly of starchy staple foods, pulses, oil, sugar and some vegetables with little consumption of meat, dairy or fruit (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018). This consumption has mostly remained unchanged over the last seven years with number of times vegetables are consumed in a week experiencing the biggest change (an increase). Interestingly, the frequency of consumption of all but two food groups, i.e. starch and pulses, decreased from 2015 to 2018, indicative of the impact of climatic shocks experienced during this period (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

Figure 8. The number of days in a week eight food groups are consumed by households in Rwanda from 2012 – 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).
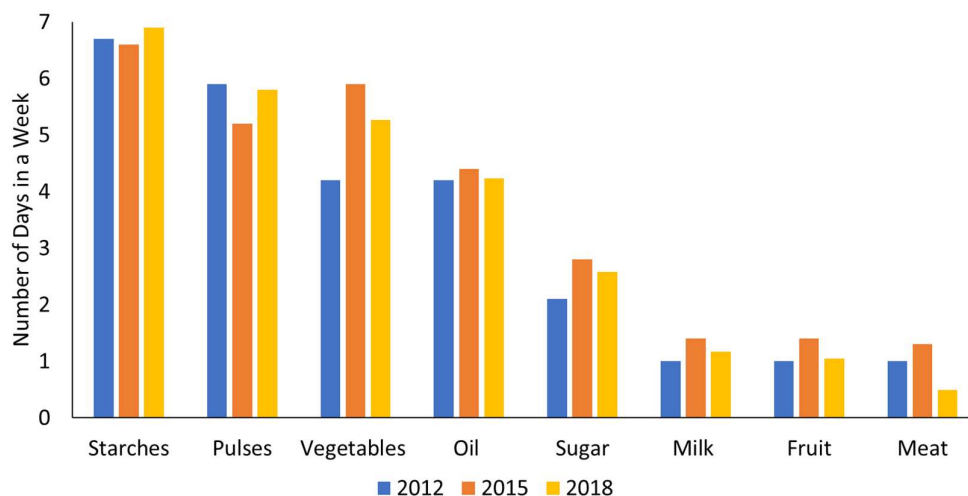
Figure 9 shows that even households with an acceptable FCS only consumed meat, dairy and fruit twice a week each and this has not changed since 2015 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018). These results emphasise that household FCS, while being a measure of dietary diversity does not provide enough information on nutritional adequacy of a diet, nor the adequacy of diets for specific vulnerable groups. Data that captures the quantities of foods consumed is needed.

Figure 9. Number of days in a week different food groups are consumed by FCS category (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).
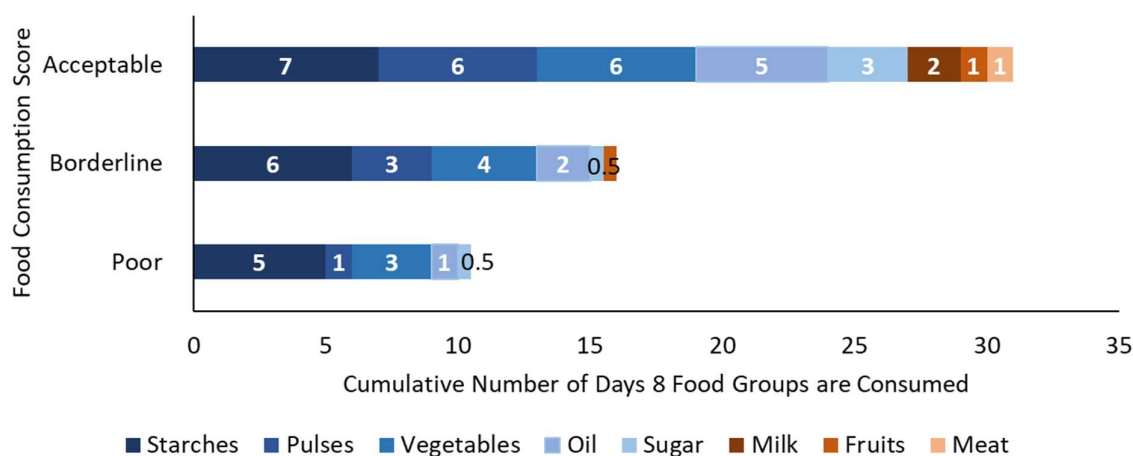
Data on the quantities (in grams) of foods consumed by households and vulnerable groups in Rwanda, is scarce. Only one report by Harvest Plus was found from 2011 conducted in the Northern and Southern provinces, which collected portion size information through 24 hour dietary recalls in 743 adult women and 674 (Berti et al. 2011)[8]. Other potential source of information is the Global Burden of Disease (GBD) database from the University of Washington, which estimates the mean intake of different components of the diet[9] for adults over the age of 25 years and then compares this to a Theoretical Minimum-Risk Exposure Level (TMREL)[10] (Institute of Health Metrics and Evaluation 2019).

Figure 10 shows that, although reportedly regularly consumed, the amount (in grams) of whole grains and vegetables eaten in the adult population is potentially too low (Development Initiatives 2018a). The quantities of animal source foods such as milk and meat consumed is also too low, which is in line with the results from the CSFVAs. The quantity of milk consumed is similar to Africa as a whole but slightly lower than global intakes. Consequently, calcium intakes in Rwanda are also reported as being too low, although there is little data on micronutrient deficiencies to sufficiently support this[11] (Development Initiatives 2018a). Sugar sweetened beverage consumption is potentially too high, for which the increasing rates of overweight and obesity within the country[12] might be indicative of (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; Development Initiatives 2018a). Although the CFSVAs report that fruit are not regularly consumed, the GBD database estimates the quantity eaten to be close to 250g per person per day, which would be close to what is recommended for minimising dietary risk of disease. Legume intake is also well above the minimum recommended about, which is very positive.

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[8] For more information on the specific results, refer key messages 3 and 4.

[9] To estimate the mean intake of each component of diet, the GBD study uses data from nationally and subnationally representative nutrition surveys and household budget surveys. It also uses sales data from Euromonitor International for fruits, vegetables, legumes, nuts and seeds, red meat, processed meat, milk and sugar-sweetened beverages, as well as data on availability of fruits, vegetables, legumes, nuts and seeds, milk and red meat from FAO food balance sheets. For nutrients, it estimates their national availability by using data from FAO's Supply Utilization Accounts and the US Department of Agriculture's National Nutrition Database for Standard Reference (Development Initiatives 2018).

[10] By definition, TMREL is the exposure level (i.e. intake level of a food or nutrient) that minimises the risk of death from all causes related to a single risk factor. the GBD study looked across many studies to assess the relationship between each dietary risk and disease endpoint and calculated the level of intake associated with the lowest risk of mortality from that disease endpoint. This gives a disease-specific optimal level of intake. Thereafter, it calculated the TMREL as the weighted average or midpoint of these numbers using the global number of deaths from each disease as the weight. The GBD study established the minimum risk exposure (TMREL) of 15 dietary factors.

[11] Discussed further in key message 2.

[12] As discussed further in key message 4.

It is important to note the limitations of these results. As standardised primary individual-level dietary data is not available for the country, the GBD will have relied on mixed sources of surveys and modelled data to run this analysis (Development Initiatives 2018b). These results therefore do not necessarily indicate current consumption patterns across the country, however in the absence of data, the GBD can give a good indication of dietary risk factors for disease and areas required for improved focus and are mostly aligned to what is reported in the CFSVAs. To achieve nutrition security in Rwanda, diets must be diversified to include more vegetables, fruit and animal source foods, the latter being a very important source of essential micronutrients such as iron and calcium, and the only source of vitamin B12.

Figure 10. The modelled consumption of food groups and diet components for men and women over the age of 25 years in Rwanda against the disease-specific optimal level of intake (Development Initiatives 2018a).

2. Malnutrition Characteristics

Stunting and anaemia in children remain a public health problem. Prevalence varies geographically and is impacted by socioeconomic factors. More information on micronutrient deficiencies is necessary to fully understand the nutrition situation. Water, sanitation and health (WASH) has improved substantially but rural areas are still at risk of disease.

Government Commitment and Progress to Targets

Adequate nutrition is critical to child development, affecting growth and health. Children who do not receive adequate nutrition can be susceptible to growth faltering, micronutrient deficiencies and common illnesses such as diarrhoea and acute respiratory infections. The Cost of Hunger study in Rwanda estimated that child undernutrition caused an average loss of 504 Billion Rwandan Francs (RWF) in 2012, which accounted for 11.5 percent of GDP (The New Partnership for Africa's Development, World Food Programme, and United Nations Economic Commission for Africa 2012). Despite Government commitment, malnutrition continues to be an important challenge with widespread consequences for Rwanda's people and economy.

Since the initiation of the Presidential Initiative to Eliminate Malnutrition in 2009, the government in partnership with development partners have shown unwavering commitment to tackle malnutrition in Rwanda. In 2010 the National multi-sectoral Strategic Plan to Eliminate Malnutrition 2010-2013 was developed to guide the implementation of the initiative's interventions, coordinated by the Ministry of Health. In 2013, the Government reviewed its nutrition policy and strategic plan, and the National Food and Nutrition Policy (NFNP 2013) and the National Food and Nutrition Strategic Plan (NFNSP 2013- 2018) were developed. Alleviating the burden of chronic malnutrition or stunting[13] of children under two years through a lifecycle approach is at the core of these documents (Ministry of Local Government, Ministry of Health, and Ministry of Agriculture and Animal Resources 2014; Mininstry of Local Government, Ministry of Health, and Ministry of Agriculture and Animal Resources 2014). The government of Rwanda recognised the need for multi-sectoral interventions and coordination to end malnutrition, thus developing the Joint Action Plan to Eliminate Malnutrition (2016 – 2020) holding six ministries accountable including health, agriculture, education and social protection to facilitate the implementation of the National Food and Nutrition Policy and Strategic Plan.

Despite this commitment, funding for nutrition activities, delivered primarily through the health sector, is heavily dependent on external support, which is continuously

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[13] Measured as the percentage of children in the survey with height-for-age z-score less than or equal to two standard deviations below the median of the WHO child growth standards adopted in 2006.

decreasing. Fifty percent of the health system is reliant on donor support whilst the current national budget allocates less than 8 percent to the sector. Thus, the activities that directly affect nutrition outcomes receive little budget prioritisation. For example, the 2015/2016 annual performance contracts (Imihigo) allocated only five percent of the total planned budget to nutrition (Ministry of Gender and Family Promotion 2018). Poor resourcing therefore poses a threat to the sustainability of interventions impacting on nutrition security.

Figure 11 shows the trends in malnutrition from 1996 to 2015 as reported by the Rwanda Demographic and Health Surveys (RDHS). The latest survey shows that despite a 10 percent reduction in stunting over the past ten years, prevalence remains high at 38 percent for children under 5 years (Office National de la Population and ORC Macro 2000; Institut National de la Statistique du Rwanda and ORC Macro 2006; National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2012, 2015). The 2018 CFSVA found that stunting prevalence is continuing to decline, albeit slowly, to a prevalence of 35 percent (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). Similarly, anaemia[14] has fallen from 52 percent in 2005 to 37 percent in 2015. Rwanda has the lowest prevalence of wasting[15] in the East African Region at 2 percent. In the last 10 years, overweight and obesity has emerged as a new nutrition threat among children under 5 years. By 2015 it affected 8 percent of them, constituting one of the largest increases of overweight among children in sub-Saharan Africa[16] (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2012, 2015).

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[14] Defined as haemoglobin levels <11.0 g/dl.

[15] Measured as the percentage of children in the survey with weight-for-height z-score less than or equal to two standard deviations below the median of the WHO child growth standards adopted in 2006.

[16] Overweight and obesity is discussed further in key message 4.

Figure 11. Malnutrition characteristics of children under 5 years of age from 1996- 2015 (Office National de la Population and ORC Macro 2000; Institut National de la Statistique du Rwanda and ORC Macro 2006; National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2012, 2015).
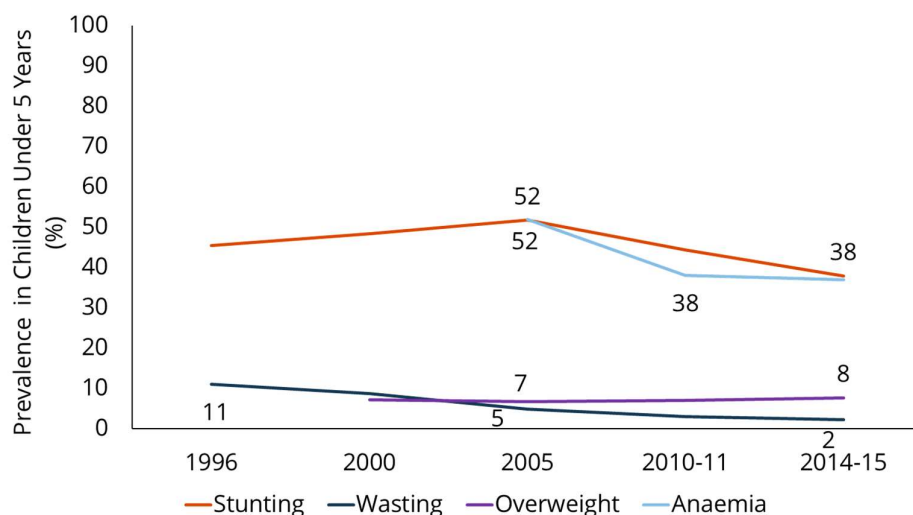
UNICEF, World Bank and WHO's database on malnutrition estimates, using the 2015 DHS data, shows that children under the age of five in Rwanda are suffering from multiple forms of malnutrition. Figure 12 shows that the most common combination is stunting and overweight which affects 3 percent of the under five population and stunting and wasting which affects 1 percent of the under five population (United Nations Children's Fund 2018). The percentage of children estimated to be both stunted and overweight is higher than the average for Africa, which is 2.3 percent (Development Initiatives 2018b). Furthermore, while the physiological mechanisms leading to a child becoming both wasted and stunted are not well understood, important evidence indicates that these children are at an elevated risk of dying compared to those affected by severe wasting alone (McDonald et al. 2013).

Figure 12. The coexistence of wasting, stunting and overweight in children under the age of five in Rwanda (Development Initiatives 2018a; United Nations Children's Fund 2018).
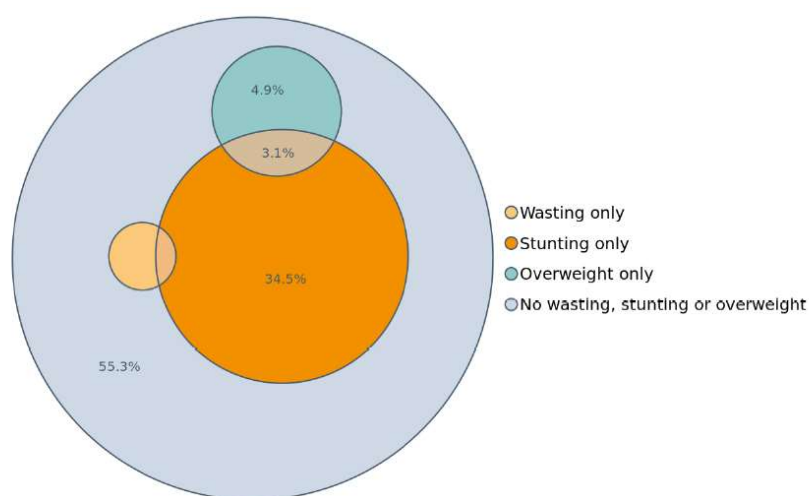
Despite the progress made in reducing child malnutrition particularily stunting, wasting and underweight, Table 2 shows that Rwanda is off track to meet the targets for stunting and underweight set in the 2012 – 2018 Third Health Sector Strategic Plan. Having said this, it is potentially on course to meet the 2025 global nutrition targets set by the World Health Assembly for stunting and wasting. There were no national targets set for under five aneamia or overweight and obesity, which given the stagnating improvement in the former and the steady rise in latter, is recommended for the Fourth Health Sector Plan.

Table 2. Current status of malnutrition in children under five years compared against the 2012-2018 Health Sector Strategic Plan and the global nutrition targets (Ministry of Health 2012; Development Initiatives 2018b, 2018a).

Indicator	Status (2015)	2012 - 2018 Third Health Sector Strategic Plan	2025 Global Nutrition Targets
Prevalence of stunting	38%	18% (off track)	40% reduction (some progress)
Prevalence of wasting	2.2%	2% (on track)	Reduce to and maintain at 5% (on track)
Prevalence of underweight	9%	4% (off track)	No target
Prevalence of aneamia	37%	No target	No target
Prevalence of overweight	8%	No target	No increase (off track)

According to the 2018 CFSVA, only four districts had a stunting prevalence below the World Health Organization (WHO) 'very high' threshold (≥30%) (United Nations World

Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). Stunting rates varied by region with the worst rates found in the Western province, as shown in Figure 13. Three districts in the West have stunting rates surpassing 50 percent (Rutsiro, Nyabihu and Rubavu) and, within this province, prevalence has declined slower than in the rest of the country over the past 10 years (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2012, 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). The CFSVA found that the greatest reduction in stunting between 2015 and 2018 occurred in Kigali City (down to 13 percent from 25 percent) but found little change in the other provinces (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

Figure 14 shows the regions with high stunting and food insecurity, highlighting the relationship between the two indicators in certain areas of the country (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). This relationship was particularly strong in the five districts of Rutsiro, Ngororero, Kayonza, Nyamagabe, Burera where approximately 30 percent or more of food insecure households also had a stunting prevalence above 40 percent.

Figures 13 and 14. The prevalence of stunting in children under 5 years of age by district in 2018, numbers in brackets represent the percentage point difference from the 2015 RDHS figures (left) and the prevalence of stunting and food insecurity by district in 2018 (right) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).
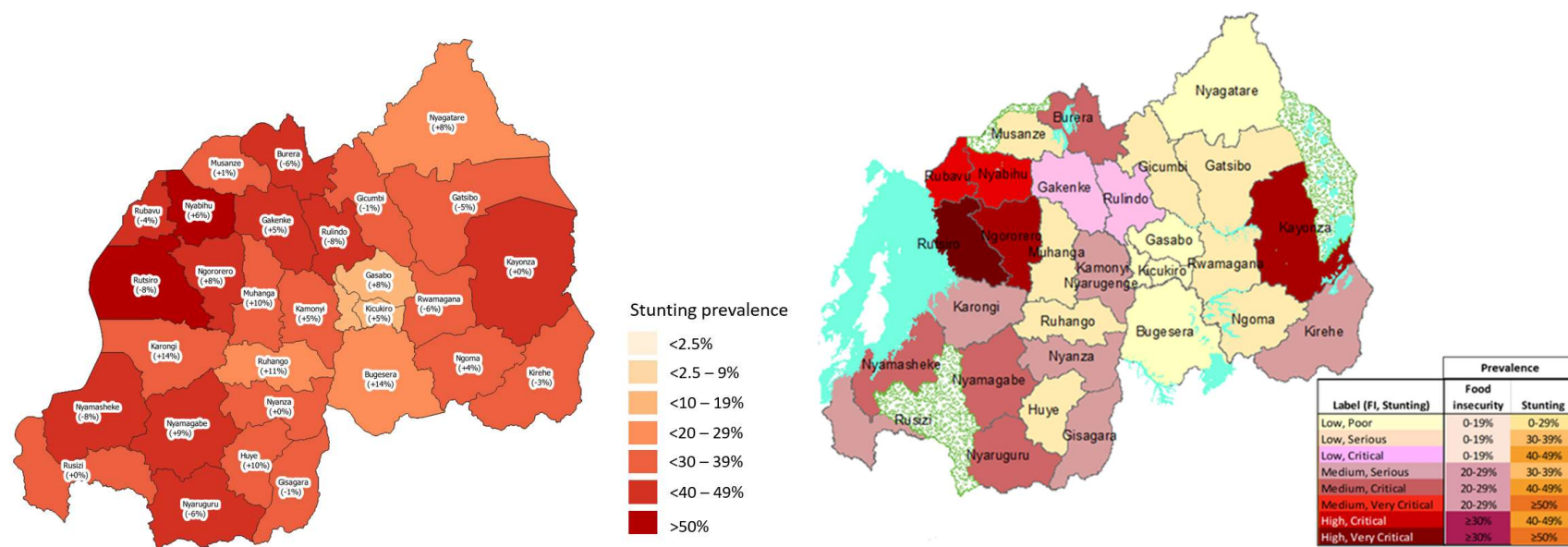
Anaemia is a moderate to severe public health problem as defined by the WHO criteria, surpassing 20 percent in all but one province and above 40 percent in 9 provinces in 2015 as shown in Figure 15 (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). There is little data on causes of anaemia but it is likely that a large proportion of anaemia is due to inadequate dietary iron intake, with only 20 percent of children under 5 consuming iron-rich foods[17]. It is estimated that two percent of anaemia is attributable to malaria (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Anaemia could also be attributed to worms and parasitic infections although 80 percent of children receive deworming tablets.

Figure 15. The prevalence of anaemia in children under 5 years of age by district (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
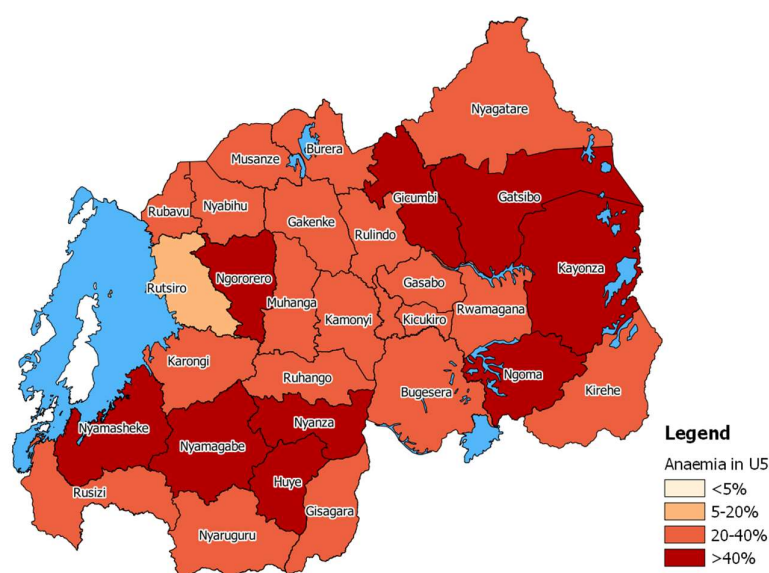
Data on micronutrient deficiencies, other than anaemia data, are not available for Rwanda. The 2015 DHS found that 86 percent children aged 6-59 months received vitamin A supplements in the six months preceding the survey whilst 74 of children consumed vitamin A rich foods in the day and night preceding the survey (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). This survey also found that salt iodisation was universal throughout the country with 99.7 percent of households using iodized salt (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). There is not yet a supplementation program that provides iron or other micronutrients (except for vitamin A) to children. The next round of the RDHS will potentially include a micronutrient survey, it is recommended that the micronutrients commonly associated with anaemia are included

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[17] For more information on the diets of infants and children refer to key message 3.

such as vitamin A, iron, folic acid, vitamin B12 and zinc. Data on calcium deficiency would also be useful (see more in the Recommendations section).

Factors Associated with Undernutrition

The 2015 RDHS and the 2018 CFSVA investigated the factors associated with undernutrition in children under five years. Both surveys found that boys are more likely to be stunted than girls (RDHS: 43 percent vs. 33 percent; CFSVA: 38 percent vs. 32 percent) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). This is a common finding in Africa but the reasons pertaining to Rwanda require further exploration. The 2015 RDHS found that IYCF practices were similar for both sexes as was vaccine coverage. The main difference found was in health seeking behaviors related to diarrhea where for a higher percentage of girls treatment was sought from a health facility (42 percent boys vs. 46 percent girls), provided with oral rehydration therapy or increased fluids (40 percent boys vs. 46 percent girls). A slightly higher percentage of boys had no treatment for diarrhea (28 percent boys vs. 25 percent girls) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). However, this difference is unlikely to explain the stunting difference between girls and boys.

In 2015 the percentage of children who had low birth weight (<2.5kg) was small at 6 percent (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Both the RDHS and CFSVA found that these children were significantly more likely to be stunted than children born at a higher weight (RDHS: 61 percent vs. 35 percent)[18] (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

The RDHS found that the prevalence of stunting was almost double in rural households compared to urban households. A similar association was found for anemia (but not wasting), although not as strong, as shown in Figure 16. This figure also shows that the reductions in both forms of malnutrition over the years have been lower in rural areas compared to urban areas (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Figure 17 shows that although children in the wealthiest households were somewhat protected from stunting and anaemia (little difference in wasting) in 2015, over 20 percent of children were still stunted and anaemic in the top quintile (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). This emphasizes that wealth is relative and that the wealthiest may

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[18] Specific numbers not provided in the 2018 CFSVA only the significant association which was (p>0.05).

still be nutrition-insecure. It also reinforces the multifaceted nature of malnutrition and that different types of interventions may be required in different wealth groups.

The RDHS found that higher educational attainment of mothers was associated with lower rates of stunting and anaemia in their children (Figure 18). The CFSVA found almost identical results for stunting[19] (47 percent stunting with no education vs. 18 percent stunting with secondary education) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). These results emphasise that literate mothers are more likely to have better access to information on nutritional education and adequate healthcare that may help to protect their child against undernutrition. Furthermore, a literate mother may generate more income than an illiterate mother, which contributes to the household's well-being.

In 2015, children whose mothers were underweight, i.e., have poor nutritional status (measured by Body Mass Index) were more likely to be stunted and wasted[20] as shown in Figure 19 (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). The 2018 CSFVA found a significant ($p < 0.05$) association between child's wasting and mother's wasting (measured by Mid Upper-Arm Circumference). Fifteen percent of children who were wasted also had a mother who was severely acutely malnourished[21] compared to 2 percent of wasted children with a well-nourished mother (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

Habyarimana, Zewotir and Ramroop (2017) ran a structured spatial additive quantile regression model using the 2015 RDHS data to better understand the determinants of childhood anaemia. In addition to what has already been discussed, the study found that Rwandan children whose mothers give birth to them before the age of 20 were more likely to be anaemic whilst children born to an anaemic mother were also more likely to be anaemic than children born to a non- anaemic mother (Habyarimana, Zewotir, and Ramroop 2017). Furthermore, an underweight child or a child suffering from wasting was found to be more anaemic than a non-underweight child or a child that does not suffer from wasting. The duration of breastfeeding was also found to significantly affect the incidence of childhood anaemia with a child who had been breastfed for less than ten months showing a decrease in childhood hemoglobin concentration (Habyarimana, Zewotir, and Ramroop 2017). Interestingly the study did not find any statistically

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[19] Anaemia data was not collected in this survey

[20] Information not available for anaemia.

[21] Criteria for defining Severe Acute Malnutrition in women not defined in report.

significant association between the place of residence, drug intake to eradicate intestinal worms, diarrhoea, the gender of the household head, the use of a mosquito bed net or whether the child was stunted (Habyarimana, Zewotir, and Ramroop 2017).

Figures 16 to 19. The prevalence of undernutrition with different background characteristics: urban and rural (Figure 16), wealth (Figure 17), mother's education (Figure 18) and mother's nutritional status (Figure 19). Type of undernutrition shown was based upon data available and where there was an association found (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
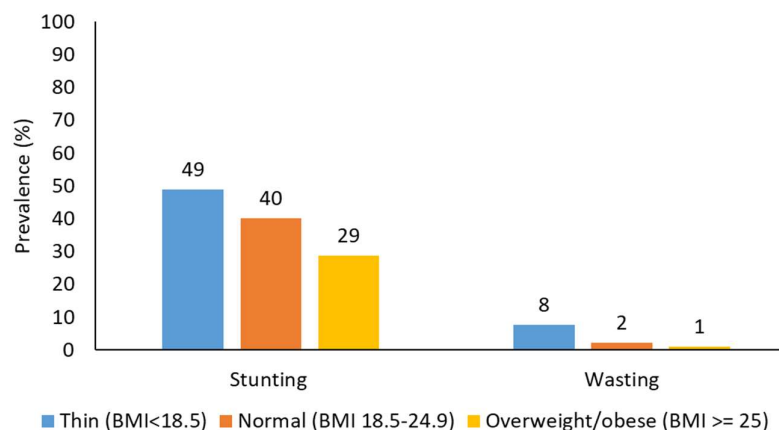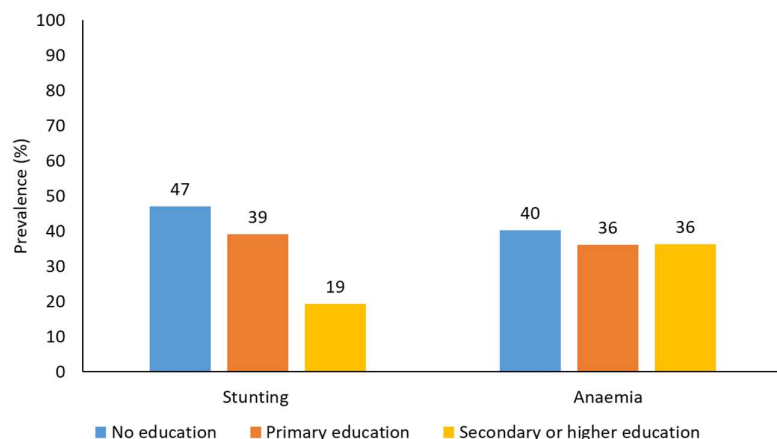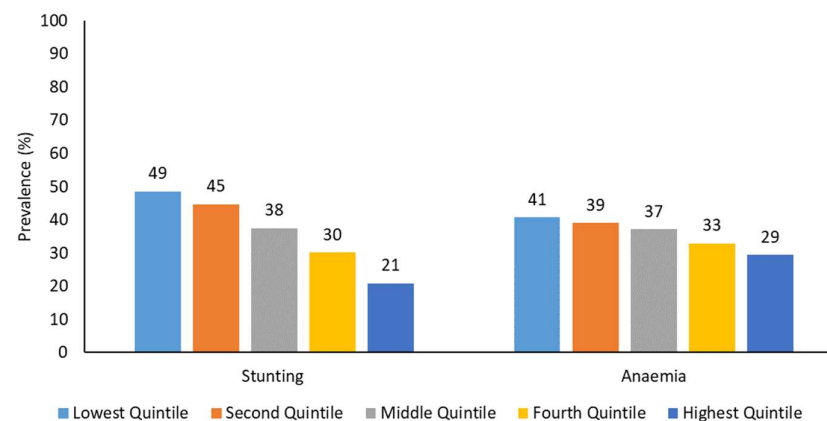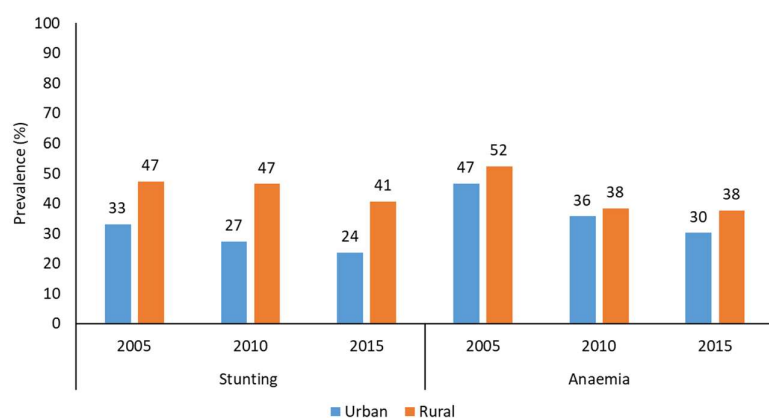
The 2018 CFSVA found that the prevalence of stunting in children under 5 years was significantly higher if children were reported to have had an episode of diarrhea, which is indicative of frequent episodes, in the two weeks prior to the survey (20 percent vs. 16 percent)[22]. Interestingly the difference varied depending on the child's age with the prevalence of stunted children who had suffered from diarrhea much higher for children aged 18-23 months (31 percent) or 24-29 months (24 percent) than for the children who were not stunted in the same age category (20 percent and 16 percent, respectively) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). These results could be indicative of poor water, hygiene and sanitation (WASH) practices particularly in the older children where they have started crawling as well as being fed complementary foods.

WASH

Significant improvements have been made in the WASH sector in the last 15 years, but rural areas require more attention. Sixty nine percent of rural households have access to an improved source of drinking water compared to 91 percent of urban households (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Furthermore, rural households experience a greater disparity in the distance to safe drinking water compared to urban households. According to the EICV4 47 percent of people living in rural areas have access to water within 500 m of their residence while 61 percent of those living in urban areas have access to water within 200 m of their residence (National Institute of Statistics of Rwanda 2015). This increases the burden on women and children who are generally responsible for fetching water. In addition, 10 percent of rural households have a dedicated place for handwashing compared to 20 percent in urban households (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

Refugee Camps

These findings emphasise that the causes of malnutrition are multifaceted with both social and economic determinants. The burden differs geographically multiple forms of malnutrition co-exist. A multifaceted problem requires multifaceted and thus multi-sectoral solutions. Funding must increase to scale up essential nutrition-specific and sensitive interventions, including WASH. Given the associations between the age[23], educational and nutritional status of mothers on the nutritional status of their children, programmes targeted at adolescent girls and women of reproductive age to ensure that they are fully grown and well-nourished before, during and after their pregnancy is essential. Much could be learnt from the refugee setting in Rwanda: when comparing

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[22] No significant correlation was observed between the prevalence of stunting and children suffering from cough and fever.
[23] 7 percent of women have given birth before the age of 18.

the host and refugee populations, the prevalence stunting is 14 percentage points lower in the refugee population on average. This difference might be due to the camps being a controlled setting that allows for: 1) high coverage of nutrition-specific and -sensitive interventions; 2) implementing partners with higher staffing levels and; 3) increased complementarity across sectors.

3. Infant and Young Child Feeding Practices

Rwanda has the best breastfeeding practices in the world. However, complementary feeding is suboptimal and precludes adequate nutrient intake. Barriers to adequate infant and young child feeding include food availability, affordability of nutritious foods, mother's health, food culture and habits, and caregivers' time constraints.

Breastfeeding

WHO recommends the initiation of breastfeeding during the first hour after birth, exclusive breastfeeding for the first six months and continued breastfeeding with complementary feeding through the first two years or beyond (World Health Organisation 2017). Colostrum in the first hour protects new-borns from acquiring infections, exclusive breastfeeding for 6 months provides the most nutritious food for the infant and protects against infections and breastfeeding during the ages of 6-12 months and 12-24 months continuous to protect against infections and can provide half and one third of energy needs, respectively, and a good share of different required nutrients (World Health Organisation 2016).

Figure 20 shows the comparison of the breastfeeding rates in Rwanda in the 2015 RDHS and the 2018 CFSVA. Rwanda has the highest prevalence of exclusive breastfeeding in the world with 87 percent of children exclusively breastfed for their first six months of life in 2015 (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). In the same year, 96 percent of children continued receiving breastmilk until their first birthday and 87 percent until their second birthday. Breastfeeding rates do not significantly change with wealth quintiles, gender, or mother's level of education. The 2018 CFSVA found similar results with the main difference being a greater reduction in the percentage of children exclusively breastfed at 4-5 months (from 81 percent to 67 percent) and the optimal introduction of complementary foods, which was already low (from 57 percent to 49 percent).

Figure 20. Percentage of children meeting IYCF indicators in Rwanda in 2015 and 2018 (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).
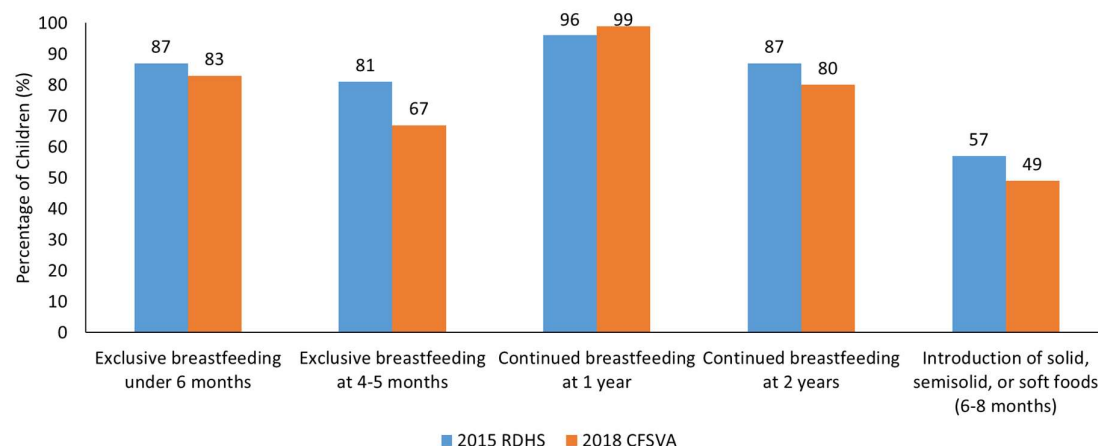
Complementary Feeding and Children's Diets

Data on undernutrition disaggregated by a child's age (in months) suggest that IYCF practices should improve. According to the 2015 RDHS stunting prevalence doubles from 10 percent in children under 6 months to 21 percent for children aged 9-11 months and reaches 49 percent among children aged 18-23 months (Figure 21). The 2018 CSFVA found a similar pattern (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). For many children as Figure 20 shows, complementary feeding does not begin at the recommended age: only 49 percent begin receiving solid, semisolid, or soft foods at 6-8 months, as required to meet nutritional needs. Thirty three percent of children receive complementary foods and liquids too early whilst 18 percent receive these foods too late (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

Figure 21. Trends in stunting prevalence by a child's age (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
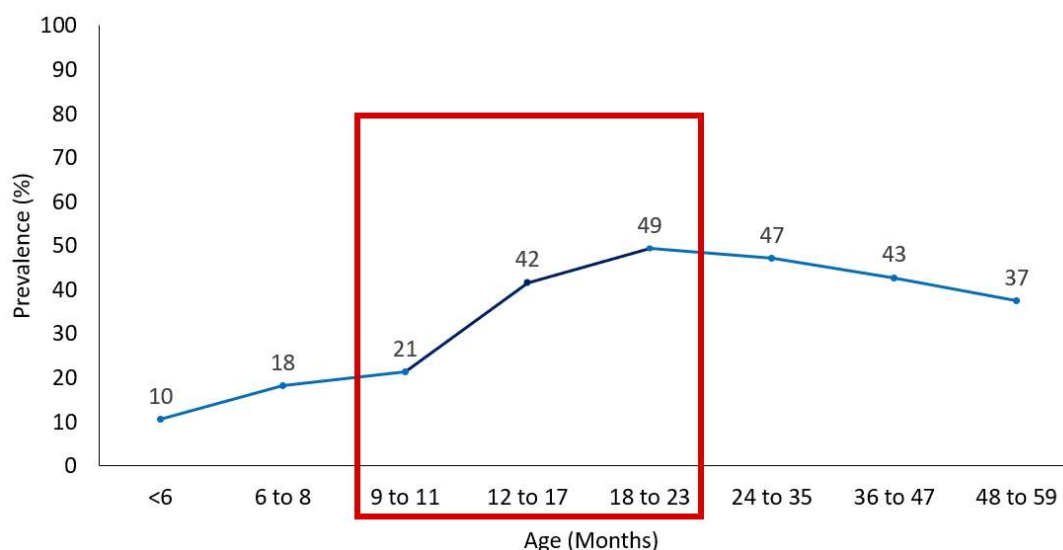
WHO recommends that from 6 months of age children are fed a diverse diet (at least 4 food groups) twice a day for children 6-8 months and three times a day for children 9-23 months with continued breastfeeding. If a child is no longer breast feeding WHO recommends a child receives milk or milk products twice a day with the same food frequency and dietary diversity. These criteria are referred to as the Minimum Acceptable Diet (MAD).

There has been little improvement in the percentage of children aged 6-23 months who were fed MAD over the last nine years. Between 2010 and 2015, diversity and frequency reached only 17 percent and 18 percent respectively according to the RDHS (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2012, 2015). The 2018 CFSVA also found little improvement in MAD, which was estimated nationally at 17 percent (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). According to the 2015 RDHS, MAD varies by region, Kigali having the highest (RDHS: 30 percent; CFSVA 22 percent) and the Western region the lowest (RDHS: 11 percent; CFSVA: 13 percent).

Between 2010 and 2015, achieving Minimum Dietary Diversity (MDD) was a greater barrier than achieving Minimum Meal Frequency (MMF) but, according to the RDHS, both indicators were low at 30 percent and 47 percent of children respectively (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). However, the 2018 CFSVA found the two indicators reversed, with 40 percent of children achieving MDD and 34 percent achieving MMF (United Nations World Food Programme,

National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

The 2015 DHS found that children aged 6-8 months were less likely to reach MAD compared to a child aged 18-23 months (12 percent vs. 22 percent) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). The CFSVA found that the achievement of MAD did not vary according to the child's age; however, as a child got older their dietary diversity increased whilst their meal frequency decreased (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). These results are aligned with qualitative research exploring local practices and knowledge of IYCF practices and are discussed below.

Figure 22 shows that in 2015 MAD, MMF and MDD improve by wealth quintile, though even in the highest quintile it does not surpass 31 percent (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). This finding indicates the possibility that wealth is relative and that limited economic access to nutritious foods for a family, and hence also for the child, could affect even the wealthiest group[24]. It also may suggest that different types of interventions are required in different wealth groups e.g. increased incomes required for the poorest and nutrition education needed for the richest. Children in urban areas were more likely to achieve MAD compared to children in rural areas (30 percent vs. 16 percent) as well as children whose mother completed secondary school or higher (34 percent vs 10 percent with no education) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). The 2018 CFSVA also found a significant association between the percentage of children achieving MAD if their mothers achieved MDD (31 percent vs. 14 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

The percentage of children achieving MAD and the prevalence of stunting were found to be correlated in the 2018 CFSVA. A child that met the MAD requirement was less likely to be stunted. Significant differences, however, were only observed in the cohort for children aged 18-23 months, where the percentage of stunted children reaching MAD was significantly lower than the percentage among children who were not stunted (13 percent vs 21 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). This result is aligned with the data presented in Figure 21, highlighting the contribution that

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[24] Detailed further in key message 7.

inadequate complementary feeding, particularly between the ages of 6 – 11 months is making to the prevalence of stunting.

Figure 22. The percentage of children aged 6-23 months achieving MAD, MMF and MDD by wealth quintile in 2015[25] (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
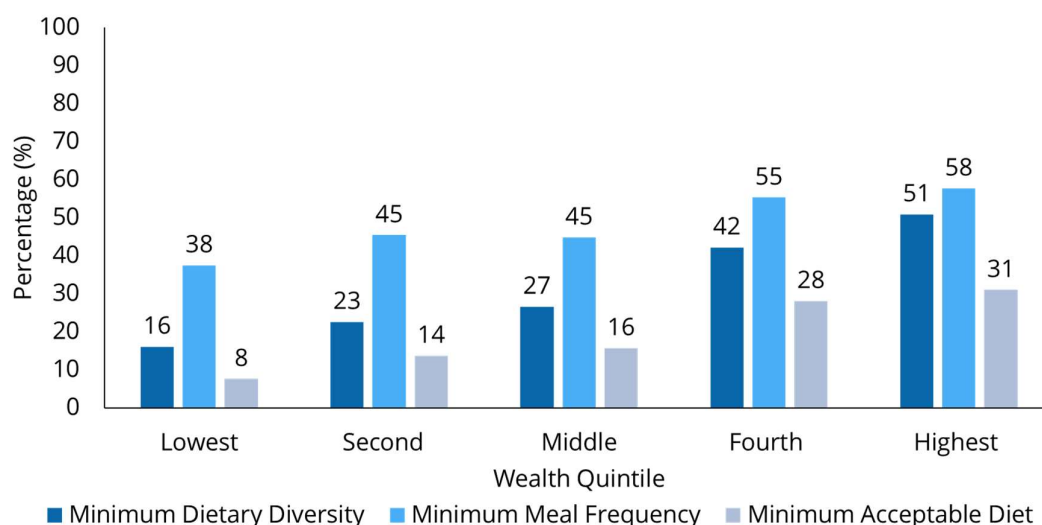
Figures 23 and 24 show the percentage of children aged 6-23 months who consumed different food groups in the last 24 hours proceeding the 2015 RDHS and the 2018 CFSA. Although the classification of the food groups are slightly different, both figures show that children's food consumption has not changed substantially in recent years with fruit and vegetables rich in vitamin A, legumes and nuts, cereals and tubers making up the majority of the diet (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

The main and very positive difference is the increase in the percentage of children who reported consuming dairy products, flesh[26] and fortified foods. Animal source foods provide important contributions to essential micronutrients such as vitamin B12, iron, calcium and zinc but tend to be expensive. The consumption of fortified foods, such as fortified blended flour, which in Rwanda is provided to the poorest wealth groups through the *Shisha Kibondo* program can provide an important contribution to micronutrients and improve nutrient intakes. The 2018 CFSVA found that children aged 12-23 months who consumed the product were significantly less stunted. This was

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[25] Analysis not available in the 2018 CFSVA.
[26] Although, as flesh and fortified foods are grouped together in Figure 24 it is not known whether the consumption of meat, fish and poultry products has increased from 2015 or not.

particularly true for children aged 18-23 months where stunting was half (20 percent) in those children consuming the product compared to those not consuming the product (40 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

The percentage of children consuming dairy products rose from 1 percent in 2015 to 22 percent. This could likely be due to the increased Government investment in the dairy industry (discussed further key message 6). The CFSVA also found a significant association between the consumption of dairy products and stunting in older children (12-23 months) emphasising the important contribution of micronutrient such as vitamin A, B12, calcium and zinc this food group can provide (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

It is important to note that the data presented in Figures 23 and 24 show frequency of consumption and not quantities, hence it is not known whether sufficient amounts are consumed by the children to meet their nutrient needs. Evidence suggests that food quantities fed to small children are often inadequate, in addition to not being sufficiently diverse (Karumba and Griffiths 2009).

Figure 23 and 24. Percentage of youngest children under age 2 who are living with their mothers, by type of foods consumed in the day or night preceding the interview in 2015 (left) and 2018 (right) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).
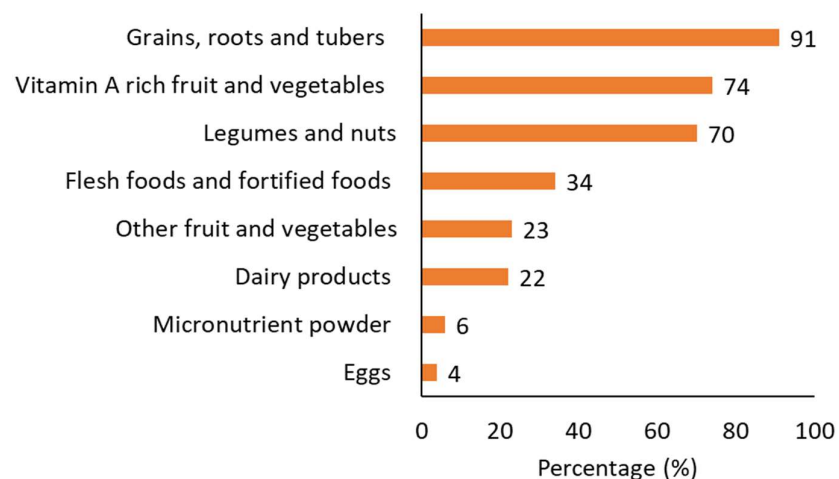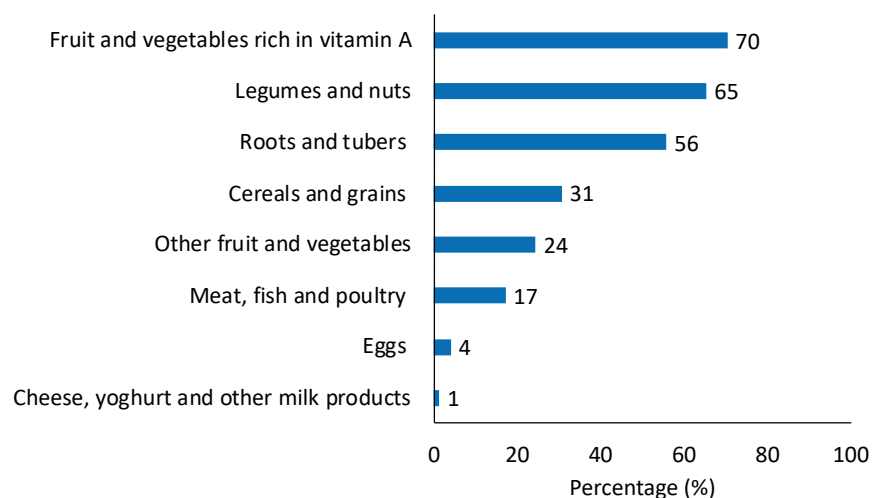
Despite improvements, the low consumption of animal source foods parallels that of the household's diet, discussed in key message 1, suggests that food availability and economic access are important barriers to adequate complementary feeding. Indeed, several studies of complementary feeding identify economic access as a major barrier (RTI International 2018). According to one father in Rusizi district, "You offer small children the same food you eat because that is what is available in the home" (Thuita 2011). Another 2009 qualitative study also supports this finding, with mothers citing cost of nutritious foods as a barrier to implementing the complementary feeding recommendations they had received (Karumba and Griffiths 2009).

The CotD software was used to model the cost of the complementary feeding recipes recommended by the Ministry of Health (Ministry of Health 2014)[27]. These recipes include foods such as soybeans, tomatoes and fresh fish which, although very nutritious, are also expensive. Figure 25 shows that the first two recipes which include fresh fish (which was more expensive than dried fish on the market), on average double the cost of the nutritious diet for the child aged 6-23 months. The third recipe includes dried fish, but still increases the cost of the nutritious diet. Therefore, the recommended complementary feeding recipes may not be affordable for many households, especially poorer ones. These results support the finding that accessibility and availability of nutritious foods may be negatively impacting the diets of young children. Alternative foods that could be included in the recipes, which were found to be inexpensive and nutritious by the CotD analysis were groundnuts, avocado, milk and sorghum.

Figure 25. Daily cost of a nutritious diet for a child aged 6-23 months, with different complementary feeding recipes.

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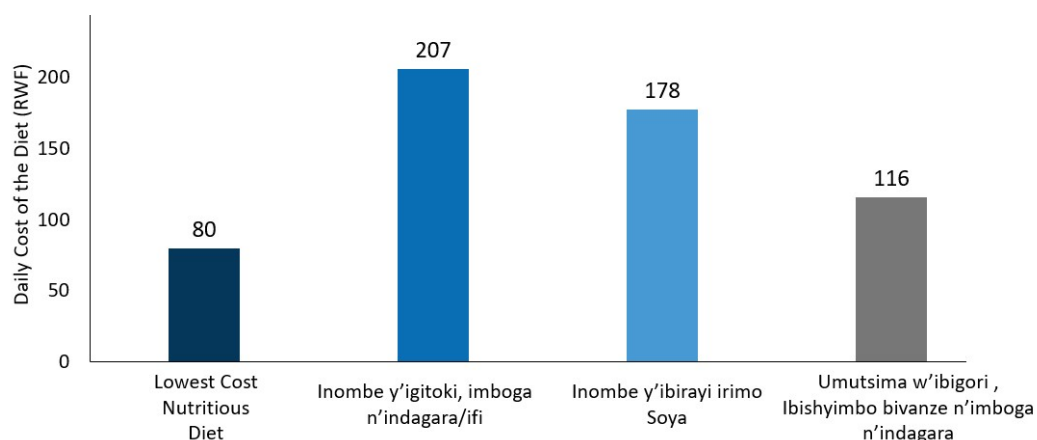
[27] For details of the recipes and modelling assumptions, please see Annex 4.

Barriers to Adequate IYCF Practices

Besides limitations in food availability and accessibility, there are additional barriers that inhibit optimal IYCF practices, as identified in different studies of child feeding practices in Rwanda (Global Alliance for Improved Nutrition (GAIN) 2016; Karumba and Griffiths 2009; Thuita 2011; RTI International 2018).

There is evidence of knowledge and information gaps, of parents with uncertainty or misinformation about child feeding, including the duration of breastfeeding, frequency and quantity of feedings, and appropriate timing and foods for complementary feeding. One study found that health workers sometimes gave out erroneous information to mothers (Karumba and Griffiths 2009). With regards to feeding practices and customs, a major problem is that the porridge generally fed to small children is too diluted (watery), with caretakes not knowing that it should be thick (Karumba and Griffiths 2009; Thuita 2011; Umugwaneza 2017). Furthermore, the porridge is often unenriched, with caretakers unaware that adding foods such as groundnut powder, dried fish, oil, or avocado could be appropriate and relatively affordable ways to improve the child's diet (Karumba and Griffiths 2009; Global Alliance for Improved Nutrition (GAIN) 2016). In some cases, myths and beliefs about what foods are appropriate or not for small children stand in the way of optimal feeding practices (Thuita 2011; Global Alliance for Improved Nutrition (GAIN) 2016). The lack of assisted feeding and of dedicated bowls for the child also impedes optimal feeding (Karumba and Griffiths 2009). Finally, some parents report feeding water, herbal remedies, or small sips of beer or banana wine to their child as they believe this is a remedy for stomach worms, whereas this is not recommended (Karumba and Griffiths 2009). The 2018 CFSVA found that the coverage of nutrition education could be improved with only half (48 percent) of women stating that they received counselling or education on nutrition. This figure includes women from all provinces and all levels of education (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

Time poverty – that is, a scarcity of time due to high workloads in and outside of the house – play a role in limiting caretakers ability to feed children the right foods (adequate quantities, qualities and diversity) often enough (feeding frequency) to meet their nutrient needs (RTI International 2018). In Rwanda, women carry the principal responsibility for feeding young children. By holding a disproportionate amount of responsibility for domestic, childcare, and food preparation (discussed further in key message 4), mothers may not have enough time to feed their children diverse and frequent meals tailored to their specific nutritional needs. Caretakers require not only the economic resources, but also time and a supportive environment (e.g. engaged

fathers, supportive community, childcare services, enabling legal and economic context) to be able to meet their children's nutritional needs (RTI International 2018).

High fertility rates and lack of birth spacing was also found to lead many women to provide complementary foods too early (Karumba and Griffiths 2009), highlighting the need for continued efforts to promote sexual and reproductive rights, services, and information for women and men, including for adolescents. The health and nutritional status of the mother was also identified as a factor which impeded sufficient breastfeeding (Thuita 2011).

Cost of the Diet Modelling

To better understand how effective different types of interventions could be in reducing the cost of a nutritious diet for a child under 2 years of age, four different models were included in the Fill the Nutrient Gap analysis as requested by stakeholders. These span across different entry points and transfer modalities and range across both short-term and long-term solutions. For a full list of assumptions and specifications for each model, please refer to Annex 4.

Figure 26 shows that both fresh foods, specialised nutritious foods and home fortificants have the potential to reduce the cost for the age group, with fortified blended flours showing the greatest impact in terms of direct reduction of cost. It should be noted that no single one of these interventions is considered a silver bullet, but that only the combination of short-term and long-term interventions can make a sustained impact in the nutrition of this target group. It may therefore be the case that a longer-term solution associated with increasing the production of nutritious foods[28] addresses the nutrient gap the best, but that there is also a programmatic need to act immediately in the short-term, for which *Shisha Kibondo* (fortified blended food) provides a first solution. The largest reduction in cost does not imply that the intervention is the best solution. As the CotD analysis only looks at cost to the household, the cost to the implementer are not considered and may make different interventions more or less feasible.

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[28] See key message 6 for more information.

Figure 26. The daily cost of a nutritious diet in RWF for a child 6-23 months with various nutrition specific interventions.
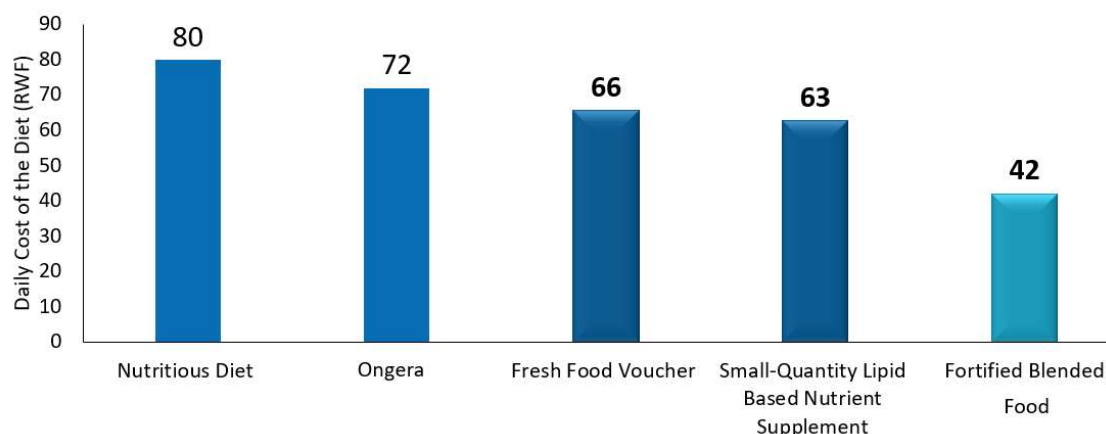
4. Adolescent Girls and Women's Nutritional Status and Diets
The nutrient needs of women and adolescent girls are high. Although the rate of thinness is decreasing, overweight and obesity in women is rising. Data on women and adolescent girls' diets, micronutrient deficiencies and the causes of overweight and obesity is lacking. Gender inequality at household level may be negatively impacting women, girls' and children's nutrition.

Nutritional Status of Women and Girls
While thinness in women aged 15-49 declined from 10 percent to 7 percent from 2000 to 2015, overweight or obesity increased by 9 percentage points in the same period. The prevalence of overweight or obesity in women in 2015 was more than three times as high as that of men (21 percent compared to 6 percent) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

Overweight and obesity in women is highest in Kigali (24 percent), in higher wealth quintiles (36 percent) (Figure 27) and women aged 30-39 years (19 percent), while thinness is higher in lower wealth quintiles (10 percent) and the South (9 percent) and East (7 percent). Thinness is also highest in adolescent girls aged 15-19 years (10 percent) compared to older women (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

The IHME data shows that the dietary risk factors related to increasing overweight and obesity are on the rise, including high blood pressure and high fasting plasma glucose, the 6th and 7th ranked risk factors driving death and disability in Rwanda (Institute of Health Metrics and Evaluation 2019). The rising rates of overweight in women concurrent

with high stunting in children indicates that Rwanda must start taking preventative action against the double burden of malnutrition.[29]

Nineteen percent of women aged 15-49 are anaemic. Great progress was made in reducing anaemia in women from 2005 to 2010 (from 26 percent to 17 percent in 2010) but it has since slowed (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Figure 27 shows that the burden of anaemia is highest in the East and South of the country. As with children, the causes of anaemia in women are unclear and a micronutrient survey is recommended. Almost three quarters of women (73 percent) sleep under a mosquito net during pregnancy, whilst 49 percent of women received deworming tablets during pregnancy (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

Figure 27. The prevalence of anaemia in women by district in Rwanda (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
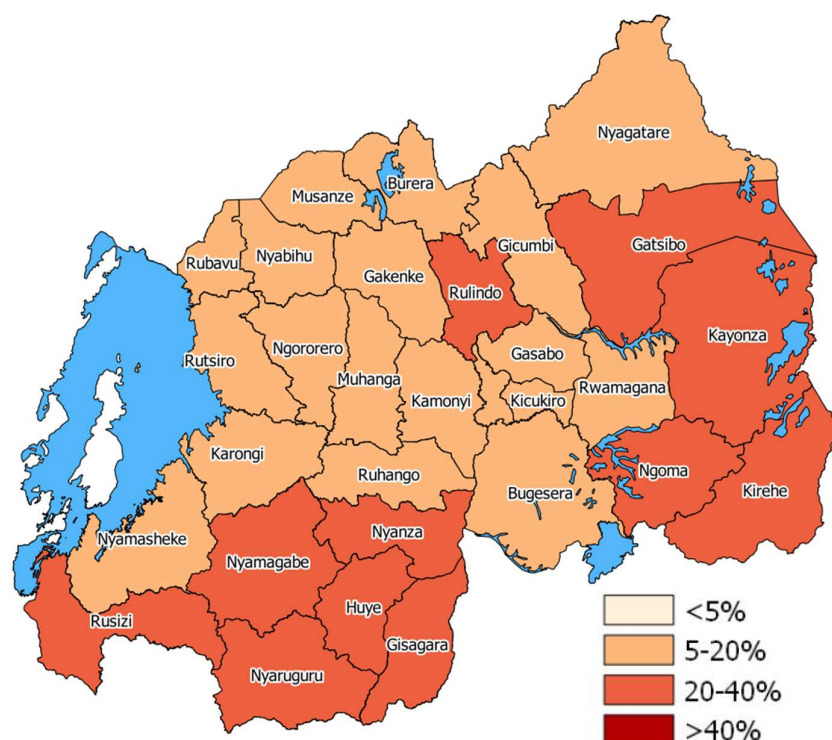
A driving factor of anaemia could be a lack of iron rich foods in women and girls' diets, which are dominated by staples and beans, which are high in phytates that hinder iron

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[29] The double burden of malnutrition is characterized by the coexistence of undernutrition with overweight and obesity, or diet-related noncommunicable diseases, within individuals, households and populations, and across the life course.

absorption, and contain little animal source foods and iron-rich vegetables (Figures 30 and 31 explained further below). In 2015, only 3 percent of women took iron tablets or syrup for the recommended 90 days or more during pregnancy (68 percent took them for 60 days) (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). The 2018 CFSVA found that this figure had increased somewhat to 27 percent, but is still low (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). This low intake of iron, particularly during pregnancy, is impacting the nutritional status of their children. Figure 28 shows that the prevalence of anaemia in children aged 6-8 months is very high at 72 percent, suggesting poor iron stores laid down during pregnancy.

Figure 28. The prevalence of anaemia in children by age in Rwanda (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).
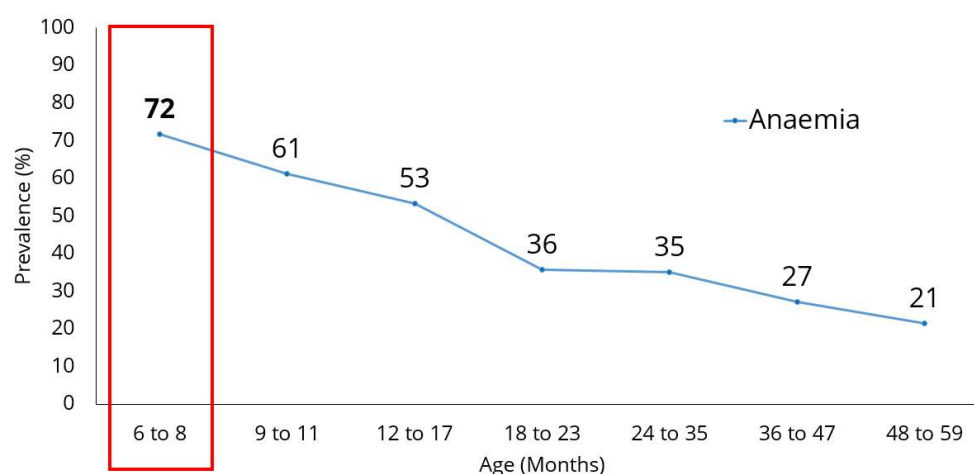
Diets of Women and Girls

The CotD analysis reveals that PLW and adolescent girls require 58 percent of household cost of a nutritious diet, making their nutrient needs the most expensive to meet. Figure 29 shows that the cost of the diet is even higher for the adolescent girl than the PLW, hence a focus on meeting the nutritional needs of this target group is essential to ensure they are well nourished to safeguard their own health and that of their future children. Figure 29 shows the proportion of energy and iron requirements for the household attributed to different members. This highlights that iron needs drive the cost of a nutritious diet in Rwanda, not energy as is often assumed. For example, the adult man requires the highest proportion of energy but a much lower proportion of iron than the PLW and the adolescent girl.

Figure 29: Proportion of household cost of the nutritious diet, energy and iron requirements by household member.
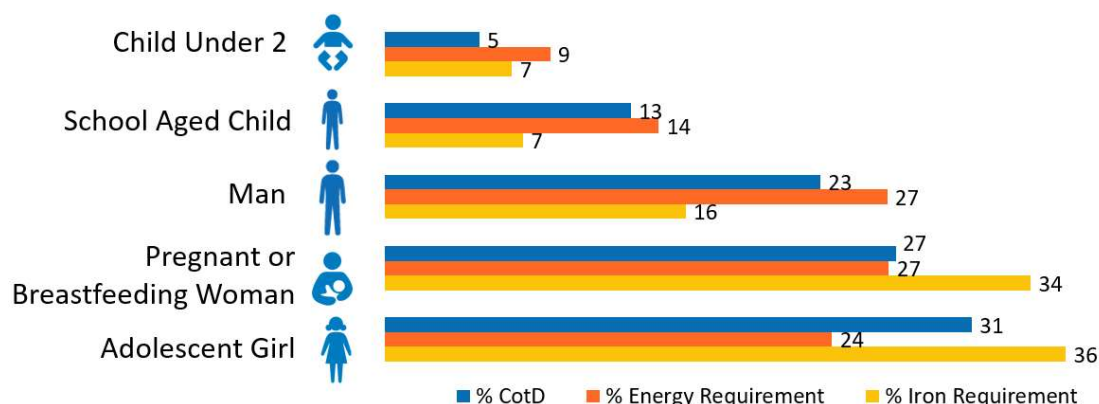
The 2018 CFSVA found less than a third (28 percent) of women aged 15-49 years achieved minimum dietary diversity, which Is defined as consuming 5 or more food groups in the previous 24 hours of the interview (MDD-W) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015). MDD-W improved with wealth with only 8 percent of women in the poorest wealth group achieving minimum dietary diversity compared to 58 percent in the wealthiest group. This finding emphasizes the possibility that economic access to foods is a major barrier to adequate nutrient intake in Rwanda. The majority of women consumed 3 (30 percent) or 4 (20 percent) food groups (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018).

Figures 30 and 31 show that food consumption in women is similar to that of the household and has not changed since 2015. Unfortunately, MDD-W was not calculated in the 2015 CFSVA so it is not possible to compare. Both figures show that the diets of women mostly comprise of staples, pulses and green leafy vegetables and the consumption of micronutrient rich foods, particularly vitamin A rich foods and animal source foods, is low. There was a 7 percentage point rise (from 10 percent to 7 percent) in women who consumed meat, fish and poultry from 2015 to 2018 but no difference in the consumption of dairy and eggs (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).

Figures 30 and 31. Percentage of women in 2015 (left) and 2018 (right) consuming different food groups the day before the survey (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018).
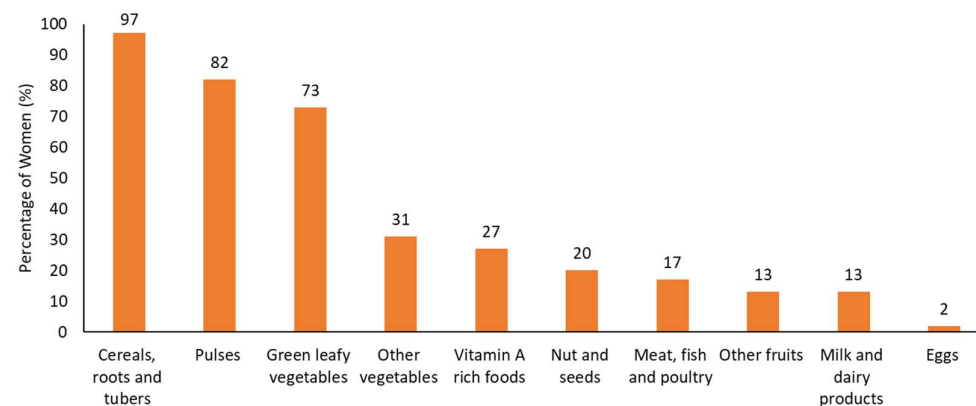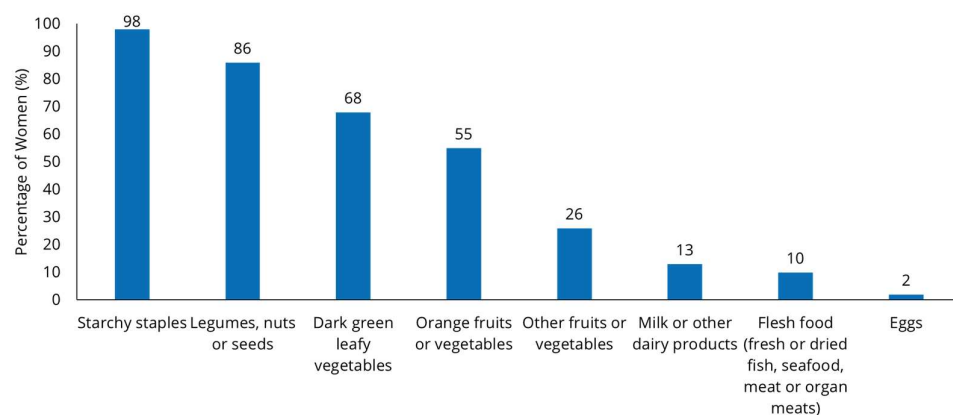
Qualitative findings from other studies have also found that despite increased nutrient requirements during this lifecycle phase, the diets of pregnant and lactating mothers were reported to be largely similar to the rest of the family members (Thuita 2011). Limited market availability and economic accessibility of nutritious foods, especially animal-source foods, are reported as major barriers to women consuming a nutritious diet (Thuita 2011). Even when women's particular nutrition needs were recognized by family and community members, unavailability and inaccessibility – exacerbated by poverty and low agricultural productivity – inhibited the consumption of sufficient and diverse nutritious foods (Thuita 2011). This finding highlights that nutrition education as an intervention on its own may not be enough to change dietary habits unless coupled with interventions that improve the access and availability of these foods. Furthermore, evidence suggests that certain harmful myths and beliefs persist with regards to women's nutrition, in particular that some nutritious foods such as avocado, cassava leaves, pumpkin, sweet potato and pork should be avoided during pregnancy. However, other beliefs are potentially beneficial, such as the belief that cassava leaves and meat increase the production of breastmilk (Thuita 2011).

Comparatively little is known about the nutrition, health and diets of girls and boys aged 10-14 as they are generally subsumed into the category of children, a data gap which makes it difficult to assess trends and needs (Presler-Marshall and Stavropoulou 2017). Concurrently, girls 15-18 are often subsumed into the category of women of reproductive age. A lack of data and evidence makes it difficult to learn from existing programming and identify the most effective and sustainable interventions to protect girls of different ages (Presler-Marshall and Stavropoulou 2017). The 2015 RDHS found that on average, 21 percent of girls are pregnant by the age of 18 whilst 7 percent have given birth before the age of 18 (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

A CotD scenario model was run to better understand how the cost of a nutritious diet changes if an adolescent girl was to become a PLW. As demonstrated by Figure 29, adolescence is a time of increased micronutrient requirements for girls, which further increases should they become pregnant or breastfeed. Figure 32 shows that these increased requirements of adolescence equate to an 18 percent higher cost of a nutritious diet compared to a woman aged 19-59 years (reproductive age). Given that a younger age at first birth of the mother has been associated with an increased risk of stunting in children in Rwanda[30] this analysis therefore further demonstrates the need to delay age of marriage and first pregnancy until adult as well as target adolescent girls

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[30] As discussed in key message 2.

with nutritional interventions and provides impetus to promote family planning and sexual and reproductive health education.

Figure 32. The daily cost of a nutrition diet in RWF for an adolescent girl and a woman for reproductive age.
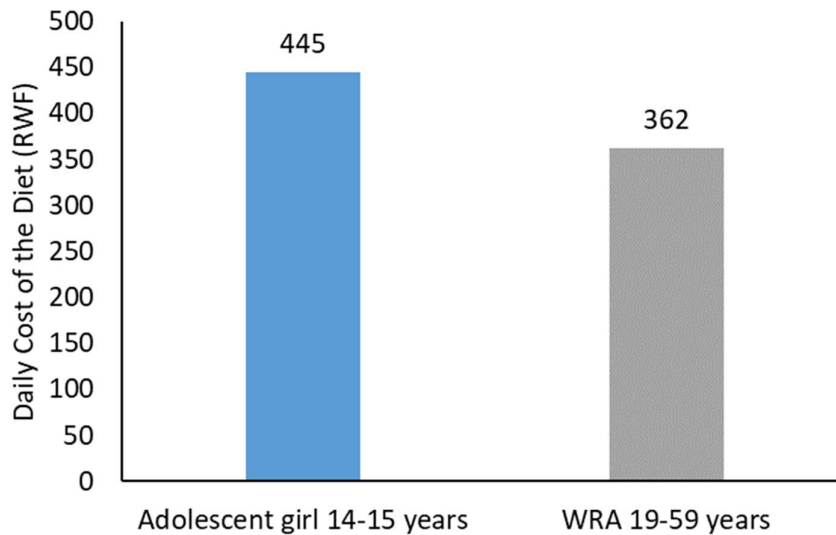
Cost of the Diet Modelling

To better understand how effective different types of interventions could be in reducing the cost of a nutritious diet for an adolescent girl and a PLW, four different models were included in the Fill the Nutrient Gap analysis as requested by stakeholders. These span across different entry points and transfer modalities and range across both short-term and long-term solutions. For a full list of assumptions and specifications for each model, please refer to Annex 4.

Figure 33 shows that a fortified blended flour reduced the cost of the nutritious diet the most for both target groups: by 27 percent for the adolescent girl and 22 percent for the PLW. These results emphasise the importance of improving the access and availability of micronutrient rich foods available to nutritionally vulnerable target groups through a range of entry points. It is important to note that the interventions modelled were nutrition specific interventions that are essential in the short term to improve nutrition on a population level. This analysis does not suggest that this is all that needs to be done. It is essential that longer term interventions that improve the access and availability of nutritious, fresh foods are undertaken in conjunction with short term solutions so that nutrition security is sustainable. These longer-term solutions were modelled at a household level and are discussed in the next sections of this report.

Figure 33. The daily cost of a nutritious diet in RWF for an adolescent girl and a PLW with interventions to improve access to nutrients as proposed by stakeholders.
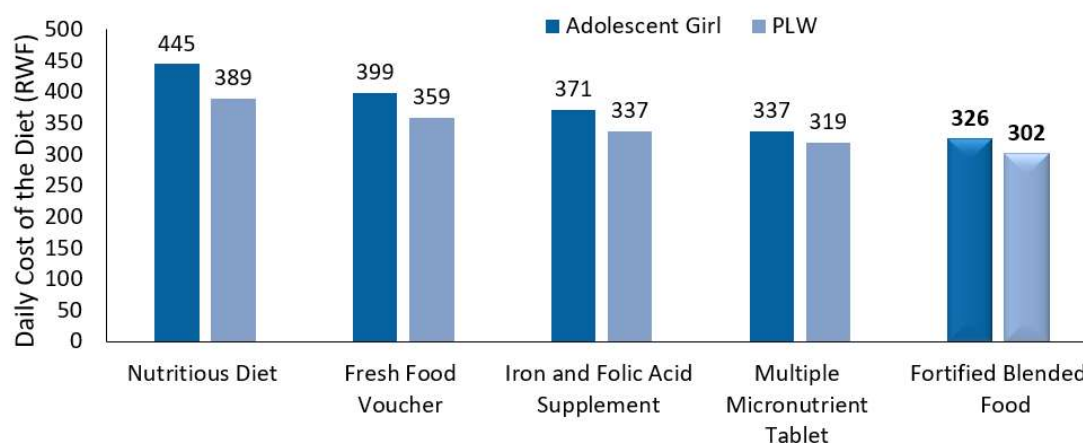
The WFP country office were also interested in understanding the difference in the reduction in cost between the provision of SuperCereal[31] (commonly given to PLW), Nootri Mama which is a locally produced fortified blended flour and SuperCereal Plus[31] provided by the Clinton Health Access Initiative (commonly given to children under 2 years but also being provided to PLW in some WFP programmes in East Africa). Figure 34 shows that SuperCereal Plus has the greatest reduction in cost for both an adolescent girl (37 percent) and a PLW (26 percent). The impact of programming and the global supply chain of both products would need to be considered before a change in programming.

Figure 34. The daily cost of a nutritious diet in RWF for an adolescent girls and a PLW with different formulations of fortified blended flours.

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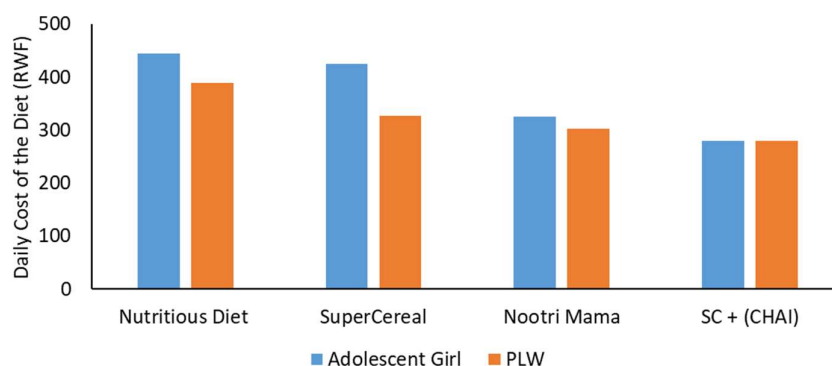
[31] WFP specifications.

Barriers to Adequate Diets for Women and Girls

Gender inequalities may be negatively impacting women's nutrition. What roles and responsibilities women, men, girls, and boys are assigned in their households, communities, and government affect their abilities to achieve nutritious diets. Gender-related inequalities – like access to decision-making and incomes – as well as the perceived "value" of women, men, boys and girls can impact food habits, coping strategies, diets, and ultimately nutrition outcomes (World Food Programme 2015). Research has shown that Rwandan women who are unable to decide on daily tasks and take charge of their time are 19 percent more likely to have stunted children (Lung'aho et al. 2015) .

Rwanda has made important strides in gender equality, especially at government level, where it has the world's highest rate of women's parliamentary representation (Presler-Marshall and Stavropoulou 2017), as well as a minimum 30 percent quota for women in all decision-making positions (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018). Yet, at lower levels of government women remain under-represented, for example, with only 16.7 percent of mayors being women.

These inequalities seem also to persist at community and household levels, where evidence suggests that women are culturally dependent on men and social norms encourage women and girls to comply with men's decisions (Colverson 2018; National Institute of Statistics of Rwanda 2016a; Presler-Marshall and Stavropoulou 2017). Despite progressive land ownership and inheritance laws, women's control of resources and high-value assets including land remains challenging, due to patriarchal social norms and beliefs (Ministry of Gender and Family Promotion 2018). Studies also suggest that young girls and adolescents have less voice and agency than their male counterparts, and that they are socialized from an early age to take on caring roles rather than prioritize their personal aspirations, unlike boys who tend to be considered as the future primary income-earner (Presler-Marshall and Stavropoulou 2017).

Women hold the majority of the responsibility for children, spending on average 25 hours per week on unpaid domestic work compared to 8 hours for men (National Institute of Statistics of Rwanda 2016b). Men's role in nutrition is mostly limited to provision of money to purchase food (Thuita 2011), and women spend on average 7 hours more than men per week on cooking (National Institute of Statistics of Rwanda 2016b). Despite labor force participation rates being equal for men and women (87 percent), culturally men are seen as the family breadwinners (Colverson 2018).

Gender-based violence is also an issue particularly impacting women and girls in Rwanda, with 22 percent of women compared to 5 percent of men reporting having

experienced sexual violence at least once in their lifetime (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). Though the government is committed to promoting the human rights of women and girls, different forms of violence continue to take place. Qualitative studies indicate that violence towards women is often seen as men's right, as shown, for example, by 45 percent of girls aged 15-19 believing that wife-beating can be justifiable under certain circumstances (namely: 33 percent if a wife neglects her children, 25 percent if a wife refuses sex with her husband, and 25 percent if a wife goes out without telling her husband) (Presler-Marshall and Stavropoulou 2017).

The fertility rate of women and girls and their access to reproductive health services also contributes to their, and their children's, health and nutrition status as well as to their enjoyment of their human rights. While Rwanda has made rapid and important progress in reducing fertility, the national rate remains high at 4.2 children per woman: 4.3 in rural areas and 3.6 in urban areas (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015). This is a two child per woman decrease since 2005, and there is space for reducing it further. Survey data also shows that knowledge of at least one contraceptive method among women and men age 15-49 is nearly universal in Rwanda, however, 19 percent of currently married women have an unmet need for family planning services (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015).

5. Education and School Feeding
Rwanda's efforts to prioritize children's primary education have been successful but secondary school enrolment remains low. As girls enter adolescence, persisting gender inequalities put them at an academic disadvantage. Given the associations between maternal education and child malnutrition, keeping girls in school is an important priority.

School Enrolment and Attendance
Primary school attendance is near universal in Rwanda, with a net attendance rate of 88%, thanks to the government's concerted efforts (National Institute of Statistics of Rwanda (NISR) 2018). Between 2014 and 2017 attendance rates stagnated at both primary and secondary levels, with a net secondary attendance of merely 23% at national level (National Institute of Statistics of Rwanda (NISR) 2018). Attendance rates for secondary school are twice as high in urban areas compared to rural areas, and are about five times higher for children in the richest quintiles (National Institute of Statistics of Rwanda (NISR) 2018). The World Bank Human Capital Index shows that though Rwandan children can expect to complete 6.5 years of school by the age of 18, this is only equivalent to 3.8 years when adjusted for quality of learning (World Bank 2018). School enrolment drops substantially after primary school for both girls and boys, with girls slightly outnumbering boys in primary (by 1 percent) and secondary school (by

almost 4 percent) (National Institute of Statistics of Rwanda (NISR) 2018). Yet, evidence suggests that girls' advantage over boys disappears as they progress through adolescence. Age disaggregation shows that though twice as many girls as boys aged 13-15 are in lower-secondary school, by the last year of secondary school enrolments equalize, and by age 17, boys outnumber girls (Presler-Marshall and Stavropoulou 2017). Furthermore, boys score higher on both the lower and upper secondary school leaving exams (Presler-Marshall and Stavropoulou 2017). The majority (55 percent) of students enrolled at tertiary level are male (Presler-Marshall and Stavropoulou 2017).

Persisting gender inequalities are likely to be putting girls at this academic disadvantage. Girls spend on average 4-6 hours more per week on unpaid domestic work compared to boys (National Institute of Statistics Rwanda 2012), leaving them less time for schoolwork. Evidence also indicates that classmates and teachers perpetrate sexual violence against adolescent girls, with a third of men admitting to having sexually abused an adolescent girl when they themselves were in school (Slegh and Kimonyo 2010). Furthermore, sexual and reproductive health for adolescents requires strengthening to facilitate school attendance. As previously mentioned, 21 percent of girls are pregnant by the age of 18, and seven percent of girls have had a child by the time they turn 18, leading some of them to leave school early (National Institute of Statistics of Rwanda, Ministry of Health, and ICF International 2015; Presler-Marshall and Stavropoulou 2017).

Girls are ten times more likely than boys to become HIV+, which suggests adolescent girls have inadequate access to, and decision-making power over, their sexual and reproductive health (Bloom, Cannon, and Negroustoueva 2014; Presler-Marshall and Stavropoulou 2017). The evidence also indicates that many adolescent girls experience their sexual debut on a transactional basis, which could suggest a vicious circle between poverty, lacking sexual and reproductive health services, and interrupted education, with negative consequences for the nutritional status and mental health of the adolescent girl (Presler-Marshall and Stavropoulou 2017). Given the associations between maternal education and child malnutrition presented in key message 2, keeping girls in school and ensuring the quality of their education is essential.

Cost of the Diet Modelling

School meals are a crucial platform to improve the nutrient intake for school aged children. Currently there are three school feeding programmes operating in Rwanda, two of which are government funded and operated. One is a Ministry of Agriculture (MINAGRI) funded school milk programme, called One Cup of Milk per Child, which serves milk twice per week to students in pre-primary and grades 1-3. The other is a Ministry of Education (MINEDUC) funded programme that subsidizes meals cooked at secondary schools[32]. The third programme is implemented by WFP, providing a cooked lunch to primary and lower secondary schoolchildren in food insecure districts[33].

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[32] The ration is a hot meal consisting of fortified maize meal, beans, vegetable oil and salt.
[33] Which consists of SuperCereal and sugar.

However, coverage of these programmes is low and, taken together, they only reach 10 percent of all students in pre-primary, primary and secondary schools in Rwanda.

A CotD analysis was run to determine the potential impact that the three school meals programmes could have on improving access to a nutritious diet for school aged children. The quality of the school meal was also assessed by the CotD software and additional models were run to determine what inexpensive, locally sourced foods could be used to improve the micronutrient content of the meals. For more details on the assumptions made for these models refer to Annex 4.

Figure 35 shows that each meal provides an important contribution to nutrients and thus reduces the cost of a nutritious diet. Both Package 1[34] and Package 2[35] reduce the cost of the diet the most, by 25 percent.

Figure 35. The daily cost of a nutritious diet in RWF for a school aged child with the three current school feeding programmes.
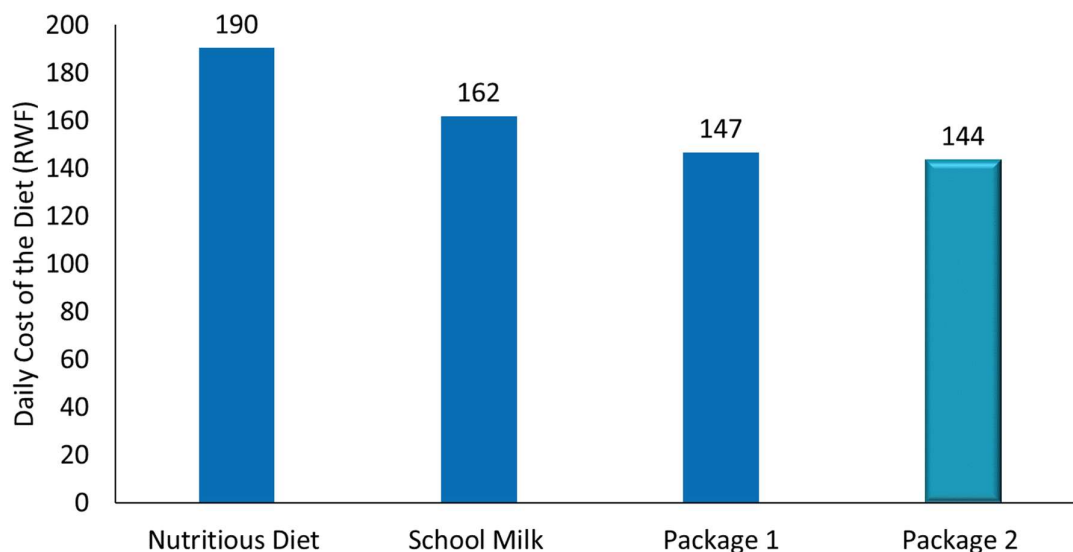
Figure 36 shows the percentage nutrient requirements met by the three school meal options for a school age child. There are no minimum nutritional standards for school meals in Rwanda but according to a FAO review of nutrition guidelines and standards for school meals from 33 low- and middle-income countries, these tend to be set at 30 percent of all nutrient requirements (Food and Agricutural Organization 2019). The black line in Figure 36 represents this threshold. Given the high rates of anaemia in women and children (indicative of micronutrient deficiencies) it would be beneficial if the

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[34] SuperCereal and sugar.
[35] Fortified maize flour, beans and oil.

minimum requirements for micronutrients such as vitamin A, folic acid, vitamin B12, iron, calcium and zinc were set to 50 percent.

The figure below shows that the school milk intervention provides the lowest percentage of nutrients, overall. It does, however provide vitamin B2 and B12 requirements over the 30 percent threshold and a high percentage of calcium requirements. Including a fortified blended food in a school meal ensures that almost all micronutrient requirements are met by above 30 percent, however, the energy and fat content of this package (1) is below this recommendation. Package 2 of fresh foods meets macronutrient requirements by 30 percent or above and the majority of micronutrients. However, this package does not include any vegetables or animal source foods and therefore doesn't meet the minimum standard for vitamin C, pantothenic acid, calcium and iron.

Figure 36. The percentage of nutrient requirements met for a school aged child per day with three different school meal menus. The black line represents a recommended minimum nutritional guideline for school meals.
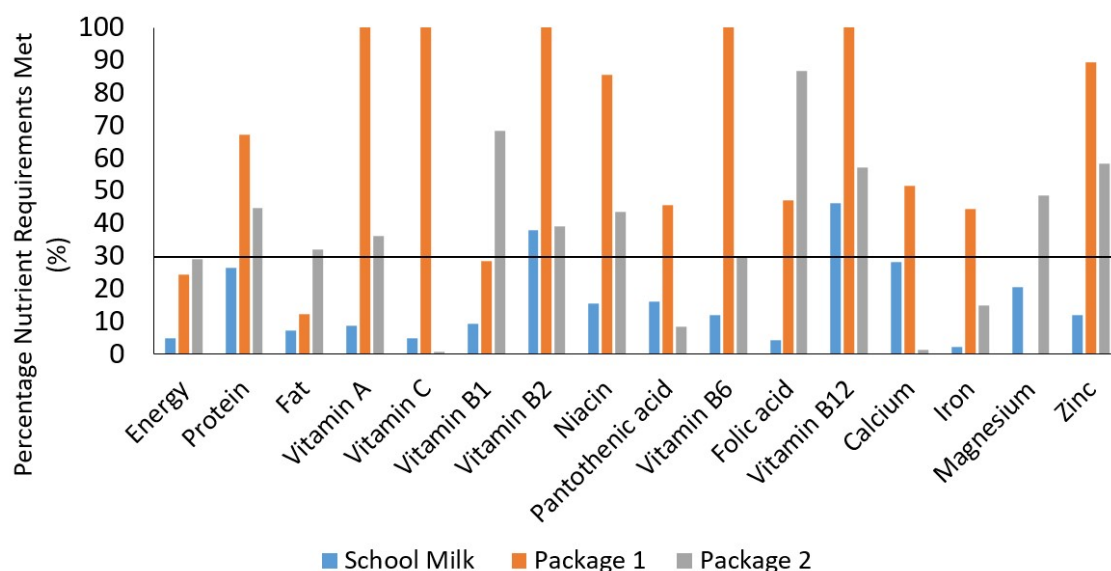
During the inception workshop, stakeholders brainstormed ideas of how to make the school meal packages more nutrition sensitive. They suggested combining the school milk programme with both packages as well as exploring the possibility of school ponds and gardens where fish (which would then be dried) and vegetables could be grown as part of an education intervention for students but to also supply the school kitchens with nutritious, fresh foods. School gardens are a nationwide programme endorsed by the Ministry of Education and implemented by the Ministry of Agriculture as part of the National Food and Nutrition Strategic Plan (2013-2018). The possibility of school ponds

have yet to be explored in Rwanda. For the assumptions used to model these interventions, please refer to Annex 4.

Figures 37 and 38 show that the interventions with both packages have a similar impact on the cost of a nutritious diet for a school aged child. Both figures show that compared to the school garden and ponds, adding the school milk intervention to the two packages reduces the cost of the nutritious diet the most, by a further 8 percent to a total of 33 percent. Combining all of the interventions does not drastically reduce the cost of a nutritious diet any further.

The reason for the limited impact of the vegetable garden and the fish pond is likely to be due to the underlying assumptions of the quantities of foods that were added to the child's school meal, which were 60g a week of fish and a combined total of 60g a week of carrots, bananas, avocadoes and cabbage per child. Stakeholders were not able to provide data on the yields of these interventions nor the quantity of produce that a child would receive from them. The estimations were therefore made very conservatively. These results show that to really have a substantial impact on nutrient intakes, the quantities of these foods would need to be increased.

Figures 39 and 40 show the nutrient requirements provided by the packages (blue bar) with the addition of the nutrition sensitive interventions. These figures show that based upon the assumptions made, milk (yellow bar) and dried fish (grey bar) top up the nutrient requirements provided by the base rations, particularly energy, fat and magnesium in Package 1 and pantothenic acid, calcium and iron in Package 2. Fat remains under the 30 percent threshold in Package one whilst vitamin C and iron remain under this threshold for Package 2. Both figures show that vegetables do not make a significant contribution to nutrient requirements due to the small portion size assumptions.

The annual reports from MINAGRI in 2013-14 and MINEDUC 2015-16 indicate that 79 percent of pre-primary, secondary and vocational training centres possess a school garden (European Commission 2018). In 2018 the European Commission undertook a review of school gardens and found that the primary aim of these gardens for 33 percent of schools included in the survey was to produce vegetables and fruits in order to feed children and for 21 percent of schools was to educate children on nutrition and vegetable gardening (European Commission 2018). The evaluation found that of the 33 percent, 19 percent of schools felt that the aim of providing school meals was fully achieved, 11 percent felt this aim was partially achieved, whilst 3 percent stated that this was not achieved (European Commission 2018).

Data was not available on the types of fruits and vegetables grown in the school gardens although the Rwanda Agriculture Board manual recommends five indigenous vegetables: amaranthus, spiderplant, cowpea, nightshade and kale and five exotic vegetables: cabbage, carrot, spinach, tomato, onion[36]. Data could not be found on the types or yields of fruit and vegetables produced. The evaluation found that less than 3 percent of schools received agricultural inputs or teacher training for the set up and maintenance of school gardens (European Commission 2018). It also concluded that the gardens success at improving the quality of school meals depended on their size, which reportedly varied significantly from a large plot of land to a small 'demonstration' spiral garden (European Commission 2018). Data was not available on what percentage of schools had what type of garden. The report recommended that monitoring and evaluation of this programme should be strengthened as well as designating a focal point for nutrition and agriculture for each school who could ensure that the school gardens are effectively linked with nutrition and agriculture education as well as within the design of school meals (European Commission 2018).

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[36] Information on fruit could not be found

Figures 37 and 38. The daily cost of a nutritious diet in RWF for a school aged child with different nutrition sensitive school meal interventions for Package 1[37] (left) and Package 2[38] (right).

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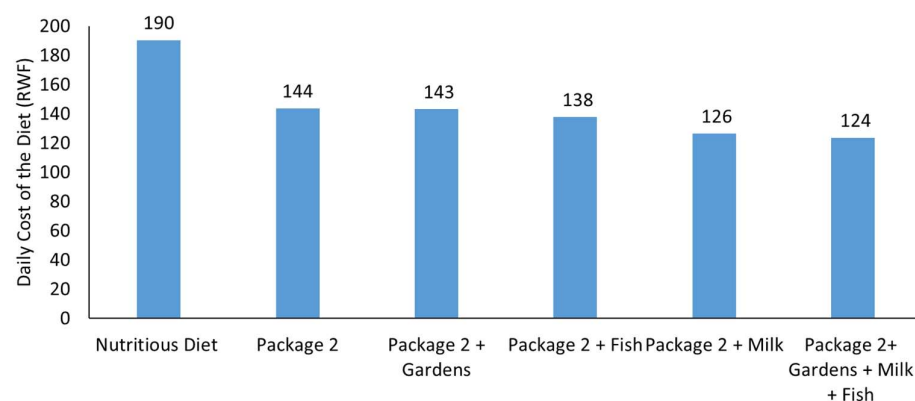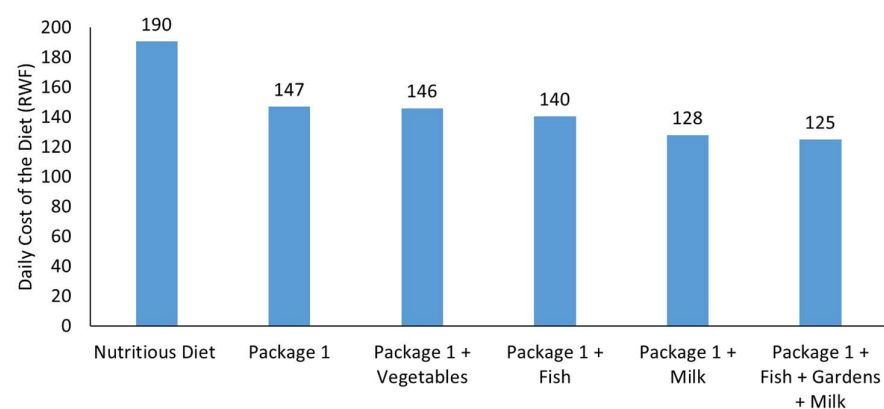
[37] SuperCereal and Sugar
[38] Fortified maize flour, beans and oil.

Figures 39 and 40. The percentage nutrient requirements met per day for a school aged child with different nutrition sensitive school meal interventions for Package 1 (left) and Package 2 (right).
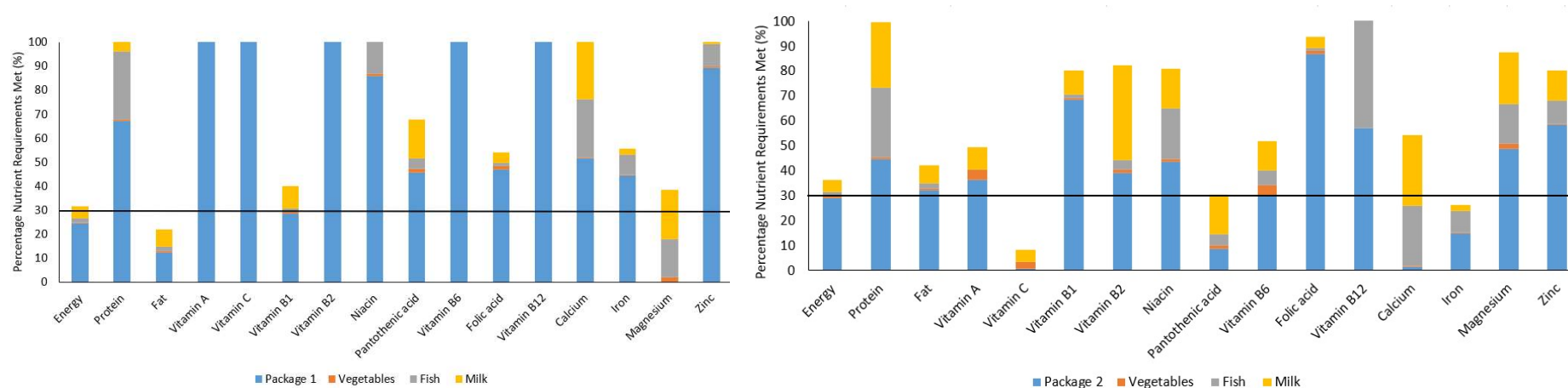
6. Food Availability

Despite agriculture being the main economic livelihood in Rwanda, it is negatively impacted by low crop and animal productivity. Staple food production dominates agricultural production. Increasing crop diversification is critical to support better nutrition. Fortified and biofortified foods together with nutrition-sensitive smallholder initiatives, could contribute to better nutrition at household level.

Agricultural Production

Food security is defined by the United Nations' Committee on World Food Security as all people, at all times, having physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life. The four pillars of food security are availability, access, utilization and stability (Committee on World Food Security 2017). The Government of Rwanda have adopted this definition and given it a high priority in the national development agenda through its inclusion in key policy documents such as Vision 2020 and the second Economic Development and Poverty Reduction Strategy 2013-2018 (Ministry of Finance and Economic Planning 2000a, 2013). However, the four pillars of food security are not being equally addressed through government efforts with food availability receiving the most focus (Ministry of Gender and Family Promotion 2018).

Agricultural production and improving access and availability of food falls under the framework of the Third Strategic Plan for Agriculture Transformation (PSTA III 2013-2018) which builds upon the first (2004) and second (2009) strategic plans. Its strategic objectives are to: (1) intensify, commercialize, and transform the Rwandan agriculture sector to enhance food security and nutrition, reduce poverty, and drive rapid economic growth; and (2) accelerate sustainable increases and an expanded private sector role in production, processing, and value addition and commercialization of staple crops, export commodities, and livestock products (Ministry of Agriculture and Animal Resources-Rwanda 2013). The framework is divided into four programme areas: agriculture and animal resource intensification; research, technology transfer and professionalisation of farmers; value chain development and private sector investment; and institutional development and agricultural cross-cutting issues (Ministry of Agriculture and Animal Resources-Rwanda 2013). Programme 1, which includes the Crop Intensifications Programme (CIP) and the one cow per household programme (GIRINKA)[39] receives the most attention by government and development partners accounting for 73 percent of the budget allocated to the agriculture sector (Ministry of Gender and Family Promotion 2018).

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[39] Both discussed further in this section.

Agriculture accounts for 33 percent of Rwandan GDP, and 89 percent of total workforce (57 percent for women, and 43 percent for men) (World Bank, CGIAR, and International Centre for Tropical Agriculture 2015). The sector plays a key role for national food self-sufficiency with more than 90 percent of the food produced nationally being consumed in the country (World Bank, CGIAR, and International Centre for Tropical Agriculture 2015). Though the majority (71 percent) of Rwandan households own land, only 6 percent own plots larger than one hectare (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). The majority of land remains under subsistence farming and crop yields remain below potential (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015). The 2018 CFSVA found that food security was closely linked to land ownership with a household owning farming land with a minimum size of 0.5 hectare, increasing the probability of being food secure to 90 percent (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

To combat land constraints, the CIP, initiated in 2007, encourages farmers to synchronize their crop cultivation on land which is consolidated and rearranged to form larger and more rational holdings. Famers enrolled receive inputs and complementary extension services. The programme focuses on eight priority crops of maize, rice, wheat, beans, soy bean, cassava, Irish potato and banana (Institute of Research and Dialogue for Peace 2017). As a result of this programme, productivity has risen particularly for maize and wheat where production levels have increased by six-fold, while Irish potatoes and cassava levels have tripled (Ministry of Gender and Family Promotion 2018).

Figure 41 shows the agriculture production in 2017, which highlights the success of the CIP. Though these foods are important in providing for the population's energy requirements, their content of essential micronutrients is much lower than that of fruit, vegetables and animal source foods. In 2017, Rwanda produced 10 million tons of roots and tubers for every 1 million tons of fruit and vegetables (National Institute of Statistics of Rwanda 2018). The CotD analysis emphasizes the importance of diversifying the food supply for a nutritious diet, as seen in Figure 42. As a nutritious diet was possible to calculate, this indicates that food availability is not a key barrier to adequate nutrient intakes in Rwanda. There is a stark contrast to the emphasis on vegetable production in Rwanda compared to the importance of this food group in a nutritious diet. National data on livestock and fish production is limited as this information is not presented in the annual agricultural surveys. The 2018 Strategic Review of Food and Nutrition Security reported that in 2014/15 706,000 MT of milk was produced in Rwanda, which meets 97

percent of the target (723, 831 MT a year) set out in the PSTA III (Ministry of Gender and Family Promotion 2018).

Figure 41 and 42. 2017 Agricultural production in Rwanda, in 1,000 million tons (left) compared with the percentage quantities of different food constituting the nutritious diet for the household as analysed by the CotD software (right) (National Institute of Statistics of Rwanda 2018).
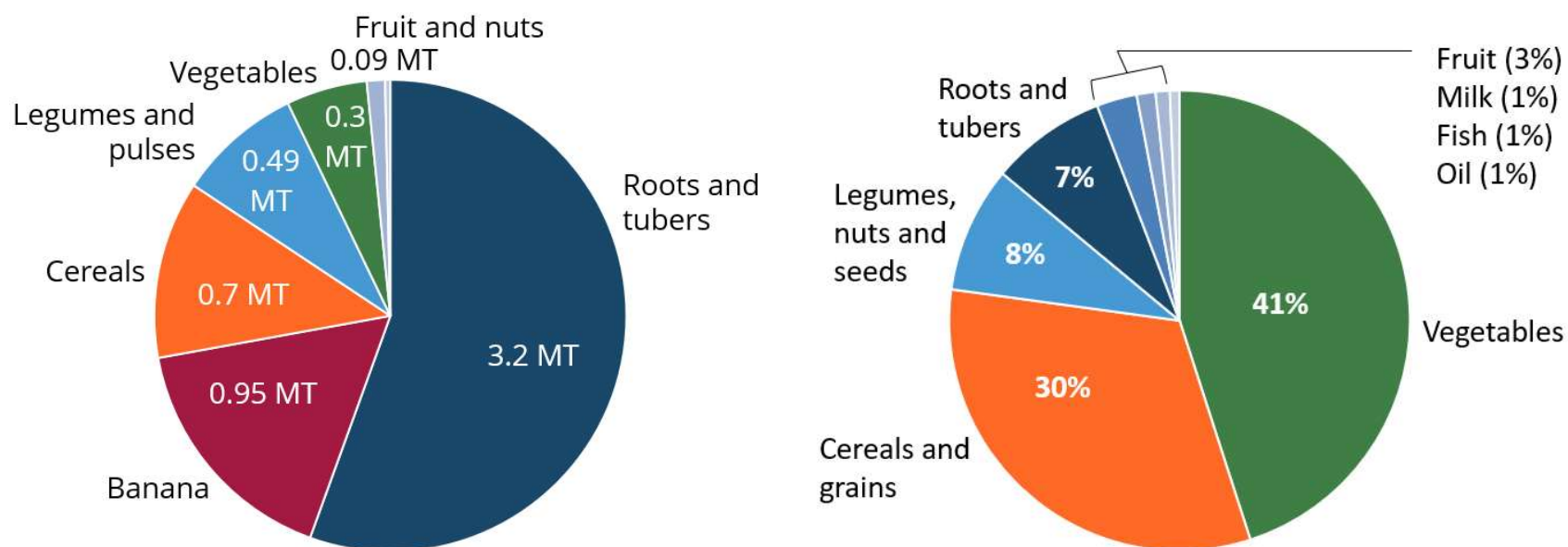
Apart from land availability, agricultural production faces multiple challenges such as seasonal climate shocks[40], shrinking biodiversity; low quality and degrading soils; poor access to agricultural inputs, financial services, post-harvest and agriculture extension services (Ministry of Gender and Family Promotion 2018; Ministry of Finance and Economic Planning 2000b). Little use of irrigation (93 percent of agricultural households do not irrigate their land) accentuates the impact that weather conditions have on household's agricultural production and on food and nutrition security (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015).

Unsurprisingly the 2016/17 poverty profile report found that agricultural GDP has risen at a slower pace than industry or services over the last 10 years whilst the 2018 CFSVA results highlight how food insecurity predominantly impacts smallholder farmers and agricultural workers (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a; National Institute of Statistics of Rwanda (NISR) 2018). The CFSVA found that the households engaged in agricultural daily labour represented 16 percent of Rwanda population and were typically the most food insecure (40 percent). Low-income agriculturalists represent 32 percent of the Rwandan population and 21 percent were found to be food insecure. The most food secure livelihood groups were salaried workers and business owners (98 percent of food secure households) and skilled labourers (97 percent food secure) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). A study by Lung'aho et al., (2015) also found that low productivity was an underlying barrier to alleviate malnutrition, and further, that households with low production, who used few agricultural inputs, or who farmed on degraded land were the ones for whom stunting in children primarily persisted.

Opportunities to Improve the Nutrition Sensitivity of Food Production

As part of the PSTA III the Government of Rwanda has been exploring and implementing a number of initiatives aimed at improving the availability of nutritious foods at a household level namely fortified and biofortified foods, kitchen gardens, GIRINKA and the provision of small animals. The pros and cons of each these have been explored separately.

Food fortification could present cost-effective opportunities to improve nutrition. Home fortification using micronutrient powders was found to have very high acceptability among mothers through a 30 day acceptability study with 60 to 100 caregiver-child pairs (Suter 2014). A 12-month quasi-experimental control trial conducted with 1049

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[40] Discussed further in key message 8.

mother/child pairs (intervention: n=569; control: n=480) also found that haemoglobin levels of children with moderate to severe aneamia significantly improved in the intervention group compared to children in the control group (P<0.05) whilst 98 percent of caregivers were willing to continue using MNP (Michaux et al. 2015). A high percentage of mothers perceived benefits of MNP, including improved appetite (84 percent), increased activity levels (87 percent), and improved health (88 percent) of their child (Michaux et al. 2015).

Several ongoing initiatives from the private sector and other organizations aim to improve food utilization in Rwanda and reduce the high rates of malnutrition. These initiatives include the African Improved Foods company which produces fortified complementary food for children under 2 years old. These foods could be a suitable solution to improve nutrient quality of complementary feeding in children 6-23 months and are currently distributed through the *Shisha Kibondo* as well as through WFPs school feeding programme (Global Alliance for Improved Nutrition (GAIN) 2016; Ministry of Gender and Family Promotion 2018).

There are also several potential opportunities for staple food fortification for the general population (Global Alliance for Improved Nutrition (GAIN) 2016). Cooking oil, maize flour, blended cereals, and flavour/spice sachets or cubes are frequently consumed by households and are foods with which the Rwandan industry has some experience or is building experience with (Global Alliance for Improved Nutrition (GAIN) 2016). However, concerns about food adulteration among Rwandan consumers presents a potential barrier to demand for processed fortified foods. Rwandan consumers hold a strong preference for "natural" foods, avoiding "factory" foods, which are seen as artificial and potentially harmful. Fortified foods might therefore struggle to overcome consumer distrust associated with industrial foods (Global Alliance for Improved Nutrition (GAIN) 2016).

Biofortification could be effective, inexpensive, and sustainable, but has fewer micronutrients than post-harvest fortification (Bouis et al. 2011). Through developing crop varieties rich in iron, zinc, and vitamin A, these can contribute to body stores of micronutrients throughout the individual's life cycle. Also, due to the predominance of staples in the diets of the poorest households, biofortification of staples could implicitly target the most nutritionally vulnerable (Bouis et al. 2011). Beta carotene-rich orange flesh sweet potatoes are the most common biofortified food available in Rwanda. High iron beans also offer a potential to improve iron intake. Randomized controlled trials have shown that consumption of iron-biofortified beans significantly improved iron status in Rwandan women (Haas et al. 2016). However, studies also show that biofortified beans that are high in phytic acid limit the absorption of the additional iron bred into them and can have adverse gastrointestinal effects (Petry et al. 2012, 2016).

For biofortification to be successful, several elements need to be in place: 1) successful breeding to achieve high nutrient densities, 2) bioavailability of the nutrients needs to be ensured and retained in processing and cooking, 3) biofortified crops must be adopted by farmers and consumed by the (target) population, 4) Rwanda requires a national strategy to promote biofortification and strengthen research (Bouis et al. 2011). Ultimately, good nutrition is dependent on variety of nutrients coming from a wide range of foods, hence strategies cannot rely entirely on fortification or biofortification of staple foods, though they can make a valuable contribution (Bouis et al. 2011).

FNG stakeholders were interested in better understanding the impact the fortified and biofortified foods could have in improving economic access to a nutritious diet. Figure 43 shows that making these foods available at the same market price[41] as their unfortified/biofortified counterparts could reduce the cost of a nutritious diet by 4-8 percent.

Figure 43. The daily cost of a nutritious diet in RWF for a household of five people with fortified and biofortified foods available at the market.
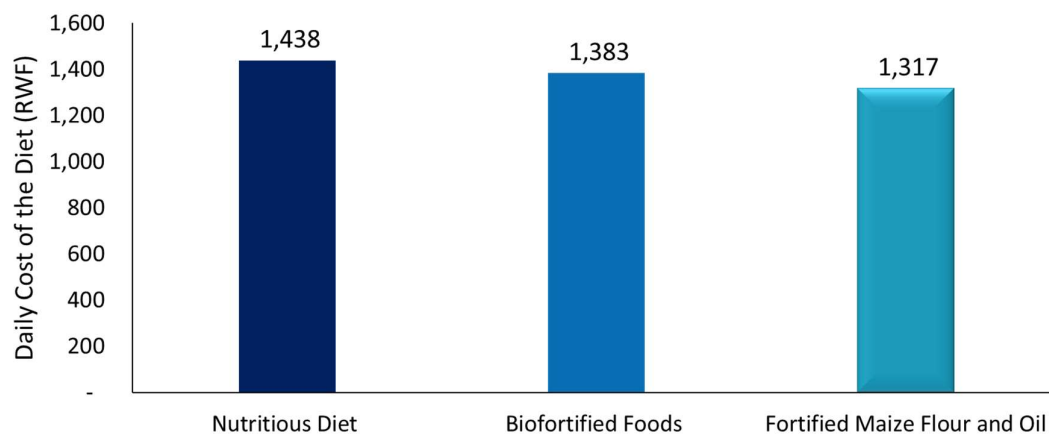
Kitchen gardens have been highly endorsed by the government to improve nutrient intakes (Ministry of Agriculture and Animal Resources 2009), and studies identify them as a promising avenue for improving nutrition outcomes (Ecker, Weinberger, and Qaim 2010; Habimana 2015). Sixty four percent of households have a kitchen garden and 97 percent of the food grown is consumed (Pirotte and Traoré 2018). Qualitative research shows that kitchen gardens generally increase the availability of nutritious foods and allow households to eat vegetables more regularly (Pirotte and Traoré 2018). The 2018 CFSVA found that almost half (47 percent) of the severely food insecure households had a vegetable garden compared with 65 percent of food secure households (United

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[41] To review these assumptions refer to Annex 3 and 4.

Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

However, the limited quantity and variety of vegetables grown results in limited improvements in dietary diversity: on average, only two types of vegetables are grown, and the yields are low (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015). Kitchen gardens require labour, time and financial investments which poorer households may struggle to provide (Pirotte and Traoré 2018). The 2018 CFSVA results support this finding. The labour required to set up and maintain a kitchen garden might have negative impacts on women's time, increasing their already disproportionate burden of household and economic responsibilities (discussed further below) – which in turn has potential negative repercussions for their own health and the nutrition of their children. Appropriate resources and support are required for kitchen gardens to reach their nutritional potential while minimizing risks and negative effects.

The GIRINKA program distributes dairy cows to poorer families with sufficient land and is a key priority for the government. A quantitative study of livestock distribution programmes in Rwanda found substantial increases in dairy consumption among households who were given a dairy cow, as well as marginally statistically significant improvements in stunting, wasting and underweight of children under 5 years of age (Rawlins et al. 2014). The 2018 CFSVA found that households owning livestock were more likely to be food secure (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

The potential positive impact on household dietary diversity and nutritional status is, however, not a guarantee. Importantly, the programme's success depends on the quality of household targeting (are the most nutritionally vulnerable being reached?) and training (are the households receiving adequate and sufficient training to maintain a dairy cow?) (Colverson 2018). Furthermore, proper management of the livestock needs to be ensured to avoid unintended harmful impacts on health, hygiene, and sanitation, e.g. animal faeces in household living spaces, which could worsen nutrition outcomes (Colverson 2018). The costs and potential difficulty in providing adequate quantity and quality feed for a cow is a main constraint facing small scale dairy farmers in East Africa and must not be overlooked (Lukuyu et al. 2009). Furthermore, if the milk produced is sold to purchase less nutritious foods or other products, the nutritional impact may be reduced (Colverson 2018). Finally, since cows are often seen as "men's domain", extension services have been found to not always include women, which reinforces gender inequalities and diminishes the potential impact of the program to assist the most nutritionally vulnerable (Colverson 2018).

FNG stakeholders were interested in better understanding the impact that smallholder poultry, a nutrition sensitive kitchen garden and the GIRINKA programme could have in improving economic access to a nutritious diet. Figure 44 shows that these initiatives could reduce the cost of a nutritious diet by 2-20 percent, with the GIRINKA programme having the greatest impact. The assumptions made for these programmes are documented in Annex 4. Stakeholders were unable to provide accurate yield data regarding eggs, vegetables and milk and therefore these results could be either over or underestimated. It is also important to stress that while the potential impact is positive, the associated input and time costs and women's workload have not been considered.

Figure 44. The daily cost of a nutritious diet in RWF for a household of five people with various small holder agriculture interventions.

Women's Role in Agriculture

Agriculture in Rwanda is predominantly female, and adolescent girls are more likely than adolescent boys to work in agriculture (72 percent against 64 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015). In rural areas, 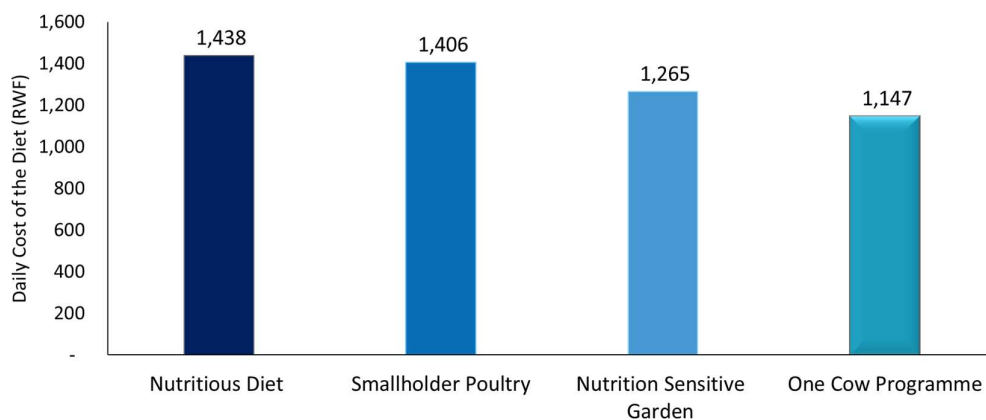92 percent of women compared to 77 percent of men work in agriculture. While the majority of women farmers grow subsistence crops, men are more likely to be engaged in higher-value cash crops (Ministry of Gender and Family Promotion 2018). Women are thus key players in producing food for their household and for the market (Ministry of Gender and Family Promotion 2018). With progressive laws, women and men have equal rights to land, its management, and inheritance. Nevertheless, patriarchal norms and beliefs persist and limit women's actual control and decision-making over natural resources, including land (Ministry of Gender and Family Promotion 2018). Lack of public knowledge and understanding of laws, insufficient legal support, and the threat of domestic violence limit women's abilities to have their rights respected (Ministry of Gender and Family Promotion 2018; Abbot and Mulumba 2015). Decisions over land and agricultural production typically depend on husbands' decisions within the married households,

despite women providing a larger share of the labour (Ministry of Gender and Family Promotion 2018).

Women farmers also face higher barriers to access agricultural inputs and services, for example, 45 percent of women versus 75 percent of men have access to organic fertilizer (15 percent versus 20 percent for inorganic fertilizer) (Ministry of Gender and Family Promotion 2018). In part, this is due to women's plots generally being smaller than men's plots, and often below 0.5 hectare, which prevents them from being eligible for certain agricultural support programs (e.g. the Fertilizer Subsidy Programme) (Ministry of Gender and Family Promotion 2018). Men are also more likely to be in charge of selling agricultural product on the market, with 75 percent of women reporting not being the primary person responsible for crop selling, compared to 52 percent for men (Ministry of Gender and Family Promotion 2018). The consequence of the various gender inequalities in the agricultural sector translate into lower productivity on women's farms, reduced economic opportunities for women, lower earnings, and lesser food availability for households (Ministry of Gender and Family Promotion 2018). In addition, they contribute to many women's continued economic dependence on men, and increases their nutritional vulnerability (Ministry of Gender and Family Promotion 2018).

Considering women's important role in agricultural production and in children's nutrition in Rwanda, it becomes evident that there is a need to identify and implement strategies to enable women farmers to make decisions and have access to the support and resources they require to be productive and healthy (Lung'aho et al. 2015). For example, reducing the time burden on women through agricultural labour-saving technologies (Lung'aho et al. 2015), and through involving men in domestic and childcare roles, could contribute to women's empowerment as well as to improving nutrition outcomes. Access to credit has also been found to be one of the most important determinants for stunting in children: on average, households where women did not participate in credit groups were 47 percent more likely to have stunted children, reflecting the large complementary benefits that women derive from participating in these groups (participation in non-finance related groups did not have similar significance) (Lung'aho et al. 2015). Reducing gender inequalities in the home and on the farm therefore holds important potential for improving diets and nutrition outcomes.

Food Safety

Food safety and quality is of concern in Rwanda and foodborne illnesses caused by microbial hazards contribute significantly to the burden of disease in the country. In 2013 a study in Rwanda estimated that food related illnesses such as watery diarrhea, bloody diarrhea, cholera and typhoid fever resulted in 887 Disability Adjusted Life Years

(DALYs), 42 per million inhabitants. The primary food safety concern center around a few different topics. Firstly, the contamination of certain staple foods is a key emerging issue that recent studies have drawn attention to. The amount of contamination varies by region of the country and by food product. High levels of aflatoxins have been found in maize, exceeding regulatory limits (Matsiko et al. 2017). Cassava is comparatively safe when it comes to mycotoxins, but extremely high levels of cyanogenic plant toxins have been observed in certain cases, pointing to the need to improve post-harvest management (Sulyok et al. 2015). Mycotoxins have been found in high levels in groundnuts, and fusarium graminearum in beans (Nyinawabali 2013). Foodborne pathogens have also been found in farm vegetables and agricultural water caused by high-risk farming practices. The lack of awareness amongst vendors about the possible contamination of fresh products is worrying, as are the possible negative impacts on dairy, egg and meat products linked to contamination of animal feed (Nishimwe et al. 2017). The current policy gap on food quality and safety management should be urgently filled.

7. Economic Access

It would cost a household twice as much money to purchase a nutritious diet than a diet that only meets kilocalorie needs. Economic access is a barrier to households consuming a nutritious diet, particularly in the Western province. Animal products and fish provide essential micronutrients but are also the most expensive commodities to purchase.

Cost of the Diet

Rwanda has made impressive strides in reducing poverty over the last 20 years. The percentage of households living in poverty has reduced from 60 percent in the year 2000 to 38 percent in 2016/17, with chronic poverty reducing from 24 percent to 16 percent in the same timeframe (National Institute of Statistics Rwanda 2018; Ministry of Gender and Family Promotion 2018). The Western province had the highest rates of poverty (47 percent total poverty, 21 percent extreme poverty) whilst Kigali City has the lowest rates of poverty (13 percent total poverty, 4 percent extreme poverty) (National Institute of Statistics Rwanda 2018). Economic growth has also been notable with an annual rate of around 8 percent since the year 2000 (Ministry of Gender and Family Promotion 2018).

Despite a 14 percent increase in Gross Domestic Product per capita between 2014 and 2017, per capita expenditure did not change substantially and poverty only reduced by 1 percent (National Institute of Statistics Rwanda 2018). This lack of change was

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[42] DALYs is the summary measure used to give an indication of overall burden of disease. One DALY represents the loss of the equivalent of one year of full health. Using DALYs, the burden of diseases that cause premature death but little disability can be compared to that of diseases that do not cause death but do cause disability.

attributed to the substantial rise in food prices, particularly staple vegetables and root crops during the time of the most recent Integrated Household Living and Conditions Survey (2016/17) (National Institute of Statistics Rwanda 2018). The reasons for this price rise were not explained in the report but could be due to the floods and droughts experienced in parts of the country as explained further in key message 8.

Based upon 2013-2014 food prices, the CotD analysis found that it would cost a household almost twice as much to purchase a diet that meets nutrient needs compared to a diet that meets only energy needs (Figure 45). In Kigali, where the cost of both diets were the highest compared to the other four provinces, the lowest cost combination of food that meets the energy needs of the household would cost 816 RWF per day, whereas the lowest cost combination that meets the nutrient needs would cost 1,831 RWF per day. The cost of an energy only diet was lowest in the Eastern province (623 RWF a day), whilst the cost of a nutritious diet was lowest in the Southern province (1,245 RWF a day).

Figure 45: Cost of the energy only and nutritious diets for the household, in RWF per day.
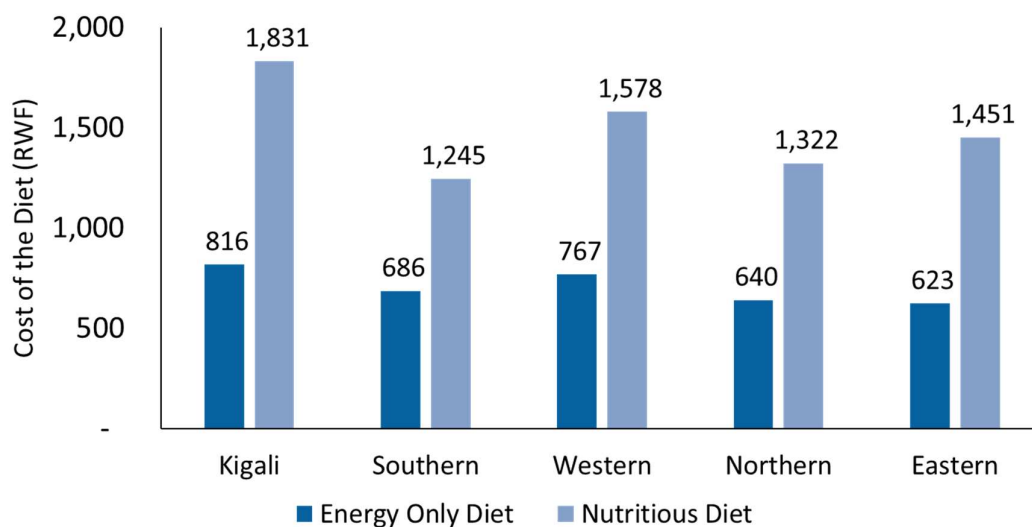
The cost differences between the two diets is due to the type and cost of foods that the software has included to meet the target nutrient requirements. While the energy-only diet generally requires the consumption of a few staple foods, such as sorghum, maize, sweet potato and cassava flour, a nutritious diet requires thirteen additional foods to meet the household's micronutrient needs. The CotD software identified soybeans, groundnuts, dodo (amaranth leaves), avocado, small dried fish and milk as nutrient-rich, locally available and affordable foods. Milk and small dried fish provide an important contribution to protein, vitamin B12 and calcium requirements but were some of the

most expensive commodities (with eggs and meat) according to the NISR price data, as shown in Figure 46.

Figure 46. The average price per 100g for food groups in Rwanda and disaggregated by urban and rural areas in 2013 (National Institute of Statistics Rwanda 2014).
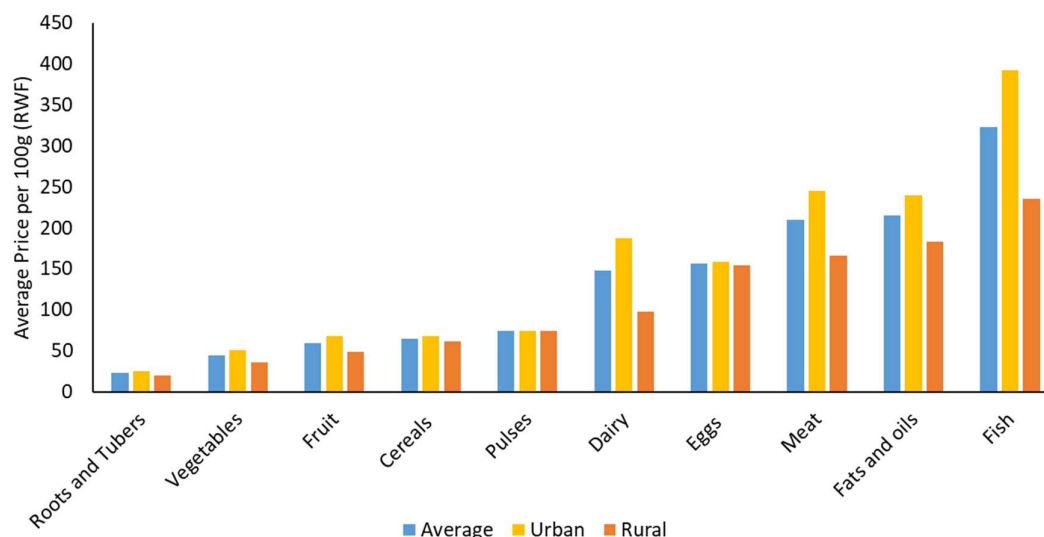
Figure 47 shows that when disaggregated by rural and urban areas, the nutritious diets are somewhat more expensive in the urban areas, while the cost of the energy-only diet does not vary substantially between urban and rural areas. This is because the availability and cost of energy dense staples such as tubers and cereals are similar across the country. Conversely the cost of micronutrient rich foods, particularly animal source foods such as dairy, meat and fish vary substantially, as shown in Figure 46.

Figure 47. Cost of the energy only diet and nutritious diet for the household, disaggregated by urban and rural areas, in RWF, per day.
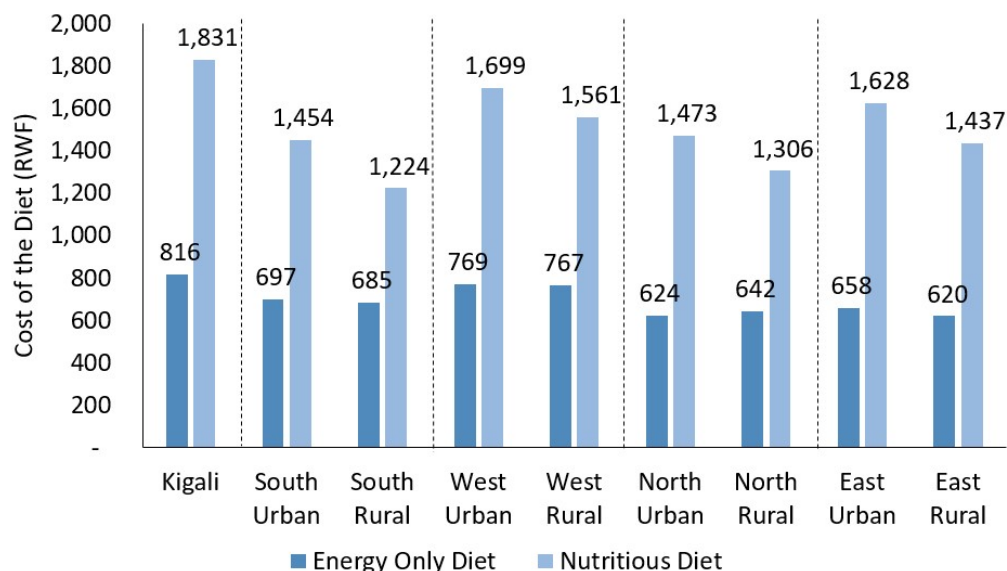
A simple linear regression was run to understand what was driving the cost of a nutritious diet in Rwanda. This analysis was run based upon the total number of foods found in the assessment areas and the cost per 100g of certain food groups. This analysis found that there was some association between the cost of a nutritious diet and the total availability of foods (R=0.47) in a province (both urban and rural) but that the strongest associations were found to be related to the cost per 100g of vegetables (R=0.69), cereals (R=0.61) and fish (0.58). This is unsurprising given that a large share of the diet is made up of cereals and vegetables (as shown in Figure 42) and, although a small part of the diet, dried fish were essential to meet calcium and vitamin B12 requirements and are the most expensive food group found on markets in Rwanda.

Affordability of the Diets

Figure 48 shows that, when the cost of a nutritious diet is compared to how much money households spend on food, on average 55 percent of the population of Rwanda would not be able to afford to purchase a nutritious diet. This is lower than the affordability results estimated in Uganda and Tanzania, the other two countries in East Africa where an FNG has been completed.

Figure 48. Percentage of non-affordability of a nutritious diet in Rwanda, compared to Uganda and Tanzania (Office of the Prime Minister and World Food Programme 2019; Tanzania Food and Nutrition Centre and World Food Programme 2019).
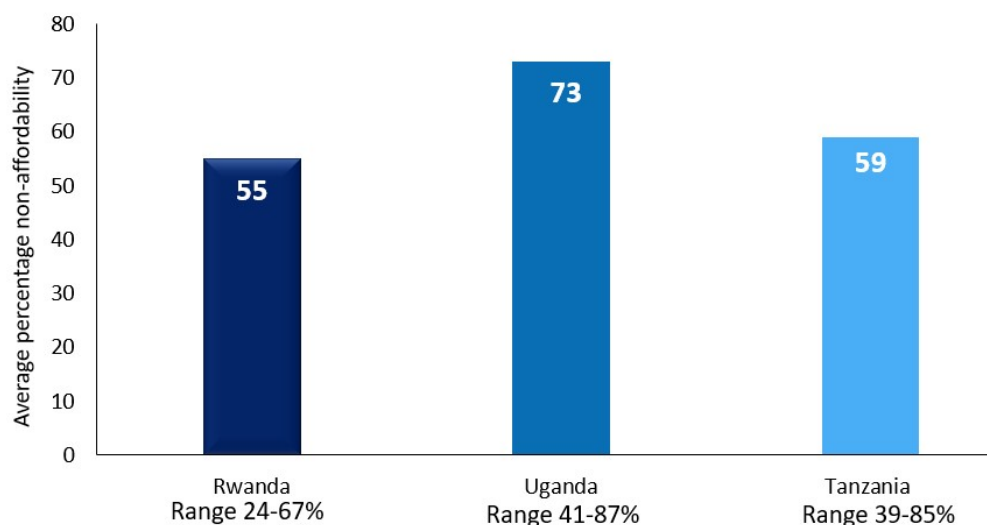
The percentage of households that could not afford a nutritious diet varies by geographical region, as shown in Figure 49. Kigali has the lowest percentage of households that would not be able to afford a diet that meets their nutrient needs (28 percent), while the Western region has the highest (64 percent), followed closely by the Eastern province (58 percent). The energy-only diet would be unaffordable for 5 percent (Kigali) to 20 percent (Western region) of households.

Figure 49: Percentage of non-affordability of the energy-only and the nutritious diets by region.
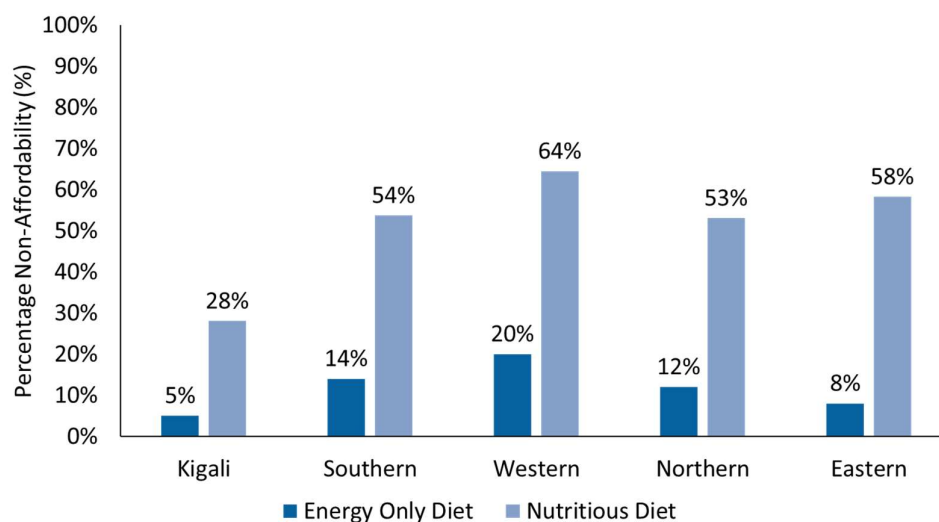
Figure 50 shows that although the cost of a nutritious diet is higher in urban areas, non-affordability was lower compared to rural areas. The difference in non-affordability by urban and rural areas was smallest in the East with an 11 percentage point difference and largest in the North where non-affordability was more than double in the rural areas compared to the urban areas. This emphasizes the more limited purchasing power that rural households in Rwanda have compared to urban households. Having said this, in comparison to Kigali City, non-affordability in the urban areas of the Southern, Eastern and Western provinces is still high at 40 – 48 percent. This indicates that the urban and rural divide maybe relative and that being classified as urban doesn't necessarily translate into increased incomes and purchasing power. Furthermore, as the cost of nutritious diet is higher in urban areas, household income also has to be higher to purchase a comparable diet to rural areas.

Figure 50. The non-affordability of a nutritious diet disaggregated by urban and rural areas in Rwanda.
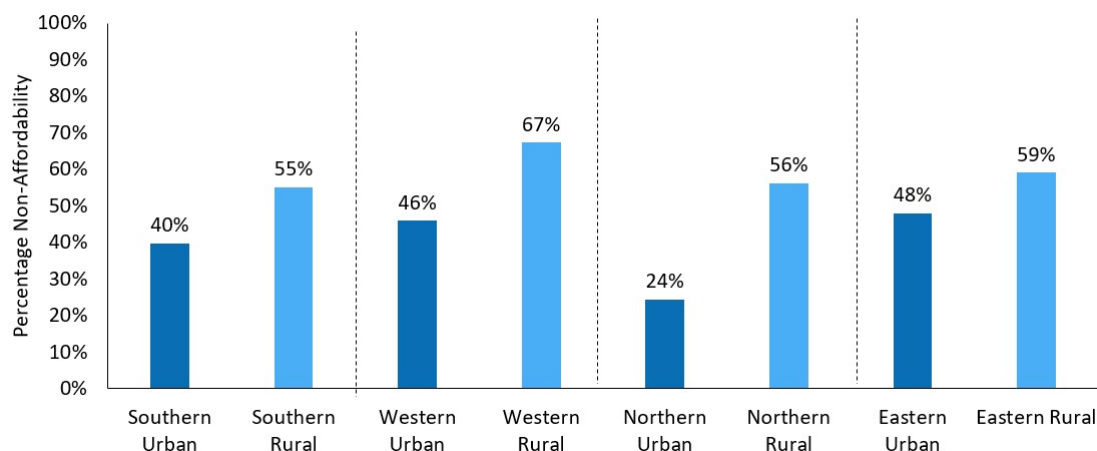
The non-affordability results are aligned with the food security, food consumption and malnutrition indicators whereby the Western and Eastern provinces had the highest food insecurity, the highest percentage of households with poor food consumption scores and the highest prevalence of stunting and anemia. These results emphasize that certainly in these two provinces economic access is a major barrier to households consuming a nutritionally adequate diet.

A simple linear regression was conducted to understand whether the cost of a nutritious diet or food expenditure were driving the results of non-affordability. The analysis found that median food expenditure was greatly associated with non-affordability (0.82) as shown in Figure 51. The association between the cost of a nutritious diet and non-affordability was much weaker (R=0.18). This emphasizes that investment must be made on interventions that aim to increase household income, coupled with nutrition

education on the importance of purchasing nutritious foods, to improve dietary intake in Rwanda.

Figure 51. Scatter graph to show the association between median food expenditure for a household of 5 people and non-affordability of a nutritious diet.
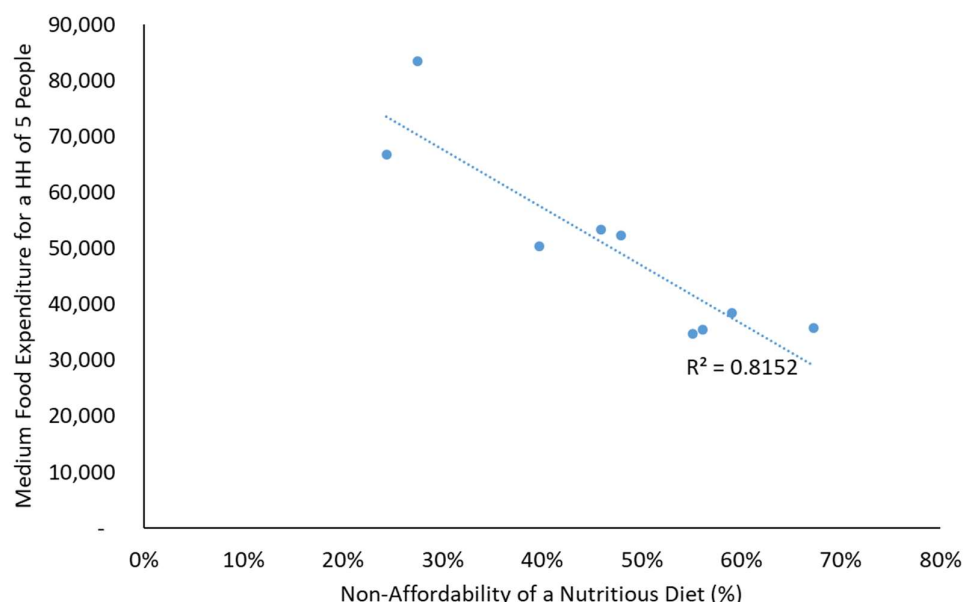
National Social Protection Interventions

As mentioned in key message 6, Rwanda implements a number of social protection schemes based around agriculture such as GIRINKA and the kitchen garden program. There is one national social safety net scheme called the Vision 2020 Umurenge Programme (VUP) which has been implemented by the Local Administrative Entities Development Agency since 2008 and which consists of three components: (1) safety nets which comprised of direct cash support[43], nutrition sensitive direct cash support[44], and cash for work (termed Expanded Public Works and Classic Public Works); (2) livelihood development comprised of asset transfers[45], skills development and financial services;

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[43] Intended to provide regular and reliable income support to extremely poor, severely labour-constrained households. It is intended to ensure that these most vulnerable households are able to meet their most basic needs and protect them from destitution.

[44] Intended to provide regular and reliable income support to extremely poor pregnant women and infants at risk of malnutrition. It is also intended to incentivize uptake of critical ante-natal and post-natal health services with a view to addressing wider risks related to malnutrition. This is a new programme and it was not possible to find any information on the cash value.

[45] **Provides** extremely poor households that have participated in VUP public works assets to develop a sustainable livelihood. Assets include small livestock, agricultural inputs and small equipment.

and (3) sensitization and community mobilization[46] (Local Administrative Entities Development Agency 2019).

Information on the cash value of the nutrition sensitive safety net could not be found. The direct cash support provided different transfer values depending on household size. For a household of 5 people this amounted to 21,000 RWF a month. For the cash for work component, households receive 10,000 RWF a month. The World Bank are also funding a pilot child-sensitive support programme where households receive 9,500 RWF a month.

Figure 52 shows the potential impact that these social protection schemes could have on improving the affordability of a nutritious diet. The 2018 CFSVA calculated that on average 46 percent of expenditure is spent on food in Rwanda, which has been applied to the cash transfer values for this analysis (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). Figure 52 shows that the percentage of household who cannot afford a nutritious diet could reduce by 3 – 20 percentage points with the direct support programme having the greatest impact.

Despite this potential impact, the 2018 strategic review for food and nutrition security reported that the coverage of the VUP is limited with only 45 percent of households in Ubedehe 1 receiving financial support in 2016/17. Furthermore, only a third of households with unacceptable food consumption levels and a quarter of households with a malnourished child received social assistance (Ministry of Gender and Family Promotion 2018).

Figure 52. The percentage non-affordability of a nutritious diet for a household of five with the VUP and World Bank cash transfer programmes.

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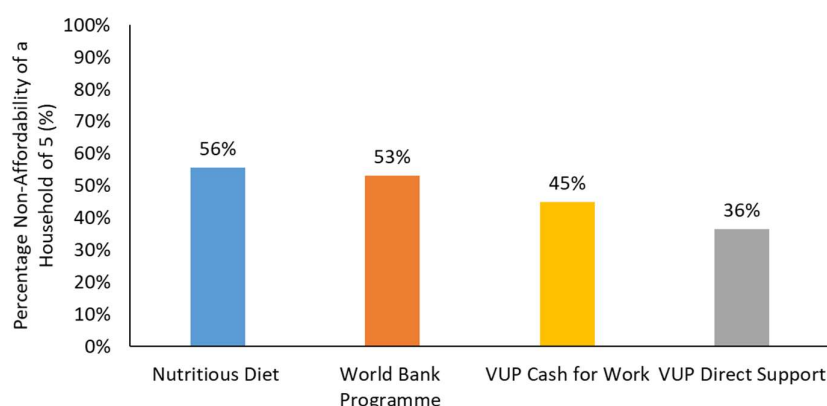
[46] To strengthen coordination of service delivery to extremely poor households through the delivery of sensitization and the establishment of referral pathways to other service providers.

8. Food Access

Access to markets is good and households purchase the majority of their food from markets. However, reliance on markets also makes households vulnerable to food price volatility.

Household Food Access

Households in Rwanda source 65 - 70 percent of their food from markets on average (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a; Ministry of Gender and Family Promotion 2018). Households that do not practice agriculture source a higher percentage of their food from markets compared to agricultural households (80 percent compared to 60 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). The fact that agricultural households still purchase such a high percentage of their food implies that there is limited diversification of agricultural production systems at the household level, as discussed in key message 6 above (Ministry of Gender and Family Promotion 2018).

These results may also imply that post-harvest management, storage and small-scale processing technologies at the household level are not fully effective and operational despite Government investment through the PSTA III in strategies such as 1) the use of modest drying grounds and temporary stores, (2) operational post-harvest facilities managed by cooperatives, (3) the construction of modern storage facilities and crop or milk collection centres, (4) and the construction of processing plants (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a; Ministry of Gender and Family Promotion 2018).

Figure 53 shows that Rwanda has a remarkable number of markets (450 in total, yet, in 15 districts, households living in villages without a market take more than 90 minutes to reach one on foot (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). Under the framework for PSTA III there has been substantial investment in road infrastructure. Markets are now connected to primary road networks and according to the 2018 CSVA almost two thirds (62 percent) of markets were accessible all year round by using transport other than walking. However secondary rural road networks remain inadequate. This is particularly true for Rutsiro, Nyaruguru and Nyamasheke districts where it takes between 110-145 minutes to reach a market by foot (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a; Ministry of Gender and Family Promotion 2018). The CSFVA found that the main challenges related to accessing foods from markets, as reported by communities, were: the distance, the unusual high food prices; and the high price for non-food items (United Nations World Food Programme, National

Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

Figure 53. Market location and average walking time to access the main market by district in Rwanda (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).
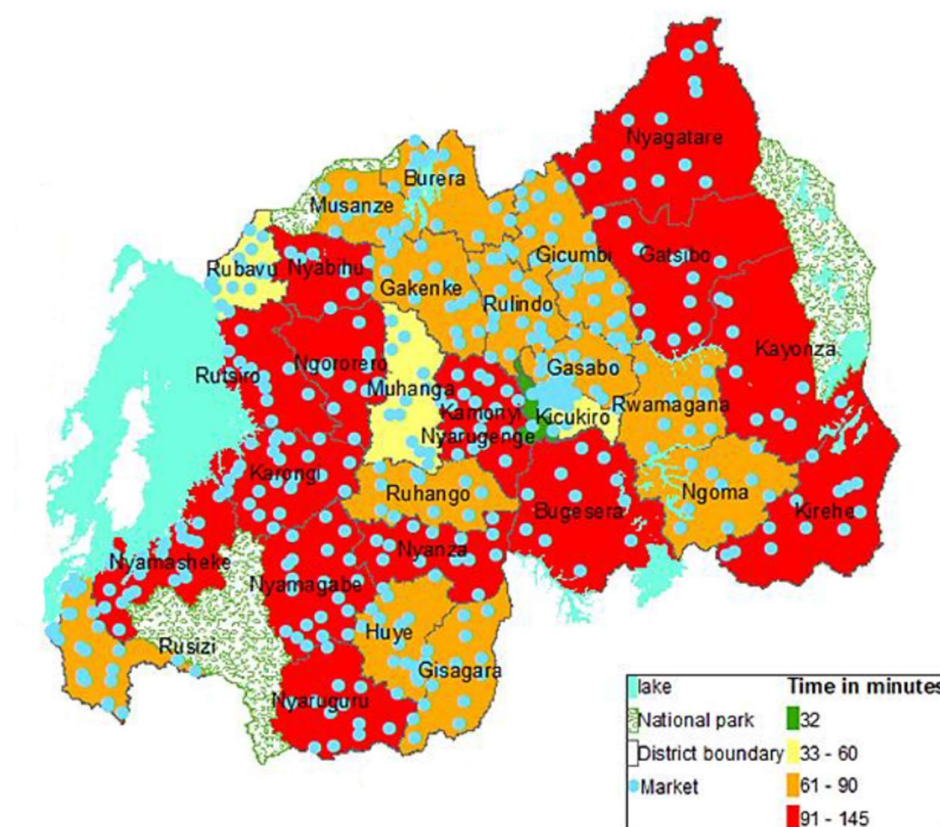
Food Expenditure and Seasonal Vulnerabilities

Figure 54 shows that nationally 46 percent of household expenditure was spent on food in 2018, down from 54 percent in 2015. In 2018, 13 percent of households had a very high share (>75 percent) of expenditure of food (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018a), indicating very high poverty. Geographically, households in Kigali City in 2018 spent the lowest proportion of their expenditure on food (42 percent) whilst the Western province spends the highest proportion of expenditure on food (49 percent), which is unsurprising given that these provinces are the most and least food insecure in the country, respectively. Certain districts had food expenditure above 50 percent namely Rutsiro (56 percent), Karongi (52 percent) and Nyamagabe (52 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). Agricultural daily labourers,

unskilled labourers, and households living from external support or begging also spend more than the half of their budget to buy food (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

Of that food expenditure, households mostly purchased cereals, roots and tubers (21 percent) and legumes (8 percent). Very little expenditure was used for fresh nutritious foods such as vegetables, fruit, meat, fish and eggs (1-2 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

Figure 54. The percentage of food expenditure in the provinces of Rwanda in 2015 and 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018a).
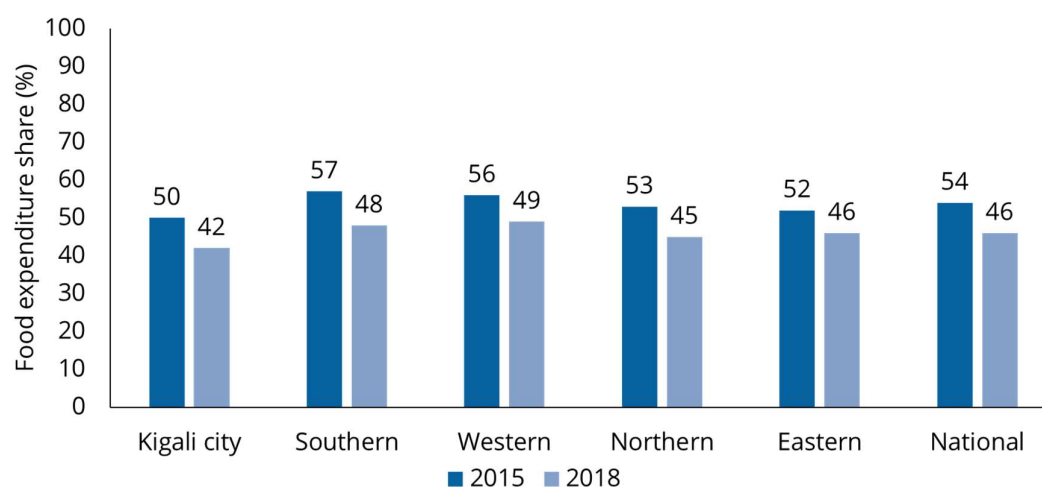
Households who rely heavily on cash purchases from markets, as well as spend a large proportion of their expenditure on food are very vulnerable to price volatility due to shocks. This is because they have little additional budget available for any expenses other than their most basic requirements. To date, no policy framework or mechanisms on food market price regulation exist in Rwanda and figure 55 shows that food prices have not only increased substantially but experienced considerable peaks and troughs from 2016-2017, particularly in rural areas (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a; Ministry of Gender and Family Promotion 2018).

Figure 55. Urban and Rural Consumer Price Index for food and non-alcoholic beverages from 2015 - 2108 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).
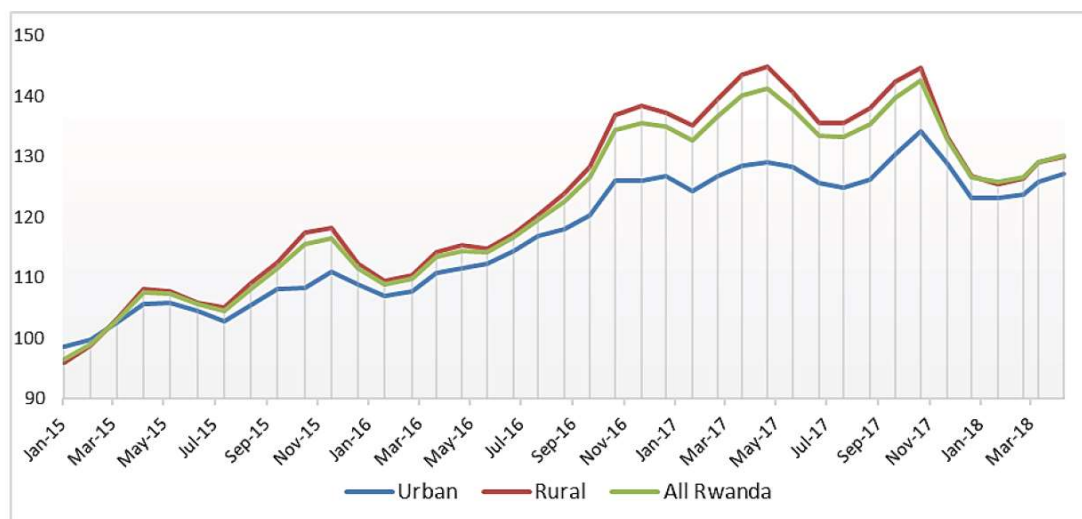
The price increase from 2016-2017 was attributed to the drought discussed previously in key message 1. Rwanda's drought vulnerability is high but it is also prone to experiencing other natural hazards such as landslides, floods, earthquakes, and windstorms, which greatly impact on the economic and social development of the country (Ministry of Disaster Management and Refugee Affairs 2015).

Rwanda has two rainy seasons from the middle of September to December and the middle of March to the middle of May (FEWS NET 2015). The East of the country is more prone to drought than the West, which is more prone to flooding. Banana, cassava, and Irish potato are the most vulnerable crops to drought which represents most of the main crops grown in the country (Ministry of Disaster Management and Refugee Affairs 2015; United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). Farmers in drought-prone areas lack the knowledge, skills, and the adequate infrastructure to cope with such harsh conditions, experiencing severe losses in agricultural production and household income (World Bank, CGIAR, and International Centre for Tropical Agriculture 2015).

The highland areas of the Western, Southern, and Northern provinces are prone to landslides due to their moderate to very high slope susceptibility with 40 percent of the country's population at risk. Approximately 2.8 million Rwandans are exposed to windstorms at intensities of moderate gale to strong gale across 13 districts. The earthquake vulnerability of Rwanda is also significant, with the entire population exposed to this risk (Ministry of Disaster Management and Refugee Affairs 2015; United

Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

The results from the 2018 CFSVA found that a greater number of households are being exposed to shocks in 2018 compared to 2015 (40 percent vs 27 percent). Of this 40 percent, 41 percent of households reported that the main shock experienced was drought. Almost half (46 percent) of households in the Eastern province reported experiencing a shock of which 59 percent reported that the shock was drought. Furthermore, the percentage of households experiencing shock in the Northern province has almost doubled since 2015 (40 percent vs. 23 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

Consequently the percentage of households using livelihood or asset depletion coping strategies[47] 30 days before the 2018 CFSVA, increased by 13 percent comapared to 2015 (53 percent vs. 40 percent) (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a). The use of these coping strategies by households in the Southern and Northern provinces increased the most between 2015 and 2019 by 19 percent and 22 percent respectively (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2018a).

Not only do households suffer from price volatility due to climate related disasters, they also have to contend with seasonal price variation within the year. Rwanda experiences two lean seasons during the year, from April – June and October - mid-December (FEWS NET 2015). The CFSVA 2015[48] found that a higher proportion of household's experience difficulties in accessing food during the rainy months of October, November and April as shown in Figure 56. Seasonal food insecurity has doubled in recent years: in 2018, 40 percent of households were seasonally food insecure, up from 20 percent in 2012 with the majority of this increase occurring between 2015 and 2018 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015, 2018a).

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[47] Such as harvesting immature crops or selling the last of their female animals.
[48] This information was not summarised in the 2018 CFSVA.

Figure 56. The percentage of households that experienced difficulties in accessing food by month from May 2014 – April 2015 (United Nations World Food Programme, National Institute of Statistics of Rwanda, and Ministry of Agriculture and Animal Resources 2015).
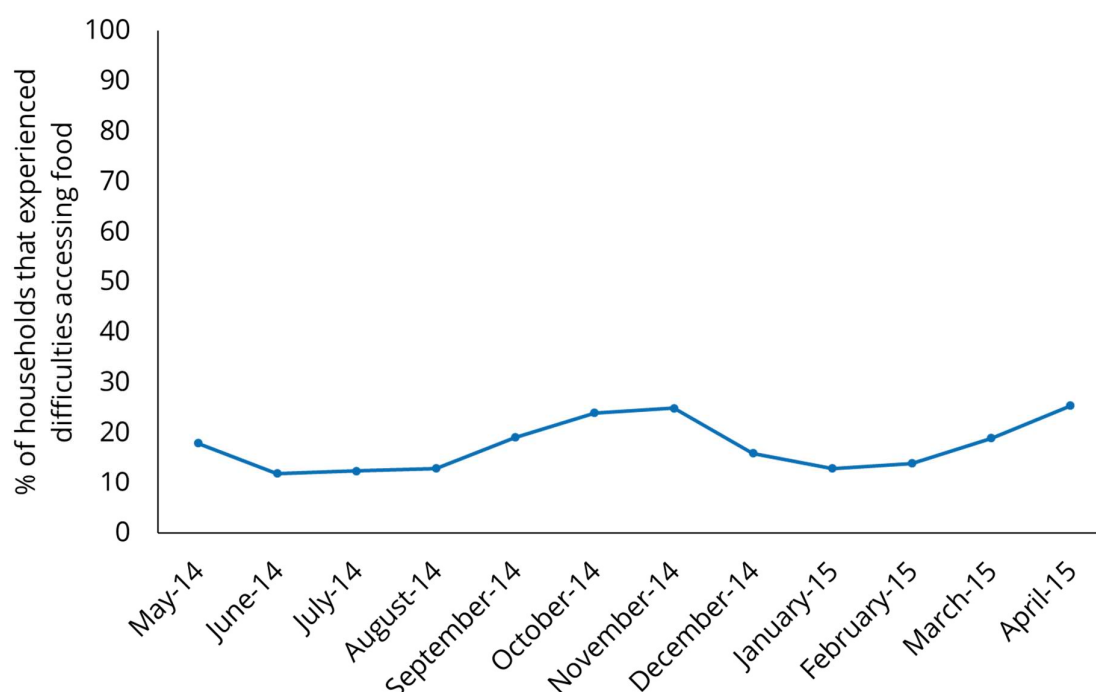
The Government of Rwanda has recognised the debilitating impact of climate related disasters on the country's population and has given considerable attention to climate change and adaption in its policies and development frameworks. The "Climate Change Strategy for Rwanda" was launched in 2010 with the support of the Department for International Development. This strategy makes important links to key sector vulnerabilities, namely agriculture, food and nutrition security, health, water resources and ecosystems. Furthermore, in 2012 a National Disaster Management Policy was launched, which aims to establish a systematic disaster prevention, mitigation, preparedness and management framework for the country (Ministry of Gender and Family Promotion 2018).

Under PSTA III a national strategic grain reserve was established to address potential shocks in food supply but the mid-term evaluation of the Economic Development and Poverty Reduction Strategy II found that the achievement of targets were behind what was anticipated. Currently 24 percent of reserves targets for maize and beans were achieved in 2015/16 and 15 percent in 2016/2017 (Ministry of Gender and Family Promotion 2018). What the country lacks however is a shock-responsive or sensitive social protection system that responds rapidly to mitigate the risk of food security decline. This would require improved early warning systems, contingency plans,

financing and adequate institutional arrangements aimed to capacitate the system to respond adequately to potential shocks (Ministry of Gender and Family Promotion 2018).

The framework for PSTA !V, which is currently under development has a much greater focus on increasing the accessibility of food though higher household incomes combined with greater resilience to market and production shocks. The framework also has a key focus of improving the resilience of smallholder farmers to production and market risks, through improved storage, early warning and market information systems and insurance schemes (Ministry of Gender and Family Promotion 2018).

9. *Intervention Modelling*

Context specific integrated packages of interventions have the greatest potential to improve affordability of a nutritious diet.

Eliminating malnutrition as a public health problem cannot be achieved by any single intervention alone from any one sector. Instead, it requires concurrent actions from various sectors and needs to involve a range of actors. As shown throughout this report, a range of interventions, for individual target groups and the household, have been modelled, as guided by the secondary data analysis and stakeholder consultation. Below is a summary of the most effective results.

- Providing FBF (*Shisha Kibondo*) is the most effective intervention for reducing the cost of meeting nutrient needs for the child aged 6-23 months, although the provision of fresh foods and a Small-Quantity Lipid Based Nutrient Supplement could also make important contributions.
- *Shisha Kibondo* is also the most effective for reducing the cost of the diet and improving access to nutrients for both adolescent girls and PLWs.
- Nutrition-sensitive school meals have a strong potential for improving the nutrition of the school-aged child. An improved meal consisting of fortified maize flour, beans and oil combined with fish from a school pond, vegetables from a school garden, and milk twice a week had the largest impact – however, the impact is nearly equally good for a combination of Option 2 and only milk.
- GIRINKA was the most effective intervention at household level to reduce the cost of the diet.
- The VUP direct support cash transfer of 9,660 RWF per household.

The CotD analysis shows that packages comprising targeted nutrition interventions, household interventions, cash transfers, and social behavior change communications could have a large effect on improving the affordability of a nutritious diet for a household. The most effective interventions for reducing the cost of meeting individual target groups' nutrient intakes were combined into a package with the most effective household interventions as shown in Table 3.

Table 3. The most effective interventions for reducing the cost of a nutritious diet as demonstrated by the CotD software.

Target Group	Intervention
Child 6-23 months	FBF
School Aged Child (6-19 years)	Nutrition-sensitive school meals (Option 2 combined with milk, fish, fruit and vegetables)
Adolescent Girl Pregnant and Lactating Woman	FBF
Household	Fortified foods available in the market Nutrition-sensitive kitchen garden
Cash transfer: VUP direct support	9,660 RWF a month per household

Figure 57 shows that a combination of multi-sectoral household and targeted interventions could improve the affordability of a nutritious diet at a national level by 30 percent, from 55 percent to 35 percent. It is noteworthy how much better the combination of intervention fares, compared to specific unilateral interventions, such as fortified blended flour or nutrition-sensitive kitchen gardens. This shows no intervention alone can solve malnutrition and that to improve nutrition at a population level, interventions need to be implemented across sectors, with different time frames and targeting different individuals. While some of the most effective interventions in this package are product-based and would be implemented for a relatively short period of time (such as fortified blended flour) long term solutions must also be prioritized such as strengthening the food system to deliver safe, nutritious fresh foods at affordable prices to households across the country.

The results of the package assume optimized behaviour, which means that not only do these interventions need to be implemented effectively at scale, Social Behaviour Change Communication is also required to accompany any intervention to ensure uptake within the population, including increased production and purchasing as well as consumption of nutritious foods.

Figure 57. The potential impact that a package of multisectoral interventions may have on the affordability of a nutritious diet for households in Rwanda.
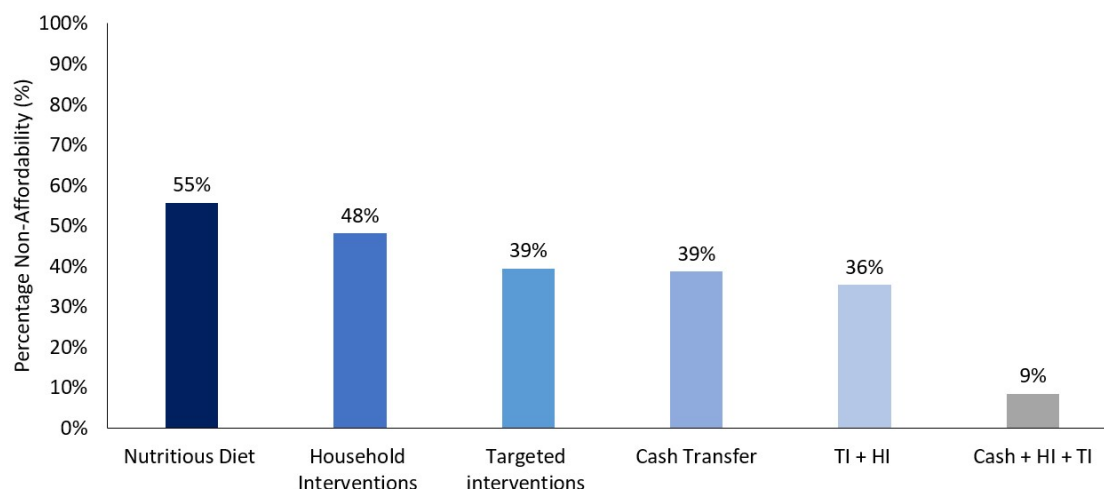
Recommendations

During the dissemination workshop chaired by NECDP and attended by the National Food, Nutrition and Water, Sanitation and Hygiene Technical Working Group and the wider stakeholder group, the main findings of the FNG analysis were shared and discussed with the participants to formulate recommendations. Participants then formed five work groups, each focused on a different target – children under 2 years; children 2-9 years; adolescent girls; pregnant and lactating women and the household.

Each group was asked to identify and then prioritise the priority issues for their target. They were then asked to brainstorm ideas for interventions that would address the issues they had prioritised. During this section of the group work they were asked to list existing interventions, improvements to existing interventions and new interventions from different sectors including agriculture, health/nutrition, WASH, education, social protection, gender, private sector and livelihoods.

After this exercise, participants were asked to select a package from these interventions that would address the issues they prioritised for their target. They were required to discuss the linkages that could exist between their chosen interventions and ensure that their package included interventions from at least three sectors. Finally, they were asked to identify the enabling environment required for their package to be successful. They had to consider the following: policy and strategy frameworks; coordination and synergies across sectors; resources; and data gaps.

The recommendations developed by the stakeholders were in line with those developed in the Rwanda Country Strategic Review of Food and Nutrition Security (Ministry of Gender and Family Promotion 2018). The following sections outline the priority issues identified by stakeholders, the recommendations for interventions, and the enabling environment. These have been aligned with the recommendations from the strategic review where relevant.

The following issues were prioritised by stakeholders based on the FNG findings: -

Nutritionally vulnerable target groups:

1. Children aged 6-23 months - low attainment of MAD;
2. Children aged under five and women aged 15-49 - high prevalence of anaemia;
3. School aged children - lack of information on health and nutritional status;
4. Adolescent girls - academic disadvantage due to high domestic workload, gender-based violence and pregnancy;
5. Women - gender disparities at household level (particularly related to workload) that may be negatively impacting on their nutrition.
6. All target groups - Poor dietary diversity and low consumption of high iron (animal source) foods;

Household:

7. Perception of low level of nutrition knowledge;
8. Poor dietary diversity and low consumption of high iron (animal source) foods at household level;
9. High percentage of households that cannot afford to purchase a nutritious diet.

Based on these issues, recommendations for interventions and the enabling environment were made as summarised in Tables 4 and 5.

Table 4. The recommended interventions identified during the FNG stakeholder workshop and the relevant recommended interventions identified by the Rwanda Country Strategic Review of Food and Nutrition Security (Ministry of Gender and Family Promotion 2018). The numbering in the third column aligns with the recommendation numbering format used in the strategic review report

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
Agriculture	An integrated package of improved smallholder livestock and kitchen garden interventions with a focus on eggs, milk and high iron vegetables, combined with a strong component of SBCC for nutrition and WASH education (see more details in nutrition education category). • Investment in biofortified seed varieties should be provided through the kitchen garden intervention • Incentives and subsidies should be provided to the poorest households, specifically Ubudehe 1 with a pregnant or lactating woman or child under 2 years. This package should be applied at the community level and in schools.	B2. Revise the existing input subsidy scheme through improved targeting of programme beneficiaries and increased access of poor households to quality seeds, fertilizers and limes. B7. Scale up existing programmes that promote nutritionally diverse foods (e.g. vegetable kitchen gardens, mushroom production, fruit, poultry and fish farming). This must be supported by evaluation studies which assess the effectiveness of these programmes in increasing dietary diversity. D8. Strengthen the GIRINKA Programme and other livestock programmes to achieve impact at scale, including through the distribution of small livestock to poor and vulnerable households that are land-constrained.
	Monitor and evaluate smallholder production initiatives such as kitchen gardens and GIRINKA for their effectiveness in improving nutrition outcomes.	B7. (See above) E9. Institute impact research requirement of programmes supporting homestead production e.g. GIRINKA, kitchen gardens and small livestock rearing.

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
School based interventions	Use school meals as a platform to create demand for nutritious foods either through smallholder production or from the private sector. The following options were proposed: • Scaling up the one cup of milk per child programme and linking to families who are enrolled in the GIRINKA programme, to create demand for their milk and provide them with additional income that could be spent on nutritious foods. • Working with the food industry to provide a fortified food. • Linking with smallholder animal and vegetable producers to supply schools with fresh, nutritious foods (especially milk, eggs, dodo leaves, iron rich biofortified beans and orange flesh sweet potatoes), creating demand for their produce and providing them with additional income that could be spent on nutritious foods for their families. • Provide MMT or IFA to adolescent girls. • Strong component of WASH to ensure meals are prepared safely and hand washing facilities provided to prevent illness.	C17. Strengthen programmes that promote access to energy-dense and nutrient-rich foods for school-going children.
	Provide separate changing rooms, washrooms and toilets with clean water, soap and free sanitary pads for girls.	

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
	Use schools as a platform to collect information on the nutrition and health status of school aged girls and boys. Reward students who perform well in school.	
Social protection/ social safety nets	Increasing nutrition sensitivity of social protection schemes such as through the provision of fortified blended foods for poor households with a child under 2 years and PLW. Continue to pilot and scale up cash transfer schemes to vulnerable households and link this with SBCC initiatives to promote the purchase of nutritious foods. Improve the use of community saving and lending groups to improve household's economic access to nutritious foods and enable households to be more resilient against shocks. Link participants of the VUP – Public Works scheme to these groups.	A5. Update the existing Social Protection Policy to reflect how social safety net interventions are linked to Food and Nutrition Security (FSN) outcomes and ensure alignment with the Economic Development and Poverty Reduction Strategy-3, Vision 2050 and the Sustainable Development Goals. D1. Continue the expansion of social safety net interventions to include individuals in lower economic classes, those who are food insecure, and households with children affected by malnutrition. D4. Include Ubudehe categories 2 and 3 among beneficiaries receiving fortified blended food with government subsidies; develop and enforce an exit strategy with clear timelines for each category. D16. Develop an effective shock-responsive/sensitive social protection system (including an early warning system, contingency plans, financing and adequate institutional arrangements) that will strengthen risk mitigation and rapid

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
		response systems to weather shocks and disasters that induce food insecurity among poor households during difficult years.
Nutrition education	Strengthen the referral process that links women in communities to health services to communicate the importance of dietary diversity and the consumption of nutrient-dense foods during pregnancy and breastfeeding. This should be done by increasing the number of community health workers and training agriculture extension workers to provide nutrition messages to men and women in communities. Messages should: • Advocate for the importance of consuming nutritious fresh foods, particularly vegetables rich in iron and vitamin A and animal source foods. • Advocate to smallholder livestock farmers the importance of children, young girls and women consuming eggs and milk and using their income to purchase other nutritious foods. • Seek endorsement from local leaders to encourage men to attend and engage in messages particularly related to taking an active role in domestic (including small livestock and kitchen gardens) and child care duties.	A8. Effectively address gender equality and women's empowerment in national policies and strategies based on well- informed gender analysis which includes disaggregated data on gender issues. C1. Strengthen nutrition awareness and education programmes at the household level. C2. Strengthen women's education, empowerment and influence within the household, including special access to extension services. C3. Integrate a nutrition education component into all relevant agriculture programmes and projects to improve consumption of nutritious crops among producing farmer households. C5. Strengthen nutrition and gender education components in the training curriculum of agriculture extension agents. C7. Develop extension messages related to the safe handling of food and safe storage practices. Integrate these messages into the training packages for Farmer Field School (FFS) facilitators, farmer promoters, Community Health Workers (CHWs) and other private service providers. C8. Establish national dietary guidelines to inform consumer food choices and facilitate nutrition education and behaviour

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
	• Contain a strong WASH and food safety component at household and school level. • Sensitize parents to the importance of keeping girls in school. • Find male champions who support their wives in domestic chores and child care duties, who believe in making decisions equally and can act as change agents in the community. • Provide adolescent sexual and reproductive health education in schools which includes messages related to delaying marriage and pregnancy, preventing HIV/AIDS, gender-based violence and the importance of nutrition and WASH.	change activities through grassroots agriculture and health extension workers. C10. Strengthen programmes that promote access to energy-dense and nutrient-rich foods, especially for children and PLW groups. C12. Promote the integration of WASH in all community-level food and nutrition security intervention programmes. C14. Expand and strengthen support to CHWs and other grassroots nutrition agents who disseminate sanitation and hygiene messages. D15. Support a comprehensive capacity development and nutrition education strategy for extension services. E5. Develop a national communication plan that involves all types of media in conveying innovative messages and approaches on the consumption of nutritious food and the eradication of malnutrition. F6. Conduct regular training sessions for health care givers (including CHWs) in nutrition-specific interventions such as maternal infant and young child nutrition, management of acute malnutrition, and management of diet-related non-communicable diseases, etc. F7. Invest in the capacity development of agricultural extension agents on nutrition related matters and develop

Sector/Entry Point	Recommended Interventions based on FNG Analysis and Stakeholder Workshop	Recommended Interventions based on Country Strategic Review
		appropriate information packs for farmers to improve the link between food production and nutrition security.

Table 5. The recommended enabling environment identified during the FNG stakeholder workshop and the relevant recommended enabling environment identified by the Rwanda Country Strategic Review of Food and Nutrition Security.

Category	FNG Recommended Enabling Environment	Strategic Review Recommended Enabling Environment
Policy and strategy frameworks	Develop strategies and policies that promote the production and distribution of nutritious foods: • Crop Intensification Programme should be more nutrition-sensitive and include fruit and vegetables. • Develop a strategy for improving the supply chain for animal source foods. • Develop a strategy for biofortified foods. • Develop a food fortification policy. Develop a tax policy that incentivises fresh, fortified or biofortified nutritious foods (through subsidies) and disincentivises high calorie, low nutrient density snack or 'junk' foods. Develop a food safety and quality policy. Develop a national strategy to prevent overweight and obesity.	A9. Develop a national strategy to prevent overweight and obesity among all members of the population. A10. Develop a policy on food fortification, including standards on ration additions of essential vitamins and minerals to food products. A11. Establish a national strategy on crop biofortification and strengthen research programmes on biofortified crop varieties. A12. Develop a specific policy on food quality and safety management. B8. Expand the range of priority crops under the crop intensification programme while considering new crop varieties with high nutritional values and benefits.

Category	FNG Recommended Enabling Environment	Strategic Review Recommended Enabling Environment
Coordination and synergies across sectors	NECPD continue to coordinate all relevant social cluster ministries and partners to take a holistic approach to ending malnutrition across the lifecycle. Improve the coordination of interventions at a district level by strengthening the Joint Action Development Forum mechanism. Strengthen coordination and synergy of interventions across sectors to ensure that all stakeholders are held accountable.	F5**.** Partners in all clusters contributing to FNS should have clear and integrated accountability mechanisms to ensure joint planning, resourcing, implementation, and monitoring and evaluation systems. F9. Continue the enforcement of a strong involvement of local government (districts, sectors, cells, and villages) in policy and programme planning for food and nutrition security.
Resources	Capacity-building of nutrition actors at all levels. Continued budget mobilization.	F3. Develop a capacity-building plan to enhance the skills and expertise of stakeholders related to FNS. Government and partners should train additional nutrition specialists who can be placed in various ministries that engage in cross-cutting FNS issues. F4. Mobilize resources to finance the FNS sector beyond the usual allocation of resources from one basket of funds specific to FNS interventions. Alternatively, increase the budget proportions in these relevant sectors to increase the amount of resources needed.
Data gaps	Include a micronutrient survey in the next RDHS. Prioritise the micronutrients related to anaemia such as iron, folic acid and vitamin B12.	A2. Investigate linkages between Ubudehe categories, food security and nutrition to better inform policy interventions. A5. Update the existing Social Protection Policy to reflect how social safety net interventions are linked to Food and Nutrition

Category	FNG Recommended Enabling Environment	Strategic Review Recommended Enabling Environment
	Include MDD – Women in the next RDHS. Conduct research to better understand what drives high rates of malnutrition in wealthier groups. Evaluate the World Bank cash transfer pilot project to assess its impact on improving economic access to a nutritious diet. Conduct more research on how gender equality and women's empowerment impacts nutrition. Conduct more research on the diets of girls aged 10-14 years and reasons for dropping out of school. Collect more data on food safety concerns for nutritious, fresh foods.	Security (FSN) outcomes and ensure alignment with the Economic Development and Poverty Reduction Strategy-3, Vision 2050 and the Sustainable Development Goals. A8. Address gender equality and women's empowerment in national policies and strategies based on informed gender analysis which includes disaggregated data on gender issues. E1. Initiate national studies to assess topics such as: the risk of underlying factors behind the persistence of child undernutrition (e.g. by gender, residence and wealth quintiles) despite the progress made in food production and poverty reduction; reasons why infants and young children tend to become more malnourished after the introduction of complementary feeding; why some districts/regions are progressing faster than others in reducing malnutrition; and the impact of nutrition interventions on MAD. E6. Carry out standardized studies aimed at understanding additional micronutrient deficiencies and diet diversification between age groups and geographic locations. E7. Establish and/or improve monitoring and evaluation systems that provide continuous feedback mechanisms to

Category	FNG Recommended Enabling Environment	Strategic Review Recommended Enabling Environment
		inform FNS programs at all levels. For instance, to better understand the FNS situation in the country, the following additional outcome indicators could be integrated into the monitoring and evaluation framework: diversity of foods produced on farms; smallholder farmer household incomes; physical access to markets; local market prices of nutrient-rich foods (or the cost of a healthy diet); food preferences; women's empowerment in the agriculture index; productivity and the diversity of off-season farming; the proportion of sustainable agriculture practices; MAD for children 6-23 months; MDD for women of reproductive age; household dietary diversity scores; household hunger scores; and coping strategies index. E13. Improve the scope of RDHS to include data collection on other micronutrients deficiencies, such as vitamin A, other minerals and vitamins.

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Annex 1: Stakeholder Consultations for Fill the Nutrient Gap

The partners listed below were involved throughout the FNG process and took part in both the inception and dissemination meetings.

<u>National Level</u>

- NECPD
- Social Cluster Ministries (Agriculture, Health, Social Protection, Gender, Education)
- National Institute of Statistics Rwanda
- Rwanda Standards Board
- LODA
- UNICEF
- WHO
- FAO
- World Bank
- Three Stones International
- African Improved Foods
- SFH
- FXB
- Gardens for Health
- Sun Alliance
- UR-CMHS/HND
- RAB
- GHI
- CRS
- CHAI
- Global Communities
- SNV
- SMAP – KICA
- Plan International
- World Vision
- Peace Corps
- Sight and Life
- USAID
- Netherlands Embassy

Annex 2: National Modelling Plan

National

Intervention	Transfer Modality	Entry Point(s)
Target group: Child 6-23 months		
FBF	In-kind/voucher	Health
Ongera (MNP)		
Small-Quantity Lipid Based Nutrient Supplement		Social Protection
Fresh Food Voucher		
Target group: School Aged Child		
Nutrition-Sensitive School Meals Option 1: Fortified blended food and sugar Option 2: Fortified maize flour, beans and fortified oil	In-Kind	Education
School Vegetable Garden	Own Production	Agriculture
Two cups of milk per child per week		
School Fish Pond		
Target groups: Adolescent Girl and Pregnant and Lactating Women		

Intervention	Transfer Modality	Entry Point(s)
IFA		Health
MMT	In-kind/voucher	Agriculture
Fresh Food Voucher		Social Protection
FBF		Markets (Private Sector)
		Education (for adolescent girls)
Target group: Household		
Fortified Foods: Maize flour and oil		Agriculture
Biofortified Foods: Orange flesh sweet potatoes and high iron beans	Market (at same price as unfortified /biofortified counterpart)	Markets
		Private Sector
Nutrition-Sensitive Kitchen Garden		
Poultry Intervention	Own Production	Agriculture
GIRINKA programme		

Annex 3: The Nutrient Composition per 100g of Foods or Supplements used in CotD Modelling

Fortified blended foods and specialised nutritious foods

Nutrients	Units	Super Cereal	Shisha Kibondo	Nutri Mama (FBF for women)	Nutri Totto (FBF for women)	Small-Quantity Lipid Based Nutrient Supplement
Energy	kcal	380	400	377	400	480
Protein	g	14	16	14	16	12
Fat	g	6	10	9.8	10	24
Vitamin A	mcg RE	1039	793	1039	800	1371
Thiamin B1	mg	0.2	1	1.2	0.6	2
Riboflavin B2	mg	1.4	1	1.5	0.8	6
Niacin B3	mg	8	8	2.1	8	33
Vitamin B6	mg	1	1	2.1	0.6	5
Vitamin B12	mcg	2	1	1.2	1.4	5
Vitamin C	mg	90	60	91	60	90
Vitamin D	mcg		10			
Vitamin E	mg		10			
Folate B-9	mcg DFE	110	160	110	160	558
Vitamin K	mcg		30			
Pantothenic acid B-5	mg	1.6	4	1.6	3.6	10
Biotin B-7	mcg		12			
Calcium	mg	362	800	358	788	1278
Copper	mg					
Iodine	mcg		90			
Iron	mg	6.5	23	15.2	19.5	23
Magnesium	mg		108		108	281
Manganese	mg		1			3
Phosphorus	mg	280	940	276		1255
Potassium	mg	140	773	158		1265
Selenium	mcg		15			
Sodium	mg					
Zinc	mg	5	17	13.9	13.9	26

Supplements and Home Fortificants per 100 g

	MNP	MMT	IFA (Adolescent Girl)	IFA (PLW)
Energy (kcal)				
Protein (g)				
Fats (g)				
Saturated Fat (g)				
Monounsaturated Fat (g)				
Poluunsaturated Fat (g)				
Carbohydrate (g)				
Fiber (g)				
Phytate (mg)				
RAE (ug retinol)	40,000	80,000		
Vit C (mg)	3,000	7,000		
B1 (mg)	50	140		
B2 (mg)	50	140		
Niacin (mg)	600	1,800		
B6 (mg)	50	190		
Folate (mcg)	15,000	66,667	46,667	66,667
B12 (mcg)	90	260		
Pantothenic Acid (mg)				
Calcium (mg)				
Copper (mg)	56	200		
Iron (mg)	1,000	3,000	6,000	6,000
Magnesium (mg)	-	-		
Zinc (mg)	410	1,500		

Fortified and Biofortified Foods

	Fortified Maize Flour	Fortified sunflower oil	Biofortified High Iron Beans	Orange Flesh Sweet Potato
Energy (kcal)	362.0	884.0	343.0	86.0
Protein (g)	8.1	0.0	22.7	1.6
Fats (g)	3.6	100.0	1.6	0.1
RAE (ug retinol)	150.0	720.7	463.0	11.0
Vit C (mg)	0.0	0.0	0.0	0.0
B1 (mg)	0.5	0.0	0.2	0.8
B2 (mg)	0.2	0.0	134.0	30.0
Niacin (mg)	7.0	0.0	8.6	0.6
B6 (mg)	0.6	0.0	45.0	25.0
Folate (mcg)	216.7	0.0	3.0	0.3
B12 (mcg)	1.0	0.0	62.4	20.1
Pantothenic Acid (mg)	0.4	0.0	0.3	0.0
Calcium (mg)	6.0	0.0	0.1	0.0
Copper (mg)	0.1	0.0	0.6	0.0
Iron (mg)	4.0	0.0	15.5	3.0
Magnesium (mg)	127.0	0.0	617.0	0.0
Manganese (mcg)	0.4	0.0	0.2	0.2
Phosphorous (mg)	241.0	0.0	142.0	47.0
Potassium (mg)	287.0	0.0	403.0	337.0
Sodium (mg)	35.0	0.0	0.5	0.3
Zinc (mg)	6.0	0.0	2.0	55.0

Annex 4: Underlying Assumptions Made for CotD Modelling

Modality	Intervention	Target Group	Dosage (g)	Frequency	Price/100g
Voucher or in-kind	FBF	U2, Adolescent Girl and PLW	U2: 60g	Once a day	0
			Adolescent Girl and PLW : 120g	Once a day	0
	Small-Quantity Lipid Based Nutrient Supplement	U2	20	Once a day	0
	Ongera (MNP)		1	Three times a week	0
	IFA	Adolescent Girl and PLW	1	Adolescent Girl: Once a week	0
				PLW: Once a day	
	MMT		1	Once a day	0
	Fresh Food Voucher	Household	Eggs: 1 dozen per week	Once a week	0
			Dodo leaves: 1kg a week		
Market	Fortified foods: maize flour and oil	Household	Same unfortified/biofortified product as defined by CotD software	Up to 3 times a day	Same unfortified/biofortified product as defined by NISR data
	Boifortified foods: High iron beans and orange flesh sweet potatoes				
Own production	GIRINKA Programme	Household	5 litres	Once a day	0
	Nutrition Sensitive Kitchen Garden		5 kg each of maize, orange flesh sweet potato, banana, dodo leaves, swiss chard, pumpkin, pumpkin leaves and onion	A month	0
	Poultry Intervention		21 eggs	A week	0

Nutrition Sensitive School Feeding Models

Food/ Supplement	School Milk	Ration 1	Ration 1 + Milk	Ration 1 + School Garden	Ration 1 + Fish Pond	Ration 1 + Fresh Foods Combined
			Intervention			
SuperCereal		120g/day				
Sugar		15g/day				
Milk	1 litre/week		1 litre/week			1 litre/week
Cabbage				For each, 15g/week		For each, 15g/week
Carrots						
Bananas						
Avocados						
Fish					60g/week	60g/week

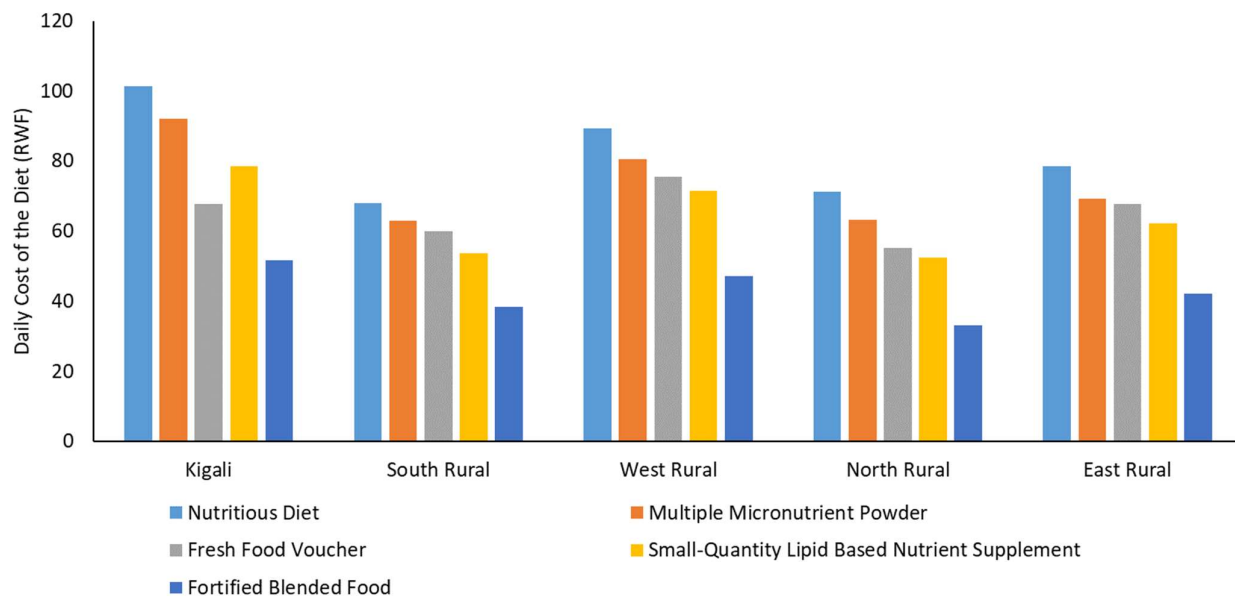| Food/ Supplement	Ration 2	Ration 2 + Milk	Ration 2 + School Garden	Ration 2 + Fish Pond	Ration 2 + Fresh Foods Combined
			Intervention		
Fortified maize flour	120g/day				
Beans	30g/day				
Oil	15g/day				
Milk		1 litre/week			1 litre/week
Cabbage			15g/week		15g/week
Carrots					
Bananas					
Avocados					

Fish				60g/week	60g/week

Complementary Feeding Recipes

Recipe	Food	Portion size (g)	Frequency	Total price of recipe
Inombe y'ibirayi irimo Soya (Potato with dodo leaves, tomatoes, small fish and soybeans)	Irish potato	210	Once a day	Kigali: 172
	Dodo	30		Southern Rural: 122
	Tomato	30		West Rural: 136
	Small fresh fish	30		North rural: 120
	Soybeans	30		East rural: 120
Inombe y'igitoki, imboga n'indagara/ifi (Matoke with dodo leaves, tomatoes and small fish)	Matoke	210	Once a day	Kigali: 185
	Dodo	30		Southern Rural: 130
	Tomato	30		West Rural: 134
	Small fresh fish	30		North rural: 117
				East rural: 121
Umutsima w'ibigori , Ibishyimbo bivanze n'imboga n'indagara (Maize, beans, dodo leaves and dried fish)	Maize	60	Once a day	Kigali: 77
	Beans	30		Southern Rural: 83
	Dodo	30		West Rural: 97
	Dried fish	30		North rural: 89
				East rural: 68

Annex 5: Cost of the Diet Results by Region

Child 6-23 months

School Aged Child

Adolescent Girl

Pregnant and Lactating Woman

Legend:
- Nutritious Diet
- SuperCereal
- Fresh Food Voucher
- Iron and Folic Acid Supplement
- Multiple Micronutrient Tablet
- Fortified Blended Flour
- SC + (CHAI)

Household

Legend:
- Nutritious Diet
- Smallholder Poultry
- Biofortified Foods
- FFV
- Fortified Maize Flour and Oil
- Nutrition Sensitive Garden
- One Cow Programme