

Food system innovation lab

Market and nutrition gap analysis

Slide deck 2 & 3

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Chapter 1: General overview



This study links nutrition outcomes, market structure and consumption and production preferences

This study is part of the [food system innovation lab](#), executed by Wageningen Economic Research in preparation for the SNV PADANE programme in Burundi in the period 2020-2022. See the [timeline](#) for an overview of research activities and corresponding deliverables.

This report presents a summary of the literature study on nutrition gap analysis and market analysis combined. The nutrition gap analysis and market analysis are guided by the [food system analysis framework](#). The food system analysis framework gives an overview of the dynamics between a selection of socio-economic and environmental drivers and food system activities that play a role in the Burundian food markets in relation to nutrition outcomes.

Nutrition gap analysis | Good nutrition is of crucial importance in the periods of conception, pregnancy and early years of childhood. Undernutrition in the earliest stages of childhood causes brain damage that cannot be cured later in life and thus has large implications not only for individuals but also for society at large. Within the food system analysis framework, the nutrition gap analysis is closely linked to food consumption behaviour and consumer characteristics, and to food system outcomes related to food and nutrition security. Based on (only limited available) datasets, the nutrition gap analysis describes the current nutrition gap in Burundi and the relationships between nutrition outcomes and consumer behaviour, food environment, biophysical environment, health environment, and socio-economic drivers.

Market analysis | Nutrition outcomes are closely linked to the structure of the food market—or food system drivers in general. The market analysis closely links to socio-economic drivers, including agricultural production, market structure, prices, and policies, food system activities and socio-economic outcomes. The analysis aims to reveal the food system drivers that are related to the nutrition gap in Burundi.

Focus group discussions | Nutrition outcomes are driven by decisions about food production and consumption. Individual preferences play an important role in these decisions. How do farmers deal with risk? Which crops do they prefer to grow? How is food allocated within the household? Who decides about that? What do people see as their ideal diet? Do producers and traders trust each other? These issues were addressed in focus group discussions conducted with farmers and value chain actors.

This report is based on a combination of primary and secondary data. The research team used various quantitative and qualitative research methods. The findings in this report are based on a combination of literature analysis, secondary data analysis, [key informant interviews](#) conducted in Bujumbura in May 2019 (summarised in the first deliverable; slide deck #1), and focus group discussions conducted in August 2019, in rural Cibitoke, Bubanza, and Bujumbura Rural.

Reading guide: from main conclusions to detailed information and further reading

Main conclusions | Chapter 2 provides a summary of the nutrition gap analysis and Chapter 3 provides the market analysis. Each page contains an overview of main conclusions on the left side, and a more detailed description of findings on the right side. The key findings, which are based on literature and datasets, are clickable and bring you to the corresponding annex with even more detailed information and source information.

Details in annex | Each main conclusion links to an annex providing more detailed information as well as references to information sources. To return from the annex to the main document, click on the button in the lower right corner of the page (◀).

Links between nutrition gap analysis and market analysis | Multiple topics are addressed both in the nutrition gap analysis and in the market analysis. Orange arrows (▶) in the nutrition gap analysis refer to related topics in the market analysis. Blue arrows (◀) in the market analysis refer back to the nutrition gap analysis.

Findings from focus group discussions | Findings from focus groups discussions with consumers, producers, and value chain actors, are summarised in green boxes. In these findings we focus on those issues that were mentioned most often in the discussions and that best explain the realities of our respondents regarding the food system.

Some slides are only based on findings in FGDs. These slides are meant to give the reader an idea of the context in which all of our findings take place.

Further reading | The final page contains a reference list with an overview of all literature and datasets used for the nutrition gap and market analyses. Most of the references directly link to the original publications, for further reading.

Ten conclusions

We provide an overview of main conclusions based on the literature and data analysis, supported by observations from focus groups. Conclusions from nutrition gap analysis and market analysis are similar. Therefore, conclusions from both analyses are integrated in the overview below.

Crop production in Burundi is primarily based on **small-scale family farming**. Eighty per cent of the Burundian population is involved in agricultural activities, yet only 28% of total agricultural production is marketed. Farmers indicate that self-sufficiency is of large importance to them.

The **low level of market integration** among farmers in Burundi is related to mistrust among the value chain actors such as farmers, traders, and risks concerning environmental shocks and market fluctuations.

Farmers are vulnerable to covariate risk including failing harvests and interest raises as well as idiosyncratic risk including illness of household members. This makes access to and uptake of any form of credit low, and farmers are often forced to sell their produce at very low prices.

Nutrition levels for young children and women in Burundi are dramatically low, with high rates of **stunting (56% of children)** and **iron deficiency anaemia (48% of children, 26% of women)**.

Dietary diversity among children is low, mainly due to low consumption of protein-rich foods, including eggs, dairy products, and meat. Production of eggs, dairy products, and chicken in Burundi is also low, when compared to neighbouring countries. Prices of animal products are high. Eggs are not part of an average diet, while consumption of milk is more accepted.

The **food system is volatile** due to crop production dependent on rains and very limited post-harvest handling including storage and conservation. This triggers seasonal nutrition gaps and hunger periods (April – May & September – December).

Rural areas have lower levels of nutrition security than urban areas. Another regional difference is observed in food prices. These vary within the country and are higher in wealthier provinces close to Bujumbura.

Northern provinces perform worse in terms of nutrition security than the south. Root causes for this difference should be investigated further.

Nutrition outcomes for children are better for well educated, wealthier households, and for households with a female household head. The latter observation suggests that **intra-household gender dynamics** play a role in nutrition outcomes.

The **food system** is volatile in Burundi. This is mainly because of crop production dependent on rains and limited storage and conservation, and political tensions in the country. Particularly food prices vary considerably within the country and are higher in wealthier provinces close to Bujumbura.

Three recommended PADANE intervention areas: nutrition programmes, value chain integration, and risk management

The PADANE programme aims to contribute to increased stability and security from improved food & nutrition security, through commercial farming opportunities, resilient farming systems and employment creation.

Keeping in mind the objectives of the PADANE programme, we recommend to focus on three key intervention areas.

- Focus on nutrition outcomes, using role model programmes and information dissemination projects.

Focus on improving nutrition outcomes for women of reproductive age—especially in the rural north. Improve the access to and consumption of protein-rich foods, for women of reproductive age. Selection of protein-rich foods must be based on local production and consumption preferences, agro-climatic conditions, as well as market conditions.

Practically, SNV could organise nutrition programmes channelled through women, while including men in the programmes. Leader figures could be used as role models to show how animal protein products can be integrated in current diets to shift current consumption preferences. SNV could organise or contribute to nutrition programmes in schools for food distribution and knowledge transfer—to indirectly reach parents as well.

- Support food value chains through storage and input provision, market integration programmes, seed system improvements and community based organisations

Focus on post-harvest handling in rural areas by collaborating with farmers' cooperatives, local agri-entrepreneurs and NGOs. Related interventions may include contribution to storage spaces and special bags for storing crops.

Focus on strengthening existing local and national value chains, before addressing international value chains. SNV may consider supporting community-based organisations (CBOs) or establish new ones to link local rural value chains with major cities.

- Improve farmers' adaptive capacity to income and production irregularities to improve food security and household income.

SNV may work on reducing risks that farmers face and improve their financial skills through various intervention types. These could include financial skills training, increasing access to (local) credit systems, contract farming arrangements, weather index insurance together with microfinance loans, weather information services through CBOs, and extension training on climate-smart agricultural (CSA) practices.

Six toolboxes to support selection of promising intervention areas

TOOLBOX 1: Develop a nutrient-food selection tool. A nutrient-food selection tool could help to select suitable food products depending on nutritious value and socio-economic and environmental characteristics. The nutrient-food selection tool helps to select which food items could be produced, depending on local preferences, area-specific agro-environmental and market conditions, seasonal dynamics, possibilities of storage and processing, costs of production, and natural resource use including need for land and water. The nutrient-food selector is ideally linked to ongoing activities in Burundi, for example the crop selector being developed by Auxfin. (See [example](#))

TOOLBOX 2: Economic analysis of storage. To investigate the types of (individual as well as community-based) storages that are most feasible for the farmers, an economic assessment of the cost and benefits of storage for various crops types is required. This tool should take into account the benefits of smoothing seasonal market prices and the decrease in post-harvest losses as well as the cost of acquiring and using the storage is required.

TOOLBOX 3: Evaluation of optimal size and organisation structure of CBOs. To allow for successful collaboration with existing CBOs (such as CBO village savings and loan associations (VSLAs), groups organised through PIP, farmers' cooperatives and other non-economic farmers' organisations such as community health organisations and women's organisations), an analysis of how existing CBOs function is key. The study should address where well-functioning CBOs are located, how people cooperate, and what are the main functions of the CBO. Research shows that optimal size and number of CBOs changes by distance to markets and member characteristics. Larger CBOs can

offer better prices and easier cover transportation costs. However, larger CBOs include farmers with different skills and productivity levels, increasing organisation costs. It is thus useful to develop a tool to determine the minimum size of CBOs that can sell their produce to distant markets in a profitable way.

TOOLBOX 4: Financial diaries. To evaluate the changes in the incomes of farmers and how they cope with financial irregularities financial diary studies can be done. This study will improve the bookkeeping skills of farmers while providing valuable information on the impacts of various interventions implemented by SNV.

TOOLBOX 5: Cost benefit analysis of CSA practices. Identify the costs and benefits of CSA practices for the farmers and determine the optimal sets of practice, and disseminate this information to the farmers.

TOOLBOX 6: Ex-ante or real-time evaluation. Assess the potential of each intervention area by conducting an ex-ante or real-time evaluation of expected impact on nutrition outcomes in relation to individual preferences and social norms, market infrastructure, and policy environment. In an ex-ante evaluation, expected effects are modelled, to help policy makers to select interventions with the highest potential impact on result areas. In a real-time (or near-time) evaluation, impact is monitored continuously during the implementation phase and feedback is given immediately, to allow policy makers to improve interventions, to increase their potential impact. This is related to action research.

Four avenues for further analysis

Apart from the toolboxes that suggest specific approaches for action research and that will help to target the interventions within PADANE, we identify four additional avenues for further analysis. These topics can be addressed in key informant interviews, focus group discussions, and surveys – ideally in close collaboration with local researchers.

Analyse drivers of consumption and production behaviour among rural households in Burundi. Evidence in existing literature about the drivers of food production and consumption behaviour in family farming households is scarce. For example, to address low protein intake, root causes of low consumption of protein-rich foods must be well-understood. Findings from innovation mapping discussions show that there are cultural barriers to eating eggs. High prices of animal products (e.g. goat meat, chicken, milk) are also important barriers to eating animal products. Consumption-choice experiments should be conducted in a larger number of communities, combined with focus group discussions and survey data to estimate the willingness to pay for those animal products.

Address intra-household bargaining power, related to decision making on food purchases, preparation and allocation within the household. In relation to the previous recommendation, it is important to understand how

decisions about allocation of income from farming, choice of on-farm crop production, purchase and preparation of food, as well as allocation of food within the household are made. Gender dynamics likely play a key role, since our results show that female-headed households have better nutrition outcomes than male-headed households. Afterwards, further analysis is needed to better understand drivers of consumption behaviour, and to test interventions that could support change in consumption decisions.

Conduct a nutrition gap analysis based on SNV nutrition baseline data and follow-up data collection. Our extensive search for nutrition data showed that nationally representative detailed data on nutrition in Burundi is limited. In the context of the PADANE project, a nutrition survey has been conducted in August 2019. SNV should follow up on the nutrition baseline in the next years and compare nutrition outcomes over time and between geographic areas.

Carry out a further analysis of the root causes of regional variations in nutrition outcomes. Our results show that there are regional variations in nutrition outcomes, and also regionally vary per crop type. The results from this study should therefore be linked to the results from the value chain analyses, as some of the root causes for regional variations may be subject of that analysis.

Chapter 2: Nutrition gap analysis



Nutrition gap analysis is based on representative data from the DHS programme and focus group discussions in Burundi

The nutrition gap analysis is based on data collected within the Demographic and Health Surveys (DHS) programme. This study is based on a nationally representative survey collected by the Demographic and Health Surveys (DHS) programme. The survey includes questions on nutritional status as well as other health outcomes and household characteristics. DHS collected nutritional intake data from women at reproductive age (15-49 years old) and children from 6 months up to 5 years old. (See [Details](#) and [DHS website](#) for original datasets and more information)

We compare nutrition outcomes between Burundi, Rwanda and Tanzania. The comparison gives an insight in the local dynamics of the Burundian food system, as the neighbours are in many ways comparable (e.g. natural environment). We also use DHS data of Rwanda and Tanzania to compare nutrition status of Burundi with neighbour countries and use information from key informant interviews to support our findings.

There are multiple [pathways from inadequate food access to multiple forms of nutrition insecurity](#). To explore the nutritional status of women and children in Burundi, we use four nutrition indicators. The selection of these indicators is mainly based on data availability:

1. **Dietary Diversity Score (DDS) for children between 6-24 months and 24-59 months** | The DDS, in the DHS, covers whether mothers fed their children food items from 7 food groups: grains, legumes, dairy, flesh, eggs, vitamin A-rich fruits and vegetables, and other fruits. The data is only available for children. The DDS addresses one of the most common nutrition problems in developing countries and is accurate in measuring (crude) nutrition gaps. In the DHS the DDS takes values from 0 to 7. Values lower than 4 signal an inadequate diet. Body Mass Index (BMI) for women | BMI is the ratio of weight in kilograms to the square of the height in meters (kg/m²), excluding pregnant women. BMI is widely used in the literature, giving information on both undernutrition as well as obesity.

* The DDS for children is only validated for 6-24 months. Therefore we report our results separately for those 2 groups. We also report Minimum dietary diversity analysis as a robustness check for our results.

2. **Anaemia prevalence for women and children** | Anaemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient, often caused by iron deficiency. Blood tests for iron deficiency anaemia is done by finger prick or, in the case of young children, heel prick blood testing.
3. **Stunting for children** | Calculated by using z-score that is available in DHS dataset and calculated by age levels. A child is considered to be stunted if the z-score is lower than -2. (See [DHS website](#) for calculation of z-score)

First, we describe the nutritional status in Burundi. We use the 4 indicators and compare them with neighbouring countries Rwanda and Tanzania. We present regional differences in nutrition outcomes in various maps.

Second, we investigate how various determinants predict nutrition outcomes in Burundi. Our literature review identified five main groups of determinants affecting nutrition outcomes: consumer behaviour, food environment, biophysical environment, health environment, and socio-economic drivers. We use [proxy indicators](#) from the DHS dataset for each group. We identify critical determinants of nutrition gap in Burundi, using descriptive statistics, graphical analysis, as well as regression estimation methods.

Third, we use qualitative data from 9 focus group discussions to explain our findings from the nutrition gap analysis. The FGDs addressed behavioural factors, social norms (e.g. gender norms and household bargaining in food and crop choices, trust in various actors and institutions), and aspirations that drive food choices. Based on this, potential areas of innovation are mapped. For this study we conducted mapping discussions in rural Cibitoke, Bubanza, and Bujumbura. ([Details](#)) In all regions we held 3 separate discussions, one with farmers, one with consumers (we invited household couples) and one a variety of value chain actors (e.g. traders and transporters). Each discussion had 10 to 12 participants.

Focus group discussions on food consumption, choices and preferences

Meals are consumed at home. Most meals are consumed at home together with household members. This is both seen as important and as a necessity, as most people cannot afford meals outside the home.

Men and women within a household eat diversified diets. Meals are generally served on two different plates: one for the husband and one for the wife and their children. Many of the women indicated that they would prefer three plates instead: one for the adults, one for the older children and one for the younger children. This might be to be able to share their plate with the husband instead of with the children. Women in Buganda preferred to have a separate plate for all the household members.

Additional research should be done to get a full understanding of the dynamics regarding food consumption between household members.

Women cook the food, but often share the decision power. All respondents indicated that women are responsible for preparing the food, sometimes helped by a worker or a child. Often, it is also the women who are going to the markets to buy the food.

However, it is not only the women who decide what will be eaten. Men have to give consent. One respondent explained this by pointing at the fact that men decide on the money and on the land where food is produced. Especially in times of a food crisis one respondent in Musigati explained, men take more decisions regarding household consumption.

Farmers indicate a strong preference for foods with high energy levels which will easily satiate their families. It is most important for people to ensure that all the household members consume enough energy to survive, for a cost that they can afford. Hence, this explains the popularity of beans, maize flour and cassava flour. These food preferences also translate in production choices on their own farms.

People prefer food which is grown in their own colline – most ideally by themselves. There are several reasons why eating produce from the own colline is preferred. In Mugongo Manga people indicated that this could generate money to use in other projects. In Buganda people referred to the lower costs due to the absence of travel costs. In Musigati, the region where food seems to be most scarce, people indicated that production by themselves is more reliable than having to rely on the market. Security of food was mentioned in all the focus group discussions: 'You never know how much you will get from another, but production from the own farm will be good enough.'

Beer is the most popular drink. Many of the respondents indicated that they prefer beer as a drink – even above milk, which many of them link with positive health effects. Another popular drink is Fanta.

The willingness to try new food differs per region. In Musigati people are open to new food items. However, most of the respondents in Buganda and Mugongo Manga were hesitant and afraid to get sick.

Nutrition levels are especially low for children and women

Key findings



More than half of the children under 5 years in Burundi were stunted in 2016, compared to less than 40% in Rwanda and Tanzania.



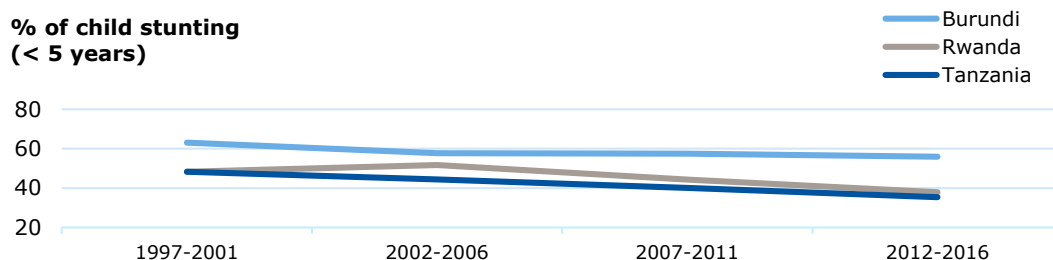
Iron deficiency anaemia decreased for children and women. There is a comparable trend in the neighbouring countries.



High percentage of underweight females of reproductive age.

Within the household, women of reproductive age and children under five years are the least nutrition secure. In 2016, 48% per cent of the children had iron deficiency anaemia and 56% was stunted. Especially stunting will negatively affect the performance of these children throughout the rest of their lives. The percentage of stunting children has been decreasing in Burundi since 1997. However, this trend is slow, compared to the neighbouring countries Rwanda and Tanzania.

% of child stunting
(< 5 years)



Source: DHS

Regarding women in the Burundian households, in 2016 26% of the reproductive women faced iron deficiency anaemia and 19% of them were underweight.(Details)

Overall Burundi scores lower for nutrition outcomes than its neighbouring countries and does not improve fast. The incidence of iron deficiency anaemia in Burundi is comparable to the incidence in neighbouring countries. However, child stunting is higher and stable over time in Burundi, while it is decreasing in Rwanda and Tanzania. Also the percentage of underweight for reproductive women is much higher in Burundi compared to Rwanda and Tanzania.(Details)

Dietary diversity is low

Key findings



Dietary diversity among young children is low: less than 2 food groups per day are consumed.



There are many nutritious products available; on a regular basis people consume just a few.



In some regions, respondents indicated to eat on average only one meal per day.

Dietary diversity of children under five is low. For this analysis we grouped the food in seven food groups. Based on this division we calculated how many food groups were consumed in the last 24 hours. This gives an indication of the variety of consumed nutrients. On an average day, children in Burundi consume from about than 2 different food groups (2.5 out of 7 for children between 6 and 23 months old, and 1.8 for children between 24 and 59 months old) and therefore have a diet with low nutritious value. The recommended minimum dietary diversity score is at least 4 out of 7. [\(Details\)](#) Therefore, 20% of children between 6 and 23 months old meet the minimum dietary diversity, against 15% of children between 24 and 59 months. Moreover, of the children between 6 and 23 months old, only 3% of those who are not breastfed and 11% of those who are breastfed meet the minimum acceptable diet, which combines the minimum dietary diversity and meal frequencies.¹

In general there is a wide range of products available, but most people consume just a few on a regular basis. On the Burundian markets, also on the local ones, there seems to be a large variety of goods for sale. However, only a few products are consumed on a regular basis and they cover only a few food groups. In all three regions beans and amaranth leaves are central to the main daily meal. In Musigati and Buganda this is accompanied with cassava paste, in Mugongo Manga with corn paste.

Additional food items which sometimes accompany the main ingredients were mentioned in all regions, such as: potato, ndagala (small fish), banana, rice, avocado, meat, oil, pumpkin leaves, tomato, aubergine and cabbage.

In Musigati people indicated that they eat on average only one meal per day. Also, in the other regions all the respondents indicated that they do not eat the three meals per day as they ideally would want.

¹Jones, Ickes et al. (2014)

Low consumption of animal products: financial dimension

Key findings



Animal proteins are hardly consumed in Burundi.



Financial limitations constrain people to consume (more) animal protein.



The lack of animal products in the diet is related to the marginal status of these products' value in Burundi.

Animal proteins are among the least consumed food groups: eggs, dairy, and meat products are consumed by only 3, 7, and 19% of children under 5 years old.^(Details) This is related to the marginal status of these products' value in Burundi.^(Details) Each of the food groups is consumed less often by older children than by younger children. As protein is an important macronutrient within a human diet, a deficit has serious health implications.

Financial limitations constrain people to consume animal proteins. In all focus group discussions regarding consumption respondents indicated that they would like to consume (more) animal products such as meat, milk and fish. However, the market prices of these goods are too high for most people to be able to purchase them (on a regular basis).

For example on a market in Bujumbura:

- 1 kilo of beans costs BIF 1,600.
- 1 egg costs BIF 400
- 250 gr of packed long-lasting milk costs BIF 800
- 1 full grown rooster (alive) net-weight about 1 kg costs at least BIF 10,000.

So, 2 eggs or 250 gr of milk cost the same as half a kilo of beans in the market. The milk-bean and egg-bean price ratios do not vary much among markets in various regions. Hence, consuming animal protein is not an option for poor families, given that daily wages are about BIF 2,000 in Bubanza and BIF 4,000 close to Bujumbura. It is therefore necessary that prices for animal products decrease for dietary diversity in Burundi to improve by integrating animal proteins in the average daily consumption.

Low consumption of animal products: cultural dimension

Key findings



Animal proteins are hardly consumed in Burundi.



Eggs are - in contrast to meat, fish and milk - not a popular animal product.



Milk is perceived as healthy, especially for pregnant women



The lack of animal products in the diet is related to the marginal status of these products' value in Burundi.



Eggs are not popular. We gave a large share of our respondents the choice between corn flour, beans, milk and eggs (all same market value). Almost no one chose the latter. People explained the reason not to choose eggs was mostly a financial one, and it hardly gives enough energy to feed their family. Hence, a cost-benefit calculation. However, to test this further we increased the amount of eggs to see which quantity of eggs is perceived as equal to one kilo of beans. It seemed that 30 eggs were the tipping point. However, even then people remarked that they would still prefer the beans as eggs do not fit in their traditional daily meals. Others mentioned that eggs are especially meat to be eaten by wealthy men, and therefore do not match with their own identity.

Milk versus eggs; milk is perceived as more healthy. Most of the respondents seem unaware of the health benefits of eggs. The only participant who picked the eggs in the experiments was an educated farmer. He explained that he chose eggs because they are more nutritious.

Milk on the other hand was perceived as very healthy (e.g. to treat stomach pains), especially for pregnant women. This might be the reason why milk is more popular than eggs, especially in Musigati where a milk cooperation is active and also sells at a local cafe.

However, for most people milk is too expensive to fit their daily diets.

Cheese is perceived as a good new opportunity by some, but it is currently not available (yet) on a large scale. In Musigati a milk cooperative is exploring the possibility to produce cheese and sell this both in the local market and in Bujumbura city. They described cheese, unlike eggs, as being compatible to their traditional meals. However, during the focus group discussions it did not become clear why cheese is currently not widely available in Burundi yet. It might again have to do with the involved expenses, both for production and consumption.

Hunger is seasonal due to agricultural production cycles and lack of post-harvest handling

Key findings



Hunger is seasonal and is linked with rain cycles and harvest periods.



Studies indicate 2 periods of hunger.



The impact of seasonality is related to limited options for food storage and processing.



In times of hunger market prices tend to rise and wages tend to drop.

Hunger is related to the rain and production cycles. Literature shows that hunger is seasonal and directly linked to harvest periods. There are three harvest periods in a year in Burundi. These are related to the three rain seasons. Households have in general enough food when food can be harvested. However, in the periods when crops are planted, food shortages can arise. An overview of the seasonal hunger in Cibitoke and Kirundu and its relation to the rain and production of cassava, beans and sweet potato is given in the annex. [\(Details\)](#)

Limited options for food storage and processing enlarge the impact of the seasonal production. Food in Burundi needs to be consumed almost directly after the harvest. As a result of the lack of storage and processing, there are relatively high levels of aflatoxins found in products on the food markets in Burundi. This means that if the products are not eaten straight away they will rot and become post-harvest losses. Hence, in the periods without harvest, there is just limited preserved food available. [\(Details\)](#)

Seasons of hunger are related to market prices and salaries for wage labour. In times of food scarcity, food prices tend to rise. On the other hand, as more people are looking for a job, salaries for wage labour can drop drastically. [\(Details\)](#) This makes it even harder for people, especially for those without savings, to obtain enough food.

People tend to store food at home during the harvest season to save for times of food scarcity. However, for many this was not or just enough to cope with the periodic food shortages. Plus, in regions where they specialise in crops as potatoes which are hard to store, it is more difficult for people to store sufficient amounts of goods.

Due to the fluctuating markets people are hesitant to rely on the market for their food supply. People indicated that they never know what they can get and for which price, so they prefer to rely on their own subsistence farming.

Nutrition security is lower in rural than in urban areas

Key findings



The dietary diversity among children is lower in rural areas than in urban areas.

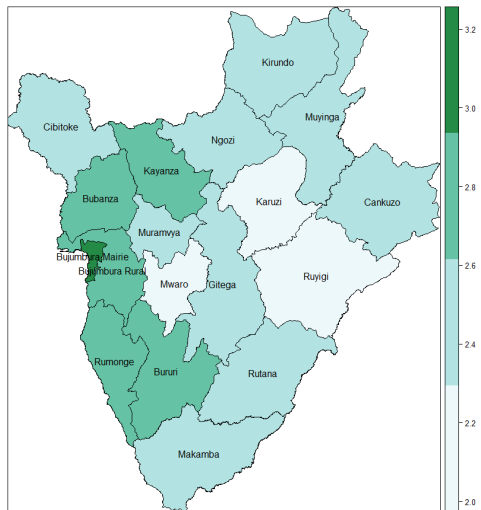


The distance to nearest city (markets) and Bujumbura are not clearly related to the nutrition levels.

*Dietary diversity score per province
(6-23 months)*

Nutrition outcomes in Burundi are regionally dispersed. There are large differences in nutrition outcomes between rural and urban areas.

In urban areas, the dietary diversity score (DDS) is significantly higher (3.02/7 for children between 6 and 23 months, and 2.24/7 for children between 24 and 59 months old) than in the countryside (2.39/7 for children between 6 and 23 months, and 1.77/7 for children between 24 and 59 months old), although the mean DDS is inadequate in both rural as well as urban areas.



Also stunting rates among children under 5 years, child anaemia and female anaemia are significantly lower among urban populations. [\(Details\)](#) This is related to higher wealth levels in cities [\(Details\)](#) and higher dietary diversity. [\(Details\)](#)

Other regional effects related to the cities are diffuse. For instance, the distance to Bujumbura increases the likelihood of iron deficiency anaemia among children and women, but decreases the likelihood of being underweight for females. The distance to the nearest city is positively correlated with dietary diversity of children between 24 and 59 months old and female iron deficiency anaemia, but negatively correlated with iron deficiency anaemia among children. And lastly, the altitude decreases the likelihood of being anaemic (after a correction of haemoglobin count for altitude as oxygen is less available at higher altitudes), but increases the likelihood of low BMI scores for women. [\(Details\)](#)

Northern provinces have lower levels of nutrition security than provinces in the south

Key findings



More than half of all children in the north of Burundi are stunted. Stunting rates are still high, but slightly lower in the south (*Figure 1*)

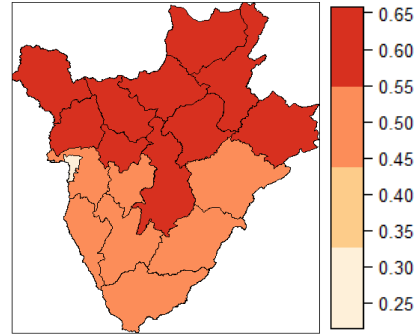


Both child and female iron deficiency anaemia are more prevalent in the northern Burundian provinces (*Figure 2 and Figure 3*)

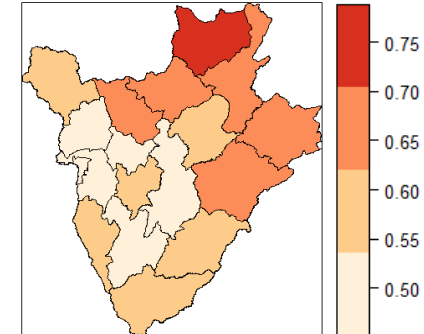


Female underweight is most prevalent in the west of the country close by Bujumbura and more prevalent in the north of the country (*Figure 4*)

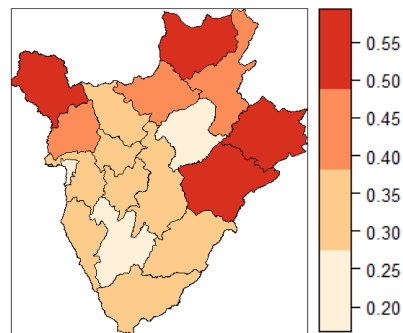
1. % of child stunting (<5 years)



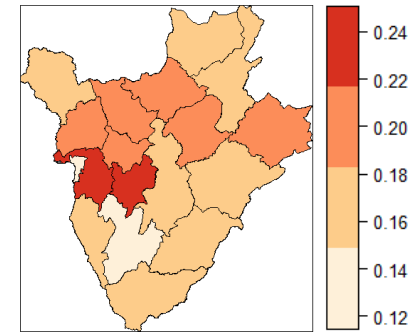
2. % of child anaemia (<5 years)



3. % of female anaemia (reproductive age)



4. % of female underweight (reproductive age)



Nutrition outcomes for children are better for well-educated, wealthier households, with a female household head.

Key findings



Better education is generally associated with improved nutrition outcomes for children.



Children and females who live in wealthier households report better nutrition outcomes.



Children with female household heads are less likely to be stunted or anaemic.



In times of hunger market prices tend to rise and wages tend to drop.

Various socio-economic household characteristics, including education, wealth and sex of the household head, correlate with nutrition outcomes for children.

Education | Generally, the higher the education level of the household head and/or the women in the household, the better the household scores on the dietary diversity score of children, iron deficiency anaemia of children and women, stunting of children and the BMI of women. ([Details](#))

Wealth | Children in wealthier households - in terms of housing conditions (roof material, wall material, type of toilet & water source) and assets (livestock, land size, mobile phone) - have better nutrition outcomes. Wealth status is most strongly correlated with the nutrition outcomes for children, in particular regarding reduced stunting of children under 5 years. Housing material, owning livestock, owning a mobile phone and land size show the strongest relations with better nutrition outcomes. ([Details](#))

Female household head | Children living in households with a female household head are less likely to be stunted (5% less compared to male-headed households) or anaemic (6% less). Having a female household head, however, does not improve nutrition outcomes for the women in those households. ([Details](#)) This might be related to the intra-household dynamics and gendered bargaining positions.

Important role of women in food choices, with consent of men. The majority of participants of the FGDs agreed that women in general make more nutritious food choices than men. However, although they seem to be in charge of the kitchen, the men – being in charge of the household and often the money – have to give their consent to the women's decisions.

To get a better understanding of interhousehold bargaining mechanisms, especially those which can influence PADANE, additional research is needed. For example, by economic experiments tailored to the PADANE target group and intervention areas.

An average family in Burundi cannot afford a sufficiently nutritious diet

Key findings



Given current market prices, the cheapest nutritious diets would consist of beans, cassava flour, and eggs.



The minimum costs for a sufficiently nutritious diet for an average family of 5, would be EUR 4.15 or over BIF 8,000 per day.



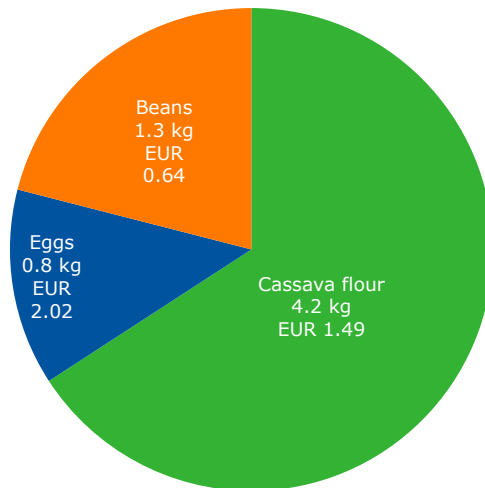
Given current GDP per capita in Burundi, an average family cannot afford a sufficiently nutritious diet.



Farmers already produce beans and cassava, but their produce is not sufficient to feed their family. Eggs are uncommon in an average Burundian diet.

The Minimum Costs of a Healthy Diet (MCHD) tool calculates what would be the cheapest possible diet that meets required nutrition intake (RNI) for an average family. [\(Details\)](#)

According to the MCHD tool, the cheapest possible diet that meets the daily RNI for an average family of 5 persons, would consist of 4.2 kg of cassava flour, 1.3 kg of beans, and 0.8 kg of eggs (about 16 eggs). This translates into 0.84 kg of cassava flour, 260 grams of beans, and 3.32 eggs per person per day. This diet would cost EUR 4.15 or BIF 8,471 per family per day.



Although the tool is a simplification of reality, two main conclusions can be drawn:

1. An average Burundian family cannot afford a sufficiently nutritious diet, given high food prices on the one hand, and low income on the other. Average estimated income of a family of 5 is EUR 3.43, which is well below the EUR 4.15 needed for a nutritious diet. [\(details\)](#)
2. Beans and cassava are produced widely, and already part of a common Burundian diet, although own production does not meet the volumes suggested by the MCHD tool. Eggs, however, are rarely consumed—especially in rural areas.

Chapter 3: Market analysis & food system drivers



The market analysis is primarily based on 3 major data sources

The market analysis focuses on key food system drivers. The market analysis includes a description of agricultural production, market prices, institutions, and socio-economic characteristics to explore how food access, availability and affordability are related to nutrition outcomes.

We use data on market prices, crop and livestock production, consumption rates, wealth levels, and market institutions from several different data sources to conduct the market analysis.

All price data are derived from the [database of World Food Program Vulnerability Analysis and Mapping \(WFP-VAM\) website](#). Data for livestock production, crop production; and yield, fertiliser use are derived from [FAOSTAT](#).

Regional consumption rates for different food groups, wealth levels, and distances to market are derived from the DHS dataset that we also use in the nutrition gap study. We estimate provincial consumption rates based on whether children from 6 months to 5 years consumed a particular food group over the past 24 hours. This information is too limited to conduct an extensive consumption analysis. However, it is the only available information on food consumption that is available. We use these data to understand whether prices influence consumption levels, but results are suggestive and should be interpreted with caution.

The *institutional analysis* is based on literature review and key informant interviews conducted by WUR researchers in Burundi in May 2019. ([Details](#))

We apply qualitative and quantitative methods to conduct the *market analysis*.

Comparing Burundi, Rwanda and Tanzania | To describe the agricultural production in Burundi, we combine the insights from the literature review and key informant interviews with quantitative analysis of crop and livestock

production. Tanzania and Rwanda are benchmark countries in our study, because of their geographic proximity to Burundi, yet with completely different institutional and policy environments. We compare farmers from Burundi with farmers from Rwanda and Tanzania in terms of crop yields, production, fertiliser use, and livestock production.

Statistical regression analysis | We analyse the relationship between market demand, prices, wealth, and geographic location (distance to capital) at provincial level through correlation analysis. The WFP-VAM database reports prices from multiple markets per province. We take the average price from various markets to calculate prices at province level. We calculate information on other regional characteristics such as wealth, consumption rates, and distance to market by transforming household level data from the DHS survey to province level. Finally, we use those data at province level in our correlation analysis and check whether our results are robust to controlling for distance to markets by using statistical regression analysis.

Price volatility | We compare price volatility of key crops in Burundi with that in Rwanda, for the same crops (common consumption crops in both countries). We chose Rwanda as comparison country since Rwanda and Burundi are neighbouring and have similar geographical characteristics. To minimise the confounding effects of geographical differences even further, we select markets that are located close to each other, at both sides of the border.

We use qualitative data from focus group discussions to explain our findings in food system analysis. In the FGDs we collected data on behavioural factors, social norms (e.g. gender norms and household bargaining in production choices. In total there were 9 FGDs, in 3 regions, each with one group of stakeholders (consumers, producers and value chain actors). ([Details](#))

Some context: food production in Burundi

Most farmers in Burundi possess only small farms. Most interviewed farmers only have between 0,5 and 3 hectares of land. On their plots farmers produce a small variety of different goods.

Consumption choices are guiding the production choices. Most farmers in Burundi are subsistence farmers. This means that they consume mostly what they produce themselves. In our focus groups discussions this was underlined by our respondents. All farmers indicated that when choosing which crops to grow, they plant whatever is needed for consumption.

The surplus of the production is sold to traders and on the markets. However, the marketability of the products and the added value hardly seemed to guide their production decisions.

Risk aversion is also guiding the production choices. Natural hazards such as rain and plant diseases have damaged production significantly in the past. For example, a destructive banana disease hit many places on the African continent. Due to the dependency of families on their production, these kind of hazards have a great impact.

This makes farmers worry about the future as they expect more diseases and heavy, unpredicted rains due to the climate change, coming their way. Hence, they become more hesitant to grow 'risk crops' such as banana and corn. Also, many respondents indicated that they would like to learn more on how to cope with the changing seasonality.

There is a strong link between regionality and food production. In the different regions we visited during our fieldtrip, we saw a regional difference in production. This seemed both related to environmental enabling features (e.g. the water availability in Musigati) and local traditions (e.g. the potato variety Ndinamagara in Mugongo Manga). However, staple foods such as beans are planted throughout the country.

Farmers hardly take credit to improve their farming practices. In our focus group discussions there were only a few farmers who indicated to have taken a loan. Most of the farmers who did, were member of a cooperative. They indicated that without a cooperative, it is difficult to get access to credits.

Another reason for the absence of credits was the calculated risk of not being able to pay back the loaned money plus interest on time.

There are hardly any technologies around to improve the production and to store or process the harvest. Limited financial resources, accompanied with the difficulty to access credit or being part of a cooperative, limit the investments of farmers in improved technology. However, in all discussions, farmers indicated that they would like to invest in such technologies, combined with inputs and agricultural trainings.

Crop production is primarily based on small-scale family farming

Key findings



Mainly subsistence farming



Consumption choices are guiding the production choices in the farm for food security.



Due to inheritance law, farms are likely to get even smaller and more dispersed in the future

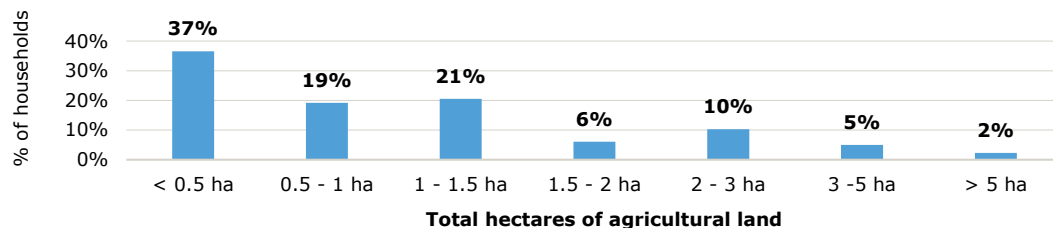


Most farms are spatially dispersed.

About 80% of the Burundian population are involved in agricultural activities. Most of the farmers produce mainly for their own consumption (subsistence farming). Hence, the share of commercial farming is low: 28% of total production is marketed. ([Details](#))

Consumption choices guide farm production choices. Farmers can produce a wide range of crops. In some FGDs they listed they can grow more than 12 types of crops, both fruits and vegetables. However, the main crops for production differ by region, and subsistence crops are most important, because food security is a key motivation for farmers. While participant to the FGDs perceive that cassava and beans are the most important crops in Musigati, potato and corn are the major crops in Mugongo Manga. Our focus group discussions show that farmers keep at least 15% (sometimes 50%) of these crops for home consumption.

Most farms are small and often spatially dispersed. Agricultural production in Burundi mostly takes place on small farms: 37% of the farmers own less than half a hectare. Many farms are too small to produce enough for household subsistence farming. It is projected that the land of farmers will shrink even more in the future, due to the inheritance laws. According to these laws, the land is distributed among all sons of the deceased land owner. Note that not all farms are small, as land is quite unequally distributed. ([Details](#)) On average, farmers own about 6 plots, which are spatially dispersed. This means that plots are sometimes miles apart.



Input use is limited, but perceived as an opportunity

Key findings



Farmers use fertilisers, pesticides and other inputs only at a small-scale basis.



Similar performance to Rwanda and Tanzania in terms growth in crop yields, cultivated area, and fertiliser use.



Farmers aspire to use more advanced methods to improve the quantity and quality of their production.

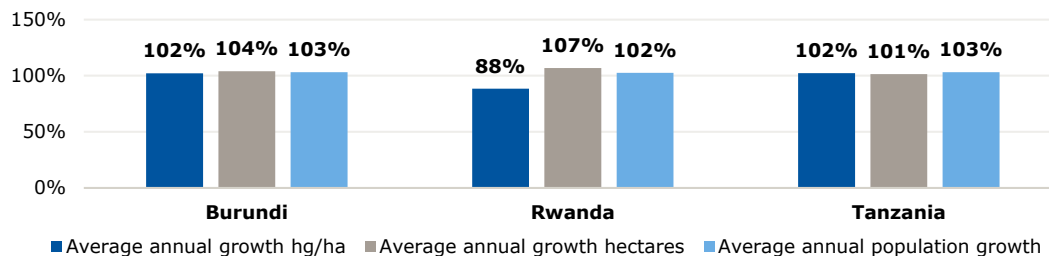


Farmers lack financial means to invest in those methods.

Farmers hardly use inputs such as fertilisers, pesticides and improved seeds. Most farmers rely on manure or mulch; use of fertilisers and other inputs is limited. Seeds and seedlings used in agricultural production are mostly local varieties saved from previous harvests. [\(Details\)](#)

There are no big differences between Burundi, Rwanda and Tanzania. Compared to farmers in neighbouring countries Rwanda and Tanzania, farmers in Burundi perform equally in terms of crop yield, cultivated area, and fertiliser use. [\(Details\)](#)

Changes in cultivated area and yields of main crops (combined) vs population growth



Farmers aspire to use more advanced methods to improve the quantity and quality of their production, but they lack finance to invest in those methods. Farmers would like to produce subsistence crops that they already know but at a larger scale. Therefore they want to use monocropping with access to larger lands, fertilisers and pesticides, and access to improved seeds to enhance the production. However, they do not have access to finance. In their perceived ideal farming system they would have access to communal storage facilities and better storage materials.

Heavy rains, unpredictable season changes and crop diseases are threatening food production

Key findings



Environmental shocks can ruin production and put families in financial trouble.



Farmers are the most vulnerable actors in the value chain related to environmental shocks.



Farmers choose their crops and varieties according to the perceived risks.



Farmers expect the risks to increase in the coming years.

Environmental shocks can ruin production and put families in financial trouble. In our focus group discussions many people indicated that in the past five years they faced some environmental shocks. Heavy rains, changing seasons and crop diseases destroyed part of their production. This immediately had an impact on their lives.

Farmers are vulnerable, as they have little access to finance and limited availability of household assets. Farmers indicated that almost none of them ever used credit for farming purposes. Farmers do not produce crops that require much investment in Musigati and Buganda. They prefer crops and varieties that are known to have short harvest cycles and are not affected by diseases or heavy rains (which is why bananas are losing popularity).

All value chain actors in the focus group discussions indicated that the farmers face the highest risk in the value chain due to seasonal fluctuations in the production. As there are no long contracts and farmers make all the production investments, a production loss weighs most heavily on their shoulders.

Crops are picked on the perceived risks. Some farmers prefer traditional good crops and varieties – as it helped them through difficult periods in their lives (e.g. potatoes in Mugongo Manga). Others indicated that they are hoping on new seeds and farming methods that help them cope with these risks.

Farmers expect the risks to increase in the coming years. In general the respondents of our focus group discussions were quite pessimistic about the future prospects. Most respondents expect more unpredictable weather and referred to the climate change. They also expect crop diseases to increase.

Low production of eggs, dairy products, and chicken

Key findings



The production of eggs in Burundi is much lower compared to Tanzania. The production of eggs in Burundi is decreasing.



The production of milk is much lower in Burundi compared to both Rwanda and Tanzania, but has been slowly increasing.



The production of chicken is also lower in Burundi, but differences are smaller compared to milk and eggs.



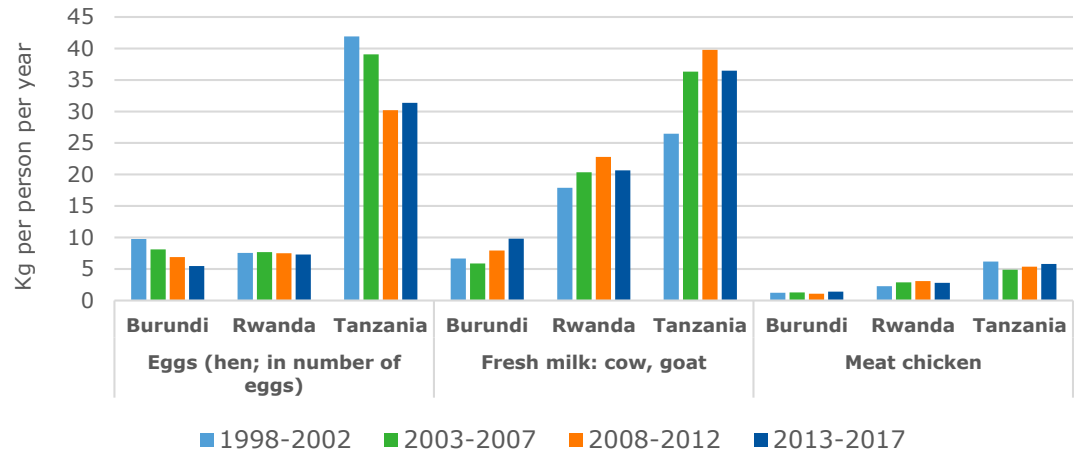
The low availability of eggs, dairy products, and chicken is an important factor in the low dietary diversity.



Production of animal products is low, also in comparison to neighbouring countries.

The nutrition gap analysis shows that many people in Burundi do not include animal products in their diets, such as eggs, dairy and meat. This is reflected in the production of these products (see figure below).

Production of eggs per person is much lower in Burundi than in Tanzania, and has been decreasing steadily between 1998 and 2017. Production of milk per person is lower in Burundi than in Rwanda and Tanzania. The meat production per person is low in all three countries, but almost non-existent in Burundi.



Farmers mainly produce subsistence crops, although they are market oriented

Key findings



Male household head usually has the decision power regarding production and commerce.



Young farmers in particular are market oriented, and rely less on social exchange networks than older farmers.



Women are in charge when food products are given away in their social network.

Male household head usually has the decision power regarding production and marketing of produce, due to land titling system. Most respondents indicated that men have the final say in the decision what is produced, how much and if and how it is sold. The most common explanation was that the men possess the land and are therefore in charge.

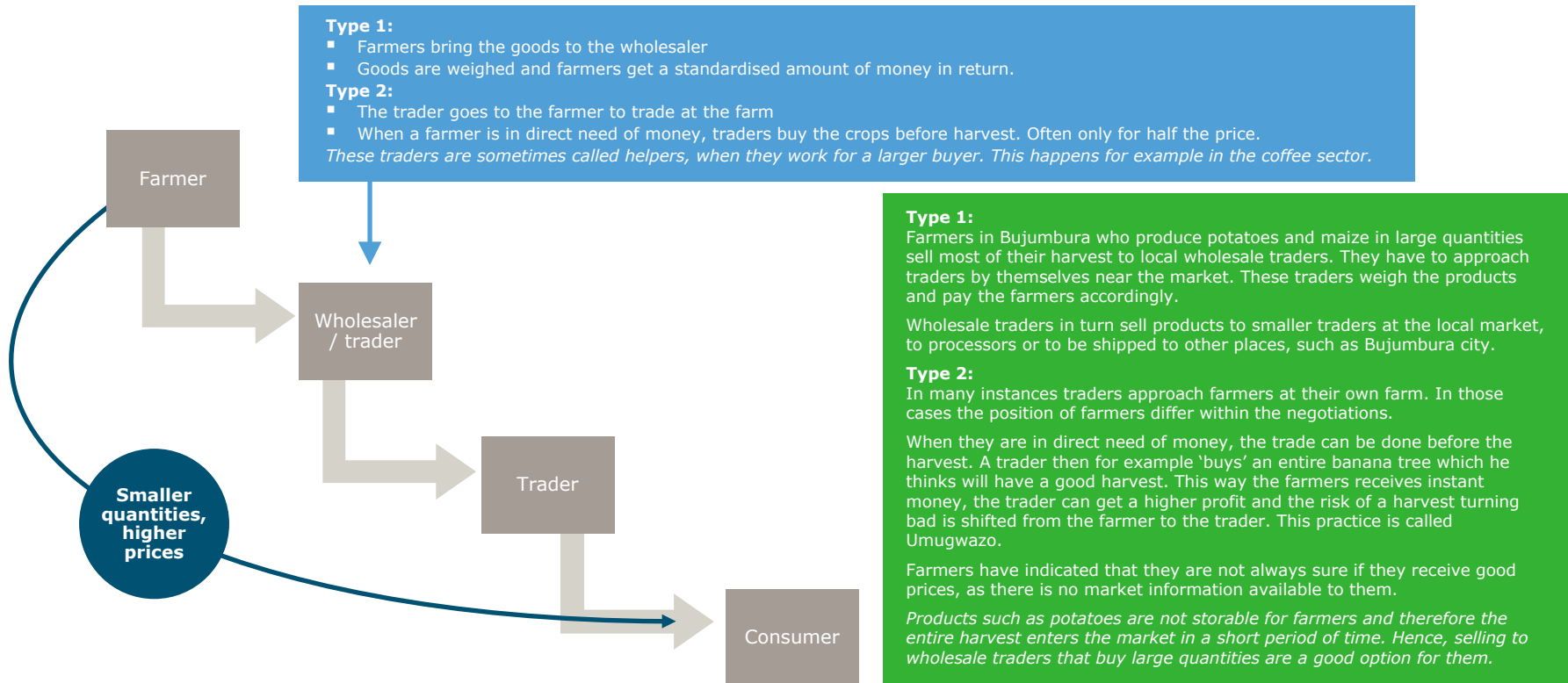
However, this does not mean that other household members do not have interhousehold bargaining power. Almost all respondents indicated that it is important to include spouse and children in farming decisions – as they are needed in farm production.

To get more understanding on interhousehold bargaining relations, a more detailed study is needed on specific activities, for example related to PADANE.

Farmers – particularly young ones – are market oriented. Although farmers make production decisions guided by consumption needs, they are also market oriented. Their surplus is almost entirely sold to traders or on the market itself.

Even though social connections often play a role in Burundi for market decisions, almost all our respondents indicated that they prefer to sell their product for a higher price on the market than to a friend/family member for a lower price. They usually do not barter their produce with their neighbours. Some older FGD participants—especially in rural Bujumbura—mention giving away part of their production to family, while younger participants did not mention giving away any produce. The decision power of giving food away – how much and to whom – was mostly in the hands of women, since they are in charge of maintaining social relations for the family.

Farmers sell to wholesale traders or directly to consumers



Volatile food system due to crop production dependent on rains and limited storage and conservation

Key findings



High volatility of food prices, when compared to similar markets.



Production and food supply are linked with the three rain seasons.



Lack of storage, conservation, and financial stress cause instable market prices and high post-harvest losses.



The seasonality of the market prices and production is related with the seasonality of hunger

Market prices of food products are volatile in Burundi, more than market prices in neighbouring countries. We compared prices of maize flour and beans in Burundi and Rwanda. We compared both the average of all markets in those countries, but also two markets that are geographically close to each other on both sides of the border. Results indicate that market prices in Burundi are twice as volatile as market prices in Rwanda. [\(Details\)](#)

Agricultural market prices in Burundi have been increasing slower than overall inflation in Burundi in 2010-2018. Food prices in Burundi have increased over the years by about 34%, while overall prices in Burundi increased by about 83% in the same time period. However, the real food prices, corrected for the inflation decreased by about -27%, implying that agricultural producers' real income decreased compared to other sectors in Burundi.

Market prices fluctuate significantly within the year. For most staple foods, market prices fluctuate significantly per month. On average the last months of the year, November and December, are the most expensive periods. [\(Details\)](#) Monthly price fluctuations are related to the three rain seasons and related harvest seasons. The last two months many crops are planted, but not harvested, which probably relates to those high prices. [\(Details\)](#) All farmers produce the same products at the same time. Hence, all the products arrive at the same time on the markets. Due to this overload, the prices of these products drop. In our interviews it was often mentioned that farmers do not even earn their own cost price when they bring their products to the market. On the other hand, when harvest of products is low, market prices rise again.

Seasonal price fluctuations are driven by financial stress and lack of post-harvest handling. The large price fluctuations throughout the farming season are enforced by the lack of low-cost possibilities to store or process goods and financial stress. Farmers have to sell their crops to get cash because of lack of cash. Therefore, produce sometimes has to go directly to the markets, decreasing the prices in high season. In addition, due to the lack of storage capacity and processing, post-harvest losses are high. [\(Details\)](#)

Food prices vary within the country and are higher in wealthier provinces close to Bujumbura

Key findings



Higher food prices in the western provinces, close to Bujumbura.



There is a lot of trade from the countryside to cities, especially to Bujumbura.



Market prices are unpredictable, which increases the risks for traders.



Taxes along the roads increase the cost of trading with other places.

Besides yearly and seasonal price fluctuations, there are geographical food price differences.

Food prices differ geographically: there are also price differences between food markets. These differences seem to be related to regional socio-economic characteristics.

Distance to Bujumbura | The distance to Bujumbura is negatively correlated with the market prices of different food items. 100 km away from Bujumbura, the price of goat meat decreases by BIF 900, and the price of sweet potatoes decreases by BIF 150. We find similar negative relationship between the distance to Bujumbura and prices of cassava, cassava flour, sorghum, maize, and beans that are local produced. However, prices for locally produced rice are not related to the distance to Bujumbura. This is probably because rice is produced in only 2 areas in Burundi. ([Details](#))

Traders from other regions sell to Bujumbura. In our focus group discussions, traders told about selling to Bujumbura and other cities. A prerequisite for this trade are good roads and vehicles. Traders who were associated with a milk cooperative in Musigati remarked that their trade possibilities increased tremendously after collectively buying a car. Selling to Bujumbura increases the market, but also gives the opportunity to sell goods at higher prices.

An unpredictable market. A driver in Buganda who trades in tomatoes on a daily basis, told us a story about the unpredictable markets. One day he bought a bag of tomatoes from a farmer for BIF 3,000. When he drove it to Bujumbura city, the prices dropped as he was driving and he could only sell it for BIF 1,500.

Tax along the roads increases the costs of selling elsewhere. When a vehicle is driving along the road carrying tradeable goods, a tax needs to be paid. Sometimes it becomes therefore too expensive to ship goods and trade somewhere else, as the taxes can be higher than the value of the shipped goods.

Regional differences in wealth status and demand for food also affect regional price differences

Key findings



Prices are higher in the provinces with wealthy households.



Prices and consumption rates are positively related.



The centralisation of wealth and purchasing power in Bujumbura and other cities relates to the better nutrition outcomes in those areas. ◀

Apart from the distance to Bujumbura, wealth and demand for food determine regional price differences.

Wealth | Various food items are more expensive in areas inhabiting the richer households compared to areas with mainly medium wealthy households. In food markets located in richer areas, sorghum prices are BIF 207 higher, rice prices are BIF 68 higher and bean prices are BIF 130 higher than in food markets in poorer areas. However, there is no statistically significant relationship between wealth status and prices of maize, sweat potato, cassava, and goat meat. ([Details](#))

Demand | Not surprisingly, there is a positive relationship between food consumption (demand) and food market prices, indicating that the purchasing power determines the food supply. We found this relation amongst others for maize flour, cassava and meat. These results imply that purchasing power of consumers moderates food supply to the wealthier regions. ([Details](#)) Note that the urban population is 13% of the total population. The estimated yearly rate of urbanisation (2015-2020) is 5,7%.¹

The centralisation of wealth and purchasing power in Bujumbura and other cities relates to better nutrition outcomes in those areas (as discussed in more detail in the nutrition gap analysis). ([Details](#))

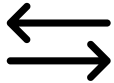
¹ CIA factbook 2019

Limited official export, informal export seems to happen at larger scale

Key findings



Restriction of official food exports.



Informal border crossing trade seems to be an everyday reality.



There is a significant difference between the official and unofficial trade rate of foreign currency.



Informal exports seem to be linked to the high unofficial trade rate of foreign currency.

There are **limited official export possibilities**. Interviewees during both our fieldwork trips explained that due to political relations it is currently not possible for Burundians to trade with their neighbouring country Rwanda. In addition, exporting processed foods is difficult due to strict quality regulations in neighbouring countries: Burundian quality certificates are not accredited outside Burundi.

Informal trade seems to happen at a large scale. Many of the participants of our focus group discussions mention that they to some extent sell to Congolese traders. These traders come to Burundi over land. (Though there are various ways to cross the border over water, this does not seem to happen often.) This market is lucrative for the Congolese traders as the products are cheaper in Burundi and for the Burundese as it enlarges their market.

A businessman explained that he would not sell across the border himself, but that he does sell his goods near to the borders. This could increase his market, when products 'leak' out of the country.

Many of the people knew about these trading practices and/or traded themselves with the Congolese, we cannot make any estimations about the scale. We also do not know about trade with other countries such as Tanzania, as we did not travel close to that border area.

Distortions of foreign exchange markets. There is a difference in Burundi between the official trade rate and an unofficial trade rate for foreign currency. This makes that there is limited official exports, due to the high costs. ([Details](#))

There is a need for foreign currency, to foster informal border crossing trade. Various key informants indicated that border crossing trade often needs foreign currency. Hence, possessing foreign currency as US Dollars or Euros is a necessity to many traders. However, it is not possible for everyone to purchase these currencies at the bank. This is due to the scarcity of these currencies at the banks and because people need a special licence to do so (which almost no one has). This fosters the black market for foreign currency and drives up the price.

Labour opportunities are limited in Burundi, especially stable and high wage labour

Key findings



There are just few options for wage labour in Burundi.



Farming wages rates differ per location and recruitment method.



With farm wages it seems impossible to afford a nutritious diet for a family.



There is a need for temporary labour during the harvest.

There is a weak labour market in Burundi | About 80% of the population currently works in the agricultural sector. There are only few (low) wage jobs on farms, and employment opportunities outside farming — in the formal private sector and the government—are limited. Most farmers employ their own family on their farms, and farmers with just little or no land are (informally) employed at larger farms. During seasons of hunger, the labour market is even more under pressure. According to the literature, wages may even drop by 500% and men migrate temporarily to Bujumbura. [\(Details\)](#) Wage rates seem to decrease with distance from the main commercial centre in Burundi: Bujumbura city.

Wage rates on farms differ, but are nowhere enough to afford a nutritious diet. In our focus group discussions and during interviews with key informants came to learn different daily farm wage rates (workdays from 8am to 3pm).

- BIF 4,000 (2 euros) in Mugongo Manga
- BIF 2,000 (1 euro) in Musigati
- BIF 1,000 (0,50 euro) in Ngozi

The differences might be due to the geographical differences between the places. Another explanation is the recruitment method. When a worker is hired directly by the farm, the wage is higher than when there is a recruiter in between.

None of these wages is enough to afford a nutritious diet (costing BIF 8,471 per family per day)

There is a need for temporary labour during harvest. In Musigati farmers mentioned that they usually have a lack of labour in times of harvest. This delays their harvest, which hinders them to bring their products on the market on the right time and to avoid post-harvest losses. To cope with this, farmers exchange labour and work in rotation on each other's farms.

Mistrust among value chain actors seems to be widespread

Key findings



Many farmers distrust traders to give them a fair price.



Some mistrust farmers when it comes to long- term agreements.

Mistrust towards traders. This was a feeling that was expressed by various farmers. Especially when traders would come to the farms and have an individual negotiation, many farmers had the feeling that they got paid below a fair price. For instance in Musigati, farmers mentioned that trades offer different prices for the same product to their neighbours.

Additionally, the practice of Umugwazo (◀), where farmers only get half of the price for their products, seems to influence the trust. Many farmers indicated that traders only think of their own interest.

This mistrust wasn't there in Mugongo Manga, where farmers went to traders themselves and got a standardised price for their goods.

Mistrust towards farmers. In our fieldwork trip in May we spoke with a processor who stated that he wanted to do business with farmers. However, he claimed that whenever he made a pre-harvest deal, the farmers would have sold their produce to someone else already when he came to collect. At that time, farmers would pay back the initial received amount.

In our second fieldtrip, we did not find any related stories, neither by businessmen nor by farmers.

Environmental, production, and market risks limit possibilities for contract farming

Key findings



Possible future environmental shocks and market fluctuations make trade insecure.



There is hardly any evidence of contract farming in Burundi.

Risks concerning to environmental shocks and market fluctuations. Environmental shocks and a fluctuating market prices make it difficult for all value chain actors to trust the stability of their business. Even though most of our respondents were positive about their business being profitable in the future, there were quite some doubts towards this as well based on these instable factors.

No contract farming as a result of risks involving the production. Almost none of the people we spoke with had experience with any form of contract farming. The mistrust and production risks made the idea of making long-term deals and pre-season bargains almost impossible. Hence, this has a negative impact on how farmers as well as other value chain actors can plan for the future and make related investments.

Farmers lack access to finance from formal institutions

Key findings



Limited income in pre-harvest and school seasons.



Lack of access to finance creates misallocation of resources and lower agricultural investments.



Lack of access to finance formal financial institutions.



Farmers sell their produce for half the price or sell their livestock to cope with financial needs.

Limited income in pre-harvest and school seasons. Many farmers mentioned in the focus group discussions that they are short of money usually in the beginning of two agricultural seasons and school time, in most cases February and September. In these seasons, they must pay for school fees, buy books and notebooks for the children and purchase agricultural inputs (e.g. fertiliser, seeds, and pesticides).

Lack of access to finance creates a misallocation of resources and lower agricultural investments. While farmers are in need of money, they lack access to credit from formal financial institutions offering low interest loan. Some can access loans via savings- and loan associations or agricultural traders offering expensive credit. However, this is only a limited percentage of the farmers. As a result, they underinvest in agriculture and sell off their livestock in those seasons.

Lack of access to finance formal financial institutions. Almost none of the farmers who participated in the focus group discussions has a bank account or access to credit from banks or microcredit institutions. Some farmers belong to a village saving and loan association (VSLA) that they use for collective savings for health and education expenses, or they ask family and friends for a small and temporary loan.

Farmers receive trade credit from local traders with high interest rates or sell their livestock in hard times. Farmers follow two strategies to cope with the lack of access to finance:

1. They use trade credit from local traders. They sell their products on the trees (usually cash crops, such as bananas, coffee and tea) for half price to the traders pre-harvest time to finance urgent household expenses or agricultural input expenses.
2. They sell their livestock, particularly chickens, to generate extra income in those 2 seasons.

The impact of credit can both be positive and negative for farmers

Key findings



Most people who took a credit reported a positive impact.



Some reported a negative impact of receiving credit.



Many do not even try to take a credit, as they are too afraid of not being able to pay their debt.

Participants were asked whether they took credit in the recent past. If so, what was the impact of that credit on their business and the rest of their lives? If not, were there other reasons than accessibility for not taking a loan?

Most people who took a credit reported a positive impact. One lady was able to double her production and put her children to school for example. Hence, the credit to them was very positive.

Others reported falling in a cycle of debt. There was one case in which a farmer took a credit, but that season his harvest went bad. However, he still needed to pay back the loan, including a relatively high interest. In the end, he therefore ended up with less financial means than he had before. Other focus group participants mentioned that they expect to face difficulties repaying credit due to high interest rates and bad harvests. Due to interest payments they cut from food consumption. Therefore, they prefer not to receive credit.

Limited cooperation, high risk aversion and low bargaining power seem to weaken the position of farmers

Key findings



Little is known on the behavioural drivers of both production and consumption in Burundi.



High risk aversion of farmers.



Farmers' bargaining power is low due to limited collective action and lack of access to finance.

Behavioural drivers regarding both consumption and production are central to food system outcomes. However, little is known about these drivers in Burundi or similar countries in the region. Research on behavioural drivers of production and consumption can shed new light on the food system mechanisms in Burundi and in similar contexts. These behavioural drivers focus on material and immaterial behavioural choices and choices that focus on the individual and on those that relate to a community. ([Details](#))

Limited cooperation and high risk aversion | Most farmers work individually or in small collaborations. Only 3-5% of the farmers are part of an association like a production cooperative. ([Details](#)) In addition, use of modern agricultural methods is limited while risk-aversion is high. ([Details](#))

Farmers are vulnerable, have little access to finance and limited availability of household assets. In FDGs, farmers indicated that almost none of them ever used credit for farming purposes. Farmers do not produce crops that require much investment in Musigati and Buganza. They prefer crops and varieties that they know to have short harvest cycles and are not affected by diseases or heavy rains (reason why bananas are losing popularity). They prefer traditional good crops – as it helped them through difficult periods in their lives (e.g. potatoes in Mugongo Manga). Value chain actors in FDGs indicate that the farmers face the highest risk in the value chain due to seasonal fluctuations in the production.

Farmers' bargaining power is low | Farmers' bargaining power is low. Farmers often lack market information to bargain for a better price. ([Details](#)) At other moments, farmers must accept prices offered by traders before harvest due to urgent expenses.

Annex Nutrition



Method: Focus group discussions

The food innovation lab uses qualitative data from 3 mapping discussions (MDs) in Bujumbura rural and in rural Bubanza, providing in-depth insights about the food system in rural Burundi. Each MD includes 3 structured focus group discussions (FGDs) on food consumption, production, and value chains, using in-depth discussions and hypothetical experiments. See the details of each round [here](#).

Selection of participants | SNV Burundi and WUR partnered with GVZ-Italia that conducts nutrition projects in the study areas. Interested farmers were selected by GVZ according to the participant profile shared by WUR specialists.

Profiles of participants | Each consumption focus group included a man and a women representative from 6 households, so 12 individuals in total. Production focus group participants included 10 local farmers producing various crops; and value chain discussions included a total of 10 traders, transporters, and processors. The groups were balanced in terms of men vs. women and youth vs. non-youth in all discussions.

Representativeness | Note that the FGDs were designed to generate an overview of how the consumption, production and markets are shaped in general, and what are related norms, preferences and ambitions—without

being able to generalise these conclusions. Hence, the FGDs did not aim to be representative for Burundi, nor for the regions where they were organised.

Note that the stories are consistent between groups, with a few exceptions and regional differences. In addition, the stories in the FGDs fit the picture that was painted by key informants and literature. The outcomes from the focus group discussions hence provide starting points for the PADANE programme design as well as for further in-depth studies that could feed the PADANE programme. We advise to organise representative FGDs and behavioural experiments on specific topics, among a much larger number of participants, during the next phase of PADANE.

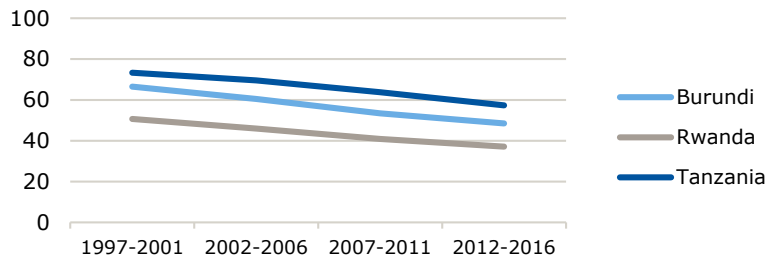
Facilitation | Two local researcher from Bioversity International facilitated the discussions by using the scenarios and tools developed by WUR specialists, available upon request. WUR specialists trained the facilitators, and facilitators used local language in the discussions. We conducted a pilot MD in the Cibitoke province of Burundi to test the scenarios and tools in the local context.

Consumer, production and value chain focus groups

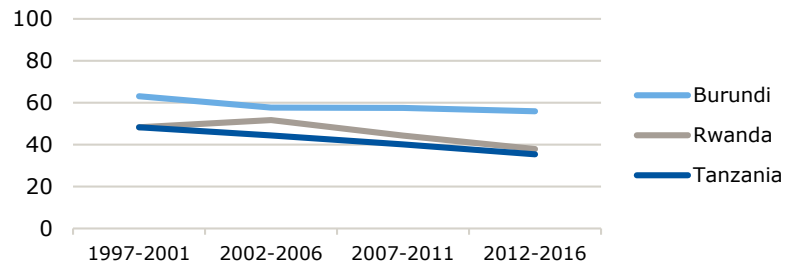
Round	Consumer focus group	Production focus group	Value chain focus group
Round 1	Meals now: Most common meals, ingredients, time and places to eat, who you eat with, sources of ingredients (own/ bought/ barter/ friends or family/ aid, etc.), who make decisions.	Production system now: Crops, level of production, consumption, sales, decisions production and sales, use of inputs (e.g. pesticides, fertilisers, improved seeds) and technologies (e.g. modern farming, technologies, storage, processing)	Value chain activities now: The characteristics or farmers (e.g. size, production, number of farms), business networks, business models (e.g. contracts, suppliers, markets), investments and investments.
Round 2	Ideal meals that they aspire: Most common meals, ingredients, time and places to eat, who you eat with, sources of ingredients (own/ bought/ barter/ friends or family/ aid, etc.), who make decisions.	Ideal production system that they aspire: Crops, level of production, consumption, sales, decisions production and sales, use of inputs (e.g. pesticides, fertilisers, improved seeds, etc.) and technologies (e.g. modern farming, technologies, storage, processing, etc.)	Ideal value chain activities that they aspire: The characteristics or farmers (e.g. size, production, number of farms), business networks, business models (e.g. contracts, suppliers, markets), investments and investments.
Round 3	Statements on the source of food (e.g. colline, own farm), taste of food, openness to innovation in food preparation, role of women and bargaining power.	Statements on the role of subsistence and cash crops the crop choice, role of youth and women in production choice, trust in traders, contracts, openness to the innovation in practices and working for wage labour.	Statements on openness to innovation in business models; trust in suppliers, customers, and farmers, (multi-season) contracts, relations with farmers, expectations in the future; role of women; and preferences to do business with small or large businesses.
Round 4	Food choice experiment: Individual choices among milk, eggs, beans, and maize flour, having equals value in the market.	Food choice experiment: Individual choices among milk, eggs, beans, and maize flour, having equals value in the market.	Bottlenecks and opportunities to grow the businesses in the value chain.

Anaemia, child stunting and reproductive female underweight

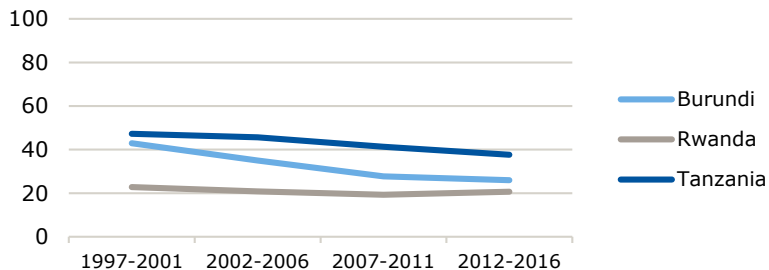
% of child anaemia (< 5 years)



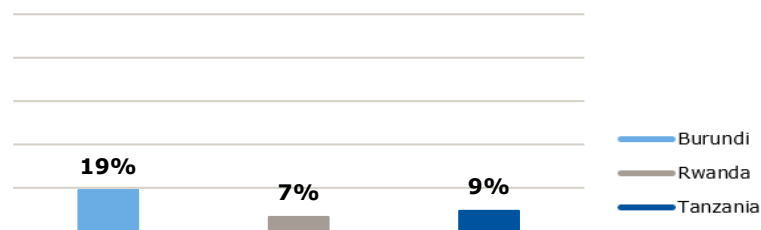
% of child stunting (< 5 years)



% of female anaemia (reproductive age)



% of female underweight (reproductive age)



-The data is collected by the national DHS programme.

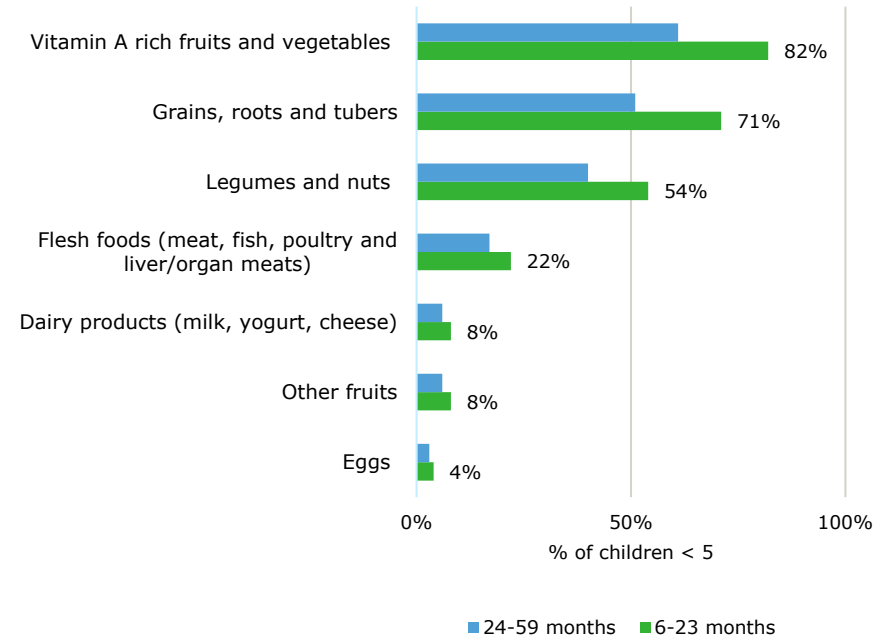


Dietary diversity of children under 5 years

- The dietary diversity is calculated to make an indication of the nutritious value of a diet. The more different food groups are included in a person's daily diet, the better. The dietary diversity score (DDS) of this study is based on 7 food groups (see figure) which are consumed in the last 24 hours.
- The recommended dietary diversity score is a minimum of 4 out of 7 food groups.¹
- In Burundi children between 6 and 23 months old consumed on average 2,5 food groups in the preceding 24 hours, and children between 24 and 59 months old only 1,8 out of 7 food groups.
- Eggs (3%), dairy (7%), and meat (17%) are least often consumed. Vitamin A-rich fruits and vegetables (72%), grains, roots and tubers (62%), and legumes and nuts (48%) were consumed more frequently.
- Consumption of all animal based foods is less common among rural households than among urban households.
- The category "other fruits" is low as some fruits (e.g. mangoes and papayas) are included in the "vitamin A rich fruits and vegetables" category. Fruit consumption could be low compared to vegetable consumption—the category does not distinguish between the two.

-The data is collected by the national DHS programme between 10-2016 and 03-2017 and covers a total of 16.620 households ¹ Guide to DHS Statistics DHS-7 (n.d.), DHS programme, [link](#)

Percentage of children consuming each food group used in the dietary diversity score



Seasonality of production and hunger



There are three main rain seasons^{1,2}



The annual rainfall varies¹
between 1,200 - 1,500 mm



The rainy seasons have been shorter in recent years²



Food production and household consumption
rely on the rain seasons^{1,2}



Studies indicate 2 hunger periods, which
are related to the production cycle.*²



There is a potential impact of a good
storage system on food security¹

*2	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain	Light rain			Heavy rain		Light rain				Heavy rain		
Planting		Beans		Sweet potato					Cassava	Cassava & Beans	Beans & Sweet potato	Sweet potato
Harvest	Beans		Sweet potato			Beans	Cassava & Sweet potato					
Food security	Enough food			Severe hunger		Enough food			Hunger		Sever hunger	

¹Niragira et al.(2015) – Data collected in 2010 in Ngozi ²Devereux et al. (2019) – Study is conducted in the northern Cibitoke and Kirundo provinces. In other regions the pattern may differ.



Storage, processing and post-harvest losses



There is a lack of storage systems.¹



Conservation is close to non-existent.¹ This is partly due to the lack of electricity in the countryside of Burundi. Another barrier is the long process of getting certified as processor.³



We spoke with various organisations during our first fieldwork activities which have are working on inventions regarding storage and processing: e.g. Spark & GIZ³



It takes a relatively long time to get a licence for processing food. This hinders new entrepreneurs in starting a processing business.³



As a result of a lack of storage and processing, food hits the market all at once causing fluctuation in the prices.^{1,3}



As a result of the lack of storage and processing, there are relatively high levels of aflatoxins found in products on the food markets in Burundi.²



The high levels of aflatoxins suggest high post-harvest losses – hence, much food probably never reached the food markets or home consumption.²

¹Oketch & Polzer (2002)

²Udomkun et al. (2018) – data collected in spring 2016 in Gitega and Cibitoke

³Information came up during interviews during first fieldwork activities. GIZ has special solar panel systems with processing tools. Spark has a conservation method that runs on water hydration.

Burundian labour market



Due to a small private sector, there are limited job opportunities for official wage labour.¹



The state is a main provider of wage employment and agent of economic redistribution.¹



Many find low wage jobs in rural employment, although options are limited.²



On most farms, farmers employ family members.³



Medium and large farms offer jobs to those with little or no land.²

During periods of food crisis



More people search for jobs⁴



Informal labour exchange between farms²



Wages may drop. Even down with 500%⁵



Men temporarily migrate to the city Bujumbura⁴

¹Oketch & Polzer (2002)

²Niragira et al.(2015) – Data collected in 2010 in Ngozi

³Niragira et al.(2018) – This study uses data from a agricultural survey

⁴Iradukunda et al. (2019) – Data collected in 2017 in Muyinga

⁵Vervisch et al. (2013) – Data collected in 2006 & 2007 in Burara, Cumba, and Tangara

Difference between provinces and urban/rural nutrition outcomes

Regression estimates: Average marginal effects of different measures of location on nutrition

	Dietary diversity (6-23 months)	Dietary diversity (24-59 months)	Stunting	Anaemia child	Anaemia female	Underweight BMI
Urban	0.352**	0.423**	-0.164***	-0.079***	-0.049***	-0.019
Distance to Bujumbura	-0.002	-0.001	0.000	0.001***	0.001***	-0.001***
Distance to nearest city ¹	-0.004	-0.006	-0.001	0.001*	-0.003**	0.000
Altitude	0.000	0.000	0.000**	0.000***	0.000***	0.000**

¹with > 10,000 inhabitants | * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

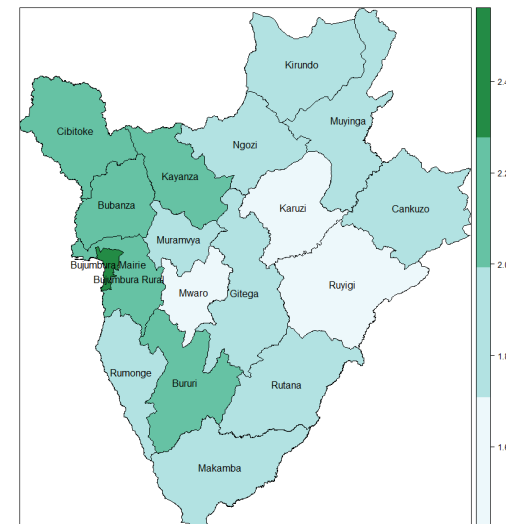
The table shows the regression results for different measures of location on all different measures of nutrition, keeping all other things constant. The regression results show that for almost all indicators, living in urban areas strongly improves nutrition. It shows that, for example, children living in urban areas have a 16 percentage point lower likelihood to be stunted compared to children living in rural areas, keeping all other things constant. The results for the variables distance to Bujumbura, nearest city and altitude are corrected for living in an urban area.

-The data is collected by in the national DHS programme the data is collected in the period of 10-2016 till 03-2017 it covers a total of 16.620 households

¹Alderman & Headley (2018)

²Jones, Ickes et al. (2014)

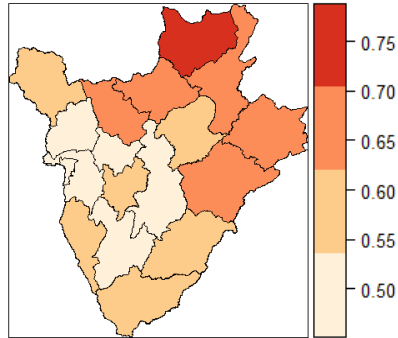
Dietary diversity score per province



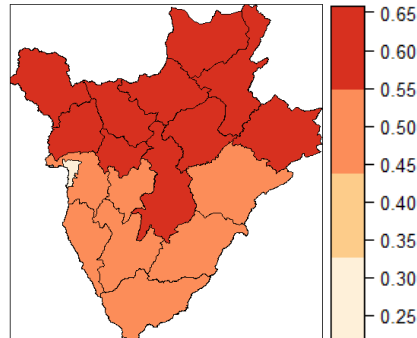
The dietary diversity score is a standard measure for calculating the nutritious value of a diet. For this calculation we used 7 food groups, consumed by children under 5 years in the last 24 hours. We split these children into two groups because the nutritional status of children under 2 does not reflect the full impacts of various postnatal nutritional deficiencies of the benefits of various postnatal protective factors such as wealth¹. Moreover, the 7 scale DDS has only been validated for children between 6 and 23 months old². For this score 0 is the lowest, 7 the highest. The maximum score of 2,4 in Burundi can be considered as very low.

Differences between provinces for nutrition outcomes

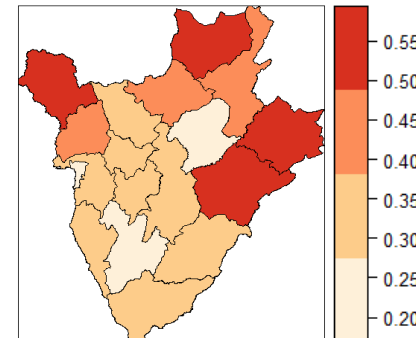
**% of child anaemia
(< 5 years)**



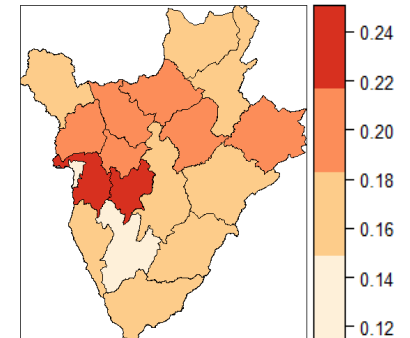
**% of child stunting
(< 5 years)**



**% of female anaemia
(reproductive age)**



**% of female underweight
(reproductive age)**



- Overall, 55% of children is stunted and 18% of females is underweight.
- Concerning (iron deficiency) anaemia, 59% of the children is anaemic against 37% of females

-The data is collected by in the national DHS programme the data is collected in the period of 10-2016 till 03-2017 it covers a total of 16.620 households

Relation between education levels and nutrition outcomes

The table shows the regression estimates for education on all different measures of nutrition, keeping all other things constant. It shows that, for example, if the household head of a child (aged 2-5) has received higher education, the child has a dietary diversity score (on a scale of 0 to 7) of 1.04 higher, compared to a child whose head of the household has had no education, keeping all other things constant.

-Own calculation from DHS data

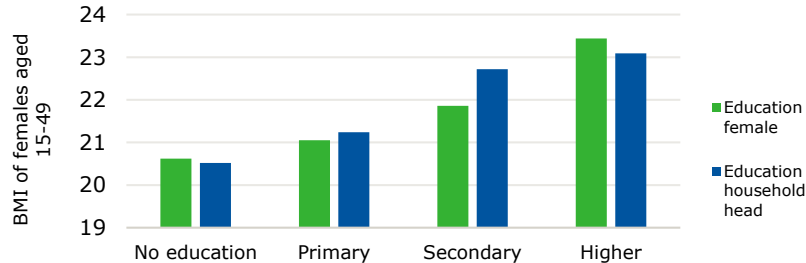
Regression estimates: Average marginal effects of different levels of education on nutrition, compared to having no education

		Dietary diversity (6-23 months)	Dietary diversity (24-59 months)	Stunting	Anaemia child	Anaemia female	Underweight
Household head	Primary	0.000	0.019	-0.005*	-0.033**	-0.025	-0.132
	Secondary	0.064	0.250	-0.078***	-0.077***	-0.193	0.077
	Higher	0.536	1.072**	-0.243*	-0.257	-0.277	-0.309
Mother / female	Primary	0.070	0.108	-0.017	-0.034***	-0.037	-0.068
	Secondary	0.263	0.136	-0.069***	-0.104***	-0.477***	-0.581***
	Higher	¹	¹	-0.145*	-0.072**	0.264	-0.640

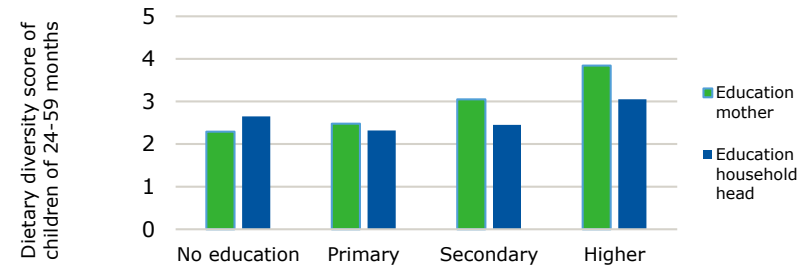
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

¹ We do not report on the results for higher education, as the number of observations of this group is too low

Relation between female BMI and education



Relation between children's dietary diversity and education



Relation between wealth indicators and nutrition outcomes

Average marginal effects of different measures of wealth on nutrition

	Dietary diversity (6-23 months)	Dietary diversity (24-59 months)	Stunting	Anaemia child	Anaemia female	Underweight
Land size	0.025**	0.036***	-0.005*	-0.001	-0.011	0.006
Tropical livestock units	0.025	0.029	-0.010**	-0.008**	-0.034	0.011
Improved water source	-0.064	-0.047	0.005	0.006	0.077	0.113
Improved toilet	0.092	-0.001	-0.050***	-0.024	-0.076	-0.114
Improved wall material	0.121	0.011	-0.037***	-0.037***	-0.054	-0.204**
Improved roof material	0.135	0.336***	-0.064***	0.017	-0.156	-0.133
Owens a phone	0.149*	0.055	-0.045***	-0.019	-0.161**	-0.319***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

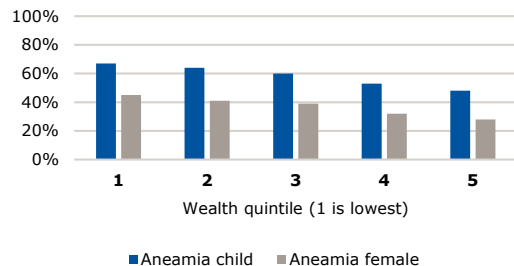
The table shows the regression results of different indicators of wealth on all different measures of nutrition, keeping all other things constant.

Wealthier households (in terms of housing conditions (roof material, wall material, type of toilet & water source) and assets (livestock, land size, mobile phone) have better nutrition outcomes. Which of these indicators of wealth matters most, depends upon the measure of nutrition.

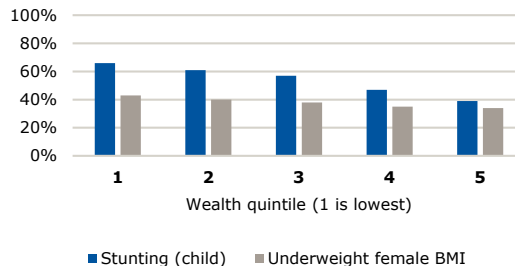
* Tropical livestock units (TLU) are based on the weight of livestock. E.g. cattle is 0.7 tropical livestock units, goats are 0.1 and poultry is 0.01

-The data is collected by in the national DHS programme the data is collected in the period of 10-2016 till 03-2017 it covers a total of 16.620 households

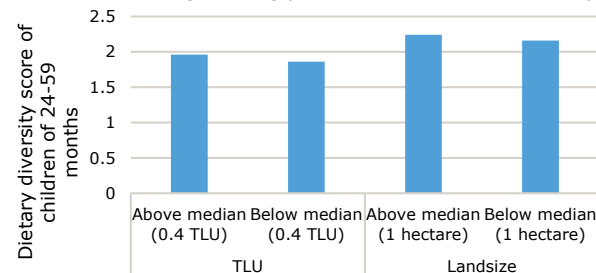
Relation between anaemia and wealth



Relation between underweight BMI (for females) or stunting (for children) and wealth



Relationship between TLU or land size and child dietary diversity (for households with livestock or land)



Relation between female household head and nutrition outcomes

- Keeping all other things constant, children with female heads of the household have a 5 percentage point lower likelihood to be stunted compared to children with male household heads
- These children also have a 6 percentage point lower likelihood to be anaemic
- There is no relation between nutrition indicators of females and gender of the household head

Regression estimates: Average marginal effects of gender of households head on nutrition

	<i>Dietary diversity (6-23 months)</i>	<i>Dietary diversity (24-59 months)</i>	<i>Stunting</i>	<i>Anaemia child</i>	<i>Anaemia female</i>	<i>Underweight</i>
<i>Gender household head (1= female)</i>	-0.030	- 0.036	-0.053***	-0.056**	0.001	-0.018

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Minimum costs of a Healthy Diet tool

- The minimum costs of a healthy diet (MCHD) tool is a simple tool that calculates what would be the cheapest possible diet that meets required nutrition intake (RNI) for an average family.
- The tool is based on market prices for locally available food prices and a food composition table (for Uganda – since food composition table for Burundi is not available), and RNI for 15 nutrients disaggregated by gender and age group. Based on these data, the MCHD is calculated.
- We conducted the calculation for 12 common food items in Burundi for which market prices and food composition table (FCT) are available.
- The MCHD tool used for the current study, is adapted from the MCHD methodology as developed by Save the Children – which was developed for calculating the MCHD for young children only.^{1,2}
- Note that the MCHD tool used in the current study is subject to a number of limitations: essential amino acids are not included, and only 12 food items are included. Hence, the tool is an illustration, and should be expanded with more food items for future analysis.

Food item	2018	MCHD calculations	
	prices	kg	Euro
Maize flour	0.41	0	-
Cassava flour	0.36	4.2	1.49
Goat meat	3.31	0.0	-
Onion	0.78	0.0	-
Sweet potato	0.23	0.0	-
Banana	0.33	0.0	-
Potato	0.31	0.0	-
Rice	0.76	0.0	-
Milk (cos)	0.97	0.0	-
Eggs	2.42	0.8	2.02
Beans	0.48	1.3	0.64
Tomato	0.54	0.0	-
Total			4.15

¹ Bodnar (2019)

² Save the Children (2007)

World Food Programme - Fill the nutrient gap

The Nutrition Gap Analysis conducted for this study, is based on a limited dataset. The results from our analysis show some similarities and differences with the results from the WFP Fill the Nutrient Gap study, published in July 2019.¹

- WFP bases its analysis on a wider variety of food items, and uses food prices of different regions in Burundi, taking into account regional food price differences; whereas we only used the 12 most common food items, and average prices.
- WFP concludes that a nutritious diet would range between EUR 1.36 in the regions with the lowest costs to EUR 2.08 per household per day in the region with the highest costs (Bujumbura). According to our calculation, the minimum cost would be EUR 4.15. However, it seems that the estimation of income also differs (we estimate daily family income to be EUR 3.43 – which also seems higher than the WFP estimation). Hence, we reach the same conclusion: the majority of Burundian families cannot afford a nutritious diet. WFP concludes that 70% of the population cannot afford a nutritious diet.
- The WFP figures regarding stunting / child malnutrition & female underweight seem to roughly match our data. Just like us, WFP finds relations between economic wellbeing and nutrition outcomes.

- WFP explores the effect of adding different types of food to the diets of children (1 egg, 20g ndagala, 60g fresh moringa leaves or 200ml milk) and finds that (depending on the region), some of these would lower the costs of a child's food compared to the current situation, while making it more nutritious. The same is true for adding micronutrient powder to the food of adolescents.

Based on their analysis, WFP arrives at a series of policy recommendations, which (partly) match the policy recommendations in our study:

- Public private alliances and fortification of key foods have a high potential to improve the nutritional status of the population
- School canteens have a high potential to improve the nutritional status of the child
- The current national school canteen programme is focused on primary schools but could also address other age groups
- Females play a central role in feeding the household as well as the agricultural production but their capacity for positive impact on nutrition is limited by inequalities within the household
- Develop local fortification of flour, or industrial fortification with promotion of market supply.

¹ WFP (2019) – Fill the nutrient gap

Annex Food system/market



Subsistence farming



72% of production consumed by households¹



28% of production sold on the market¹



87% are food crops²



13% are cash crops²



Livestock is mainly kept instead of eaten^{1,3}



Farmers plant a mixture of food crops¹

¹Niragira et al.(2015) - data is collected in 2010 in Ngozi, percentages do not include post-harvest losses

²Oketch & Polzer (2002) - the division might have changed since 2002, but recent data is not available

³ Deseire et al.(2015)

⁴Based on the combination of various articles and field visit



Food crops⁴

Rice
Beans
Cassava
Ground nuts
Sweet potatoes
Potatoes
Wheat
Banana
Maize



Cash crops⁴

Coffee
Tea
Sugar

Small-scale farming



On average, a farm of 0.98 hectare has 6 plots, often of different land types, including land of marginal quality and on steep slopes.¹



The average number of plots for Burundian farmers is 6, ranging from 1 to 26.²



Farmers own many parcels spatially dispersed all over village areas, in neighbouring villages and in distant villages. Parcels at greater distance are cultivated less intensively.²



The distribution of land over the sample is rather unequal which results in a high number of very small-scale farms.²



Land size is limited due to an ever-increasing population. An estimated 37% of the households in the sample had access to less than 0.5 hectare of agricultural land.



Men often inherit land through patrilineal lines and exercise authority in most decisions about land and income. This divides the land even further.³



Investments in agricultural production seem to be closely correlated with farm size. Larger farms allocate more resources and spend more on inputs.²



Many farms are too small to provide a subsistence living. They try to diversify the household's livelihoods in order to increase income security, food security, etc.²

¹Niragira et al.(2015) – Data collected in 2010 in Ngozi

²Niragira et al.(2018) - This study uses data from a agricultural survey available from the National Statistical Bureau of Burundi (ISTEEBU).

³Iradingunda et al. (2019) – Data collected in 2017 in Muyinga

Input use in Burundi



Seeds and seedlings used in agricultural production are mostly local varieties taken from previous harvests¹



Farmers often complement the seed stock with purchases, especially if the deducted from the previous harvest is not enough¹



Poor farmers using very few inputs.²



Despite the poor quality of the land, fertiliser use is low and farmers rely mostly on manure or mulch.²



In general, 30% of income is reinvested in agricultural production, but this varies over farm types.²



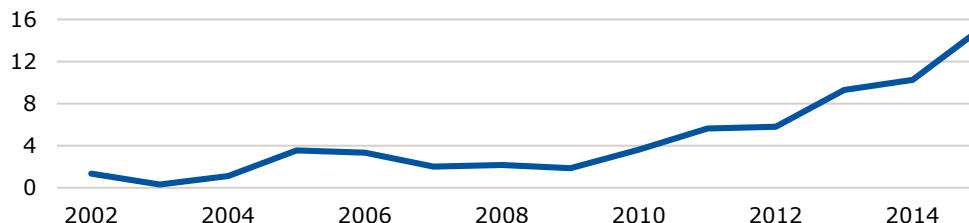
Larger farms allocate in general more resources and spend more on inputs.¹

¹Niragira et al.(2018) - This study uses data from a agricultural survey available from the National Statistical Bureau of Burundi (ISTEEBU).

²Niragira et al.(2015) - Data collected in 2010 in Ngozi

³World Bank data collected 2002-2016 - the drop in 2016 might have empirical and/or measurement reasons

Fertiliser consumption (kg/ha of arable land)³



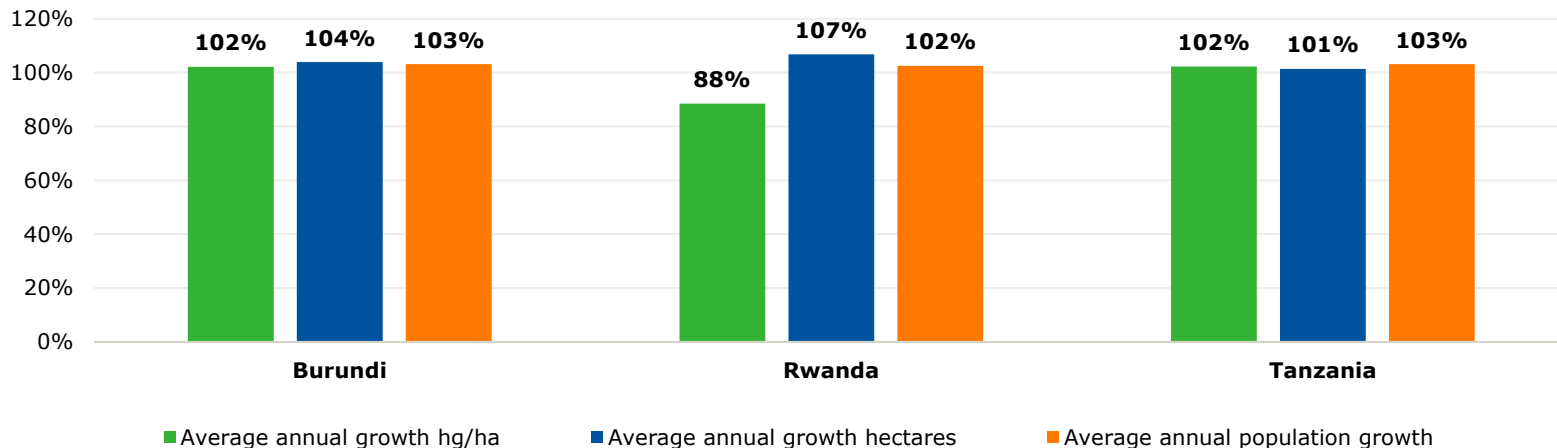
According to the data of the World Bank fertiliser use in Burundi experienced a steep grow between 2009 and 2015.



Agricultural production of Burundi compared with Rwanda and Tanzania

In Burundi & Tanzania, the annual average growth in area over the past 5 years of banana, beans, maize, (sweet) potatoes and rice crops, as well as their average annual growth in productivity are relatively close the average annual population growth

Changes in cultivated area and yields of main crops (combined) vs population growth

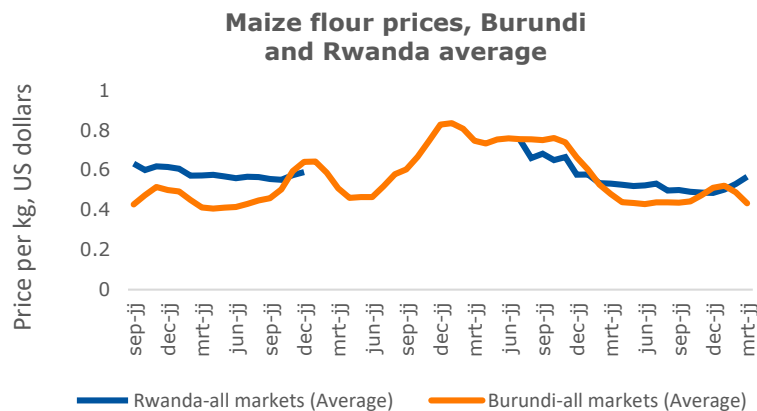


Own calculations by using data from FAOSTAT

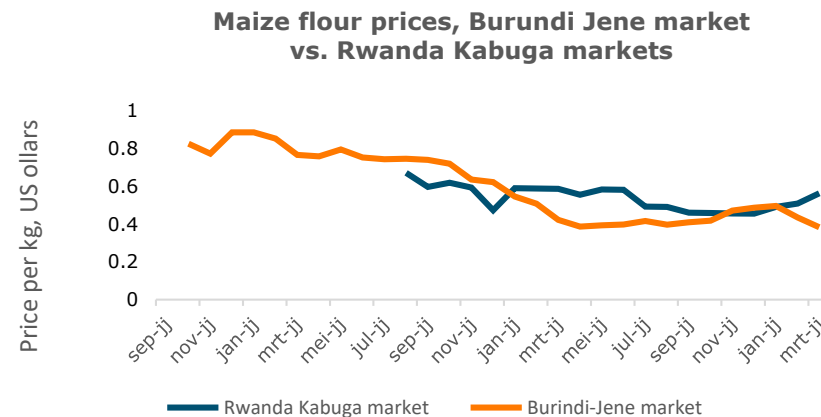


Volatility of food market prices compared to Rwanda

- The first figure shows the average price of the products for all markets in both Rwanda and Burundi.
- The second figure shows the prices only on one market in Burundi and one in Rwanda. For this comparison we took two markets just over the border to correct as much as possible difference related to the geographical location.
- The missing parts in the figures are due to missing data in the data sets. Hence, the prices in Rwanda can be more volatile than expected. However, we assume that this is not the case.
- Our coefficient of variation estimates indicate that prices are more 2 times more volatile in Burundi than Rwanda



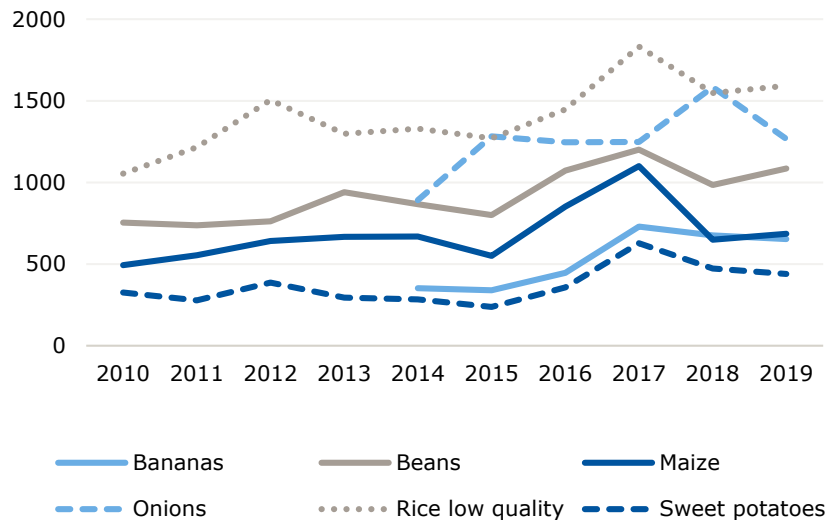
WFP-VAM



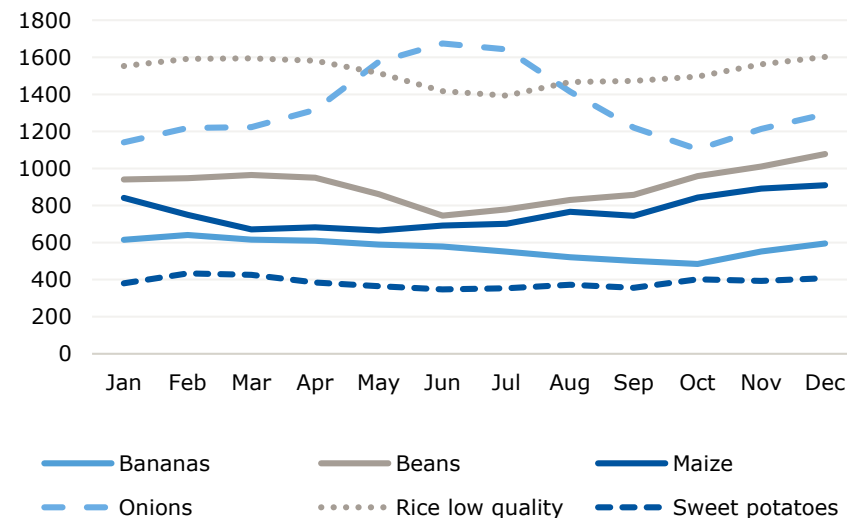
WFP-VAM

Market prices in Burundi per year and month since 2010

Food prices over the years /kg



Average prices per good per month



- Data retrieved from WFP, n.d. Economic: Prices - Dataviz | WFP - VAM

Seasonality of production and hunger



There are three main rain seasons^{1,2}



The annual rainfall varies¹
between 1,200 - 1,500 mm



The rainy seasons have been shorter in recent years²



Food production and household consumption
rely on the rain seasons^{1,2}



Studies indicate 2 hunger periods, which
are related to the production cycle.^{*2}



There is a potential impact of a good
storage system on food security¹

*2	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain	Light rain			Heavy rain		Light rain			Heavy rain			
Planting		Beans		Sweet potato					Cassava	Cassava & Beans	Beans & Sweet potato	Sweet potato
Harvest	Beans		Sweet potato			Beans	Cassava & Sweet potato					
Food security	Enough food			Severe hunger		Enough food			Hunger		Sever hunger	

¹Niragira et al.(2015) – Data collected in 2010 in Ngozi ²Devereux et al. (2019) – Study is conducted in the northern Cibitoke and Kirundo provinces. In other regions the pattern may differ.



Storage, processing and post-harvest losses



There is a lack of storage systems.¹ Some stakeholders claim that this is partly due to the lack of electricity in the countryside of Burundi.³ FDGs suggest that few farmers store their produce only by using traditional methods of storage.⁴



There are bad conservation methods.¹ This is partly due to the lack of electricity in the countryside of Burundi. Another barrier is the long process of getting certified as processor.³



We spoke with various organisations during our first fieldwork activities which have are working on inventions regarding storage and processing: e.g. Spark & GIZ³



It takes a relatively long time to get a licence for processing food. This hinders new entrepreneurs to start a processing business.³



As a result of a lack of storage and processing, food hits the market all at once causing fluctuation in the prices.^{1,3}



As a result of the lack of storage and processing, there are relatively high levels of aflatoxins found in products on the food markets in Burundi.²



The high levels of aflatoxins suggest high post-harvest losses – hence, much food probably never reached the food markets or home consumption.²

¹Oketch & Polzer (2002)

²Udomkun et al. (2018) – data collected in spring 2016 in Gitega and Cibitoke

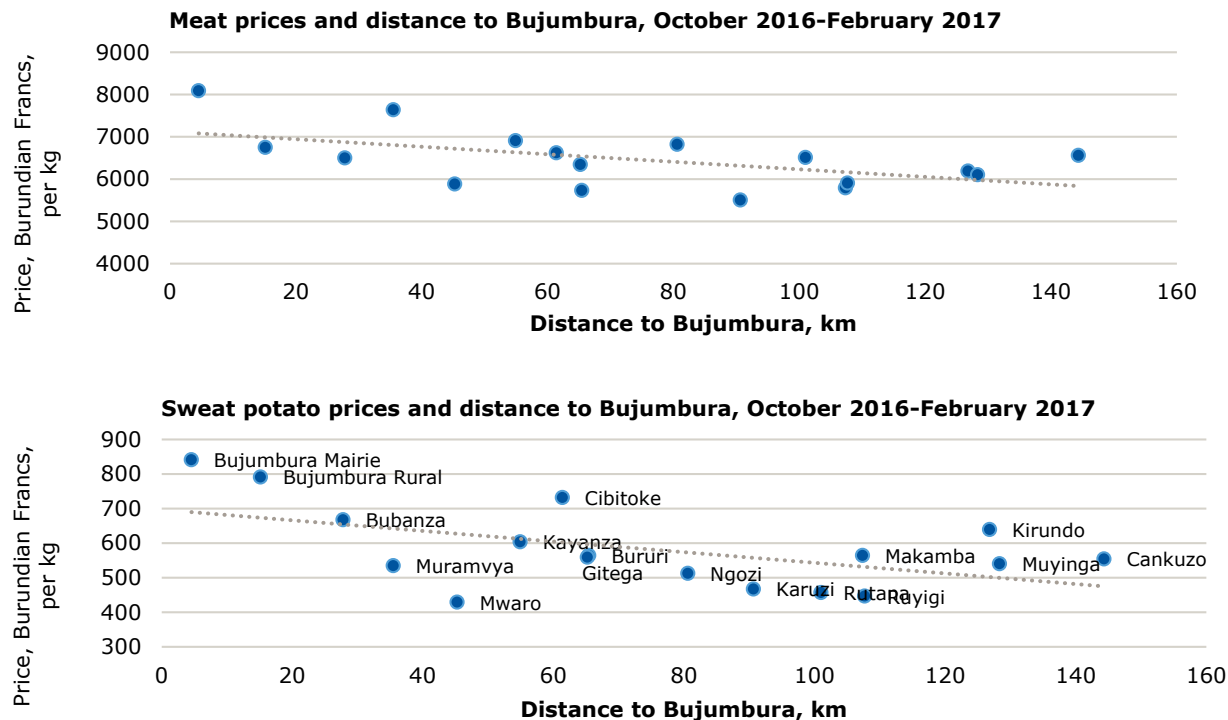
³Information came up during interviews during first fieldwork activities.

⁴From FGDs we learned that Maize producers (in Murongo Mana) lost some of their produce in the traditional storage methods due to insects. Bean producers (in Musigati) needed small houses for storing their beans. Usually NGOs provide those houses. Mice are also mentioned as a cause of post-harvest losses

Food prices related to the distance to Bujumbura (former capital)

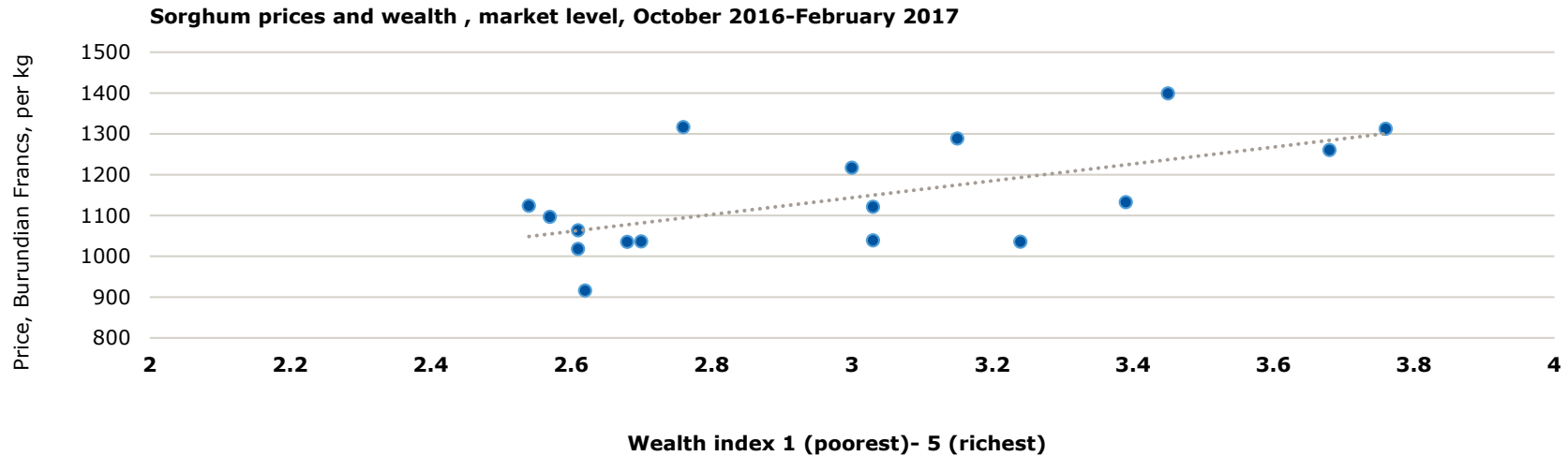
- 100 km distance to Bujumbura is associated with a decrease of BIF 900 in the prices of goat meat and 150 Burundi Franc decrease in the price of sweet potatoes.
- We find a similar negative relationship between the distance to Bujumbura and prices of cassava, cassava flour, sorghum, maize, and beans that are local produce.
- We do not detect a statistically significant relationship between distance to Bujumbura and rice prices. This is probably due to the fact that rice is produced in only 2 areas in Burundi.¹
- Our results are robust to controlling for wealth and distance to Bujumbura through regression analysis.

Own calculations by using data from WFP-VAM.
¹ Burundi | International Rice Research Institute',
 accessed 26 July 2019, [link](#)



Food prices related to wealth at provinces

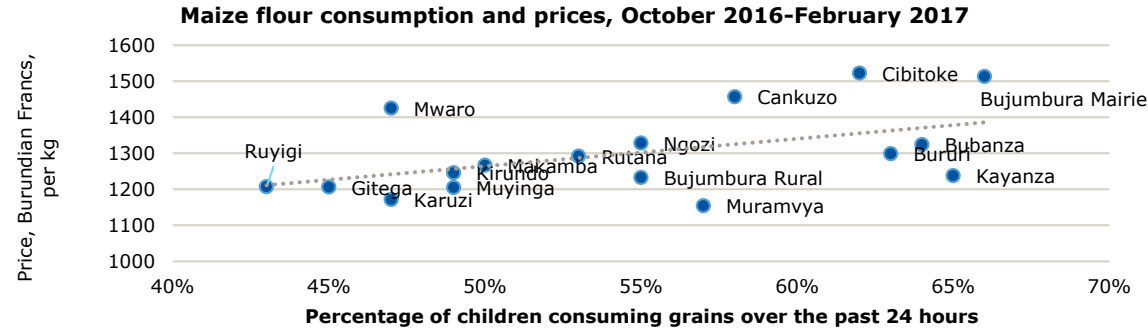
- In the markets with richer households (wealth index=4), sorghum prices are 207, rice prices are 68, and bean prices are 130 Burundi Francs higher when compared medium wealth (wealth index=3).
- There is no statistically significant relationship between prices of maize, sweat potato, cassava, and goat meat.



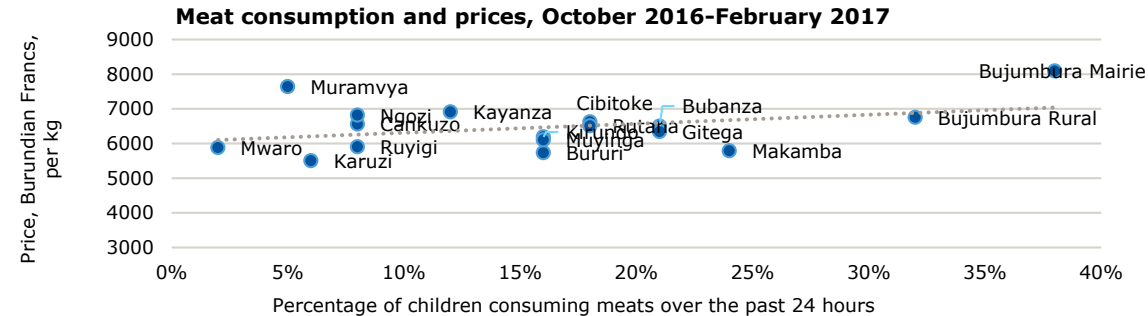
- Own calculations by using data from WFP-VAM.



Food prices related to consumption rates



- 10 percentage points change in the fraction of (0-5 years old kids) consuming maize flour is associated with 760 Burundi.
- We find a similar positive relationship between the prices of cassava, cassava flour sorghum, maize, and the fraction of cereal consumption.



- Our results are robust to controlling for wealth and distance to capital through regression analysis.
- These results may imply that food supply and access is higher where prices are high.

- Own calculations by using data from WFP-VAM and DHS survey Burundi 2016.



Exchange rates for foreign currency

There are **two financial markets** in Burundi for foreign currency: An official market controlled by the government and a parallel market on the grey market. The parallel market offers significantly higher exchange rates than the official markets.

The parallel market is tolerated in Burundi and common in urban areas, especially in Bujumbura.²

30-10-2017
Bujumbura
1\$ selling rate¹

Official market
BIF 1,735

Parallel market
BIF 2,250

¹IWACU English News | The Voices of Burundi (2017)

²Nkurunziza (2002)

On the official market the government controls...²



Ration of foreign currency



The exchange rates of foreign currency



Export proceeds of exporters



Import licences of importers

The effects of the financial markets²



Under invoicing of export & over invoicing of import



Relatively little export due to relatively high costs



Smuggling along the borders and other illegal activities

Burundian labour market



Due to a small private sector, there are limited job opportunities for official wage labour.¹



The state is a main provider of wage employment and agent of economic redistribution.¹



Many find low wage jobs in rural employment, although options are limited.²



On most farms, farmers employ family members.³



Medium and large farms offer jobs to those with little or no land.²

During periods of food crisis



More people search for jobs⁴



Informal labour exchange between farms²



Wages may drop. Even down with 500%⁵



Men temporarily migrate to the city Bujumbura⁴

¹Oketch & Polzer (2002)

²Niragira et al. (2015) – Data collected in 2010 in Ngozi

³Niragira et al. (2018) – This study uses data from a agricultural survey

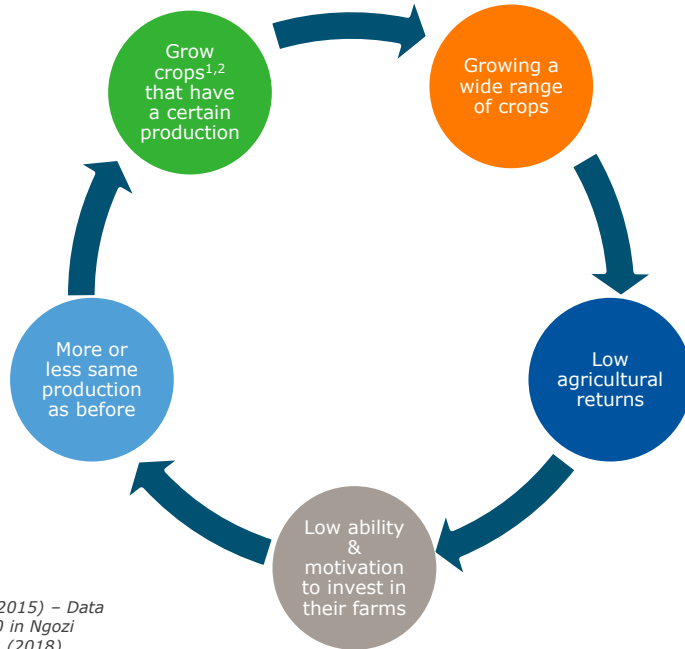
⁴Iradukunda et al. (2019) – Data collected in 2017 in Muyinga

⁵Vervisch et al. (2013) – Data collected in 2006 & 2007 in Burara, Cumba, and Tangara

Risk aversion of farmers in Burundi



Main objective: Satisfy family's food needs / preferences¹



¹Niragira et al. (2015) – Data collected in 2010 in Ngozi

²Mupfasoni et al. (2018)

More knowledge may lead to more investments²



Farmers are well aware of environmental sustainability aspects



Farmers with high knowledge construct the business ideas more from “inside-out”



Farmers with low knowledge source business ideas from what is available in their direct environment



Cooperatives for Burundian farmers



Cooperatives have a political history in Burundi going back to the colonial times under the Belgium regime.¹ In our interviews during the first fieldwork activities we found that this history makes some farmers hesitant to join cooperatives. Hence, for some NGOs it was crucial to underline the differences between political and trade cooperatives. Currently, after some success of trade cooperatives, the government is getting more involved by supporting cooperatives on its own again. We could not find however any additional literature that also reports on this trend.²













On average only 3-5% of the farmers is member of some kind of association as a cooperative.

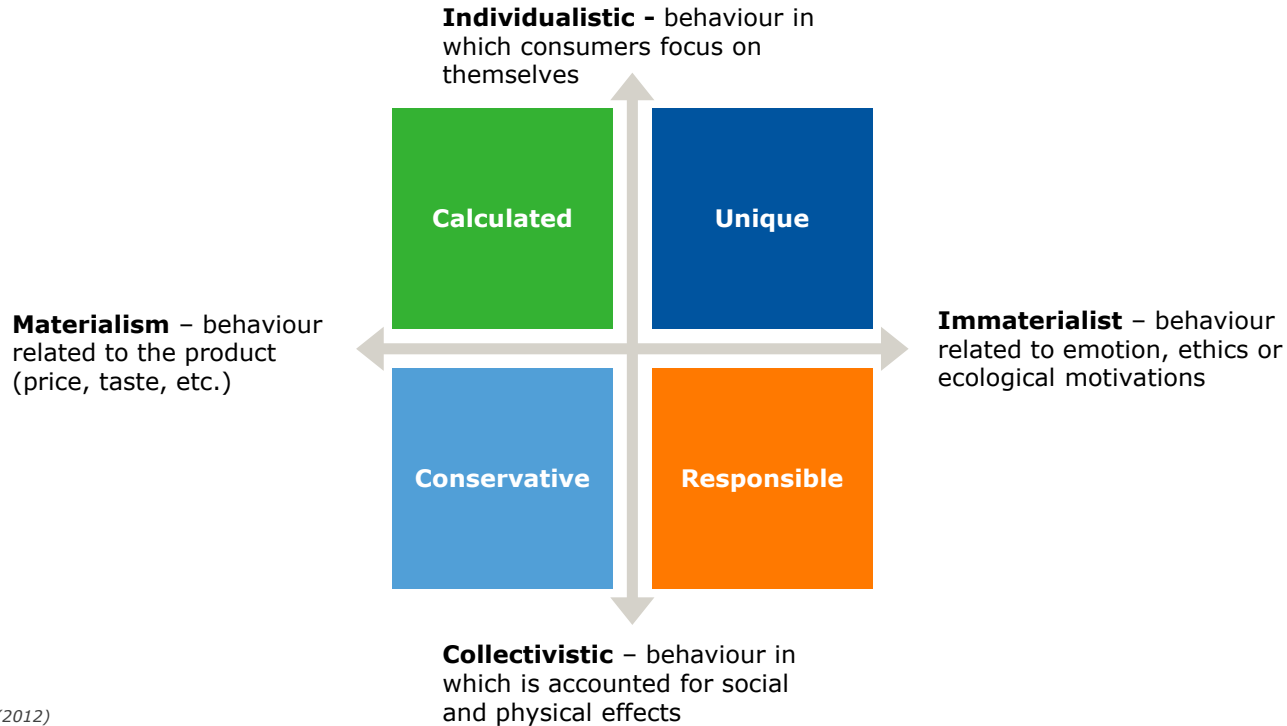
¹Popplewell (2019)

²Based on interviews during first fieldwork activities

These are the pros and cons regarding farmer cooperatives formulated by various stakeholders during the interviews in our first fieldwork trip to Bujumbura.²

✓ Pros	✗ Cons
 Can help farmers to get access to the market.	 Often cooperations are not transparent
 Can help processors to get access to farmers.	 There are incidents of management stealing money
 Can help farmers to access credit to invest in their business	 Farmers earn only a low percentage.
 Cooperations do not have to pay tax the first five years	 There are special taxes for cooperations
 Increase farmers' bargaining position vis-a-vis middlemen.	 Government interferes in the cooperation structures. This causes distrust.

Behavioural drivers for consumption

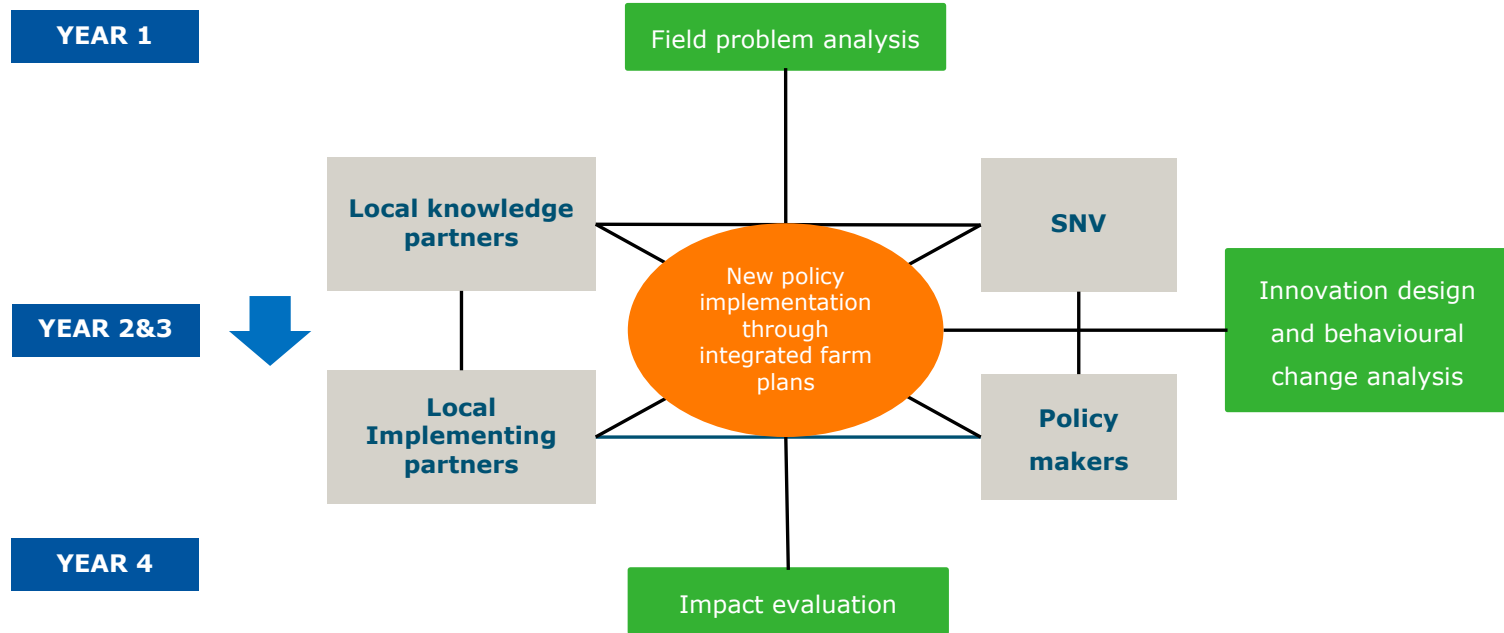


- Bakker & Dagevos (2012)

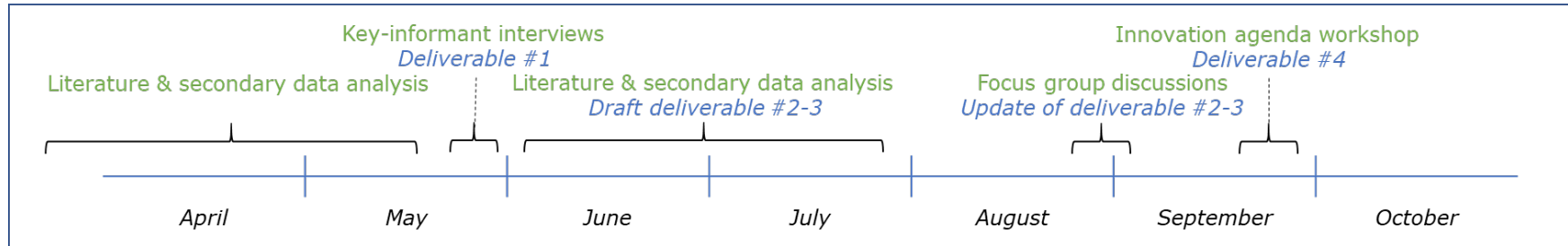
Annex Methodologies



The SNV-WUR FSI-lab supports PADANE through real-time identification, innovation research, design, implementation and evaluation systems



Research activities and deliverables



Timeline of research activities (green) and corresponding deliverables (blue)

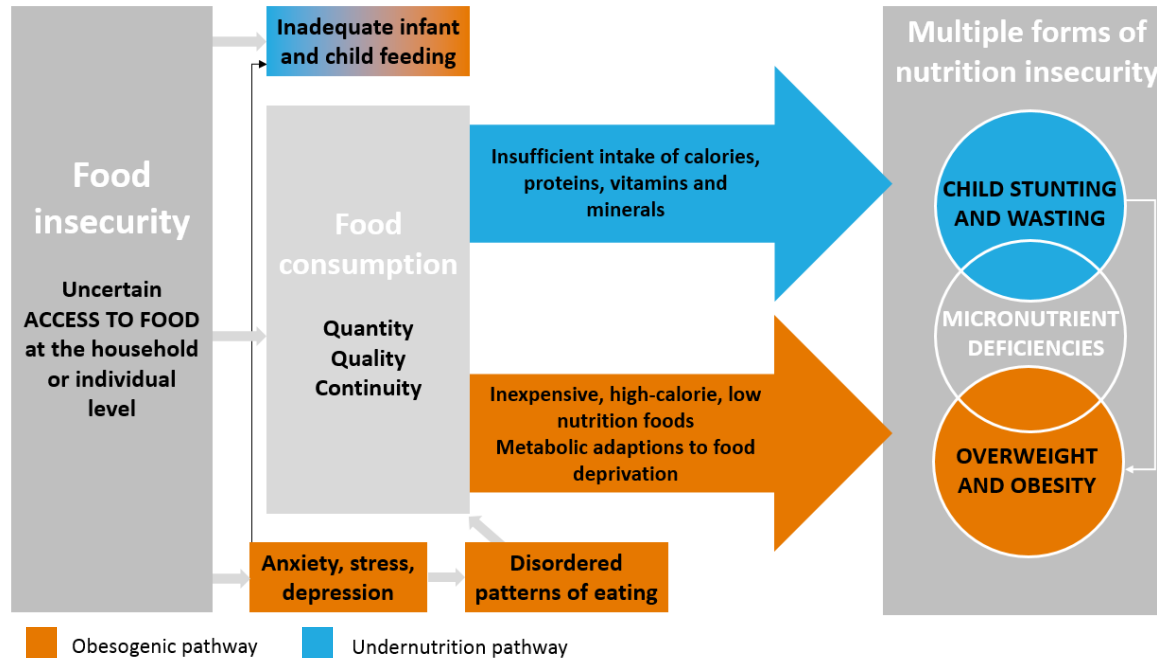
Key informants (May 2019)



Burundi DHS 2016-2017

- The availability of nationally representative detailed datasets, focusing on the determinants of nutrition gaps in Burundi, is limited.
- The Burundi DHS of 2016-2017 is representative at a national as well as a regional level. It is also representative within Bujumbura and between urban and rural areas. Based upon the general census of 2008, the country was divided into clusters. Out of this list, 554 clusters were selected by systematic drawing with a probability proportional to the number of households per cluster. For each cluster, a list of households was created, and 30 households per cluster were drawn with proportional probabilities related to urban and rural areas.
- Data were collected between October 2016 and March 2017, covering a total of 15,977 households.
- DHS data are collected by USAID.
- See [DHS website](#) for original datasets and more information.

Pathways from inadequate food access to multiple forms of nutrition insecurity



- FAO (2018)

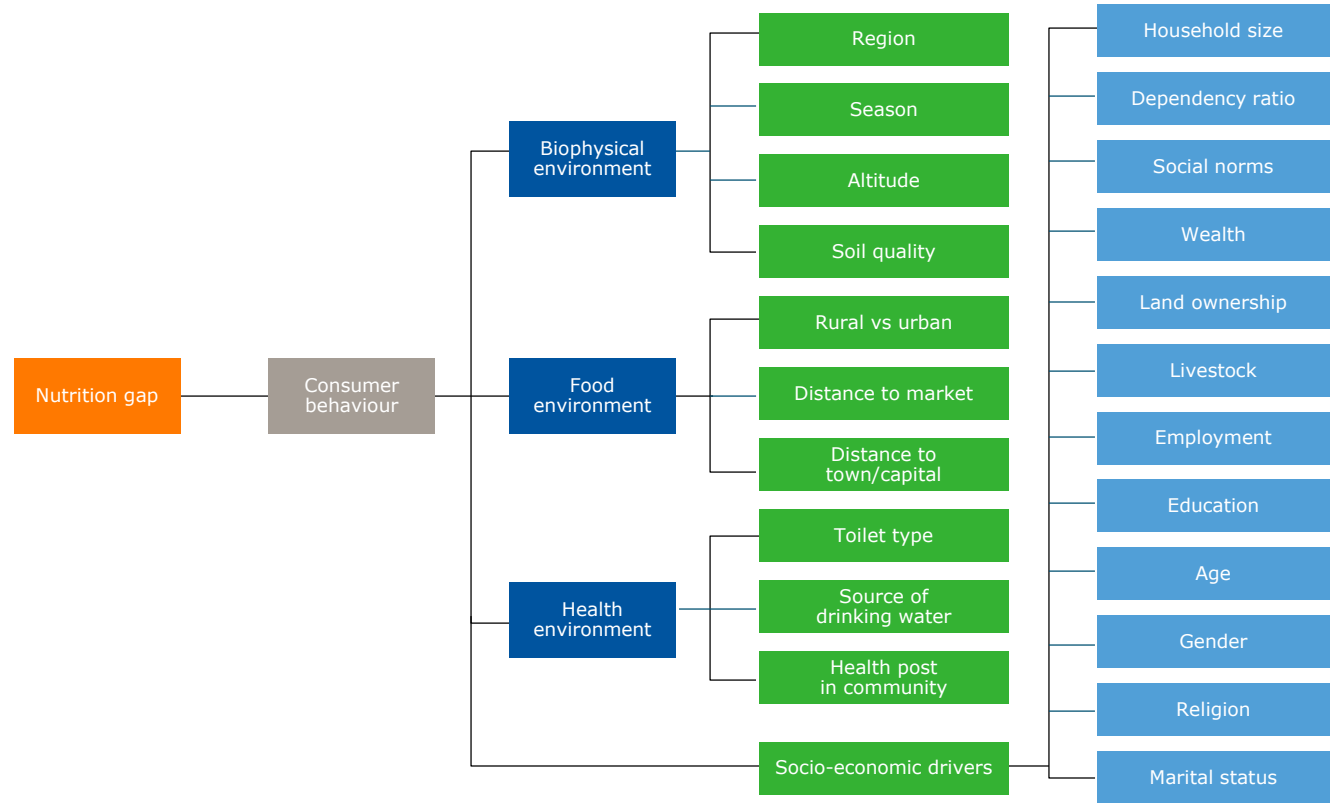


Determinants of nutrition gaps

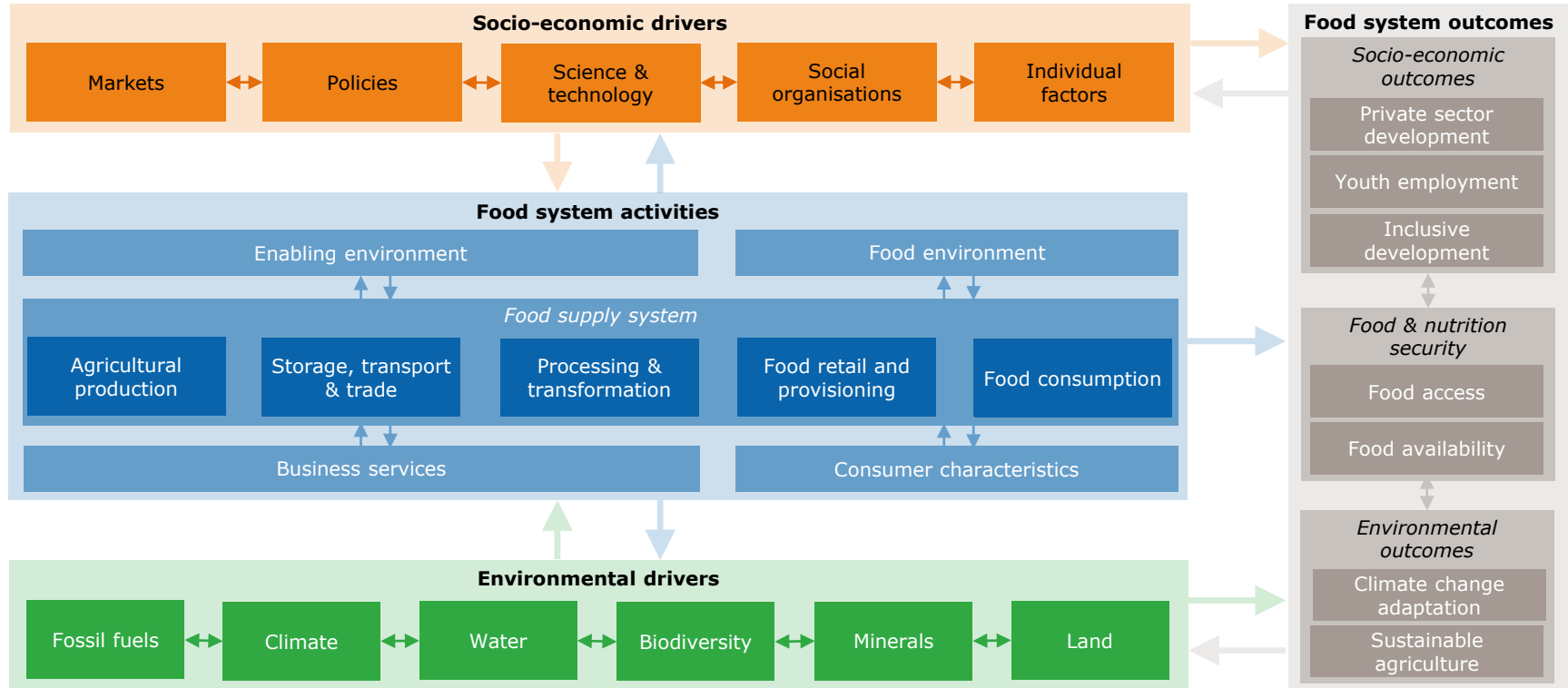
Regardless of which of the indicators of nutrition is taken, they can be caused by similar determinants

We identify five main groups of determinants, each of which will be addressed in our analysis:

- Consumer behaviour
- Food environment
- Biophysical environment
- Health environment
- Socio-economic drivers



Food System Tool



- Van Berkum et al. (2018)

Nutrient-food selector (to be worked out further)

Questions	Answers (example)
What are the major nutrients that are lacking from the diet?	Protein
Which food items contain these nutrient?	Meat, fish, eggs, dairy, legumes, mushrooms, protein-rich aquatic plants
Given the agro-climatic conditions in this area, which of these food items could be produced here?	Meat, eggs, dairy, legumes, mushrooms
Given the costs of production and for natural resources (water, land), and resilience to climate change, which food items have most potential?	Eggs, legumes, mushrooms
Which of these food products would households in this area prefer to produce and consume?	Eggs, legumes, mushrooms
Current available or possible options for low-cost storage and processing solutions	

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