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## A tuber for Ghanaian development:

Influence of agro-processing activities in the lives and livelihoods of  
cassava farmers

by

Cesar Gonzalo Davila Novoa

[ce1264da-s@student.lu.se](mailto:ce1264da-s@student.lu.se)

The study explores the influence of agro-processing activities in the lives and livelihoods of cassava farmers in five communities located in four districts in the Ashanti and Volta regions in Ghana. The qualitative research is done by performing thirty-six semi-structured interviews to farmers and stakeholders along the cassava value chain. The research concludes that agro-processing activities allowed cassava farmers to generate additional income and later invest it to improve their lives and livelihoods and those of their household members. Specifically, the investigation indicated that the additional income was predominantly generated through two channels: First, benefiting all farmers, through the influence of agro-processing activities in the use of new farming technologies, farm-size increases, and improved marketing opportunities. Second, benefiting those farmers who were processing cassava, through the additional income obtained from selling agro-processed products as opposed to raw cassava. In addition, the study found that the social development area in which farmers invested the most was education, followed by health, and infrastructure. As well, the research revealed that agro-processing activities positively influenced increasing opportunities for women and development of partnerships.

Key terms: agro-processing, lives, livelihoods, cassava, farmers, agricultural transformation, technologies, farm size, marketing, education, health, infrastructure, women, partnerships.

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*There was a time when there was no cassava on earth. Kashiri (the moon) had plenty of cassava on his farm. One day he came down to earth and fell in love with an indigenous Matsigenka woman. He wanted to marry her and thus he provided humans with a gift: the cassava stem.*

Cassava legend from the Matsigenka indigenous people from Peru.  
Source: compiled in by Arias (2003), translated by author.

To Ghana and the Ghanaian people,  
Thank you for making me feel like home  
Gonzalo Bekoe

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# List of Acronyms

1d1f	One-district-one factory
AU	African Union
CBO	Community-Based Organizations
CRI	Crop Research Institute
FAO	Food and Agriculture Organization
FBO	Farmer Based Organisation
GSS	Ghana Statistical Services
HQCF	High Quality Cassava Flower
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
MAG	Modernizing Agriculture in Ghana
MDA	Ministries, Departments, and Agencies
MOFA	Ministry of Good and Agriculture, Republic of Ghana
MOTI	Ministry of Trade and Industry, Republic of Ghana
NGO	Non-Governmental Organization
SDG	Sustainable Development Goals
SSA	Sub-Saharan Africa
UN	United Nations
UNDP	United Nations Development Program

# 1 Introduction

Section 1.1 of the introduction provides an overview of the topic, section 1.2 describes the research problem, 1.3 the aim and scope, 1.4 provides a background on development and agriculture in Ghana, and 1.5 the main results and outline.

## 1.1 Overview

The following thesis will address the influence of agro-processing activities in the lives and livelihoods of farmers in 5 different communities Ghana. Concerning the historical role of agriculture in economic development, the debate was predominantly polarized in two major views. A traditional view that regarded agriculture as “unlikely to generate transformative growth” and a new view that considers the sector to be “a potential engine for economic growth” (Andersson and Rohne, 2017). Regarding the recent view, Byerlee, de Janvry, and Sadoulet (2009) propose that minimization of the potential benefits from agricultural development has contributed to an increase in income inequalities, rural-urban gaps, environmental hazards, and food insecurity. Additionally, Adelman (1984), explains that agriculture has a pro-poor growth effect as it can increase income of farmers and consequently inject money into local markets. Similarly, Timmer (2009; 2016) declares that agriculture can accelerate economic growth and eradicate the worst traits of absolute poverty, thus contributing to the overall catching up process.

The importance of agriculture towards development has been emphasized by worldwide and African policy makers. In 2015, the United Nations (UN) implemented the Sustainable Development Goals (SDGs) which are “a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity” (UNDP, n.d). Specifically, regarding agriculture, the UN recognizes that sustainable agricultural development is “at the heart of the 2030 [Sustainable Development Goals (SDG)] agenda and a first fundamental step to securing zero hunger” (FAO, 2016). Moreover, several other organizations and researchers acknowledge that agriculture is not only related to the zero hunger SDG goal but to all seventeen of them, including for example: no poverty, quality of education, gender

equality, and partnership for the goals (Bhavani and Rampal, 2020; Chandrasekhara et al., 2018; FAO, 2016; FF, n.d.). Additionally, considering the African context, the African Union (AU) 2063 Agenda, which is “Africa’s development blueprint to achieve inclusive and sustainable socio-economic development over a 50-year period” (AU, 2022), recognizes -through the Comprehensive African Agricultural Development Program (CAADP)- that agriculture-led development is one of the principal tools to minimize poverty and eradicate hunger in the continent (AU, 2021).

In a similar take, regarding the focus of this thesis, researchers like Figueroa et al. (2018) have found that farm households who are involved with agro-processing activities are more likely to avoid poverty. In addition, Khowa and Mukasi (2021), identified that agro-processing can be a tool to generate additional income and promote local development in rural settings. Likewise, Dorosh and Thurlow (2018), note that not only agriculture can have a larger pro-poor impact than that of manufacturing and services, but also subsectors like agro-processing can equalize or exceed the pro-poor impact of agriculture as a sector. Therefore, it is relevant to explore the role of agro-processing activities in improving the lives and livelihoods in the selected Ghanaian context.

## 1.2 Research Problem

Previous research has encountered that many agro-processing industries in Ghana have a low value-addition level as they have a small size, operate under capacity, run wasteful processes, and utilize inefficient technologies; in addition, it has been found that agro-processors tend to have weak linkages with financial and marketing service providers (Owoo & Lambon-Quayefio, 2018). However, there are indications that agro-processing industries in Ghana have develop in the last few years. Therefore, through exploratory research, the aim of this thesis is to identify what is the current influence of agro-processing activities in the lives and livelihoods of the farmers.

Furthermore, concerning crops in Ghana, much emphasis has been placed in cash crops which predominantly are “cocoa, oil palm, cotton, coconut, tobacco, groundnuts, and rubber” (FAO, 1996). Cash crops have been seen as the “money makers”, therefore, governmental policies have promoted the cultivation of cash crops over food crops (Govereh

& Jayne, 2005). Consequently, the importance of food crops in agro-processing activities and economic development has been partially neglected in both policy making and academic research. Therefore, by exploring cassava as a crop, the thesis will address one of the current research gaps. In addition, secondary data for the selected context is not available. Since the intention of the study is to provide an up-to-date perspective, primary data through semi-structured interviews has been gathered.

### 1.3 Aim and Scope

The aim of this research is to explore the influence of agro-processing activities in the lives and livelihoods of cassava farmers. The intention is not to provide statistical outcomes but to perform an exploratory analysis. Therefore, the sample will be non-probabilistic. As such, the study takes place in a specific selected context: in 5 communities located in 4 districts in 2 key regions in Ghana. The selected regions were Volta and Ashanti, while the selected districts were Ho Municipal district and Central Tongu district in the Volta Region, and Sekyere district and Mampong district in the Ashanti Region (See Appendix A and B). To perform the study, one community per district was selected for the first three districts, while for the last district two neighboring communities were selected. These were: Hodzo (community 1) in Ho Municipal district, Mafi-Kumasi (community 2) in Central Tongu district, Bepoase (community 3) in Sekyere district, and Kruwi (community 4) and Woraso (community 5) in Mampong district. In addition, the selected food crop to be researched was cassava. Information on the reasoning behind crop and location selection can be found under the methods section. Considering this scope<sup>1</sup>, the thesis will answer the following research question:

1. *How are cassava agro-processing activities influencing the lives and livelihoods of farmers?*

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1. Understanding the year in which this research was conducted (2022) it is relevant to mention that, for this study, the Covid-19 pandemic is out of scope. Most of the interviewed farmers did not refer to the pandemic during the interviewees and the ones who did suggested that it did not have a considerable impact in the studied areas.

## 1.4 Background: Development and Agriculture in Ghana

Ghana is a country that can represent many aspects of the so called “African Miracle”. In the last decades, Ghana has been recognized for strengthening its democracy, judiciary system, and freedom of speech (World Bank, 2022). As well, between 2006 and 2016, the Ghanaian economy grew at 4.5% per year, significantly exceeding the growth in non-high income and low-income Sub-Saharan African (SSA) countries -respectively at 2% and 2.6%- and slightly over that of lower-middle income countries -at 4.4 %- (World Bank, 2018). This continuous growth allowed the country to transition from a low-income to a lower middle-income country category in year 2011 (World Bank, 2011). Moreover, despite the Covid-19 pandemic, it is estimated that the economy grew by 4.1% in 2021 and will grow by 5.5% in 2022 (World Bank, 2022). Therefore, it is interesting to explore the dynamics behind economic development in a country like Ghana.

Specifically, regarding agriculture, between 1984 and 2019, the sector’s contribution to the national GDP declined by 31.6 percentual points, however its nominal contribution more than doubled (See Figure 1 below). Similarly, there is evidence of a structural shift, with the service sector’s value-added contribution and the service sector’s employment share respectively overcoming those of agriculture after 2004 and 2013 (See Appendix C). Nevertheless, both the value-added contribution and employment share of agriculture remained relatively high respectively at 17.6% and 29.75% in 2019 (World Bank, n.d.). Moreover, from 2006 to 2019, the agricultural sector in Ghana was the only sector that has experienced constant labor productivity increments with no declines (See Figure 2). In fact, during the same period, the agricultural sector experienced the highest increase with a value-added per worker increment of 117.0%- versus a 61.5% increase in the industry sector and a 10.7% increase in the service sector.

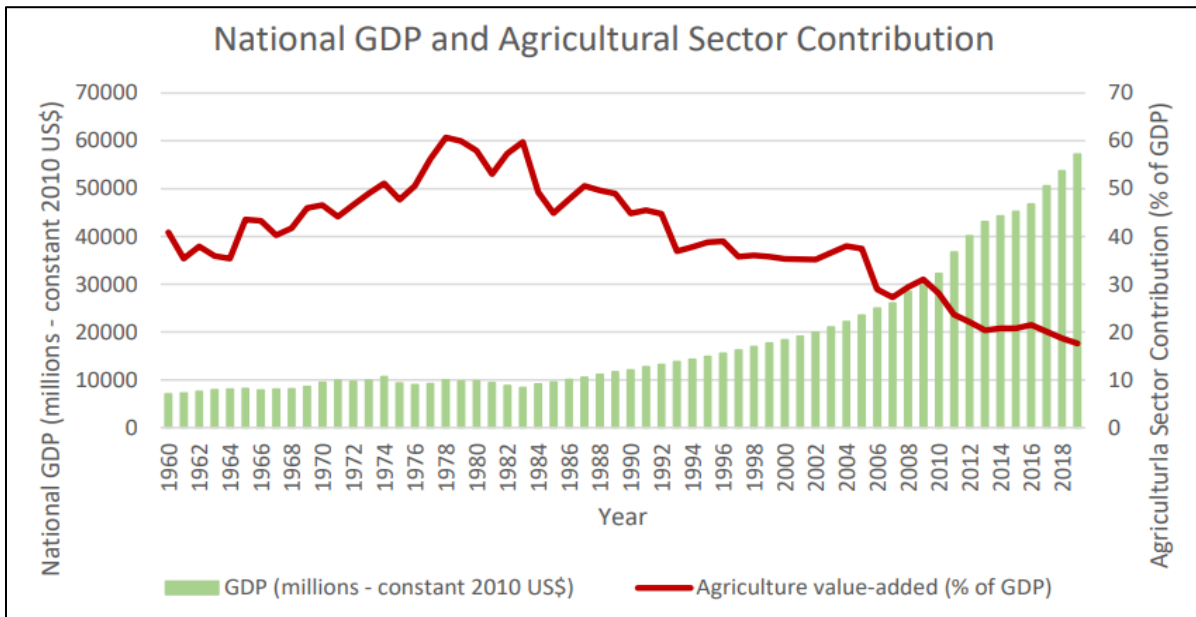


Figure 1. National GDP and Agricultural Sector Contribution.  
 Source: Author's own elaboration with World Bank (n.d.) data. Retrieved from Davila Nova (2021).

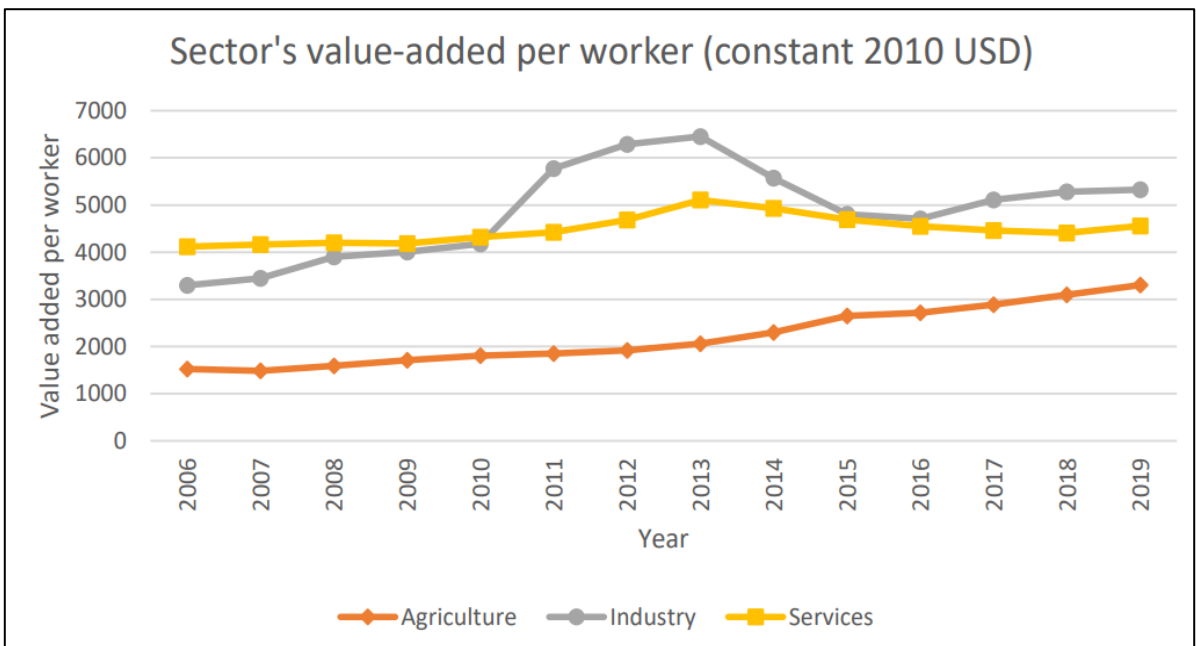


Figure 2. Sector's value-added per worker (constant 2010 USD)  
 Source: Author's own elaboration with World Bank (n.d.) data. Retrieved from Davila Nova (2021)

The sector's increased nominal contributions, reduced employment share, and increasing value-added per worker could indicate the presence of an agricultural transformation process in the country. The term “*agricultural transformation*”, which will be continuously referred to in this thesis, was coined to define the progress of a production system of agriculture that was “subsistence oriented and farm-centered into one that is more commercialized, productive, and off-farm centered” (AGRA, 2016: V). As such, it can allow farmers to obtain additional income. Furthermore, researchers like Mellor (1998) expose that, due to its multiplier effects and linkages, agriculture can also generate growth in other non-agricultural sectors. As well, Mukasa et al. (2017) emphasize that fixing the labor markets, financial markets, and land utilization imperfections that inhibit efficient investment also comprise part of the agricultural transformation process. All in all, agricultural transformation implies changes not only in the sector itself but also modifications and policies that in conjunction impact infrastructure, banking, trade, labor, and all sectors of the economy (Boettiger et al. 2017).

Regarding agricultural transformation in Ghana, Diao et al. (2019) highlight that with a fertile soil, favorable climate conditions, and direct access to international shipping, Ghana has a comparative advantage against other African countries. However, they state that, apart from the cocoa sector, Ghana has spent little on developing the agricultural sector. Moreover, they explain that the country has unsuccessfully tried to generate partnerships with the private sector to address market failures and solve problems surrounding the value chains of agricultural commodities. As well, they suggest that to be able to increase their economic growth rate, Ghana needs to: 1) develop effective government policies to relieve bottlenecks in key agricultural and manufacturing segments, 2) generate a stronger collaboration with the private sector, and 3) create new institutional arrangements that would allow them to move forward regardless of the fragile public administration and current market failures.

## 1.5 Main Results and Outline

The thesis finds that through agro-processing activities farmers have been able to obtain additional income and invest it to improve their lives and livelihoods and those of their household members. The additional income from agro-processing activities was predominantly obtained through two channels: First, benefiting all farmers, due to the influence of agro-processing activities in driving the use of new farming technologies, increased farm sizes, and

improved marketing opportunities. Second, benefiting farmers who were involved in agro-processing activities, through the additional profit margin generated from selling agro-processed products as opposed to raw cassava. Moreover, the thesis found that the additional income was invested to impact several social development areas like education, health, and infrastructure. Education was the social development area where farmers invested the most. As well, it found that through the influence of agro-processing activities there were increased opportunities for women and for the development of partnerships. The thesis is organized as follows, chapter 1 presents the introduction, chapter 2 the theory, chapter 3 the data, chapter 4 the methodology, chapter 5 the empirical analysis, and chapter 6 the conclusion.



## 2 Theory

Under the theory chapter, section 2.1 will present a literature review pertaining to agro-processing activities and their relationship to economic growth and development, while section 2.2 will discuss the theoretical framework. The literature review section is further subdivided in subsections 2.1.1 Agriculture and Industry, 2.1.2 African Context, and 2.1.3 Ghanaian Context.

### 2.1 Literature Review

#### 2.1.1 Agriculture and Industry

The FAO (1997), affirms that, traditionally, agriculture and industry have been seen as two separate sectors with the agricultural sector representing the first stage of development and the industry sector being a principal indicator of a country's development. As well, they explain that it was believed that the proper growth strategy was to engage in a gradual transition from agriculture to industry. Nevertheless, they state that this no longer seems to be entirely accurate, as the value of agriculture, and its contribution to industrialization has been reappraised. Moreover, they expose that some agricultural sub-sectors could now be considered a new type of industry as they have developed marketing, consumer choices, vertical integration, technology, richness, and complexity to a level close to that of other industrial sectors. Consequently, the term agro-processing surged to describe the convergence of both the agricultural and the industrial sector; and can be defined as “a subset of manufacturing that processes raw materials and intermediate products derived from the agricultural sector... [and that involves the transformation of] products originating from agriculture, forestry, and fisheries” FAO (1997: 222).

Concerning the social benefits that can emerge from agro-processing industries, researchers like Da Silva and Baker (2009) highlight the importance of the sector in engaging

into continuous economic growth, improving food security, and reducing poverty. Moreover, they emphasize that through forward and backward linkages, agro-processing industries have value-addition and job creation multiplier effects. Most importantly, they affirm that, since many agro-processing industries tend to be closer to where the raw materials are, they can have large socio-economic effects in the communities where they are located. Furthermore, they bring to attention the 2008 World Development Report which states that 75% of the world's poor are in rural communities and have agriculture as their main source of income (World Bank, 2007). Thus, Da Silva and Baker (2009) assert that an answer to the poverty challenge could be to bring agro-industrial development to those rural areas.

Likewise, researchers like Azama-Ali (n.d.), Proctor et al. (2000), and Simalenga (1996) postulate that agro-processing activities can have a positive impact in the livelihoods of farmers through increased income, employment availability, food security, and cultural and social welfare. In the same line, Diouf et al. (2009) state that promoting competitive agro-processing industries is vital to generate increased income opportunities and more employment, as they enhance the demand and quality of agricultural products. Moreover, they mention that there are substantial indicators that agro-processing industries are positively and globally impacting poverty declines and economic development in both the rural and urban levels. Nevertheless, they declare that in numerous developing countries, especially in Africa, the full potential of agro-processing activities has not yet been achieved.

### 2.1.2 African Context

Regarding the regional African context, Tarp (2018) brings to attention that, mainly due to a disappointing industrialization experience, structural transitions from sectors that were traditionally viewed as low-productivity sectors to high-productivity sectors have contributed far less to overall growth as when compared to other regions. However, he suggests that emerging agro-processing activities could provide the potential for economies to engage in “growth-enhancing structural transformation”. Moreover, Mhazo et al. (2012) highlight that agro-processing firms have the potential to meliorate people's livelihoods in Sub-Saharan Africa (SSA) by raising crop value and yielding higher return for farmers, extending marketing prospects, and increasing commodities shelf-life, palatability, and diversity. In addition, they highlight that it can empower women as, in comparison to men, they are usually more women engaged in agro-processing.

Concerning specific country case studies, after examining small and medium agro-processing systems in Zimbabwe, Mhazo et al. (2012) expose that new employment opportunities have been generated due to an increased number of agro-processing industries. Nevertheless, they state that agro-processing firms are facing multiple challenges like lack of capital, marketing assistance, technical information, and institutional support. Regarding the implications of Ethiopia's agro industrialization, Minten et al. (2016) explain that, as agro-processing activities dominate the industrial sector, they are critical when considering value-addition and generation of employment. In addition, they state that the sector has strong effects on gender inequality reductions, as more women tend to work on it. Moreover, recognizing agro-processing industries as a key sector, the Ethiopian government is currently investing in the creation of four Integrated Agroindustrial Parks (IAP) by 2023 (AFDB, PCP, UNIDO, n.d.). With these projects they expect to benefit 800,000 farming households by allowing for increased incomes, improved market access, and minimized post-harvest losses. As well, they envision that 200,000 jobs -among direct and indirect- will be generated. In addition, they estimate that 50% of these jobs will go to women and youth. Consequently, they are preparing to train 6,000 women and youth with pertinent agro-processing capabilities.

### 2.1.3 Ghanaian Context

Addressing the impact of agro-processing activities in Ghana, researchers like Owoo and Lambon-Quayefio (2018) emphasize that agro-processing activities could contribute to 1) increased access to markets and better price stability, which generate income security (especially in rural communities where people are mainly into farming), 2) adoption of new technologies and knowledge transfer, 3) generation of employment, 4) minimization of post-harvest losses, 5) creation of new enterprises and economic diversification, and 6) reduction of gender inequalities, as the sector mainly employs women. As well, they state that agro-processing encourages the generation of backward linkages -through the demand of inputs and services- and forward linkages -through value-added activities. Nevertheless, they recognize that the status of agro-processing industries in Ghana is not well developed, as there are many small-scale firms that do not have proper financial and marketing connections and which, due to the use of inefficient technologies, operate under capacity.

Likewise, researchers, like Afful-Koomson et al. (2014), mention that a downside of agro-processing industries in Ghana is that, due to adoption of native technologies, they have

a lower productivity and efficiency when contrasted with multinational firms. In this regard, they explain that native technologies result in time-consuming and labor-intensive characteristics that prevent firms from scaling-up operations. In addition, Owoo and Lambon-Quayefio (2018) expose that low-scale firms experience more legal and bureaucratic burdens as compared to their larger counterparts, thus making it harder for them to start new businesses or develop existing ones. Nevertheless, they explain that most of the Ghanaian agro-processing industries are taking part on local-to-local exchange, meaning that domestically produced goods are sold for domestic market consumption; this local-to-local exchange consequently generates linkages that are critical for the development of communities where agro-processing companies are located.

Furthermore, Owoo and Lambon-Quayefio (2018) highlight the central role that agriculture has taken in policies for social development in Ghana. For example, the first Ghana Poverty Reduction Strategy (GPRS) from 2003-2005, focused on agriculture to impulse rural development, while the second GPRS, together with the Ghana Shared Growth and Development Agenda I (GSGDA), identified agriculture as the key sector to head growth and structural transformation in the country (MOFA, 2010). In addition, they mention that through the second stage of the Food and Agriculture Sector Development Policy (FASDEP), the government specifically targeted agro-processing industries, adopting a value-chain strategy for development of the sector.

## 2.2 Theoretical framework

The aim of the thesis is to explore if agro-processing activities have influenced the lives and livelihoods of farmers. Based on academic literature, the following theoretical framework proposes that agro-processing activities could generate an additional income for farmers that could then be invested in improving their lives and livelihoods and those of their household members. The framework also proposes that the generation of additional income could occur through two channels 1) for all farmers by driving the agricultural transformation process in the studied areas, and 2) for those farmers who are processing cassava, through a higher profit margin from agro-processing activities. Theoretical support for the framework can be found in subsections 2.2.1 and 2.2.2. As well, Figure 3 below shows a conceptual model of the proposed theoretical framework.

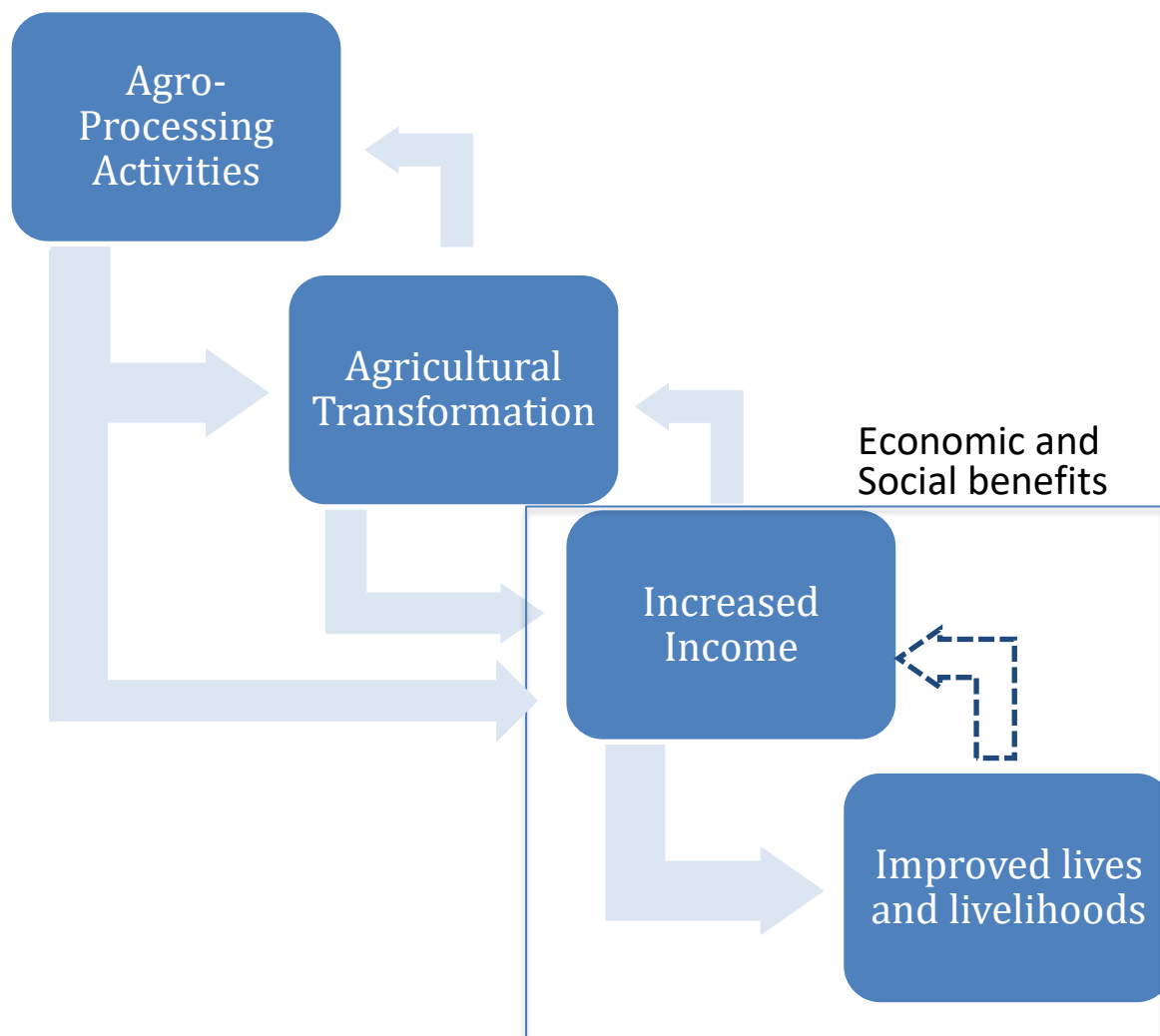


Figure 3. Conceptual theoretical framework.  
Source: Author's own elaboration.

Note that there are two arrows coming out of agro-processing activities. An arrow into agricultural transformation, as agro-processing activities could influence agricultural transformation and thus generate additional income, and a straight arrow from agro-processing activities into increased income as agro-processing activities by themselves could generate additional income. Also note that the flow of the arrows is bidirectional, as for example agro-processing activities can potentiate agricultural transformation but agricultural transformation by itself could also potentiate agro-processing activities. Similarly, some factors of agricultural transformation could result in increased income, but this increased income could also be used to further engage into agricultural transformation process. For instance, increased income could be used to purchase additional technology for the farm or additional technology in the farm could generate additional income. Moreover, increased income and employment could also have a bidirectional relation with improved lives and livelihoods, however this is a longer-term

process. To illustrate, increased income could be used to improve education, but it would take longer for improved education to translate into increased income. To depict the long-term bidirectional relation between increased income and improved livelihoods the arrows has no fill and a dotted border line.

### 2.2.1 Additional Income and Agricultural Transformation

An increasing presence of agro-processing activities is by itself one factor that could indicate the presence of an agricultural transformation process. However, as previously discussed, agricultural transformation does not only involve one factor but the combination of many. For example, specifically regarding Ghana, researchers like Chapoto et al. (2013), emphasize that the increasing number of medium- and large- size farms is mainly a product of using best farming techniques like the adoption of modern agrotechnology and improved market participation. Similarly, Jayne et al. (2016) expose that, in Ghana, medium-size farms are producing dynamism in the agricultural sector and becoming a central part of changing technical and commercialization patterns in Africa.

Increasing farm sizes could allow for a transition from self-subsistence farming into commercial farming, nevertheless, this is not always the case. It must be stressed that the sole increase in farm-sizes is not an indicator of either agricultural transformation or increased income for farmers, as farms could only increase by incurring in more expenses. Addressing this issue, researchers like Jirström et al. (2010) and Kolavalli et al. (2012) express that increasing farm size might not be a result of productivity but just a result of mere land expansion which could affect the return in non-poverty outcomes. However, the combination of both increasing farm sizes and other aspects like the use of new technologies could indicate the presence of an agricultural transformation process and increased income. Moreover, as Chapoto et al. (2013) and Jayne et al. (2016) mention, the marketing aspect is also a critical component; as, in the absence of new marketing opportunities, increased output from improved technologies or larger farm sizes could just turn into waste. Thus, agricultural transformation implies an entire revamping of the sector that would allow it to contribute to overall economic growth (Ruttan & Hayami, 1971).

In addition, agro-processing activities by themselves could generate an additional profit from selling a transformed product versus raw produce. Moreover, as discussed in the

introduction and literature review, agro-processing activities can have a direct impact in alleviating poverty, inequalities, income, and employment (Da Silva & Baker, 2009; Diouf et al., 2009; Dorosh and Thurlow, 2018; Figueroa et al., 2018; Khowa & Mukasi, 2021; Mhazo et al., 2012; Minten et al., 2016; Owoo & Lambon-Quayefio, 2018; Proctor et al., 2000; Simalenga, 1996).

Therefore, the research will focus on exploring what the influence of agro-processing activities has been in the 1) use of new technologies, 2) increasing farm-sizes and 3) improved marketing opportunities. Moreover, the research will also focus on exploring if farmers who are themselves involved in agro-processing activities have been able to obtain additional income. As previously explained, the theoretical framework proposes that the obtained additional income could then be used to improve the lives and livelihoods of farmers. Theoretical support for the connection between increased income and improvement of the lives and livelihoods of farmers is provided in subsection 2.2.2 below.

### 2.2.2 Income and livelihood improvement

Several research has found that, particularly for poor people, income constraints can have a detrimental effect in their livelihoods and those of their families (Benzeval and Judge, 2001; Duncan et al. 1998, Duncan et al., 2014; Gennetian et al., 2010, Marmot, 2002, Wagmiller et al., 2003; Wilmer and Wolf, 2020). For example, Benzeval and Judge (2001), suggest that income is a key determinant in the long-term development of children. As well, they propose that additional income can improve a child possibility of success during adulthood, especially among low-income families. Similarly, Duncan et al. (2014), describe that a higher level of stress is experienced by poor families in comparison to affluent ones. Moreover, they state that poor families lack enough resources to ensure high-quality children care. Through their study they conclude that increased income can have strong social impacts, as children whose parents have experienced a boost in income, on average, perform better at school and finalize more years of schooling.

Moreover, Marmot (2002: 31, 46), discusses two potential causal relations of income on health “through a direct effect on the material conditions necessary for biological survival, and through an effect on social participation and opportunity to control life circumstances”. Relevant to the context of this research, he concludes that “at the low end of

the scale” both potential causal relations matter. As well, he identifies that it is where less public goods and services are provided that the personal income becomes more relevant for improving health conditions. Likewise, Benzeval and Judge (2001) note the possibility of reverse causation between income and health but state that there are indications of a causal relationship of low income into health outcomes.

Therefore, being critical development areas, the research focuses on exploring how additional income is influencing education and health. As well, in the introduction and literature review, several other economic and social development aspects that could be affected were mentioned (e.g. reduction of inequalities, opportunities for women, financial inclusion, etc.). Thus, all of them have been taken into consideration when performing the interviews. As well, as per the exploratory nature of the research, the framework and study give opportunity for farmers to address other development aspects that the researcher might not have been aware of.



# 3 Methods

The research will perform an exploratory non-probabilistic study through thirty-six semi-structured interviews conducted in five communities in four districts located in two regions in Ghana. In the Methods chapter, section 3.1 will discuss the case selection, section 3.2 the suitability of the qualitative method and instruments, section 3.3 the sampling, section 3.4 the limitations, section 3.5 the ethical considerations, and section 3.6 the methodology of the analysis.

## 3.1 Case Selection

### 3.1.1 Crop: Cassava

Regarding crops there are two major groups in Ghana: cash crops and food crops. This research will focus on food crops since research addressing agro-processing activities has mainly focused on cash crops. Among food crops the ones that are arguably the most important in Ghana are maize and cassava (MOFA, 2021a). According to data obtained from MOFA (2021b), out of the major food crops and between years 2018 to 2020, cassava has been the most produced, the most per capita consumed, and the second covering the largest land area in the country (See Tables 1, 2, and 3). Nevertheless, maize has been the most common processed food crop followed by other grains like sorghum, guinea corn, and millet (Owoo & Lambon-Quatefio, 2018).

Despite not traditionally seen as an industrialization crop, cassava has gained recognition as it is now being used 1) to produce cassava flower, 2) as an input of the national brewing industry, 4) as glue for the plywood industry and 5) as an input for gari production through small and medium size firms (Darko-Koomson, 2020; Kleih et al, 2013). In addition, agro-processing of cassava is particularly relevant as it could reduce the amount of post-harvest losses (Owoo & Lambon-Quayefio, 2018). Cassava post-harvest losses in Ghana are estimated

to be around 35% (Essilfie, 2014). Moreover, in 2006, the Minister of Agriculture of Ghana put in place the Root and Tuber Improvement Programs (RTIMP) to promote production, marketization, and processing of Cassava (MOFA, 2013). Unlike maize, which agro-processing has been more recognized, cassava's recent industrialization places interesting opportunities for new research.

*Table 1. Production of Major Crops (Thousands of Metric Tons)*

Source: Author's own elaboration with MOFA (2021) data

Production of Major Crops (Thousands of Metric Tons)					
#	Crop	3-year average	2020	2019	2018
1	Cassava	23828.7	24368	22750	24368
2	Yam	8882.0	8946	8754	8946
3	Plantain	5700.3	5811	5479	5811
4	Maize	3017.7	3071	2911	3071
5	Cocoyam	1581.0	1596	1551	1596
6	Rice (Paddy)	957.0	973	925	973
7	Rice (Millet)	646.7	651	638	651
8	Groundnut	564.3	565	563	565
9	Sorghum	353.0	356	347	356
10	Cowpea	256.0	257	254	257
11	Millet	234.0	236	230	236
12	Soyabean	203.7	209	193	209

*Table 2. Apparent per Capita Consumption (Kg)*

Source: Author's own elaboration with MOFA (2021) data

Apparent per Capita Consumption (Kg)					
#	Crop	3-year average	2020	2019	2018
1	Cassava	529.40	570.45	525	492.74
2	Yam	229.74	249.06	230.34	209.82
3	Plantain	116.20	165.46	48.57	134.56
4	Cocoyam	90.39	70.65	153.68	46.85
5	Maize	70.73	75.91	73.72	62.56
6	Rice (Milled)	52.17	51.63	57.25	47.63
7	Wheat	15.49	1.79	21.1	23.59
8	Groundnut	15.33	13.43	16.74	15.83
9	Sorghum	10.65	10.77	10.98	10.19
10	Cowpea	7.24	7.8	7.12	6.8
11	Millet	6.67	6.88	7.21	5.91
12	Soya bean	5.12	4.88	5.41	5.07

Table 3. *Cropped Area of Major Crops (Thousands of Hectares)*

Source: Author's own elaboration with MOFA (2021) data

Cropped Area of Major Crops (Thousands of Hectares)					
#	Crop	3-year average	2020	2019	2018
1	Maize	1107.0	1150	1150	1021
2	Cassava	1006.3	1021	1021	977
3	Yam	490.0	500	500	470
4	Plantain	401.7	409	409	387
5	Groundnut	331.3	337	337	320
6	Rice (Paddy)	274.7	282	282	260
7	Sorghum	226.7	226	226	228
8	Cocoyam	210.3	214	214	203
9	Cowpea	165.0	169	169	157
10	Millet	146.0	148	148	142
11	Soyabean	109.0	112	112	103

### 3.1.2 Location: Ashanti and Volta Regions

Concerning location, proximity to big and medium size cities was considered based in the postulates that, generally, 1) increasing rural-urban migration is stimulating food demand in urban areas 2) an increasing urban middle-income class is requiring higher food quality 3) proximity to the cities strengthens marketization opportunities, 4) proximity to bigger cities is associated with better access to transportation infrastructure (Lara et al., 2019; Vandercasteelen et al., 2018). These postulates led to the assumption that bigger scale agro-processing industries are generally located closer to medium and bigger size cities. Therefore, proximity to the biggest two cities in Ghana -Accra and Kumasi- was taken into account (See Appendix D and E). Moreover, location was also chosen after considering which regions are the biggest producers of cassava in Ghana. The leading producer is Eastern Region “(27% of national total), followed by Brong Ahafo (21.7%), Ashanti (14.9%), Central (12.8%), Volta (9.4%) and Northern (8.2%)” (WACOMP ,2019). Taking these aspects into account, the Central, Eastern, and Volta regions -all of them relatively close to Accra- and the Ashanti region -which contains Kumasi- were considered for further investigation.

An additional criterion for the selection of the region was the number of cassava agro-processing companies per region that were under the government's One Factory-One-District (1d1f) program. The program envisions to place one factory per district and, by doing so, to “change the nature of Ghana's economy from one which is dependent on import and export of raw material to one which is focused on manufacturing, value addition and export of

processed goods” (1d1f, n.d.). The reason behind considering the number of 1d1f companies is because it is relevant for the research to also explore the dynamics around places where collaboration from multiple stakeholders takes place. Moreover, the presence of 1d1f company locations was used as an indicator and starting point, but additional recommendations on where it would be beneficial to conduct the research were obtained after contacting company officials and agricultural extension officers from each region.

The number of factories that were engaged with cassava agro-processing and were part of the 1d1f program in each region was the following: 5 in the Ashanti Region, 5 in the Volta region, 2 in the Eastern region, and 2 in the Central region (MOTI, n.d.). Therefore, the Ashanti and Volta regions were chosen to perform additional research on which districts and communities to choose. The final decision was made based on the presence of cassava farming in the area, status of the listed 1d1f companies, existence of other non-listed agro-processing companies, and the size of farms in the area. After contacting relevant stakeholders, the selected districts were Ho Municipal and Central Tongu in the Volta Region and Sekyere and Mampong in the Ashanti Region. In addition, in the first three districts, one community per district was selected, while in the fourth district, two neighboring communities were selected. These were Hodzo (community 1) in Ho Municipal district (district 1), Mafi-Kumasi (community 2) in Central Tongu district (district 2), Bepoase (community 3) in Sekyere district (district 3), and Kruwi (community 4) and Woraso (community 5) in Mampong district (district 4).

## 3.2 Suitability of qualitative methods and instruments

For the selected research context (farmers around agro-processing activities in the four districts in Ghana) there is a current research gap and no available secondary data. Therefore, fieldwork research in Ghana has been conducted to obtain primary data through semi-structured interviews. The nature of the research is exploratory, with the objective to obtain as much information as possible from the relevant stakeholders. Semi-structured interviews were chosen because they are a critical instrument for exploratory analysis that permits the interviewer to ask the same key questions to all respondents but also to obtain further information through additional probing (Arthur and Nazroo, 2003: 113). Asking the same questions allows to establish a common benchmark while the additional probing allows to obtain new relevant

information that might not be present in the current literature and that the interviewer might not be aware of.

It was estimated that 10 interviews per district were going to be conducted totalling an approximate number of 40 interviews. However, as recommended, the number of interviews conducted per district were based upon reach of the theoretical saturation point (Flick, 2009:119). “Theoretical saturation” occurs when, as performing additional interviews, no extra data is found for the purpose of the research (Glaser and Strauss, 1967: 61). The final number of conducted interviews was of 36. The sample was non-probabilistic as the intention of the research is not to provide statistical outcomes but to perform exploratory research that will shed light into the influence of agro-processing activities in the lives and livelihoods of farmers in Ghana. The used interview guides can be found on Appendix F. There are three of them, one for farmers, one for associations or small-size enterprises, and one for medium-size enterprises. As per their condition of semi-structured, the interviews were not rigid. Therefore, additional follow up questions came along during the interviews.

### 3.3 Sampling

The sampling of the interviewees was mostly done through purposive sampling. Purposive sampling was implemented with the assistance of the agricultural extension officers and members of the district assembly of each region. Under the Ministry of Food and Agriculture (MOFA), the agricultural extension officer is the closest agricultural authority to farmers, and they are responsible of “collaboration with other MDAs [(Ministries, Departments and Agencies)], provision of technical advisory service, provision of information on NGOs [(non-governmental organizations)] and CBOs [(community based organizations)] involved in agricultural development, provision of information on Farmer Based Organisations (FBOs), and provision of information on agricultural technologies (MOFA, n.d.). The members of the district assembly are local authorities elected by the people and their functions include “[exercising] political and administrative authority in the district, [promoting] local economic development, and [providing] guidance, [giving] direction to and [supervising] other administrative authorities in the district as may be prescribed by law” (Local Government Act, 2016).

Through purposive samplings, farmers that were around agro-processing activities were targeted. As well, to capture a general overview, both farmers that had a direct interaction with agro-processing activities and those who did not have it were interviewed. Following (Flick, 2009: 122) recommendations the sampling was done 1) capturing extreme cases, 2) aiming for maximal possible variation, 3) choosing critical cases for which “relations to be studied become especially clear”, and 4) considering convenience, “the selection of those cases that are the easiest to access under given conditions”. Moreover, considering potential limitations (discussed in section 3.4 below) the snowball technique was utilized after initial purposive sampling. As stated by Flick (2009) the snowball technique consists of asking key contacts or first interview participants to refer to other potential participants (Flick, 2009). Through the combination of both methods, the research intended to avoid potential biases.

## 3.4 Limitations

Limitations of the research include

- Different language: As the interviews were conducted in rural areas, some of the respondents did not fluently spoke English. Therefore, to avoid misinterpretations, if preferred by the interviewee, the interviews were performed in the local language. This was done with the help of a language and cultural translator who translated on-site. Thus, the interviews were recorded in the local language, but with immediate translation to English.
- Sampling: Concerning purposive sampling there is potential of incurring in bias from the people assisting on doing the sampling. For this reason, the sampling was not done with the input of just one person but two of them: the agricultural extension officer and the assembly man/woman. The strategy was to have the assembly man/woman and agricultural extension officers as gate openers. However, being aware that just relying on them for referrals can also cause bias, once introduced to the first interviewees, the snowball approach was used.

- Gender bias: It was previously considered that most of the positions of leadership in the communities and industries could be held by men. As such, it was likely that men will refer to other men generating a gender bias. However, as the sampling and interviews were conducted, the interviewees were naturally gender balanced in terms of the quantity of women and men.

### 3.5 Ethical Considerations

As the fieldwork research is performed in a different country, the researcher first had to get acquainted with and understand the context and culture of the country where the study was being performed. In an intend to be as acquainted as possible, the researcher moved to Ghana two months before conducting the first interview. During this period the researcher conducted on-site preliminary research. As well, the research followed the guidelines established by Lund University, ensuring respect to and confidentiality of the interviewees. Following the ESRC (2012) guidelines, 1) the interviewees were fully informed of the research objectives, the tools and methods being used, and the future intended uses of the collected information 2) participation of the interviewees was voluntary, with no coercion and 3) research independence was ensured by avoiding or making explicit any potential conflict of interests. Additionally, as interviews were conducted in a different language, the research ensured that the “interpretations [were] clearly visible... [and that they] related specifically to the data provided by study participants” (Ritchie and Lewis, 2003:34). Likewise, to ensure ethical compliance, the interview guidelines in Table 4 below, were followed. Moreover, despite their anonymity is not disclosed in the thesis, key informants provided permission to do so. In addition, permission was given for the presented pictures. To preserve the person’s identity, even though permission was given, if faces were shown they were blurred.

Table 4. A participant map of research ethics.  
Source: Graham, Grewal, and Lewis (2007)

Before the interview	During the interview	After the interview
-Unpressured decision-making about taking part	-Being able to exercise the right not to answer a question or to say more than they want	-Right to privacy and anonymity respected in storage, access and reporting of the research
-Research is independent and legitimate	-An unpressurised pace, time to think	-Unbiased and accurate reporting
-Knowing why they were selected to be approached	-Feeling comfortable and at ease, value and respected, not intimidated or judged	-Opportunity for feedback on findings and use
-Clear and worthwhile objective, purpose, and intended purpose	-Opportunity for self-expression and for own views to be recorded	-Use is actually made of the research for social benefit
-Knowing what to expect and being able to prepare especially in terms of coverage and questioning	-Questions are relevant, not repetitive, clear	
-Openness, honesty and being able to correct misunderstandings	-Left without negative feelings about participation	

### 3.6 Methodology of the analysis

In order to analyse the obtained data the approaches of Creswell et al. (2004) and Creswell (2013) were used. Codes were created to elaborate an analysis based in themes and categories. Later the responses were tabulated under each category. In line with the proposed theoretical framework, the major two themes were “income” and “lives and livelihoods” of farmers. The categories by theme can be found in Table 5 below. Following Cresswell et al. (2004) and Creswell (2013) approaches, categories that were not initially anticipated, but identified through conduction of the interviews, were also included as part of the analysis.



Table 5. Themes and Categories for Qualitative Analysis.

Source: Author's own elaboration.

Themes and Categories for Qualitative Analysis		
Themes	Categories	Sub-categories
Income	-Technology	-Variety
		-Planting technique
		-Weedicides
		-Tractor
	-Farm size	-Increase
	-Marketing	-Demand
	-Processing	-Time
		-Effort
-Profit		
-Post-harvest losses		
Lives and livelihoods	-Education	-Expectation
	-Health	-Hospital
		- Sick
	-Infrastructure	-House
		- Road
	-Women	-Empowerment
		-Ownership
	-Partnerships	-Associations
		-Collaboration
		-Government
		-Organizations
		-Private

After tabulation, the analysis consisted of two parts. First, a short quantitative analysis to explore the factors behind increased income and to quantify the number of respondents that referred to each individual social development area. It must be noted though that this quantification exercise is only done to provide a sense on what the respondents had experience. However, as previously mentioned, the study is non-probabilistic. Consequently, the second qualitative part was included to provide additional context and to enrich the exploratory nature of the research. Thus, the specific responses of the interviewees -for each one of the themes and categories- were presented. This was done by directly citing the respondents or by using long to short quotes as part of the discussion (Creswell, 2009).

## 4 Data – Interviews Background

As the study is exploratory many aspects related to the obtained primary data are discussed in the Results chapter. Nevertheless, to provide a better context section 4.1 provides information of farmers and agro-processing activities in the studied areas and section 4.2 provides descriptive statistics of those who were interviewed.

### 4.1 Farmers and agro-processing activities in the studied areas

With regards to the interaction between farmers and agro-processing activities, the interviewed farmers can be classified in three major groups. First, a group of farmers that do not have a direct interaction with agro-processing activities, meaning that they do not sell to any agro-processing company, and they do not process themselves unless it is done with indigenous technologies and in very small quantities. Second, a group of farmers that are themselves involved in agro-processing activities through the creation of small-size associations and enterprises. And third, a group of farmers that sell to medium-size agro-processing companies. Farmers with no direct interaction with agro-processing industries were also interviewed in order to explore the full dynamics surrounding agro-processing activities. Note that, regarding the number of employees, medium-size enterprises are defined as those with fewer than 300 employees, while small-size enterprises are defined as those with fewer than 50 employees (IFC, 2012). There were 5 communities in 4 districts where interviews were conducted and a total of 36 respondents. When citing or addressing testimonies of the respondents they will be addressed with the capital letter R followed by their interview number. For example, respondent 1 will be addressed as R1. The complete list of respondents can be found in Appendix G (respondents are numbered 1 to 37, however there are only 36 interviewees, this is because number 22 was accidentally skipped during the interviews).

In community 1, district 1, there was one medium-size agro-processing company, that was engaged in the use of cassava to produce ethanol, the ethanol was later sold nationally to other companies that elaborated alcoholic beverages and sanitizers. According to the managing director (R13), the company had 60 permanent workers and about 150 non-permanent workers. As well, the company could process up to 65 tons of cassava a day. The company has its own land to produce cassava but, through a formal contract, they are also purchasing it from outgrowers (farmers who supply input to the processing companies). The enterprise is currently buying cassava from 200 outgrowers.



*Figure 4. Cassava processing conveyor. Ethanol production company, community 1.*



*Figure 5. Distillation column. Ethanol production company, community 1.*



*Figure 6. Fermentation equipment. Ethanol production company, community 1.*

In community 2, district 2, there were 2 farmer associations that were processing cassava into one of Ghana’s major staples, gari. Gari is a “creamy-white, partially gelatinized roasted free flowing granular flour made from cassava roots” (Sanni et al., 2008: 1) (See Figure 8). The first association -association 1- was comprised of 15 women. Through different partnerships the association obtained modern equipment to process gari. The second association was comprised of 30 women and a few men that collaborate with some tasks. At the time of the interviews, the second association was still using indigenous technologies but was in the process of applying for funding from external organizations to obtain modern technology. Association 2 was in fact replicating what association 1 did and trying to develop partnerships with the same entities.



Figure 7. Roasting process with plates, association 1, community 2.



Figure 8. Gari produced in association 1.



*Figure 9. Roasting process with frying pans, association 2, community 2.*

As well, in community 2, two employees of another ethanol manufacturing company were interviewed. According to the agricultural manager of the company (R20) the company has its own land with 3000 hectares (7413.2 acres) and 250 permanent and casual workers, nevertheless, he mentioned that, depending on the season, the number of workers on the field could go as low as 100. Farmers directly selling to the processing company could not be reached. The company's assistant farm manager (R21) exposed that the company is buying from external farmers but that it has not yet developed a formal agreement to work with them. He stated that one of the challenges they are having is that they need farmers who have at least 50 ac. of land. In addition, he mentioned that, as of now, they are now processing 150 metric tons, from which 50 come from their own farm and 100 that are being outsourced.



*Figure 10. Ethanol processing company, community 2.*

In community 3, district 3, there was a medium-size agro-processing company that was not operating when the interviews were being conducted. A worker in charge of purchasing cassava for the company (R27) declared that the company used to process cassava chips, and that these chips were meant to be used as input for another processing company from the same investors group. However, the sister company that they were supposed to supply had not purchased the machinery necessary to process the cassava chips. Therefore, they had to stop production until further notice.



*Figure 11. Cassava chips processing company, community 3.*

Also in community 3, there was a small-size enterprise that was processing cassava into gari. This enterprise had a very similar format to that of the associations. However, as one of the founders and current enterprise manager declared (R28), it was a group of three people that set the enterprise. He explained that the farmers who process their cassava in the enterprise are not members of an association but have to pay a fee to process their cassava. The profits of the association are divided in three, one part is used to pay the laborers, one part for maintenance of the machinery, and one part for the head of the enterprise. As well, in community 3, one farmer (R26) who was processing 43 acres of cassava into cassava chips was interviewed.



*Figure 12. Roasting and grating process, small enterprise, community 3.*  
Note: face blurred





*Figure 13. Drying process for cassava chips, farmer 26, community 3.*

In community 4, district 4, there were farmers who were themselves involved in processing cassava (R29 and R30), as well they were a neighboring community of community 5, where there was one medium-size enterprise and one small-size enterprise. The general manager of the medium-size enterprise (R33) informed that the enterprise was producing gari and high-quality cassava flour (HQCF), as well he stated that they are currently developing animal feed and other cassava derivatives. In addition, he mentioned that the company has over 700 acres under cultivation, and around 63 workers. The CEO of the small-size enterprise (R37) mentioned that the company processes cassava into gari, HQCF, cassava dough, chips, cookies, chin-chin (fried snacks), and cassava mixes to elaborate local foods. She mentioned that the company has its own land with 70 acres and also that the company has 15 workers.



*Figure 14. Drying of cassava, medium-size enterprise, community 5.*



*Figure 15. Gari processing, medium-size enterprise, community 5.*



*Figure 16. Roasting plates, small-size enterprise, community 5.*



*Figure 17. Grater, small-size enterprise, community 5.*

## 4.2 Interviewees descriptive statistics

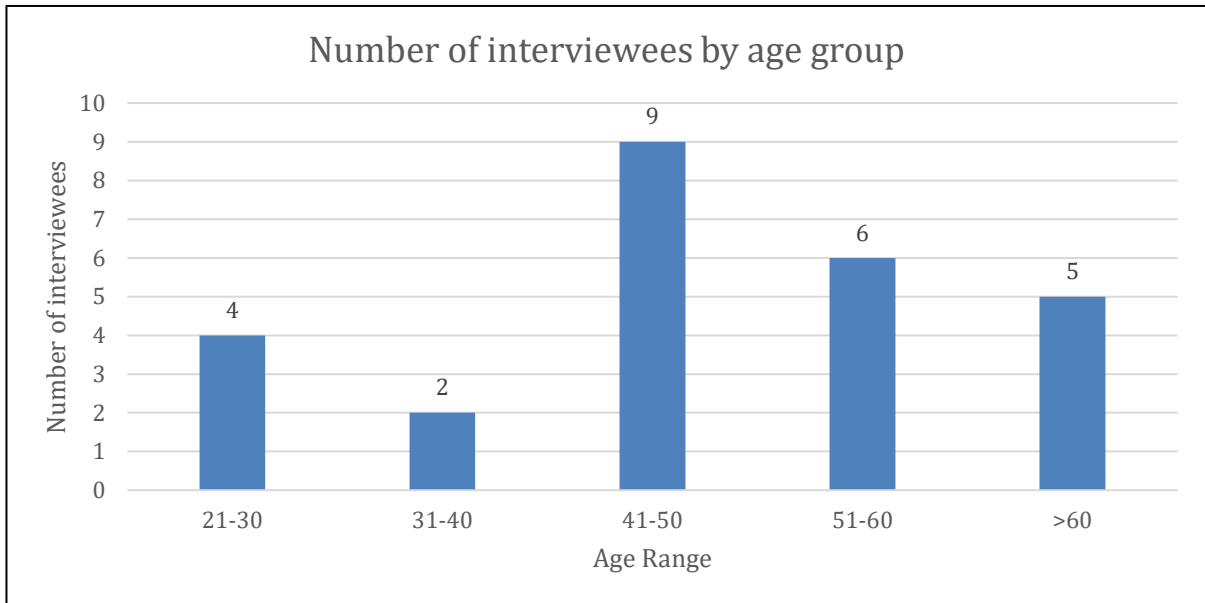
There was a total of 36 interviews, from which 27 had farming as their primary activity and 12 were key informants. 3 of the farmers were also considered key informants as 2 were chairpersons of farmer associations and 1 was the manager of a small-size enterprise. The other 9 key informants were: 5 managers/workers of medium-size enterprises, 1 CEO of a small-size enterprises, and 3 agricultural extension officers (See summary Table 6 below, for a complete list see Appendix G). The 27 farmers represent 75% of the interviewees, while non-farmers represent 25%.

*Table 6. Interviewees summary.*  
Source: Author's own elaboration

Interviewees summary	
Total number of interviewees	36
Farmers	27
Key informants	12
Medium-size enterprises managers/workers	5
Small-size enterprises/associations chairpersons/managers	4
Agricultural Extension Officers	3

As per their different condition, farmers characteristics have been analyzed separately from non-farmers. Out of all 27 interviewed farmers 52% were female and 48% were male. Therefore, from the perspective of quantity of female versus quantity of male the interviews are gender balanced. It should be noted though that among key informants from farming associations and small-size enterprises 3 out of 4 (75%) were female, all with chairperson or managerial positions. Nevertheless, among the people interviewed in medium-size enterprises, none of them were female.

Moreover, the average age of farmers was of 49.3 years, with the oldest person having 71 years and the youngest person having 27 (See Figure 18 depicting quantity by age group). Regarding educational level, 2 had no education, 3 went through basic education, 9 through middle school, 9 through high school, and 4 through tertiary education. Concerning household size, the average household size was of 6.3 members, the minimum 2 and the maximum 11 (educational level and household size graphs can be found in Appendix H).



*Figure 18. Number of interviewees by age group.*

Source: Author's own elaboration.

Note: one person did not provide age.

Out of all the 27 farmers, 24 provided detailed percentage information about their income. From all the 24, 70.8% obtained income solely from agricultural related activities. The remaining 29.2%, obtained -on average- 75% of their income through farming. The 3 farmers that did not provide detailed percentages stated that most of their income came from farming. Therefore, all of them had farming as their primary activity. The obtained non-agricultural related income mainly came from commercializing non-agricultural products (like having provision stores), construction work (like roofing and carpentry), or by receiving retirement pensions.

## 5 Empirical Analysis

Answering the thesis research question: “*How are cassava agro-processing activities influencing the lives and livelihoods of farmers?*”, the study finds that, through the influence of agro-processing activities farmers have been able to increase their income and use this additional income to improve their lives and livelihoods. Increased income was obtained by all farmers through the influence of agro-processing activities in driving three factors that could indicate a potential agricultural transformation process in the area: 1) the *use of new technologies* 2) *increasing farm sizes*, and 3) *improved marketing opportunities*. As well, the study finds that farmers who were themselves involved in processing cassava were able to obtain additional income through increased profit margins from selling agro-processed products as opposed to raw cassava. As the main reasons behind the generation of additional income, the three mentioned factors and the direct influence of agro-processing activities are examined in section 5.1. Furthermore, the research found that the additional income was invested to influence multiple development areas like education, health, and infrastructure. Moreover, it was found that agro-processing activities also influenced increasing opportunities for women and development of partnerships. The mentioned social development areas are discussed in section 5.2.

### 5.1 Additional Income and Agricultural Transformation

Regarding increased income through the influence of agro-processing activities in driving agricultural transformation, first, it was found that farmers were able to increase farm output through the conjunction of both 1) using new farming technologies and 2) increasing farm sizes. Second, that farmers obtained profit by being able to sell the increased output through 3) improved marketing opportunities. It must be again emphasized that farm sizes can be increased by just adding more land and financial resources but not necessarily by having more efficient practices. If this would have been the case, more resources would have been spent which could mean that the farmer was not necessarily obtaining more profit. Moreover,

if not being able to sell the additional produce then it would not bring any benefit and could just turn into waste.

The combination of these three factors -1) use of new farming technologies 2) increased farm sizes and 3) improved marketing opportunities- thus allowed for increased income. Moreover, the conjunction of the three is also an indicator of a presumable agricultural transformation process in the area. As well, by being able to generate a profit margin increase, there was additional income for farmers who were themselves transforming cassava into agro-processed products. Therefore, Subsection 5.1.1 discusses the use of new technologies, 5.1.2 increasing farm sizes, 5.1.3 improved marketing opportunities, and 5.1.4 agro-processing activities.

### 5.1.1 Use of new farming technologies

Use of new farming technologies are important for the generation of income as they allow for increased output per area, which can then be transformed into increased profit. During the interviews, it was first identified that farm sizes were increasing. However, to find the root causes behind the increase, farmers were asked what the reasons behind the increase were and if they had implemented any new technologies in the last 5 years. Since the use of new technologies is one of the main root causes, it is discussed first. Twenty farmers provided information on the use of new technologies and all of them mentioned they had implemented new technologies. Out of the twenty, 95% mentioned that they had introduced new varieties of cassava, 50% mentioned that they had introduced new planting techniques, 55% mentioned that they started to use weedicides, and 10% mentioned that they began to use tractors (See Figure 19). Availability of new cassava varieties was not only the most addressed technological aspect but the one that had a direct relation with the emergence of agro-processing industries, as such this aspect will be discussed in detail. The connection between agro-processing industries and the other three remaining aspects -planting technique, weedicides, and tractors- will be briefly addressed.

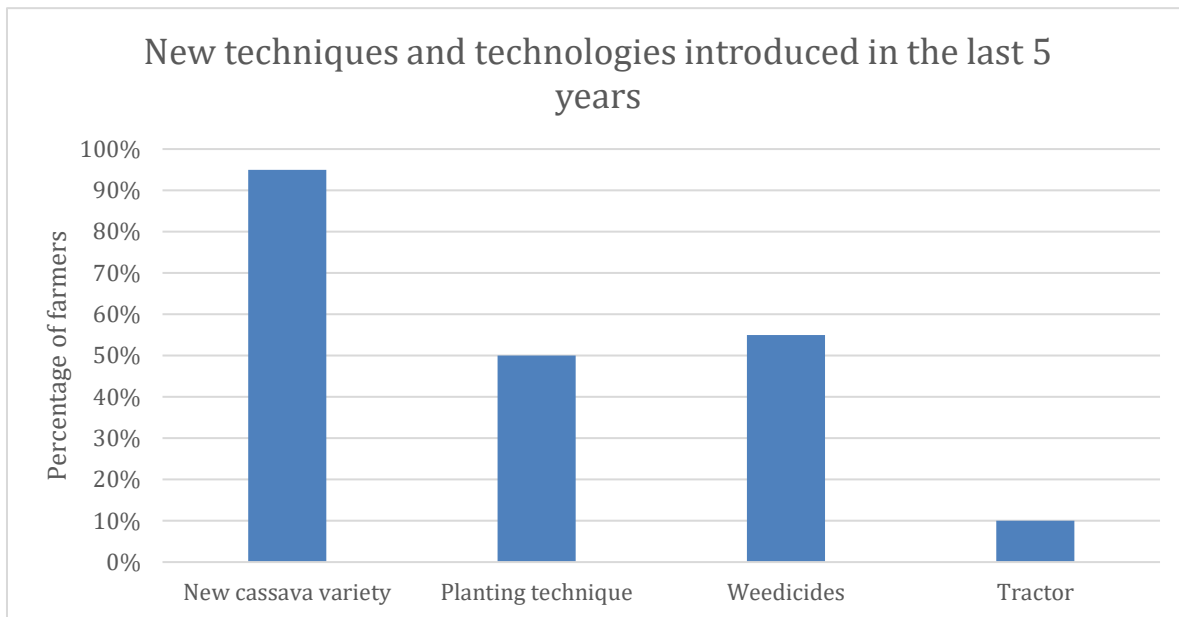


Figure 19. *New techniques and technologies introduced in the last 5 years.*  
 Source: Author's own elaboration.

New cassava varieties are directly connected with the emergence of agro-processing industries, for example, in community 1, the new cassava variety was introduced to the community by one agro-processing industry. Even the farmers that were not selling to the agro-processing industry used this new variety. In community 2, new cassava varieties were being used by farmers who were themselves involved in agro-processing activities. While, in community 3, community 4, and community 5, farmers were using new varieties that were introduced by the agricultural extension officers but that were developed by the Crop Research Institute (CRI) in collaboration with agro-processing industries. For example, the Agricultural Extension Officer of Sekyere (R32), community 3, stated that, to develop the new varieties the CRI worked with other industries to inquire them which kind of cassava they were demanding, as such he stated that the CRI worked “hand in hand with the industries”.

In addition, it was found that agro-processing industries collaborated with the spread of cassava sticks. The general manager of a mid-size company in community 1 (R13), confirmed that, through an outgrowers contract, they provide cassava sticks to farmers at no initial cost (if sticks are provided, the harvested cassava has to be sold to the company and the cost of the sticks is deducted from the final payment that the company makes to the farmer). Similarly, the general manager of a mid-size company in community 5 (R33) informed that they provide cassava sticks to farmers but there is no formal contract. As well he mentioned that if the farmers are able to process themselves, they also provide it, as it is the aim of the



company “to alleviate poverty”. He also mentioned that when the CRI needs to spread the varieties, they make their facilities available as such they are “located as a multiplier and as a seed provider”. Likewise, R37, the CEO of a small-size enterprise in community 5, mentioned that she is a member of a cassava value chain association which provides new varieties of cassava to farmers.

New cassava varieties are important because they can be harvested in a shorter time and they also have a higher yield than the native varieties. For example, in community 1, according to R4, R5, and R6 the new variety -Inshunka- could be harvested from 6 to 8 months, while the traditional variety -Ankra- was harvested in 12 months. Moreover, R6 declared that the yield of the new variety more than doubles that of the traditional one, while R8 declared that, in the same area, if she could harvest 3 sacks of the traditional variety, she could harvest up to 10 of the new. Similarly, in community 3, R23, R24, and R25 declared that the new variety -Tech Bankye- could be harvested in 18 months, while the traditional variety -Debo- could only be harvested from 21 to 24 months. As well, R24 and R26 stated that when compared to the traditional variety, the new variety has a higher yield, producing not only bigger tubers but also 25% to 40% more tubers. In community 4, R29 stated that the new variety -Abayaa- can be harvested in 6 months, while the native varieties -Akosua and Tun Tun- can respectively be harvested in 1 and 2 years, as well she estimates that the new variety yields four times more tubers. Likewise, R30 states that the new variety gives double the yield and that it can be harvested from 8 to 12 months while the traditional one takes 18 months to harvest.

Apart from harvesting time and increased yield, interviewed farmers emphasized other benefits from the new varieties. For example, R25 affirms that the life spans of the new variety is longer than that of the traditional variety and that during the rainy season the traditional variety will spoil while the new variety will stand. Moreover, R24, R26 and R30 state that the new variety has higher food content and that, due to the reduced water content, they make processing easier. In addition, R26 mentions that, also due to the reduced water content, if you use the new variety, processed products can be stored for a longer time. Nevertheless, it must be recognized that one respondent mentioned some comparative benefits of the traditional variety. R31, who cultivates both, mentions that, after maturing, the traditional variety can stay underground for a longer period. This could be beneficial because, despite cassava can go rotten in 3 to 5 days after being uprooted, it can last for a long time underground. Therefore, if farmers do not find a market for their produce, they just leave it underground until

they can sell it. As well, R24 mentioned that the traditional variety -Debo- is preferred by customers that want to use cassava to cook traditional foods like Fufu and Kokonte (Ghanaian traditional foods). This mainly due to taste preference. Consequently, he produces both, the new variety to sell to agro-processors and the native variety to sell in the local market.

The three remaining technological aspects are not strictly related to agro-processing industries however they have also been influenced by them. Planting techniques knowledge was mainly transferred by agricultural extension officers. However, enterprises were also involved in knowledge transfer by providing workshops and setting demonstration areas on their fields (R13, R33, R37). In fact, R5 an agricultural extension officer, mentioned that the agro-processing industry in his community puts up bulletin boards, with information on how to have better practices, and that “sometimes they call [them] for workshops”. Regarding the use of weedicides and tractors, agro-processing companies collaborated by making these available without an initial cost. As with the cassava sticks, the cost was deducted from the payment farmers received after they sold the harvested cassava to companies.

To illustrate, R11 mentioned that he got the tractor from the company, as well as weedicides, and that the company organized workshops to provide technical knowledge. Nevertheless, he mentioned that some of the challenges are that sometimes help is not provided at the right time, because of “money issues” as the company needs to “do a balance before they allocate resources for help”. Likewise, with regards to the use of tractors he mentioned that sometimes the “tractor is being used in their own farm [(the company’s farm)] and [thus] there are delays to help”. Regarding weedicides it can be mentioned that, partially due to the increasing marketing opportunities, farmers have seen a need to increase their output and farm sizes and, consequently, to improve their labor efficiency. For instance, R25 stated that 5 years ago, when her farm was smaller she used a hoe to remove the weeds but now that her farm is much bigger she needs to add weedicides to make it productive. Providing additional context, she mentioned that her farm “used to be there and they were not even be getting buyers to come and buy, but now they come and buy, because process has come to stay, so demand is quite high”.

### 5.1.2 Increased farm sizes

Through the interviews it was also identified that, on average, there has been an overall increase on farm sizes. This is important for the generation of income as in the studied area farms have not only increased due to resource allocation but also by using new technologies. Therefore, farmers have been able to obtain more profit. It was not necessarily one factor that followed the other. It could have been, on the one hand, that increasing farm sizes allowed for more output, and the obtained profits were later invested in more technology. On the other hand, it could have been that more technology allowed for more output per farmed area, and the obtained profits were later invested to increase the farm size. Regardless of the order of the events, the most important finding is that they occurred simultaneously, thus producing a multiplier effect and indicating a potential agricultural transformation process in the area.

To explore increasing farm sizes farmers were asked how many acres of land from which crop they currently have and how many acres of land for each crop they had 5 years ago. After obtaining their responses, farms were classified in small, medium, and large size farms. According to Jayne et al. (2016), small-size farms are those below 5 hectares (ha), medium-size farms are those between 5 and 10 ha, and large-size farms are those above 10 ha. Typically, farmland on the selected regions in Ghana is measured in acres, 1 acre (ac) is 0.404868 ha. Therefore, converting ha to ac, the farm size classification by Jayne et al. (2016) would be as follows:

- Small-size farms, those below 12.4 ac.
- Medium-size farms, those between 12.4 ac and 24.7 ac.
- Large-size farms, those above 24.7 ac.

Out of 15 small-size farm owners, 10 provided enough information to calculate overall farm size increase and cassava farmland increase in the last 5 years. The average size of these small-size farms was of 7.8 ac with cassava covering, on average, 69.7% of the farmland (about 5.4 ac). In the last 5 years all farms but one increased their farm size. The remaining one (R9), maintained the same acreage through the 5 years. Nevertheless, she changed her farm distribution and reduced 2 acres in cassava to allocate it to plantain. The reason behind was because apart from farming, she also buys cassava from other farmers and sells it, and some of her customers wanted to buy plantain together with cassava. Thus, she

decided to produce both. On average, small-size farmland increased by 27.7% with 88.4% of the increased land allocated to cassava.

All medium-size farm owners (5 of them) provided enough information to perform the previous calculations. The average medium-size farm was of 17.8 ac. with cassava covering, on average, 47.2% of the farmland (about 8.4 ac). On average, in the last 5 years, overall farmland increased by 52.7% with 54.4% of the increased land allocated to cassava. Out of the 6 large farms, 4 provided enough information to perform the previous calculations. The average large-size farm was of 35.3 ac with cassava covering, on average, 44% of the farmland (about 15.6 ac). On average, in the last 5 years, overall farmland increased by 33.7% with 67.4% of the increased land allocated to cassava (see summary in Table 7 below).

*Table 7. Analysis of increasing farm-size.*  
Source: Author’s own elaboration.

<b>Analysis of increasing farm-size</b>			
<b>Farm size</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
<b># of Farms</b>	10	5	4
<b>Avg. acreage</b>	7.8	17.8	35.3
<b>Total land</b>	77.5	89	141
<b>Cassava land</b>	54	42	62
<b>Percentage of cassava land</b>	69.70%	47.20%	44.00%
<b>Total land (5 years before)</b>	56	42.1	93.5
<b>Land increase (last 5 years)</b>	21.5	46.9	47.5
<b>Avg. increase (last 5 years)</b>	2.2	9.4	11.9
<b>Avg. percentage increase (last 5 years)</b>	27.70%	52.70%	33.70%
<b>Cassava land (5 years before)</b>	35	16.5	30
<b>Cassava land increase (last 5 years)</b>	19	25.5	32
<b>Avg. cassava land increase (last 5 years)</b>	1.9	5.1	8
<b>Percentage of Increase from Cassava Land</b>	88.40%	54.40%	67.40%

Moreover, using specific individual increase percentages for each farmer, it was estimated that, if in the next five years farms were to increase at the same rate, 4 out of the 10 small-size farms would become medium-size farms, while 6 would remain in the small-size farm category. Nevertheless, 3 out of these 6 would have farm sizes of over 9.5 acres, and

therefore would be in the border to transition from small-size farms to medium-size farms. In addition, the average size of these farms would increase from 7.8 ac. to 11.7 ac. Similar calculations were performed for medium-size farms and it was estimated that all medium-size farms would transition to large-size farms and that the average acreage of these farms would increase from 17.8 ac. to 39.4 ac. In addition, it was estimated that the large-size farms average acreage would increase from 35.3 ac. to 57.9 ac.

Furthermore, when asked about farm size increase, key informants who were not farmers provided the following answers: in community 1, R13 informed that the company he works for, motivates farmers to increase their farm sizes as they need them to supply more for the company, as well he mentioned that the company requires farmers to have a minimum of 5 acres. In community 2, R21 assistant farm manager of a mid-size processing company mentioned that, before, cassava farmers were selling in small quantities but now, they are selling more because of the processing industries. As well he mentioned that he has “seen that they are expanding their farms, because now there is ready market for the cassava”. In community 3, R28 the general manager of a small-size enterprise stated that “the farmers have increased their farm size... [because now] they have a place where they can sell it to”. In community 5, R33 general manager of a mid-size processing company mentioned that they have increased their own land size by 55% in the last 5 years. Similarly, R37 stated that her company had increased their land size by 40% in the last 5 years.

In addition, agricultural extension officer R32 in community 4 estimates that farm sizes have increased by 50% in the last 5 years. He believes that the increase is because “they have gotten a good variety that gives them more yield and also [because of] the demand for the processed cassava” he also stated that now “when [farmers] harvest they are able to break even and get their profit margin”. Agricultural extension officer in community 5, R36 estimates that in the last 5 years farms-sizes have increased, on average, by 30%. He believes that agro-processors have a big role in the seen increase as companies require certain standards and a certain acreage for those who are outgrowers, therefore “[farmers] have been motivated to even grow more than they used to grow, because now they have the hope that they have someone [who will] buy the produce from them”

### 5.1.3 Improved marketing opportunities

According to the interviewees there has been an overall increase of marketing opportunities for cassava and cassava agro-processed products. R36, agricultural extension officer in community 5 explains that the presence of agro-processing companies has positively influence the lives and livelihoods of farmers by increasing the market for cassava. He declares that “previously [there were] marketing problems for cassava” that farmers would be “chasing marketers and at the end of the day some of their produce would be left rotting in the farm”. However, he mentions that “establishing the companies has given them hope, [that] they have seen a lot of changes, [and that now] they don’t have marketing problems”. Moreover, he mentions that not only those selling to agro-processing industries have benefited but also those selling in the local market; as the ones who are now supplying to the industries used to sell in the local market for human consumption. Thus, he affirms that there is a market split, also leaving a supply gap in the local markets. Similarly, R5 the agricultural extension officer from community 1, estimates that the demand for agro-processed products has increased by one third (33.3%) in the last 5 years. While R32 the agricultural extension officer from community 4, states that agro-processing industries have positively affected farmers “because they are in demand of the cassava, so they make ready markets for the casava whenever their families harvest the cassava [and thus they] are able to get income from whatever they sell”. He estimates that in the last 5 years demand of cassava processed products has experienced a 60% increase.

To further inquire if there has been increased market opportunities farmers were asked about demand variations due to agro-processing industries in the last 5 years. If they had seen a demand variation, they were asked to quantify it. Some provided percentage estimates while some quantified it by stating if demand had increased by half, doubled, tripled, or quadrupled. Out of 15 farmers who provided information on this topic, 13 considered that demand for agro-processed cassava products has increased, while only 2 (R6 and R23) consider that there has not been a variation. On average, the 13 farmers that think demand has increased in the last 5 years estimate that demand has more than double accounting for an estimated percentage of 214%. From the two farmers who believe there has not been an increase, R6 declared that there is no demand variation in the community for agro-processed products as what has had been produced is sufficient for the communities, while R23 declared that he has not seen a demand variation specifically related to agro-processed industries.

Another interesting aspect of the market dynamics is to inquire why cassava has been the crop of preference and the one driving farm-size increase in this location. Regarding food crops cultivated in the area, all farmers saw cassava as the most profitable one. They all declared that there was now more market for cassava. As well, an important aspect to highlight is that the other major food crop in the area is maize. Maize has for long been industrialized but now the new industrialization of cassava provides new opportunities for obtaining more profit as cassava does not need as much maintenance or investment as other crops like maize.

For example, R7 stated that formally there was no demand for cassava, but now there is more demand for cassava as compared to maize, and therefore they had to increase the land for cassava. As well she stated that, in comparison to maize “there is almost no cost of production in cassava, that they spend little in chemicals and get a lot of money in cassava, but that in maize they spend a lot but don’t get much money.” Similarly, R15, R18, R23 who do inter-cropping (maize and cassava in the same land area) mentioned that they get more money from cassava than maize, that cassava is the crop from which they are benefiting the most, and that cassava is the crop driving overall farm size increase in the areas where they cultivate both maize and cassava. As well they all mentioned that one of the reasons why they cultivate maize in between cassava harvesting periods, is to generate additional income that will be used to invest in cassava farming. In addition, R23 added that to grow maize he needs fertilizer, but that he does not need fertilizer to grow cassava as cassava can easily grow in the land.

#### 5.1.4 Agro-processing activities

Farmers who were themselves transforming cassava into agro-processed products were able to obtain additional income mainly 1) by the increased profit margin of selling agro-processed products versus selling raw cassava 2) by using new processing technologies that allowed for reduced time and effort when processing their products and 3) by reduction of post-harvest losses. Concerning increased profit margin, combining the responses of R14, R15 and R16 -all farmers from the same gari processing association- it can be estimated that per one acre they can obtain two tricycles of raw cassava. If they were to sell the raw cassava they could obtain 500 cedis (Ghanaian money), however if they were to process it into plain gari they could obtain 800 cedis, the additional cost for processing would be of 100 cedis, therefore they would obtain an additional profit of 200 cedis.

Moreover, R14 the chairperson mentioned that it is actually not from plain gari that they obtained the most profit but from fortified gari. Fortified gari is gari with additives like coconut, butter, or ginger. Exemplifying with the coconut fortified gari, she declared that they can sell 1 sack of plain gari for 400 cedis, but if they fortify it, they can sell it for 1000 cedis. The additional cost to fortify it is of 120 cedis. That represents 480 cedis of additional profit, which is four times as much as their additional investment. Therefore, they prefer to sell plain gari instead of raw cassava, and fortified gari instead of plain gari. However, as there is demand for both, they process plain and fortified gari.

Another example is provided by R26, a farmer who processes cassava into chips, he declared that 5 years ago he did not process any cassava but now he is processing it and obtaining more profit. From his statements it was estimated that when selling raw cassava, he was obtaining an average profit of 1196 cedis per acre, but from processing it he was obtaining an average profit of 2769 cedis per acre. This represents a 231.5% increase in profit from transforming raw cassava into cassava chips.

Regarding the use of new processing technologies R14 chairperson of the first gari processing association, declared that with the new technologies they have reduced the amount of time to process gari from 7 days -when they used the indigenous technologies- to 2 days. That is 28.5% of the initial time. Likewise, R19, secretary of another farmer's association declared that, having the same amount of labor, you could get 2 sacks a day with the indigenous technology but 5 sacks a day with the new technologies. That represents a 150% increase in output. Moreover, the members of both associations agreed that the indigenous technologies required more effort in comparison to the new technologies. For example, with the new technologies they use roasting plates as those presented in Figure 7, and with indigenous technologies they use frying pans as those presented in Figure 9. Moreover, in the past they used stones to press cassava and take the water content out but now they use mechanic presses.

Concerning reduction of post-harvest losses, R26 estimates that before processing cassava he was incurring on 17% to 20% post-harvest losses, but now as he processes everything he has 0% losses. He also mentioned that casava chips can be stored from 60 to 80 days. This is relevant as raw cassava can go to waste from 3 to 5 days. Likewise, R30, a farmer who is processing raw cassava into gari, mentions that before processing he would incur in 20% waste but now he has no waste. Important to mention, however not specifically related to these farmers but to the whole agro-processing influence, agricultural extension officer R32 from



community 4 estimates that 5 years ago 25% of the cassava was getting rotten, but now only 0.5% this because “most of the cassava that was getting rotten has now gone into processing”. Similarly, R36, agricultural extension officer in community 5, estimates that agro-processing industries have contributed to solve 80% of the waste reduction problem.

## 5.2 Social development areas

To analyze social development areas farmers were asked which areas of their lives and livelihoods had cassava farming and cassava agro-processing activities influenced. The majority of respondents 21 out of the 27 (77.8%) referred to education, 8 to health (29.6%), and 5 to infrastructure (18.5%). Thus subsection 5.2.1 will address education while subsection 5.2.2 will address health and infrastructure. Moreover, some of the social implications were not only referred through the specific livelihoods question but in different portions of the interviews. Through them it was found that agro-processing activities also had a positive influence in increasing opportunities for women and the development of partnerships. Therefore, subsections 5.2.3 and 5.2.4 will respectively discuss opportunities for women and partnerships.

It must be noted that not all the farmers that referred to education, health, and infrastructure were directly influenced by agro-processing activities. Six neither sold to industries nor processed themselves however they were indirectly influenced mainly through the availability of new cassava varieties and through increasing marketing opportunities. If broken down by referred development area, the indirectly influenced respondents were 6 out of 21 for education, 2 out of 8 for health, and 1 out of 5 for infrastructure. These 6 farmers were R2, R7, R8, R9, R10, and R23.

In particular, 5 out of the 6 respondents who were indirectly influenced were using a new variety that was introduced into community 1 by a medium-size agro-processing company. Nevertheless, they did not directly obtain this variety from the processing company, but from other people that had obtained it from the processing company. These were respondents R2, R7, R8, R9 and R10. The remaining one R23, from community 3, was using a new variety that was developed by the Crop Research Institute (CRI) in collaboration with agro-processing industries. The indirect influence is also confirmed in the farmers testimonies, as R7 recognizes that it was the agro-processing company who brought this new variety, and that the

industry offers some help to the community. Similarly, R10 mentioned that agro-processing industries have not had a direct impact for her, however she declared that the new variety is coming from them and therefore it is a great achievement for the community. As well, as aforementioned, all farmers, but one (R23), believe that the demand of cassava for agro-processed products -and consequently the overall demand for cassava- has increased.

### 5.2.1 Education

Out of all the 21 farmers who mentioned education as an area of influence, 20 were using the additional money to invest in the education of their children. Therefore, most of the educational impact is not affecting the current generation but will affect the next generation. 10 farmers were asked about the expectations they had for their children and 6 of them (60%) mentioned that they would not like their children to continue farming; mainly because it is very labor intensive and that they have invested in their education so that they could leave farming and continue with their new professions. For example, R17 chairperson of an agro-processing association declared “no I wouldn’t like my children to become farmers, to go through the difficulties and challenges that we go, that’s why we set up this group so we can use it to support our family, so our children can go very far the educational ladder”.

The remaining 4 (40%) would like them to continue farming but as a side activity. For example, R15 mentioned that “if they advance in education and they dive into the area of agriculture then they can become agricultural experts then yes”. R23 mentioned that “it depends on the child, I would give them advice, if they wish, because you cannot force them, [but that] it would be good for us if they earn a salary and also income from the cassava”. R24 mentioned that she would “encourage her kids to continue their career but also take the farming business [seriously]”. Similarly, R31 stated that he expects his children to continue the farming business but also have another profession and do both, their profession and farming. These are all interesting findings as they represent not only family expectations but, if expectations become real, there could be a potential intergenerational change in labor structures by which the new generation would work in more productive and less labor-intensive jobs.

An interesting case is that of R19 the only farmer who was not investing in the education of the subsequent generation but on his own. He is a young farmer with no kids, 28 years old at the time of the interview. He is also a member and secretary of an agro-processing

association. He is going to school to become a teacher and he mentioned that he would like to work on his profession but also to continue farming on the side. However, he explained that he might stop processing while working as a teacher since he will probably not have enough time to process and farm. Thus, he believes he will only farm. In fact, he is now using his contacts in school to further develop selling channels in Accra, the capital.

Moreover, regarding other aspects of education. R12 informed that the local agro-processing industry had provided the junior high school with computers, this information was corroborated by R13 the manager of the agro-processing company who stated that they had “supported an IT lab in the high school, [and that they had] donated 8 computers”. The general manager also declared that “the high school did not have computers before, so it is the first time they have access to this kind of technology”. In addition, he mentioned that they had contributed to the farmer’s own education by doing workshops and teaching them not only farming techniques but also managerial principles.

## 5.2.2 Health and Infrastructure

Concerning the 8 respondents who mentioned health (R7, R8, R12, R14, R17, R24 and R31). In community 1, R7 mentioned that when she is sick, she uses money from cassava farming, R8 mentioned that she used it to take care of her father, while R12 mentioned that one agro-processing company had assisted hospitals with equipment. Nevertheless, when asked about the declarations of R12, the manager of the referred processing company (R13) denied it. In community 1, R7 and R8 did not have direct interaction with agro-processing activities but were using the new variety introduced by the agro-processing company while R12 was an outgrower directly selling to the company.

Furthermore, in community 2, R14 who is a farmer and chairperson of an agro-processing association mentioned that “when someone from the association or one of their family members is sick, they can take the money to pay for the medical expenses and afterwards they [can] put it back”. In addition, she mentions that if it does not take that much time to give the money back, they do not need to pay any interest. Under normal circumstances, if people borrow money from the association, they need to pay an interest rate of 3% per month. R17 chairperson of another agro-processing association in community 2, said that she uses part of the profits she obtains from the association for health issues. In community 3, R24 states that it

is through cassava farming that she has been able to acquire health insurance, while, in community 4, R31 states that through cassava he has been able to provide money to go to the hospital. Both R24 and R31 are farmers who sell to agro-processing industries.

Regarding the 5 farmers who mentioned infrastructure (R2, R7, R14, R30 and R31) they all declared that they were able invest in their house and added more structures through the income generated from cassava. The degree of influence from agro-processing industries for R2, R7 (community 1), R14 (community 2), and R31 (community 4) was previously addressed in the education and health paragraphs. The remaining one, R30, from community 4, was himself processing cassava. Moreover, R14 informed that “if someone is building and they need some material they can offer the person with assistance through money”. Apart from the five farmers, who addressed their own household infrastructure impact, R12, mentioned that some of their lands were not accessible and that it was through the local agro-processing industry that they were able to create roads and now are able to access their lands. Likewise, R33, manager of a mid-size agro-processing industry in community 5, mentioned that they have helped communities by providing road networks so farmers can easily access their farms. As well, R17 mentioned that some of the association’s money was used to build up the gari processing infrastructure.

### 5.2.3 Opportunities for women

Previously in the ethical considerations, regarding gender bias, it was considered that most of the farm owners could be men. However, once the study was performed it was noticed that there was not much difference between the number of male and female farm owners. In fact, as indicated in the descriptive statistics, out of the 27 farmers that were interviewed 52% were female while 48% were male, as previously mentioned there was no manipulation to balance genders. As well, in the small-size agro-processing associations/enterprises, the majority of chairpersons/managers where women with 3 out of 4 (75%). Nevertheless, in the medium-size agro-processing enterprises none of the 5 managers/workers were women. However, it must be noted that despite the manager of one of the medium-size enterprises was a male (R33), the CEO and founder of that enterprise was a female. As the literature states, this could indicate the presence of more opportunities for women in the agricultural sector.

An illustrative case was that of farming association 1 which was solely formed by women (15 of them) and, consequently, ran by a woman. The chairperson (R14) explained that the farming association surged as a women empowerment program to support their children education. She also mentioned that they have received help from multiple organizations including an organization of Canadian women (further explained in subsection 5.2.4.). As well she stated that the association has a mutual fund from which women can borrow money. The contributions dynamics are the same as other associations (also explained in section 5.2.4). The difference with this association is that first, there is no set amount that they have to contribute (they contribute as much as they want), second, that depending on the situation -like health issues or other emergencies- there is no interest if you borrow money (information corroborated by R15), and third, that if the money is borrowed with interest, the interest is lower than the other associations around the area (3% versus 4-5% per month).

Particularly interesting, when asked why she was able to grow her farm-size. R14 answered that first she farmed with her husband but then she was able to increase the farm size because she separated from him (not as a couple, just for farming). Consequently, she was able to weed and plow the land in large quantities because she herself had enough money to do so. A follow up question was why she was able to increase it if previously they were two but now only one, and she replied that it was through her personal effort and the help of the association that she was able to do so. Moreover, when asked if it was because she had more ownership over it she replied affirmatively.

#### 5.2.4 Partnerships

Under this development area two sorts of partnerships will be discussed: internal partnerships created within the farmers and partnerships generated between farmers and external entities. Regarding the first kind of partnership the research found that farmers have associated among themselves mainly due to a lack of financial saving and credit services. They associate in cooperatives through which they make weekly contributions to a common fund. In some associations the amount of the weekly contribution is set by all members, and all must contribute the same amount every week. In other associations the amount of the contribution depends on how much money each member wants to contribute. Farmers can then borrow money from the mutual fund, but they have to pay an interest rate that usually goes from 4 to 5 % a month. Typically, at the end of the year, the entire fund, with the contributions and the

apportioned interests, is divided among all farmers. Therefore, all contributors can obtain a small profit from the accrued interest.

Some of these associations, like the farming associations that produce gari surged as a direct consequence of agro-processing activities. As well, companies in the area have promoted farmers associations. For instance, R13, general manager of a mid-size enterprise manifested that they have formed an outgrowers association through which they explain to them how to “improve their skillset in cassava cultivation”. As well, they use the association to provide workshops addressing different topics like farm management. However, determining if there has been an influence of agro-processing industries in the forming of associations of independent farmers requires further research. Nevertheless, it could be hypothesized that agro-processing activities could have had a partial contribution, as it could have been that, following the increasing demand of cassava, farmers needed additional financial resources to produce more cassava and, consequently, created these mutual funds.

Particularly regarding the farmers agro-processing associations, there were some interesting examples of partnerships with external entities and of inter-collaboration between associations. R14 chairperson of association 1 explained that they were able to obtain the modern technologies through multiple partnerships. First, they obtained a grater from the MAG project, which stands for Modernizing Agriculture in Ghana. The project provides “direct funding to the Government of Ghana to improve food security and make the agriculture sector more modern, equitable, and sustainable” (Government of Canada, n.d.). Later, they obtained stoves from the United States embassy, and finally “a group of women from Canada” came to help them with stoves, a grinding mill, a grater, and a mechanic press. She mentioned that the farming association was already formed before the external help came, but that they knew about the external opportunities through the agricultural extension officers from the area.

Moreover, regarding partnerships with the government, R17 chairperson of association 2, mentioned that the government “advised them to form an association and that if they did the government would come and help them”. Therefore, they formed the association and were able to obtain additional help from the agricultural extension officer even in non-farming related activities like teaching them how to make meat pie, bread, and soap detergent. As well, R19 secretary of the association, declared that they got an annual award from the agricultural extension office because of forming the association. The award consisted of 1 movable grater, 1 sprayer, and 5 cutlass.

Concerning inter-collaboration between the associations, R16 a member of the first farmers association mentioned that “there was another association in a neighboring town that was trying to replicate their example and they went to train and assist them”. R19 secretary of the association to which R16 was referring, confirmed this information by stating that “other group members from another town gave a workshop and they taught them how to add coconut to the gari”. When asked about the workshop arrangement, R19 mentioned that it was also through the government and because they were looking to obtain support from the Canadian program.

## 6 Conclusion

The aim of the thesis is to explore if there has been an influence of agro-processing activities in the lives and livelihoods of cassava farmers. To perform this study thirty-six semi-structured interviews were conducted. Through the interviews it was identified that agro-processing activities allowed farmers to generate additional income that was later used to improve their lives and livelihoods and those of their household members. Farmers were able to obtain the additional income through two channels. First, benefiting all farmers, through the influence of agro-processing activities in the use of new farming technologies, increased farm sizes, and improved marketing opportunities. Second, benefiting farmers involved in agro-processing activities, through increased profit margin from selling agro-processed products as opposed to raw cassava.

The additional income was invested to improve several social development areas like education, health, and infrastructure. Education was the area where farmers invested the most. In fact, through education, most of the farmers expect their children to leave farming or at least to have farming as a side activity alongside their profession. Moreover, the investigation indicated that agro-processing activities also influenced increased opportunities for women and development of partnerships. As well, as a secondary finding, the research suggests that the conjunction of the use of new farming technologies, increased farm sizes, and improved marketing opportunities, could indicate the presence of a potential agricultural transformation process in the studied area.

Due to its exploratory nature, the main practical implication of this thesis is to promote further research on how agro-processing activities can influence the lives and livelihoods of cassava farmers in Ghana. Moreover, as it was found that there is a positive influence of agro-processing activities in the studied areas, the research hopes to capture the attention of local government officials that could develop policies to promote further development of agro-processing activities.

Furthermore, the research intends to motivate deeper investigation of other highlighted areas presented in this work. For example, now that there is indication of a potential



agricultural transformation process, quantitative studies could be performed to obtain probabilistic data. As well, regarding education, it would be particularly interesting to perform a future study to identify what have been the educational returns and if the expectation of farmers was fulfilled. Similarly, further research could focus on health, infrastructure, opportunities for women, or partnerships. Ultimately, the researcher hopes that the presented work does not only contribute to discussion in the academic spheres but that it can also contribute to generate a positive development impact in Ghana.

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# Appendix A – Districts in Volta Region

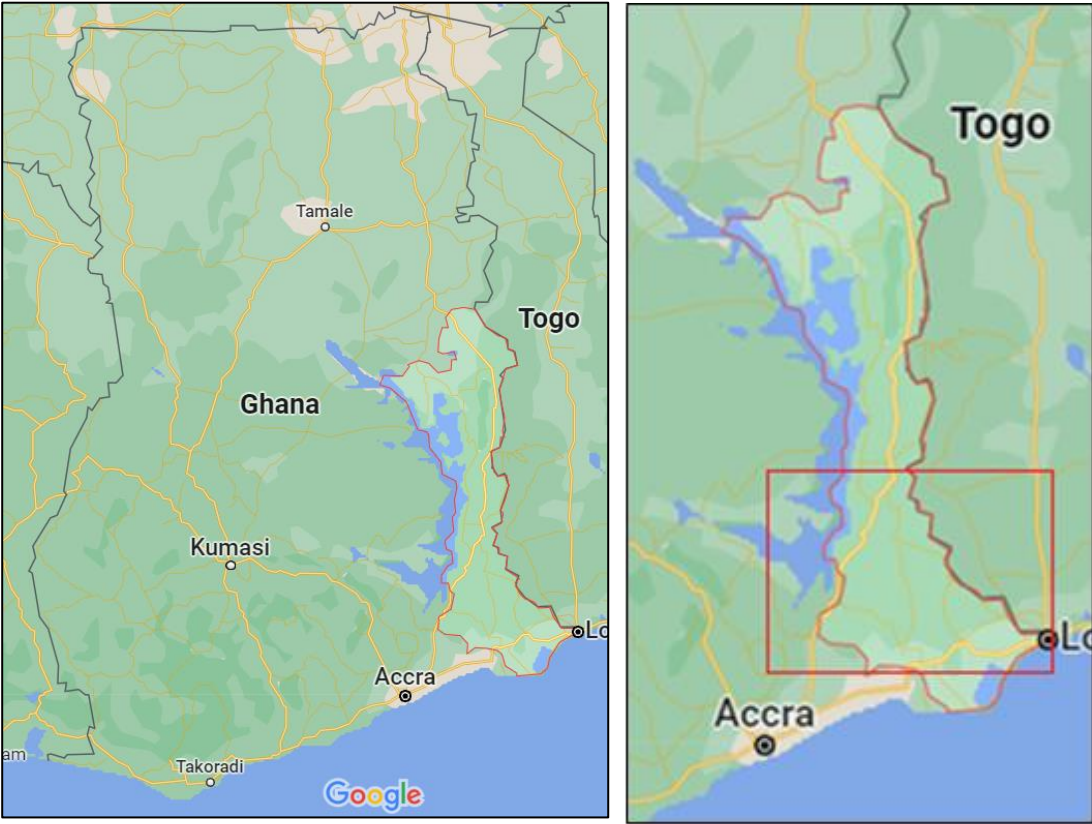


Figure 20. Volta Region, Ghana.  
Source: Google Maps (n.d.). Focus area selected by author.



Figure 21. Ho Municipal and Central Tongu districts, Volta Region.  
Source: Google Maps (n.d.). Pins placed by author.

# Appendix B – Districts in Ashanti Region

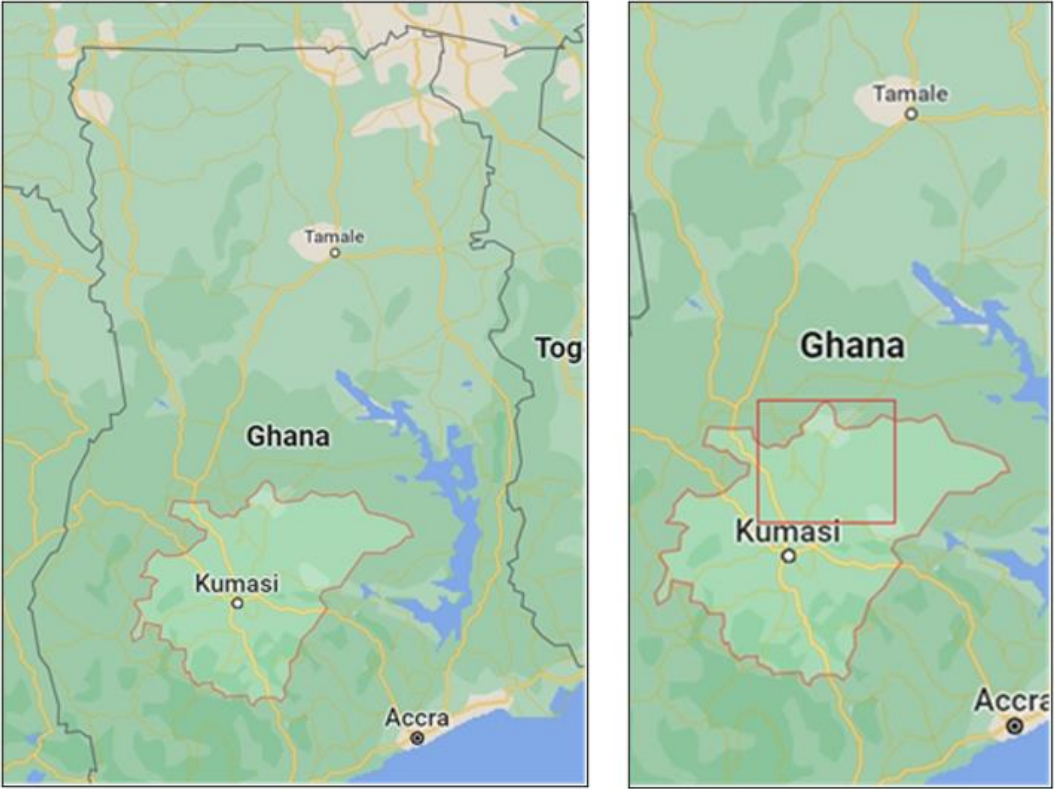


Figure 22. Ashanti Region, Ghana.  
Source: Google Maps (n.d.). Focus area selected by author.



Figure 23. Mampong and Sekyere districts, Ashanti Region.  
Source: Google Maps (n.d.). Pins placed by author

# Appendix C – Sector’s employment share and value-added

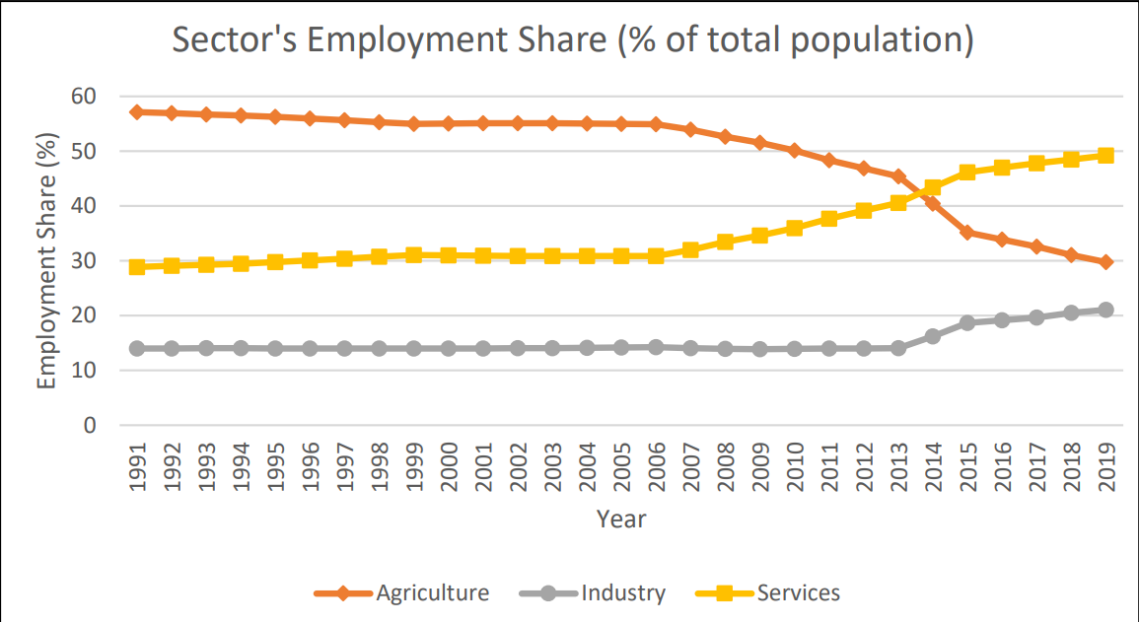


Figure 24. Sector's employment share (% of total population).  
 Source: Author’s own elaboration. Retrieved from Davila Novoa (2021).

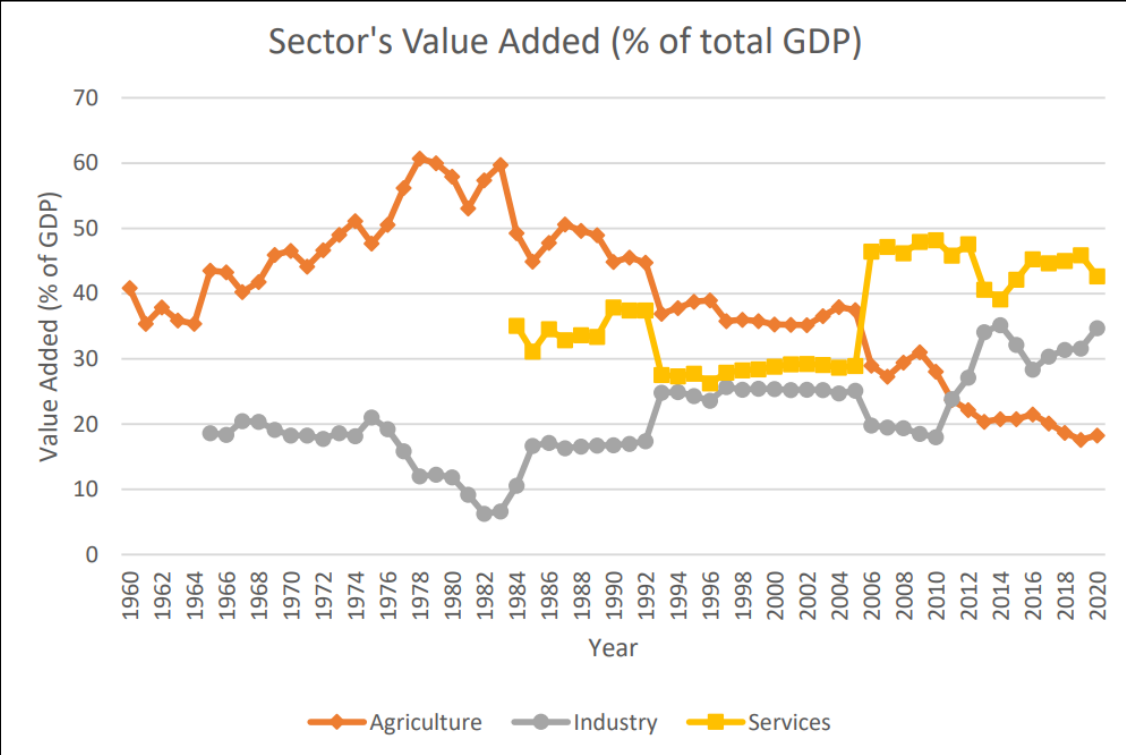


Figure 25. Sector's value added (% of total GDP).  
 Source: Author’s own elaboration. Retrieved from Davila Novoa (2021)

# Appendix D – Regional map of Ghana



Figure 26. Regional map of Ghana.  
Source: Ontheworldmap (n.d.)

# Appendix E – Population of cities in Ghana

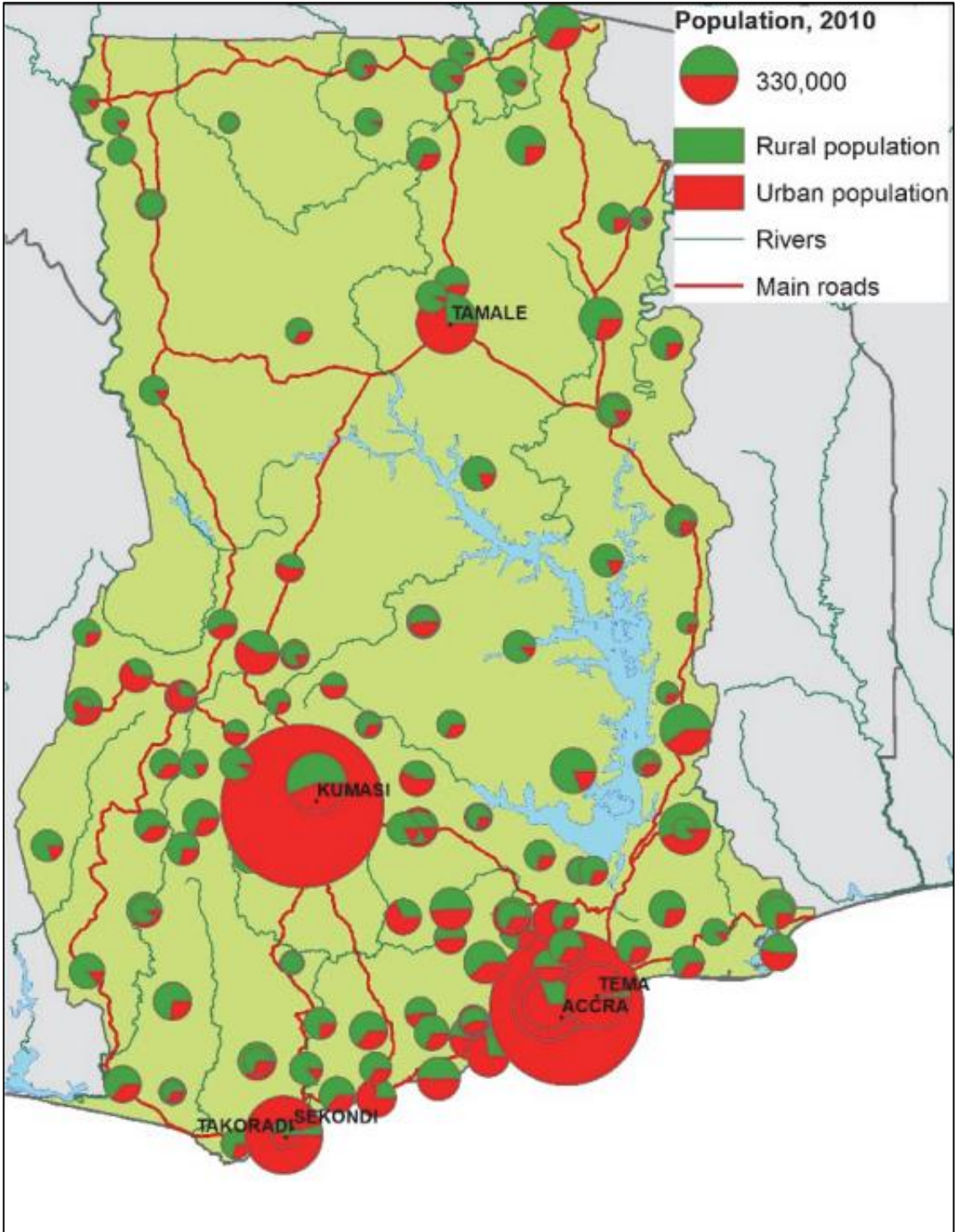


Figure 27. Location of Ghana cities.  
Source: World Bank (2015) and GSS (2013) 2010 Population and Housing Census.

# Appendix F – Interview guides

## Interview Guide I - Cassava Farmers

Purposive sampling: Cassava farmers/agro-processors who have cassava as their main source of income.

### Personal information

1. What is your role on the farm? (record gender)
2. What is your level of education? (primary, high-school, university, postgraduate)
3. What other activities do you do besides farming?  
*Note: If agro-processing is mentioned ask if it is for commercial purposes or self-consumption.*
4. What is your household size?

### Description of the farm

5. Apart from cassava, what other food crops do you grow? Which farming system do you practice? Please, describe it... (monocropping/ mixed cropping, etc...)
6. How many acres of land do you operate/manage? How many of these do you own, rent, or operate through other tenure form?
7. How much output from each crop has your farm produced in your last crop year?
8. How many people work in your farm? Do you hire labour? What other sources of labour do you have (household/community, etc.)?
9. Has there been any change on your farm size in the last five years? If so, how big/small was it? Why?

### Marketing and Linkages

10. To whom and at what price do you sell your produce?
  - a. How do you sell it? (before/after the harvest, official contract/handshake)
  - b. How is the price of your produce determined?
11. What is the distance to your main market locations?
  - a. Who carries the cost of transportation? (farmer or buyer)
  - b. What challenges do you have when carrying your produce to your main market locations?
12. What proportion of the produce
  - a. Do you use for self-consumption? Do you process any for self-consumption?
  - b. Do you process any for commercial purposes?
  - c. What proportion of cassava you are not able to sell? What do you do with it?

- d. Has the quantity you sold changed in the last five years? Please describe.
  - e. Do you regularly sell cassava or just in specific occasions? Which? (Ex: times of distress)
13. If you don't process any cassava. Why? (Note: Have you considered it? What are the challenges to processing?)
14. If you process cassava for commercial purposes
- a. Which kind of agro-processing activity are you engaged with? Please describe.
  - b. At what price do you sell it and to whom?
  - c. Percentage wise, how much income do you obtain from the sale of cassava and how much do you obtain from processing it?
  - d. Which utensils/machinery/technology do you need to process cassava?
  - e. Do you own the utensils/machinery/technology or rent it? Please describe.
15. Are you part of any association or cooperative either for farming or agro-processing? If so, please describe the reasons why.
16. Do you sell any of your cassava to external agro-processing households/industries or to a middleman reselling it?
- If they sell to agro-processing households/industries
- a. To which households/industries? What do they produce?
  - b. Where are the industries located?
  - c. How do you think this has influenced your farm?
    - i. Have you noticed any changes in farm-size in the last five years?
  - d. Has selling to agro-processing households/industries brought more stability to the price of your crops? Please describe.
  - e. Has the connection with agro-processing industries reduced the overall amount of produce you are not able to sell? have you purposely produced more to sell to agro-processing households/industries?
17. Do you have any direct collaboration with agro-processors?
- a. Which? (backward linkages: fertilizers, inputs, machinery, credit, production-generating services or external knowledge). Please describe the impact.
  - b. What challenges have you found in the collaboration with agro-processing companies?
18. If you have not had collaboration with agro-processing households/industries
- a. Why do you think this has not been possible?
  - b. Do you think collaboration would be beneficial? How could it be achieved?
19. To a personal level, how have cassava agro-processing industries influenced
- a. Your income?
  - b. Education in your household?
  - c. Health in your household?
  - d. Employment for the community?
  - e. Other important for the welfare of your household or community?
20. Have you seen any changes in the demand for agro-processed products in the last 5 years?
21. Have you introduced new technologies in your farm or have made changes to be able to access agro-processing industries? Please describe.



## **Interview Guide II - Associations or small-enterprises just dedicated to agro-processing**

Purposive sampling: small size-enterprises/associations mainly engaged in cassava agro-processing.

### **Personal information and description of the enterprise**

1. What is your role on the enterprise?
2. How is the enterprise constituted? (association, family, community, etc.)
3. In which agro-processing activities is your enterprise involved? Please describe your agro-processing process
4. How long has the enterprise been operating?
  - a. Have you seen any changes in the last 5 years? Please describe (maybe 10).
5. Are you personally engaged in other activities besides agro-processing and farming?
6. What is your level of education? (primary, high-school, university, postgraduate)
7. What is your household size?

### **Marketing and Linkages**

8. How many kgs or tons of cassava do you process per day?
  - a. How much of the cassava you need do you produce yourself?
  - b. How much of the cassava you process do you purchase? From whom?
9. If you buy cassava as an input for your processing activities
  - a. Could you describe your purchasing process? Do you buy directly from the farmers or through a reseller?
  - b. Do you have specific requirements from the farmers? Which?
10. To whom do you sell your products?
  - a. What percentage do you sell locally (buyers from the district)?
  - b. What percentage do you sell externally (outside the district)? Please describe
11. How is the price of your products determined?
12. Do you have any kind of collaboration with the farmers?
  - a. Which kind, please describe?
  - b. What are the challenges surrounding collaboration with the farmers?
13. If you have not had collaboration with the farmers. Why do you think this has not been possible and how could it be achieved?
14. How has your agro-processing industry influenced the farmers?
  - a. Production and productivity on their farms?
  - b. Changes in farm-size in the last five years?
  - c. Income?
  - d. Education of their household?
  - e. Health of the household?
  - f. Employment for the community?
  - g. Other important implications for the welfare of the household or community?
15. How has the demand for agro-processed products developed in the last 5 years?

- a. Locally? (On the district)
  - b. Externally? (Outside of the district)
16. Do you provide farmers with any machinery, fertilizers, or knowledge (new varieties of seeds, planting/harvesting techniques, land preparation, etc.)?
17. What challenges does your enterprise face?
18. Have you obtained assistance from the government or other organizations to set up/improve the enterprise? Please describe.

## **Interview Guide III - Agro-processing Industries Interview (medium-size/large-size)**

Purposive sampling: Medium to large size enterprises engaged in cassava agro-processing.

### **Personal information and description of the enterprise**

1. What is your role on the enterprise?
2. In which agro-processing activities is your enterprise involved? Please describe your agro-processing process
3. How long has the enterprise been operating?
  - a. Have you seen any changes in the last 5 years? Please describe. (maybe 10)

### **Marketing and Linkages**

4. How many kgs or tons of cassava do you process per day?
  - c. How much of the cassava you need do you produce yourself?
  - d. How much of the cassava you process do you purchase? From whom?
5. If you buy cassava as an input for your processing activities
  - a. Could you describe your purchasing process? Do you buy directly from the farmers or through a reseller?
  - b. Do you have specific requirements from the farmers? Which?
6. To whom do you sell your products?
  - a. What percentage do you sell locally (buyers from the district)?
  - b. What percentage do you sell externally (outside the district)? Please describe
7. How is the price of your products determined?
8. Do you have any kind of collaboration with the farmers?
  - a. Which kind, please describe?
  - b. What are the challenges surrounding collaboration with the farmers?
9. If you have not had collaboration with the farmers. Why do you think this has not been possible and how could it be achieved?
10. How has your agro-processing industry influenced the farmers?
  - a. Production and productivity on their farms? (Maybe changes in farm-size?)
  - b. Income?
  - c. Education of their household?
  - d. Health of the household?
  - e. Employment for the community?
  - f. Other important implications for the welfare of the household or community?
11. How has the demand for agro-processed products developed in the last 5 years?
  - a. Locally? (Nationally)
  - b. Externally? (Internationally)
12. Do you provide farmers with any machinery, fertilizers, or knowledge (new varieties of seeds, planting/harvesting techniques, land preparation, etc.)?
13. What challenges does your enterprise face?
14. Have you obtained assistance from the government or other organizations to set up/improve the enterprise? Please describe (One district one factory program).

# Appendix G – List of Interviewees

Table 8. List of Interviewees. (Communities 1, 2, and 3)

Source: Author's own elaboration.

List of Interviewees		
Interview #	Role	Condition relative to agro-processing
<b>Community 1</b>	<b>Hodzo Community, Ho Municipal District, Volta Region</b>	
1	Farmer	Independent
2	Farmer	Independent
3	Farmer	Independent
4	Farmer	Independent
5	Agricultural Extension Officer - Hodzo	Officer
6	Farmer	Independent
7	Farmer	Independent
8	Farmer	Independent
9	Farmer	Independent
10	Farmer	Independent
11	Farmer	Outgrower
12	Farmer	Outgrower
13	Managing Director - Medium-size industry 1 (Ethanol)	Agro-processor
<b>Community 2</b>	<b>Mafi Kumasi Community, Central Tongu District, Volta Region</b>	
14	Farmer/Chairperson - Farming Association 1 (Gari processing)	Associated
15	Farmer	Associated
16	Farmer	Associated
17	Farmer/Chairperson - Farming Association 2 (Gari processing)	Associated
18	Farmer	Associated
19	Farmer	Associated
20	Agricultural Manager - Medium-size industry 2 (Ethanol)	Agro-processor
21	Assistant Farm Manager - Medium-size industry 2 (Ethanol)	Agro-processor
<b>Community 3</b>	<b>Bepoase Community, Sekyere District, Ashanti Region</b>	
22	No respondent (accidentally skipped)	
23	Farmer	Independent
24	Farmer	Independent
25	Farmer	Independent
26	Farmer	Independent
27	Purchaser - Medium-size industry 3 (Cassava chips)	Agro-processor
28	Farmer/General Manager - Small-size enterprise 1 (Gari)	Agro-processor

Legend:

	Key Informants but not farmers
	Key Informants and also farmers)
	Location Information

Table 9. List of Interviewees (Community 4 and 5)

Source: Author's own elaboration.

List of Interviewees		
Interview #	Role	Condition relative to agro-processing
<b>Community 4</b>	<b>Kruwi Community, Mampong District, Ashanti Region</b>	
29	Farmer	Independent
30	Farmer	Independent
31	Farmer	Independent
32	Agricultural extension officer - Kruwi	Agro-processor
<b>Community 5</b>	<b>Woraso Community, Mampong District, Ashanti Region</b>	
33	General Manager - Medium-size industry 4 (Gari and HQCF)	Agro-processor
34	Farmer	Independent
35	Farmer	Independent
36	Agricultural Extension Officer - Woraso	Agro-processor
37	Chief Executive Officer - Small-size enterprise 2 (Multiple derivatives)	Agro-processor

Legend:

	Key Informants but not farmers
	Key Informants and also farmers)
	Location Information

# Appendix H – Interviewees Statistics

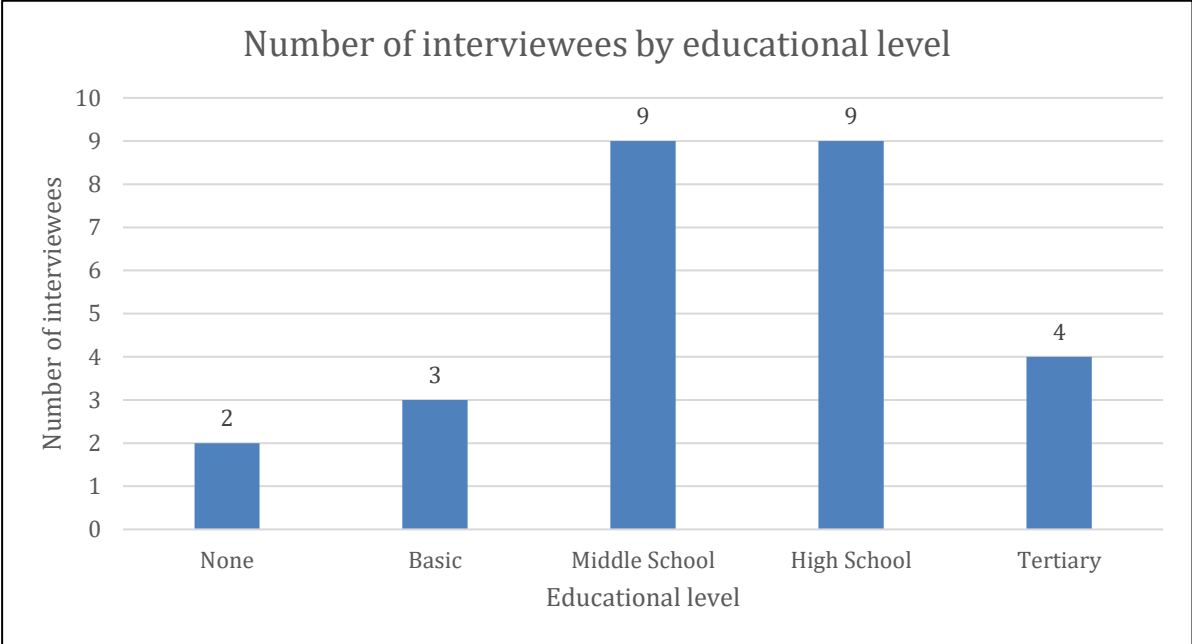


Figure 28. Number of interviewees by educational level.  
Source: Author’s own elaboration.

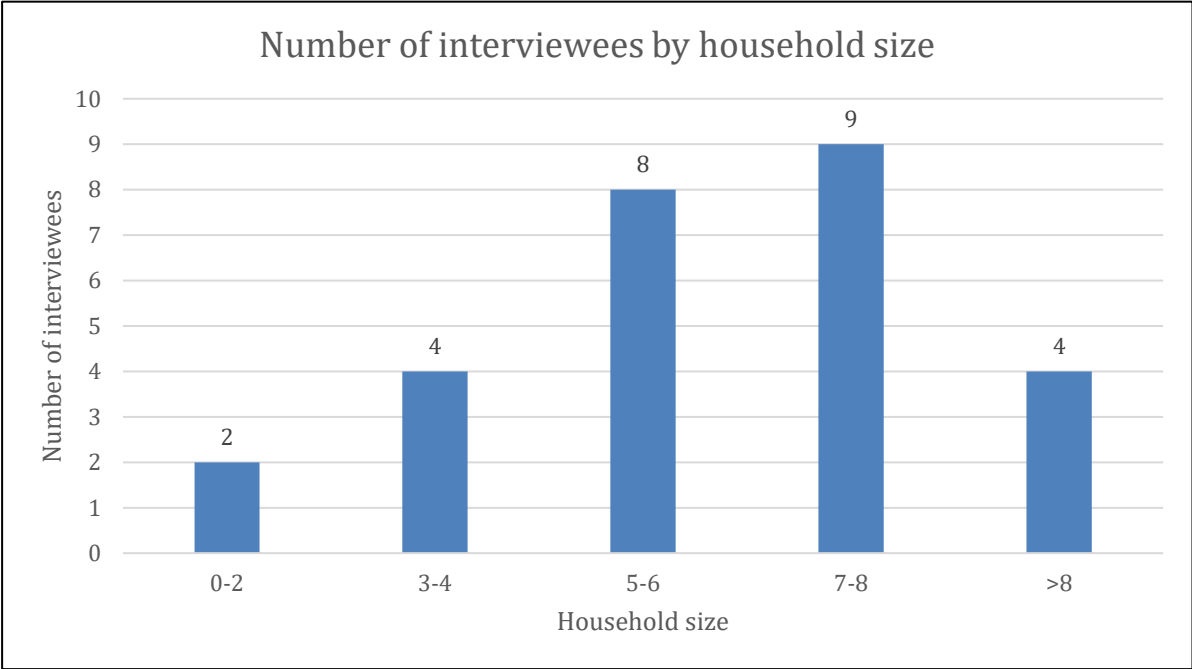


Figure 29. Number of interviewees by household size.  
Source: Author’s own elaboration.