

**Understanding the Role Weights and Measures Play in Food Security: A Case of Women, Farmers and Marketers at Ghana's Local Market**

January 2021

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A Dissertation Submitted to  
the Graduate School of Life and Environmental Sciences,  
the University of Tsukuba  
in Partial Fulfilment of the Requirements  
for the Degree of Doctor of Philosophy in Environmental Studies  
(Doctoral Program in Sustainable Environmental Studies)

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## Abstract

In Ghana, most people living in rural areas are food insecure. These people are mostly smallholder farmers who depend on their production. For a living, they bring their products to nearby local markets for cash income without having good skill for price negotiation. As a result, farmers often receive unfair prices for their products as local market buyers take advantage of their weak bargaining position. This situation affects local market performance, farmers' productivity, food security, household income, and international competitiveness. Previous researches on food security in rural Africa have emphasized the need to improve local markets to meet international standards. However, they placed little emphasis on strengthening market regulatory functions, such as standard weights and measures that are important in determining fair prices for farmers to sell their products. Based on this understanding, this study designed a questionnaire survey and conducted it among 312 farmers and 137 marketers at Berekum and Techiman local markets in the Brong Ahafo Region of Ghana. In this survey, I attempted to examine the current setting of prices and how this practice affected their profits. Also, I identified the advantages both farmers and marketers would have when the standard weights and measures are implemented at Ghana's local markets. The interviews were conducted between August and October 2018. The results show that farmers' price decision-making was based primarily on three primary methods: (1) traditional weights and measures that vary by shape and size in weighing or measuring, (2) negotiation with individual buyers, and (3) negotiation with market queens *Ohenemaa*. On the other hand, marketers make price decisions based primarily on two methods: (1) traditional weights and measures and (2) negotiation with individual buyers. In these practices, market queens *Ohenemaa* or those who led marketers resorted significant influence. Both farmers and marketers similarly found that these practices had negatively affected their profits. In contrast, they said that standard weights and measures could secure a fair share of their profits at local markets. This shared notion partly reflects another finding I made about the overall wage differentials in Ghana. It demonstrated that workers in agriculture received the least wage. In particular, women were more likely to be paid less than males. In general, women spend \$287 per month for a decent basic living standard, but they earn \$90 per month as profits from selling their products at the local market. As women in Ghana tend to be overweight, they need more access to nutritious food products. Going back to the finding from the survey of 2018, I also examined the prospect of using standardized weights and measures at these

markets. The result shows that 81% of marketers and 89% of farmers strongly agreed that these standards would improve their profits. They believed that having standards would help better inform consumers about products and compete with supermarkets or international markets where standards are well established. Similarly, my study identifies openings for policy interventions that could address inequality in income. That said, for an effective implementation the policies should not fail to recognise education, age, experience, gender and, social role of farmers, individual marketers, and market queens *Ohenemaa*. This study clarifies how accessibility to food in Ghana will be realized when farmers and women can have the physical and financial purchasing power to procure the food they need for themselves and household. The findings provide background information on the interrelationship between standards and food security and ways to deal with physical accessibility. It also shows the opportunities for the transition of the agriculture sector towards sustainable food consumption and production patterns.

Keywords: Food Security, Local Markets, Weights and Measures, Rural Women, Income

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## **List of Abbreviations**

BMI	Body Mass Index
FAO	Food and Agriculture Organization
GDHS	Ghana Demographic Health Survey
GHS	Ghana Cedis
GSS	Ghana Statistical Services
IFAD	International Fund for Agriculture Development
IFPRI	International Food Policy Research Institute
ILO	International Labor Organization
ISO	International Organization for Standardization
MOFA	Ministry of Food and Agriculture
NAFCO	National Food Buffer Stock Company
OECD	Organization for Economic Co-operation and Development
OXFAM	Oxford Committee for Famine Relief
PNDC	Provisional National Defense
SRID	Statistics Research and Information Directorate
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

## **Chapter 1 Introduction**

### **1.1 Significance of the Study**

Food security has received much attention, especially during the 2007-2008 and 2010 world food price crises (Lang and Barling, 2012). This situation called for more significant agriculture investment in developing countries. However, with recent events, it has become increasingly clear that food insecurity is still a significant problem in many parts of the world (Candel, 2014).

Food insecurity is interlinked with other issues such as prices and markets (Lang et al., 2009). In Ghana, about 47% of households indicated that food prices had risen in June 2020. For example, cassava and plantain prices recorded 206% and 413% increases in June 2020 compared to the same period in 2019 (WFP, 2020). The price increase in the lean season can exacerbate the instability of market transactions (Tollens, 1997).

Despite the increase in food prices, weights and measures have a long history of stabilizing price-making systems at local and international markets. A study by the International Organization for Standardization (ISO) (2012) argued that the development of standards gives farmers a competitive advantage in selling their products; in turn, their enhanced income can add more purchasing power. Considering this point, Ghana's local markets lack standards (FAO, 1994) and exposes some areas for market improvement in the future.

The Ghanaian government posited that ad hoc pricing practices at local markets have long contributed to unfair market transactions and, therefore, indirectly to food insecurity of local farmers. In June 2013, it passed legislation that installed the nationally standardized weighing-scales to local markets. This was to ensure uniformity in trading, eliminate disputes over price-related ambiguities among trading partners, and facilitate trade with its West African neighbours such as Cote D'Ivoire, Togo and Burkina-Faso. As the use of weighing scales and measures is now established well in these countries, adopting the same weighing scales in Ghana was considered necessary to make local Ghanaian markets internationally competitive and accessible (Yiridoe, 2005).

Under this law, municipal and district assemblies are responsible for ensuring appropriate food marketing infrastructure at local markets. They establish days and hours of operation and issue licenses for marketers to conduct commercial trade. However, in practice, local authorities tend to leave management responsibilities to local marketers and market

queens *Ohenemaa*<sup>1</sup>. Another institution that is responsible for food marketing is the Ministry of Food and Agriculture (MOFA). The MOFA formulates and implements all agricultural policies and programs in Ghana. Its policies promote production rather than marketing.

As this thesis discusses with details in the ensuing chapters, this legislation for standardization and the roles of institutions to implement standards at local markets have met inaction by local marketers. Is this part of resistance of local marketers or farmers to the government action? Or is this because this standardization policy was not designed well to reflect local conditions? This study was partly designed to answer these questions. It also attempts to answer some of the salient questions that affect smallholder farmers' roles at local markets. Throughout these investigations, I argue that the introduction of standardized weights and measures at local markets can be closely linked to the income of farmers, marketers and women in rural Ghana. To explore this point further, this thesis seeks to answer the following questions:

1. How do farmers and marketers at rural Ghana set prices?
2. Do farmers gain or lose by going through traditional ad hoc bargaining processes?
3. How do they perceive the use of standard weights and measures in connection to their profits?
4. Can standardized weights and measures secure more profits for farmers and women?

## **1.2 Objectives of the Study**

Based on past studies on market pricing and my field surveys at Ghana's local markets, this thesis argues that standard weights and measures for pricing products can improve farmers' income and, therefore, help alleviate current food insecurity in Ghana. Food security for smallholder farmers will be possible when they can have a physical and economic access to safe and nutritious food to meet their dietary needs (FAO, 1996). This thesis seeks to examine the impact of weights and measures on food security at Ghana's local markets with the following specific objectives: (1) to examine the extent to which the introduction of weights and measures secures profits for farmers in Ghana; (2) to better understand how rural women can achieve food security; and (3) to analyze how market associations and market queens *Ohenemaa*, set market prices.

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<sup>1</sup> The term market queen or *Ohenemaa* is used in the Ghanaian society for female marketers who are leaders at the local markets. They may be in charge of particular agricultural commodity, groups of commodities and the entire market.

### **1.3 Ghana's Local Markets**

Ghana's local or traditional markets have distinctive features. Within its ten administrative regions, Ghana recognizes two types of markets: major and minor markets. Each region has one major daily market. It also has several daily minor markets. On top of these, there are local markets that open weekly. According to Weatherspoon and Reardon (2003), these local markets are called wet markets because they are open-air public markets. These markets have local marketers selling a wide variety of fresh produce, seafood, and meat. A typical wet market sells such items as food, clothes, and household appliances. Trading is done predominantly by women, either working alone or with daughters or nieces (Clark, 1994).

Lyon (2000) argues that prices at these markets are highly unpredictable and vary from seller to seller. Within a day, at the same market, prices fluctuate even though most marketers use similar traditional weights and measures. Due to price variations, margins marketers receive also vary partly due to their negotiation skills. However, farmers can heighten their bargaining power by using price-setting committees and associations as well as appropriate weight measures (Yiridoe, 2005; Lyon, 2000).

At Ghana's local markets, activities reflect individual needs and perceptions, society, and culture. These markets are not places where people simply acquire food materials through freighting, storage, and marketing (Unger et al., 2006). Britwum (2011) suggests that Ghana's food distribution and retail systems are significant and integral parts of the urban-rural agricultural network. They link thousands of producers to thousands of small food retailers in rural and urban environments, incorporating various local needs. Women are the majority in this network system. They participate in this system as farmers, travellers, marketers, wholesalers, petty traders, and hawkers (Oltmans, 2013).

The local market is physically divided into wholesale and retail areas. The wholesalers buy products from producers and other marketers; then, they sell to buyers on commission. Occasionally some wholesalers visit farmers/producers to procure products. Wholesale yard is located at the edge of local markets, where trucks can enter to unload products. It is filled with many goods, but only a small number of traders work there. The retail area, which is in the middle of the market, consists of marketers who sell relatively small quantities. They sell goods for household needs and are specialized in a commodity (Lyon, 2003).

The traditional food environment changed with the introduction of market liberalization, but inefficient transactions persist without national standards for measuring. This has made it challenging to incorporate local markets into the national and international

market systems. For example, as wholesale markets do not sort products by grade, supermarkets that buy these products must invest a lot to sell high-quality fresh products. Thus, the supermarket prefers integrated systems from a producer to a distributor (Oltmans, 2013).

This said, government trade associations did determine prices by the standardized system for agricultural products, mainly grains from the 1970s to the 1990s (Lyon, 2003). These associations were an integral part of the Ghanaian and West African food pricing systems (Ortiz et al., 2010). They were headed by market queens *Ohenemaa*, who influenced decision-making on prices and other transactions at the local market. Giving the upper hand to marketers like *ohenemaa* resulted in price collusion and exploitative practices. Many producers or consumers were exploited unknowingly for various reasons. Quaye (2008), for example, argues that producers were often deceived due to the irregular use of customary weights and measures at local markets. Adejobi et al. (2011) report that irregular weights and measures nurtured the business environment, in which marketers attempted to increase their profit margins. Phillips et al. (2004) contend that a lack of standardized weights and measures made market efficiency assessment difficult. Overall, studies agree that these customary practices do not achieve fairness in pricing, contributing to food insecurity.

#### **1.4 Link between Local Market Pricing and Food Security**

As this thesis attempts to link local market pricing practices to food security, it is important to examine some of the past trends on food security issues relevant to this thesis. Since 1996, food security has received increasing attention from both academics and non-academics. Generally, food security studies tend to focus on production and consumption index (Porter et al., 2014; Tomlinson, 2013; Barnett, 2011; Lerner and Eakin, 2011; Wilde, and Nord, 2005; Abdulai and Aubert, 2004; Kitalyi, 1998; Quisumbing et al., 1996). Nevertheless, recently some emphasized the importance of a multi-dimensional approach in solving food insecurity (McCarthy et al., 2018; Candel, 2014). This multi-dimensional emphasis became noticeable after the world food price crisis between 2007 and 2008. Scholars argued that food security was interlinked with environmental change, market transactions, and overall policies (Lang and Barling, 2012).

An increasing number of researchers supported the notion that food security solutions should look at technical dimension in tandem with social and economic ones (FAO 2012). Gortz and Weber (1986) established the price-revenue interconnection in rendering profits

to rural households. Kennedy and Peters (1992) further contended that food security cannot be realized by only addressing nutritional void. Policymakers also needed to improve household income and women's control over household spending. Similarly, Furness et al. (2004) showed that food insecurity decreased with increasing income. The OECD (2013a) argued that overcoming hunger and malnutrition meant raising the income of the poor. Kuwornu et al. (2011) cautioned, however, price reliability at local markets for small-scale farmers in developing countries has been questioned.

Regarding special conditions developing countries face in dealing with price reliability, the USAID (2013) found that rural farmers had limited access to updated price information. This information isolation has limited their bargaining skills with buyers. There are also concerns about internal marketing mechanisms (FAO, IFAD, UNICEF, WFP, and WHO, 2020). This links to the fact that small-scale farmers at local markets often face difficulty in complying with operationalized standards with the rise of supermarkets and international buyers. Localized studies found that Africa's local markets used ad hoc measures like butter cups, milk cups, olonka, and basins in selling their food crops (Saurav and Neeraj, 2015; Quaye and Kanda, 2004). Partly because of this irregularity, prices are generally not displayed on products. The quoted price depends on various characteristics of a buyer (socioeconomic class; status at the market; tourist/visitor; regular customer). Under such conditions, price is not a measure of the value of nutritional attributes or taste (El-Lakwah, 1995).

In Ghana, there are more than fifty different types of traded agricultural products in Ghana, including cereals, roots, tubers, vegetables, pulses, fats, oils, fish, and meat. Standard weights and measures are used for meat and fresh fish. Traditional weights and measures like olonka and pales are used for food crops. Figure 1.2 depicts price movements in Ghana for wholesale maize, rice, cassava and tomato from June 2018 to March 2020. It shows that wholesale maize, rice and cassava rose steadily from September 2018 to September 2019 before moderating. By contrast, the wholesale price of tomatoes remained more unstable until August 2019, when it declined. Some of the problems that negatively impact tomato marketing include a myriad of relationships between producers and consumers (IFPRI, 2020; Wongnaa et al., 2014).

## **1.5 Research Methodology**

This thesis adopted both qualitative and quantitative research designs. Quantitative research design is widely used to acquire an in-depth explanation of a phenomenon by collecting numerical data analysed using statistics (Creswell, 2009). Qualitative method is used to understand complex issues that are impossible to quantify (Neuman, 2011). In this research, both methods were considered suitable for understanding traditional transactions' perception and intricate web.

The data were primarily collected through a questionnaire survey with farmers and marketers at two local markets (Berekum and Techiman) in the Brong Ahafo Region of Ghana using a purposive sample. Brong Ahafo is the second largest region in Ghana and accounts for 70% of regional agricultural output. The region dominates in the production of major cereal and tuber staples for national consumption, including maize, yam, cassava, and vegetables (SRID-MOFA, 2015). Important markets like Techiman, Sunyani, Goaso, Atebubu, and Berekum ensure provisioning food crops to other urban markets across the country and neighboring countries. Although there is a long history of government control over commercial agriculture, the crop market system has experienced weak regulation practices.

I initially conducted informal interviews with selected farmers and marketers at Berekum to ascertain their knowledge on pricing practices. These interviews were conducted to investigate their perceptions (Kvale, 1996). The first questionnaire targeted farmers and asked the following questions: (1) Do farmers set price?; (2) What factors influence price determination?; (3) Do traditional measures somehow secure your profits?; (4) Has your profit margins increased or decreased in the last 5-10 years using traditional measures?; (5) Do you feel cheated using traditional weights and measures?; (6) Do you think the profit margin affects your food production and accessibility?

The survey was conducted between August and October 2018. The selection of respondents was made through a random sample. Three field officers each from the municipalities distributed the questionnaire among those who lived in the study areas. The first questionnaire survey selected 312 farmers who came to the market to sell their products. In total, all persons (Berekum 165; Techiman 147) responded. Responses represent 9% and 6% of households engaged in crop farming. The results are discussed in chapter 3.

The second survey was done by distributing the questionnaire to marketers. In total, 137 marketers were approached at the two local markets. A 100% response was obtained. To clarify the significance of my questionnaire survey results within academic frameworks, I

reviewed published materials in agricultural economics and food security. Most reviewed researches focus on income, markets, and women, and food security. Some of these studies are already discussed below. I also reviewed policy documents and papers, which gave me in-depth knowledge about Ghana's local market policies.

### **1.6 Thesis Outline**

This dissertation is organized into six chapters. Chapter 1 clarifies my research objectives, literature review and methodology. Chapter 2 discusses why standardization should be included in the discussion of food security. In particular it examines legislative and regulatory frameworks to understand the gaps. To conceptualize this argument, the third chapter examines the extent to which the introduction of standard weights and measures secure profits for farmers in Ghana the price perceptions on weights and measures at Ghana's local market among marketers. The fourth chapter assesses how rural women can achieve food security. Chapter 5 delineates how market associations and market queens *Ohenemaa* set market prices. The last chapter discusses overall findings and provides recommendations for enhancing weights and measures issues.



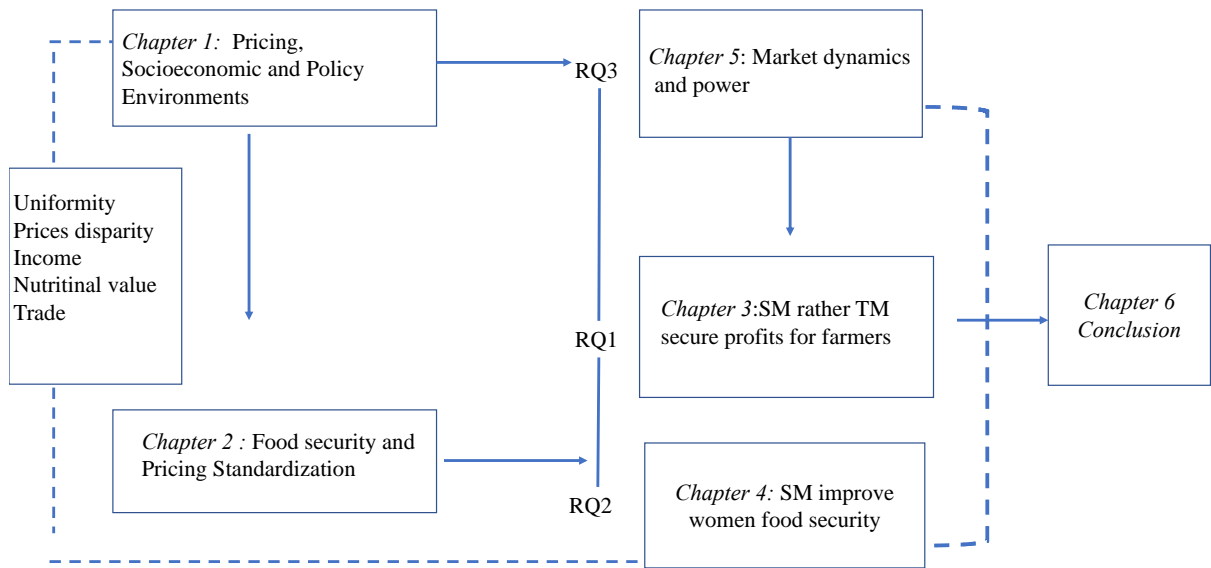


Figure 1.1 Structure of the dissertation

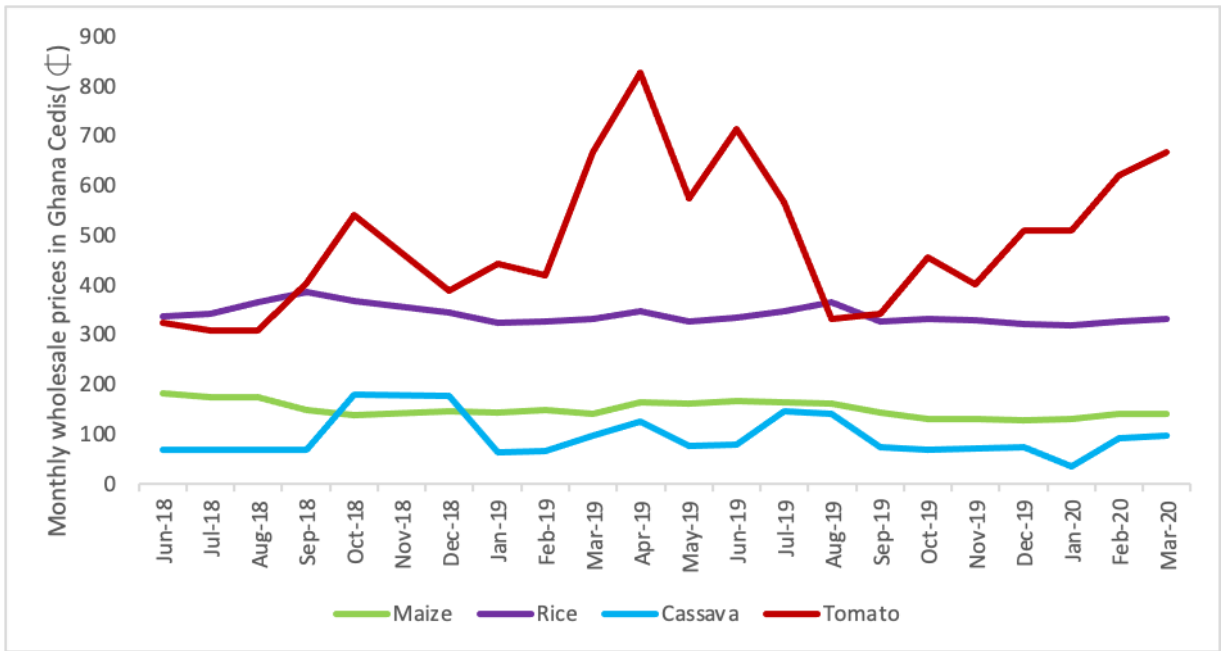


Figure 1.2 Trends of Wholesale Prices in Ghana (SRID-MOFA, 2020)

## **Chapter 2 Food Security Studies on Standardization**

### **2.1 Introduction**

In 1996 various nations came together for the World Food Summit and declared that their goal for food security to let all people at all times have sufficient physical, social and economic access to safe and nutritious food. Although this is respectable and noble concept, it was silent about access, utilization and stability that are also important strategic pillars to achieve food security (Barrett, 2010). Most countries broke free of nutritional poverty largely thanks to advances in agriculture production. Adequate availability is necessary, but it does not ensure universal access. The shortcoming of this definition, I argue, has led national leaders to focusing narrowly defined food security (OECD-FAO, 2009; USDA 2009).

This chapter examines past studies on food security market price transactions. In particular, it seeks to better understand why past food security studies have paid scant attention to pricing standards at local markets. Recently the Ghanaian government has shown interest in standardizing weights and measures at the local market, but it has not been successfully implemented. The chapter argues that having stronger policy interface between food security and pricing standardization at local markets can lead to food security and poverty alleviation as well as sustainable local economies.

### **2.2 An Overview of Determinants of Food Security**

As discussed above food security is based on four conceptual pillars: availability, accessibility, utilization and stability. Availability is associated with productivity that sustain consumers' needs. Accessibility means affordability and preferences of food. Utilization addresses social and nutritional values. Stability secures the adequate quality and quantity. These food security pillars are often threatened by changes in population sizes, environmental conditions, agricultural practices, and gender inequity or other social security issues, according to the World Food Summit in 1996 (FAO,1996). Globally, we produce enough to feed the world's population; yet about 850 million people are still food insecure partly because they do not have sufficient income to buy food.

Reflecting on the predominant focus of food security studies on availability, Sen (1982), in his *Poverty and Famines*, argues that future food security research needs more focus on access, stability and utilization rather than availability. Increasing production is linked to technological innovation and subsidies especially in developing countries (Cock, 2013). Food

availability alone is not enough to determine food security. In rural areas where markets are less developed, income on livelihood strategies tend to be weaker. In view of this, the importance of market conditions changes with available factors of production. Similarly, deregulations at the markets leave women farmers to negotiate at a disadvantage with higher powers whether for farm inputs or to sell their production (Spielloch, 2007). As farmers support mechanism like price-setting have been dismantled through trade liberalization, the cost for small-scale farmers to produce outweighs their profits. Access, utilization and stability to available food should also be taken into consideration (Aborisade and Bach, 2014) (Table 2.1). According to FAO (2008), at least 40% of the urban population is energy deficient in Burundi, Ghana, Guinea and Tanzania. In urban Ethiopia this percentage is 90%. In urban Malawi and Zambia 76% and 72% of people were energy deficient, respectively (FAO, 2008).

Ghana has been commended globally for its reducing hunger, poverty and malnutrition. However, poverty, hunger and malnutrition persist in many parts of the country. In Ghana, about 5% of the population (1.2 million people) are food insecure. In 2015, about 8.4% of Ghanaians were extremely poor. They could not meet their basic food needs. In case of extreme poverty rate, rural areas had 27.3% (WFP, 2016). In the World Food Programme report (2012), about 2 million people across the nation were vulnerable to food insecurity, of which 1.5 million lived in rural areas. In terms of urban vulnerability, the largest proportion of them lived in the Brong-Ahafo Region (11%).

Ghana's agriculture sector plays an essential role in its food security. It employs about 60% of the population. Among them, 6.5 million are women. Each year 300,000 to 350,000 new workers are employed. Agriculture is the main source of livelihood sustenance for the country's poorest households. The bulk of the crop yield is sold at the local markets for income. Although nearly 70% of Ghana's agricultural production is dominated by food crops (e.g., rice, maize, groundnuts, soybeans, cassava, yams, and plantains), workers in the sector suffer from the minimum wage (Teasing et al., 2018). This low wage problem has been exacerbated by ad hoc price-setting practices at local markets. For these people low income means that healthy nutritious food is not affordable. The 2003 Ghana Demographic Health Survey (GDHS) indicated that malnutrition contributed to 40% of child mortality. Another survey in 2014 found that 40% of Ghanaian women were obese, a 10% increase from 2008 (WFP, 2017; Roncoli, 1994).

Adejobi et al. (2011) argued that a well-regulated market ensures the efficient distribution of food to consumers as well as employment opportunities for farmers and food

distributors. It generates more income and incentivizes farmers. A well-regulated market with standardized weights and measures promotes competition and raises food quality standards. Again, it can help protect the welfare of poor small-scale farmers leading to more sustainable livelihoods and progress out of poverty and hunger (FAO, 2015). The importance of weights and measures was stressed when the barter trade was transformed into the modern system of trade in Africa (Yiridoe, 2005). Along with liberalization and modernization at markets, weights and measures became key elements in the development of agriculture and market transactions. According to Tollens (1997), this modernization left out some aspects of traditional market customs. The price standards for cereals, for example, still widely vary in many parts of Africa due to customary price setting practices. As a result, customers often find it difficult to understand the quality of the products.

### **2.3 Why Standardization for Food Security?**

The need to observe weights and measures in trade was recognized by civilizations as early as 3000 BC (Skinner, 1967) whereas in some societies the barter trade persisted in many facets of market transactions, paying little heed on standard weights and measures in determining the value of food (Yiridoe, 2005). This mix of standards and barter culture still exist in contemporary local markets (Babatunde et al., 2005; Yiridoe, 2005). Here small-scale farmers from local neighbourhoods come and sell their food crops to marketers. In Ghana, some crops and meat products are sold on the basis of standard weights and measures, other crops are in the domain of so-called market queens *Ohenemaa* (traditional authorities at local markets) who can decide prices on the basis of their opinion and experience. Usually, these transactions are done by using traditional weights and measures (Adejobi et al., 2011). Consequently, farmers who come to sell their products at the market often realize that they lose price premiums after negotiations with marketers (Yiridoe, 2005).

Standardization is regarded as a mechanism to promote rural development in Africa (Yiridoe, 2005; International Labour Organization, 2014). Table 2.1 shows that proper standardization constitutes a necessary means for largely small-scale farmers to improve productivity and revenues. Given that food crops are perishable, farmers of high-quality produce can obtain higher price premium from sales at domestic and potentially international food markets, allowing more agricultural investments and employment. This factor is assumed to unlock the potential of rural economies.

Secondly, it allows proper grading according to nutritional quality. This factor is assumed to improve food security of the rural poor leading to long-term benefits such as better health and increased human capital (World Bank, 2007). A study shows that market liberalization tends to produce low income when markets are not competitive (Chikhuri, 2013). Non-competitive markets occur when inflexible trade structure limited market access and weak transaction mechanisms. The market should maintain its price-base competitive advantage. Farmers can increase their profit margins by grading prior to selling. This places farmers in a much better position to bargain for a better price and still remain highly competitive export markets.

Furthermore, the food security study has primarily focused on nutrition, calory intake, and food consumption. In examining the trend and characteristics of food security policies, Crush and Frayne (2010) found their predominant focus on food production and productivity. Scholars and international aid workers from developed countries come to developing countries like Ghana and found low crop yields (Hedzro-Garti, 2010). The FAO Committee on World Food Security (CFS), for example, examined food security in Sub-Saharan Africa and proposed to address complex land tenure conditions, urban farming and urban-rural infrastructure linkage (FAO, 2008).

#### **2.4 Policy and Programs to Promote Ghana's Food Security**

To reduce food insecurity, the Ghanaian government has implemented several policies (Norton, 2004 and ISSER, 2008). It provided fertilizer subsidy and introduced block farming programs. It spent GH¢ 345.244 million (US\$5,947,477 million) on the fertilizer subsidy program alone between 2008 and 2013. It aimed to increase the production of the major staples (maize, cassava, rice, yam and cowpea (MOFA, 2014). The Ministry of Food and Agriculture has also distributed improved crop varieties with technical support to farmers (Alhassan et al., 2004; Langyintuo and Dogbe, 2005). However, Akudugu et al. (2009) reported that the interventions did not benefit the rural poor, small-scale farmers, youths and women. It mainly benefited large-scale and wealthier farmers (Nazaire et al., 2017).

In 2010 the Ghana government established the National Food Buffer Stock Company (NAFCO). The company bought maize, rice and soya beans from farmers at minimum prices to minimize post-harvest loss, ensure price stability and grain reserves for lean season and exports (FAO, 2015). However, the NAFCO has had limited influence on the market as it lacked enough storage facilities and purchasing power.

Other government food security programs focused on rural irrigation and the rehabilitation of existing infrastructure. After examining these projects, Al-Hassan et al. (2004) argued that the majority of farmers who were involved in irrigation projects could reduce food insecurity by enhancing productivity.

Since the 1970s Ghana has attempted to reform agricultural policies. Agricultural pricing and marketing interventions were important in the 1970s. In 1971, the Ghana Food Distribution Corporation (GFDC) was established to provide markets for farmers in rural areas. As a sole institution, it purchased and traded agricultural products, especially maize and rice, at a guaranteed price for specific weight or measure. To help set the prices for commodities, the Agricultural Commodity Prices (CACP) was also established. However, this scheme collapsed when producers and marketers mainly engaged in bargaining (Oltmans, 2013).

In 1975, the Ghana decree, NRCD 326, established the use of weighing scales as a standard tool for trading. However, its enforcement at local markets faced grave challenges. The Metropolitan and District Assemblies (MMDA) were made responsible for the establishment and supervision of local markets. To those officials who were to implement this new policy, local markets appeared to be chaotic and unorganized where a limited number of officials to influence or control. These officials from outside could not see the existing traditional market policies.

From the 1970s through the 1990s, prices were set by trade associations, but the Ghanaian government increasingly placed pressure on these associations because they allegedly engaged in price fixing/manipulation. Sometimes goods were hoarded to create supply shortages and price hikes (Lyon, 2003; Ortiz et al., 2010). Ultimately, the government could not eliminate these practices as these associations were integral part of the traditional Ghanaian and West African food system (Ortiz et al., 2010). Those associations were headed by so-called market queens *Ohenemaa*. This tradition started in the early 1900s and became institutionalized in the 1930s and 1940s (Clark, 1994; Ortiz et al., 2010). The queen was chosen based on personal leadership quality, age, emotional reliability, familiarity with market affairs, negotiation skills and wealth (Weatherspoon and Reardon, 2003; Boselie et al., 2003; Neven and Reardon, 2004; Ortiz et al., 2010).

## **2.5 Summary**

Although the Ghanaian government has long recognized the importance of improving food security and standardizing weights and measures at local markets, traditional practices remain

largely unchanged. This chapter has seen that although some recent scholars did acknowledge that access to food depends farmer' income, little emphasis was placed on strengthening market regulatory functions.

The agriculture sector holds a great potential role in improving Ghana's food security, especially nutritional deficiencies. The Ghanaian government has provided new prospect in addressing food security issues. The main challenge now is how these new programs may integrate standard weights and measures in addressing food security. This is important because the implication of good pricing structure will benefit producers and consumers.



Table 2.1 The potential role of standardization in food security

<b>Dimension of food security</b>	<b>Aspect of the food system</b>	<b>Impact on food security</b>
All dimension	All aspects of the food systems (production, extension, research, market, gender	<ol style="list-style-type: none"> <li>1. Increases agriculture investments: <ul style="list-style-type: none"> <li>• enhances production through increase in revenue.</li> <li>• Accurate information and record keeping of farming activities.</li> </ul> </li> <li>2. Protection of equity and quality to buyers and traders.</li> <li>3. Monitoring demand and supply.</li> </ol>
Accessibility	Marketing, grading, processing	<p>Transparency in the market system</p> <ul style="list-style-type: none"> <li>• eliminates multiple prices for a single crop</li> <li>• increase trust and fairness between farmers and traders</li> <li>• increase competition and international trade</li> <li>• reducing the bargaining system</li> <li>• increase in purchasing power</li> </ul>
Utilization	Quality and quantity	<p>Efficient food preparation and processing at households;</p> <ul style="list-style-type: none"> <li>• improve food safety,</li> <li>• optimize decision for consumers at markets,</li> <li>• accuracy of nutritional proportion.</li> </ul>

## **Chapter 3 Farmers' Profits Can be Helped by Standard Weights and Measures<sup>2</sup>**

### **3.1 Introduction**

The number of people who suffer from food insecurity in Ghana has increased from 1.2 million in 2009 to 2.1 million in 2016 (FAO, 2017). Rural communities suffer the most. According to the World Food Programme Report (WFPR, 2016), about 15.5% of people in Ghana's Brong Ahafo Region, which is mainly rural, are food insecure. They eat 36% of the food they produce and buy 58% at local markets (WFPR, 2016). This means that local markets play important roles in ensuring rural farmers' food security.

Farmers in the Brong Ahafo Region face many difficulties to optimize their sales benefits at the market. According to Antwi and Matsui, (2018) traders' ad hoc bargaining exploited the majority of farmers in this Region. Crop and vegetable prices were often determined by traditional weights and measures that traders preferred. Adejobi (2011) similarly found that traditional weights and measures at local markets created price inefficiencies. As a result, farmers who come to sell their products at market tend to distrust the market's pricing system (Pool et al., 2003).

This chapter examines the extent to which standard weights and measures rather than traditional ones can secure profits for farmers in Ghana so that the country can reduce the number of its food insecure people in the future. In order to achieve the objective, I identify (1) current pricing practices at minor and major local markets, (2) effects of these practices on farmers' profits, (3) determinants of farmers' profits, and (4) farmers' perceptions about using standard weights and measures. In the following discussion, I first describe the significance of the study area. I then explain the methodology and discuss the results of my questionnaire survey.

### **3.2 Methodology**

#### **3.2.1 Study Area**

The survey was conducted in the Brong Ahafo Region. This region is known as the "food basket" of Ghana because most residents are farmers who raise important cash crops like cocoa,

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<sup>2</sup>Part of this chapter was presented and published in a conference proceeding paper in the 2019 WEI International Academic Conference, Boston. July 29-August 2, 2019. pp. 9-13. [https:// www.westeastinstitute.com/wp-content/uploads/2019/10/WEI-HUM-2019-Boston-Proceedings.pdf](https://www.westeastinstitute.com/wp-content/uploads/2019/10/WEI-HUM-2019-Boston-Proceedings.pdf). It was also partly published in Antwi, A. O. and Matsui, K. (2019). Farmers Profits: Can the Standard Weights and Measures Help?. *International Journal of Environment and Agriculture Research*, 5(12):6-11

cashew, fruit trees, maize, rice, yam, and other vegetables (SADA, 2016). Using purposive sampling two markets were selected from two municipalities: Berekum Market and Techiman Market.

Berekum Municipality is located in the north-western part of the Region. According to the Ghana population census of 2010, the municipality had a population of 129,628. The Ghana Statistical Service projected the municipality population would reach 156,349 by the end of 2019, a 17% increase. More than half of the population (129,628) were economically active and involved in agriculture, mostly growing tomato, plantain, maize, eggplant, pepper, okra, cassava, rice, and yam. Most farmers (83.5%) were literate (Ghana Statistical Service, 2012). Berekum Market operates on Thursdays when marketers and farmers within the boundary of Berekum Municipality and outside meet. Also, as this market is close to Cote D'Ivoire, Cote D'Ivoire buyers often come for acquiring tomato, garden-egg, pepper, plantain, cassava, maize, and many other farm products.

Techiman Municipality is situated in the central part of the Brong Ahafo Region with a population of 147,788, of which about 74.2% was economically active. About 46.2% was involved in agriculture, mostly cultivating tomato, eggplant, pepper, cabbage, okra, maize and yam. About 74.2% of the residents in this municipality were literate (Ghana Statistical Service, 2012). Techiman Market is one of the largest markets in Ghana and operates three days a week (Monday to Wednesday). Monday and Tuesday are for wholesale crops while Wednesday is for both wholesale and retail transactions. This market attracts people from other West African countries like Mali, Burkina Faso, Nigeria, and Niger as well as Ghana's big cities like Accra and Kumasi.

These two municipality markets are important to rural farmers. Berekum Municipality Market is operated by those who live in Berekum and neighbouring towns while Techiman Municipality Market, an urban market, brings different tribes to trade. Traditionally Techiman Market is located on one of the major trading routes between the northern and southern boundaries of Ghana. It was the primary centre for trading bulk foodstuffs such as yams, grains and vegetables from north Ghana to urban markets in Accra, Kumasi, Takoradi, and Cape Coast.

### **3.2.2 Data Collection and Analysis**

The data collection for this research was largely based on a semi-structured questionnaire to gather responses from farmers at the two markets. Our survey attempted to understand farmers'

perceptions about the benefits of traditional pricing and the prospects of having standard weights and measures (Lyon, 2000). It was conducted in the period between August and October 2018. In total I collected valid responses from 312 farmers (165 from Berekum and 147 from Techiman). The response rate was 98%. Before conducting this survey, eight skilled enumerators were briefed to administer the questionnaire. The study was supervised with the collaboration of municipal information officers (MIS) in Berekum and Techiman. In the same period, I conducted in-person interviews with 10 farmers each from the two municipalities to seek their understanding of the questionnaire and personal experiences on the current pricing methods. I also undertook pre-survey observations at the two markets to familiarize with the area and observe how they transacted businesses.

The survey focused on three sets of questions: (1) socio-demographic characteristics of the respondents, (2) farmers' current pricing practices and their profits, (3) farmers' perceptions about standard weights and measures, including their motivating factors.

I assessed the performance of six current price-setting methods on farmers' profits at market and factors influencing the use of standard weights and measures using multiple regression analyses. The coefficient was used to measure the strength of the relationship between variables. P-value (typically  $\leq 0.05$  and  $> 0.05$ ) was used to determine the significance of the results and whether to accept or reject the null hypotheses.

### **3.3 Results and Discussion**

#### **3.3.1 Socio-demographic Characteristics of the Respondents**

The first part of the survey asked the respondents about their age, education, gender, work experience, family size and farm size. These are important to identify relevant factors for analysing multiple regression. The result shows that about 67% of the respondents were men (Table 3.1). Here it is important to note that in general men in Ghana dominate commercial farming activities. Regarding education, 63% of the respondents had formal training up to tertiary level, and 37% had no formal education. The majority (84%) were married with an average family size of six persons. Regarding age, the average age of the respondents was 42 years old with a minimum age at 22 years old and a maximum of 71 years old. This indicates a tendency of local farmers being aged. This observation supports recent arguments (Feed the Future, 2017; Okoffo et al., 2016) about aging Ghanaian farmers. The respondents had an average farm size of nine acres, and 14 years of trading experience at local markets.

### 3.3.2 Current Pricing Practices at Berekum and Techiman Markets

To better understand current pricing practices among farmers at the two markets, I asked the respondents to select the methods they had used to set prices with multiple choices. Based on information I collected from local market authorities and field observation at these two markets, I listed six choices (Table 3.2). One of the options, which is unique in Ghana, is to negotiate with a market leader or so-called “market queen,” who traditionally determined prices at markets. According to Aguda (2009), market queens *Ohenemaa* no longer influenced pricing at Ghana’s markets, but my earlier study found otherwise. So, I wanted to know how this traditional practice persisted. Other options listed included negotiation with individual buyers, the use of ad hoc traditional measures (e.g., *olonka* as a unit that uses different sizes of empty cans as containers for vegetables like tomatoes), the use of standardized weights and measures, and negotiation with market and farmers’ associations.

The result shows about 96% of farmers interviewed arbitrarily used varying sizes of traditional weights and measures. In my fieldwork, I observed that farmers in Berekum mainly used black buckets and baskets with different sizes for bulk trade or wholesale. For retail sales, they used calibrated tins or *olonkas*. At Techiman Market, people from northern Ghana used calabash and “koko bowls” in trading grains while those from south used buckets and baskets for vegetables and fish. About 62% of the respondents at Techiman Market negotiated with market queens *Ohenemaa* and leaders of market associations while 68% dealt with individual marketers. These are the practices farmers complained about marketers’ unfair pricing practices. Similar to these findings Quaye and Kanda (2004) found ineffective price transmission at the locals because of the weights of the bowl measure used in Bambara marketing.

In response to a question about the past use of standard weights and measures at the markets, about 81% of the respondents were negative. However, the respondents generally believed that standards would make pricing practices fairer. Additionally, I interviewed farmers who traded cashew and cocoa at Techiman Market. They said they used standard weights and measures to keep track of their production and benefits at the end of the harvesting season. The results showed that some farmers (39%) benefited from farmers’ associations, especially at Techiman. These associations negotiate with market queens *Ohenemaa* on behalf of farmers. They also help them loan from banks and other financial institutions.

### **3.3.3 The Effects of Traditional Price Setting on Farmers**

I then asked the respondents to indicate their level of agreement and disagreement with five provided statements about pricing practices. The results show that 67% of the respondents did not think that they would obtain a fair price for their products at local markets (Table 3.3). Similarly, 68% felt cheated at markets in the process of pricing their products. The respondents attributed this problem to the influence of marketers, market queens *Ohenemaa* (Scheiterle and Birner, 2020) and a lack of standard weights and measures. The function of market organizations appears challenging, where there is no restriction to entry and control over the commodities traded in Ghanaian markets. Empirical studies have found market groups acting as cartels in the case of tomatoes, because of its peculiar features, but a monopoly over prices and quantities could not be confirmed (Mensah and Antoh 2005). Although negotiations allow farmers and marketers to decide on prices, farmers are sometimes forced to accept marketers' offers. Regarding unfairness at the market for farmers, 68% of the respondents said their profits did not increase by using traditional weights and measures.

### **3.3.4 Significance of Current Pricing on Farmers' Profits at Local Market**

To understand the extent to which the current ad hoc pricing practices affected farmer's profits, I tried to find the relationship between farmer's profits and pricing practices through regression analysis (Table 3.4). Among the six methods, the relationship between farmer's profits and negotiation with market queens *Ohenemaa* had the most significant P-value of 7.8E-05. This reiterates my earlier finding that market queens *Ohenemaa* still have a strong influence on pricing activities at Berekum and Techiman markets despite the national policy to abolish the roles of market queens *Ohenemaa* in the 1980s.

The multiple regression analysis result for the other pricing methods (negotiation with individual traders, and traditional measures) were significant at a P-value of 0.007 and 0.02 respectively (Table 3.4). However, coefficient values for traditional measures showed a sign of negative relationship. These results indicate that the minimal usage of traditional measures can increase farmer's profits and help them make better price-decisions. In Kenya and Tanzania, tomato farmers were able to maximize profits by capturing the premium for quality by standardizing (Robinson and Kolavalli, 2010). Replacing ad hoc measures with standardized ones can minimize the influence of market queens *Ohenemaa*. Institutional support rather than individual efforts tends to promote transparency and trust at local market.

### **3.3.5 Farmers' Perceptions about Standard Weights and Measures**

Having these results, I tried to understand farmers' perceptions about the use of standard weights and measures. The questionnaire asked farmers to answer the extent to which they agreed or disagreed with four possible results from the use of these standards (Table 3.5). The analysis indicates that about 89% of the respondents strongly agreed that the use of standards could improve their profits. More than half (60%) of the respondents perceived that standard weights and measures would motivate them to increase their production. Also, almost all the respondents strongly agreed or agreed that standard weights and measures would better inform marketers and consumers about their products (Table 3.5). Lastly, about 69% of my respondents strongly agreed or agreed that the use of standard weights measures would help compete with the supermarket and international trade.

### **3.3.6 Factors Influencing the use of Standard Weights and Measures**

Ghana has formulated a policy that imposes the use of standard weights and measures at all local markets. As this policy is not yet effectively implemented, I tried to identify factors that can influence the implementation. In particular, I tried to find out how respondent's age, farm size, and experience can influence the level of policy implementation. The multiple regression analysis results showed that farm size, age, and farming experience were significant at a P-value of 5% ( $p < 0.05$ ). However, the coefficient values for education and experience showed negative. This indicates that inadequate training and information on the use of standard weights and measures may affect farmers' usage and price decision-making (Table 3.6). Moreover Snels et al., (2018) demonstrates that education and training on standards will help raise farmers' professionalism and enhance the quality of their crops, in turn their profits.

## **3.4 Summary**

From this findings, I conclude that inefficient practices at Ghana's local markets could have directly or indirectly affected the current rise in rural farmers' food insecurity. Market queens *Ohenemaa* continue to influence the market pricing system that led to the loss of farmers' profits, limiting farmers' purchasing ability. Also, traditional weights and measures tended to take advantage of farmers. I also found that about 67% of the respondents did not receive a fair price for their products and 68% felt cheated in negotiation. They did emphasize the importance of having standard weights and measures to decide on prices. Standard weights and measures can also better inform marketers and

consumers about products, compete with the supermarket and neighbouring countries. They further encourage them to increase their production. For the Ghanaian government to successfully implement its market standardization policy, it needs to better inform farmers and marketers about benefits standard weights and measures can bring to the local markets.

However, I also observed that rural women have high employment participation at the local markets. Female-led farms are more likely to be market-oriented than those held by men. Yet, this characteristic is hampered by great gender inequalities in access income. The question then is how can standardization improve women's livelihood at the local markets of Ghana? Therefore, the next chapter examines women food security in Ghana



Table 3.1 Socio-demographic characteristics of farmers at Berekum and Techiman markets

Characteristics	Response (%)			
	Sex	Male	Female	
	67.1	32.1		
Education	None	Primary/JSS	Senior/Form 4	Tertiary
	36.5	45.2	16.6	1.6
Marital Status	Married	Single	Divorced	Widow
	84.9	7.4	4.8	2.9
Descriptive Statistics				
	Min	Max	Mean	Standard Deviation
Age	22	71	42	8.9
Work Experience	1	50	14	8.3
Family size	1	15	6	3.1
Farm Size (acre)	0.5	40	9	13.6

Table 3.2 Farmers' pricing practices at local market

<b>Pricing Method</b>	<b>Yes</b>		<b>No</b>	
Negotiated with market queens	194	62%	118	38%
Negotiated with individual marketers	211	68%	101	32%
Used traditional weights and measures	299	96%	13	4%
Used standard weights and measures	58	19%	254	81%
Market Associations	78	25%	234	75%
Farmers' Association	122	39%	190	61%

Table 3.3 Farmers' perceptions about current pricing

	Percentage of the respondents (%)				
	Strongly Agree	Agree	Not sure	Disagree	Strongly disagree
Do you receive a fair price?	26	3	4	0	67
Do traditional weights optimize profits?	3	16	9	3	68
Has profit margin increased in last 5-10 years?	11	29	33	23	4
Is price negotiation beneficial?	20	20	7	18	36
Do price cheating occur?	68	0	0	0	32

Table 3.4 Regression result of the determinants of profits

<b>Variables</b>	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-value</b>	<b>Lower 95%</b>	<b>Upper 95%</b>
Intercept	-277.7	692.1	-0.401	0.68	-1639.7	1084.2
Negotiate queen	856.06	213.8	4.002	7.8E-5*	435.1	1276.9
Negotiate Individual	622.12	231.1	2.691	0.007*	167.3	1076.9
Tradition weights	-998.29	454.3	-2.197	0.02*	-1892.3	-104.2
Standard weights	81.68	354.7	0.230	0.81	-616.4	779.8
Market association	87.02	301.8	0.288	0.77	-506.9	680.9
Farmer association	375.12	264.5	1.418	0.15	-145.4	895.6

\**P-value* < 0.05

Table 3.5 Farmers' perceptions about the benefits from using standards

	Percentage of respondents (%)				
	Strongly Agree	Agree	Not sure	Disagree	Strongly disagree
Standards would improve my profit	89	0	0	0	11
They better inform about products	50	31	16	3	0
They help compete with supermarkets	46	23	20	7	4
They encourage to increase production	60	0	0	0	40

Table 3.6 Regression analysis of factors influencing standard weight and measure

<b>Factors</b>	<b>Coefficients</b>	<b>Standard error</b>	<b>t Stat</b>	<b>P-value</b>
Intercept	0.964	0.141	6.824	4.73E-11
Age	0.008	0.004	2.043	0.041
Education	-0.013	0.015	-0.823	0.18
Experience	-0.010	0.004	-2.347	0.019*
Farm size	0.009	0.001	5.540	6.4E-08*

\**P-value* < 0.05

## Chapter 4 The Role of Weights and Measures for Women and Food Security<sup>3</sup>

### 4.1 Introduction

Global food insecurity has been on the rise (FAO, IFAD, UNICEF, WFP and WHO, 2018), and women are predominant players of food market activities (Levin et al., 1999). Women are known to be the most vulnerable to food insecurity (Corsi et al., 2017; Alkire et al., 2013). Existing cultural norms create a disadvantage for women farmers, specifically in decision-making, bargaining, low wages and insecure employment (Oxfam, 2019). Furthermore, household response to food price changes is a change or reduction in food consumption. Dietary changes as a response to prices often include eating less or fewer meals, choosing foods in rich macronutrients over foods richer in micronutrients (FAO, 2017). Women are of particular concern socially; they are vulnerable to inadequate nutrition.

In Nicaragua and Ghana, women spend much time and income on their household food production and consumption (Marselles-Culleres, 2011; IFPRI, 2002). Their food security and poverty reduction are interconnected with better managing their income-related activities (Bengesi, 2018). To improve rural women's nutrition security, some scholars suggested to focus more on increasing rural women's income, as higher income can lead to higher purchasing abilities, more decision-making power and better health conditions (UNDP, 2017; Njuki et al., 2011; Baiphethi and Jacobs, 2009). FAO has also promoted to diversify income sources for rural women as it is believed to increase crop yields (FAO, 2005).

Some studies showed substantial connections between pricing standards and vibrant local market transactions, and smallholder farmers' food security in developing countries (Tollens, 1997; Chiputwa and Qaim, 2016). Vakis et al. (2002) argued standardizing the valuation system, such as weights and measures, can improve quality and quantity of food crops. Furthermore, weights and measures can introduce fair and transparent pricing practices for agri-food crops as markets without these standards tend to rely on cultural and traditional ways of bargaining (El-Lakwah, 1995), causing high variability in market prices (Asante et al., 2016; Mwaniki, 2006). Slusher (1987) compared gender differences in pricing food crops at the market and found that prices women gave to customers fluctuated less than those men did.

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<sup>3</sup> This chapter was partly based on my conference presentation: Antwi, Adwoa Oforiwa, Matsui, Kenichi and Ondiba, Hesborn (2019). The Role of Weights and Measures in Improving the Livelihood of Women Farmers in Ghana. 2nd International Conference on Economic Policy, Entrepreneurship Growth and Role of Social Science, Singapore at page 15.

Others suggested realizing well-regulated markets (Negi and Anand, 2015; García 2013; USAID, 2013). What is so often missing at rural markets is the use of standardized weights and measures for farmers, marketers, and customers alike to uniformly understand crop values. Standard weights and measures can help rural women who come to sell their crops or buy food, to manage benefits and costs at the traditional market better. However, this much said, there has been scant discussion about how market regulations can be a tool, directly or indirectly, to improve women's food security. Through these standards in place, rural women as customers can also save money; therefore, increasing their purchasing power, taking more decision-making roles, and focusing more on nutritional aspects in buying food. Therefore, this chapter aims to understand how standard weights and measures can improve rural women's food security. To do so I examine the following criteria: (1) wage differentials among men and women in Ghana, (2) nutritional status of women in Ghana, and (3) the estimated living cost for a family at Techiman District in Central Ghana. It argues that implementing of standard weights and measures at local markets in developing countries can help women gain higher income from selling their crops.

## **4.2 Methodology**

The following discussion is based on my analysis of published surveys that are related socio-economic and health factors affecting women in Ghana, including Ghana Living Standards Survey Round Six (GLSS6) and the Ghana Demographic and Health Surveys (GDHS). These were conducted by the Ghana Statistical Services between 2012 and 2014. The responses were tabulated in national, regional, rural and urban levels. Detailed questions focused on health, employment, household agriculture, household expenditure, and income. The responses were further classified into different demographic groups to enhance cross-tabulation and comparison. The data on women's perceptions about weights and measures were obtained from my field survey at Techiman Market. The collected data were coded by using numerical numbers and analyzed in Excel. Also, I estimated the gross margin of women farmers' profits to help analyze the living cost for a standard family in rural Ghana (Salau and Salman, 2017). Finally, the multiple regression analysis was applied to test if standard weights and measures have significant influence on the profits of women farmers in Ghana.

## **4.3 Result and Discussion**

### **4.3.1 Wage differentials**



According to the International Labour Organization decent work involves opportunities that are productive and deliver a fair income; provide security and social protection for workers and families (ILO, 2015). Weights and measures enforcement can maintain fairness in wage received at the market (Coldfelter, 1998). Better still, it has the potential to revamp inaccuracies during grading. Nevertheless, Table 4.1 shows that substantive inequalities still exist among sectors. Legislators had high hourly paid wage of \$0.76 per hour than those laborers in the agriculture sector (\$0.40/hour). This great income inequality is a concern as agriculture remains important for rural economy and 3.3 times poorer than an urban economy (FAO, 2012).

Similarly, rural women are paid less than men. Hourly earnings of women employed in professionals (\$0.56), legislative (\$0.40), crafts (\$0.17) and agriculture (\$0.08) are less than the national average wage (UN Women, 2020). According to the Gender Inequalities in Rural Employment report, about 25% of the rural population is poor, mostly dominated by women. Furthermore, inequalities in paid income is evident in self-employed agriculture activities, in particular for females about 72% fall within the low-income classification. Surprisingly, in most agriculture activities like planting, harvesting and trading where women labor is preferred and dominant, wage disparity are more apparent (Ramachandran, 2006). This wage disparity can lead to low productivity and poorly functioning markets.

In order to estimate gaps between female farmers' living wage and actual wage I tabulated their profit margins. Table 4.2 shows the cost and return of women farmers at Techiman District. Techiman is important for Ghana's trading. Since the colonial times there have been weekly retail markets on Fridays. Some of them became a three-day wholesale market, especially for yams and grains. As trading is mostly in the hands of women, women's trade associations emerged. These associations determined the relationship between traders and farmers, as well as the selection of market queens *Ohenemaa*. In addition, the market fees they collect form 70% of the district administration revenues (Dennis and Peprah, 1995).

The results indicate that Ghana's women farmers spend about \$274 per season on cultivating one acre of vegetable farm. They tend to spend more for hiring Seasonal laborers (\$97) than any other cost of production. This was followed by fertilizer cost (\$45), insecticide (\$40) and seed (\$25) per season. At the same cost for production, the net profit was \$540; 16% higher than that of male farmers'. Although, it is on the low side, it indicates women's in-depth knowledge about transaction processes. On the other hand, if these transactions are standardized, they expect to increase profits according to estimates from the Ministry of Food

and Agriculture. Also, it will empower them to make better price-decisions compared to male farmers, therefore, supporting the household and improving their standard of living (Doss,1996).

#### **4.3.2 Estimated Living Cost of a Rural Family**

The analysis of the basic living cost is based on Figure 4.1. Figure 4.1 illustrates factors that contribute to decent living defined globally but adjusted based on Ghana conditions. I considered detailed information for a low cost nutritious diet, basic decent household expenditure like education of children, decent health care, personal care etc. A small margin cost was then added to help provide unforeseen events (Anker, 2011). This information was complemented with FAO studies on nutritional profile and UN housing profile for Ghana. To be time-bound and place-specific, primary information collected in my questionnaire survey in Techiman was used for estimating food cost and house rent. The estimation was done for a rural average family size (two adults and three children).

Table 4.3 shows the breakdown of costs for an average family of two adults and three children. My estimate shows the amount that would be necessary to cover living expenses for the average family. The total estimated cost of a decent living in rural Ghana is \$287 (GHS ₵1,656) per month. This figure is based on minimum standards for decency in Ghana. An average cost for diet was \$0.8 for a person per day. This implies \$122 per month for the family. The calculation was based on local food prices at Ghana's local markets and a low-cost model diet (2,294 calories) for Ghana (Smith and Sarpong, 2018).

The total housing cost was \$51 (GHS ₵294) per month. The estimates comprise house rent for two rooms (\$21) and utilities (\$30), provided that landlords are responsible for house maintenance. My estimate for housing was 17% of the total living cost. This is 11.5% higher than the one indicated by the United Nations-Habitat Report and 8% by the Ghana Living Standard Survey Household Expenditure Report for rural forest. The increment in rents can be attributed to the difficulty in finding decent accommodation in rural areas (Yankson and Gough, 2014).

Comparatively, my estimate for living wage for women farmers is lower than the living cost but twice the level of international poverty line of \$1.90 per person (Table 4.2). Taking into account inflation, high in the fruits and ready whole foods markets; woman may have to increase their profits. In so doing avoid falling below the poverty line and food insecurity.

### **4.3.3 Nutritional Status of Women in Ghana**

The 2014 Ghana District Health Survey Report indicates that about 54% of Ghanaian women had a Body Mass Index (BMI) in the normal range, 6% was thin, and 40% was overweight or obese. About 5% of the women were classified as mildly thin, and 1% was moderately or severely thin. Overweight and obesity seem to be of greater concern in Ghana. The mean BMI for women aged between 15 and 49 in Ghana was 24.8 kg/m<sup>2</sup>. This increases with age, with the lowest value (21.3 kg/m<sup>2</sup>) recorded in women age 15-19. BMI is found to be significant with household wealth (Masood and Reidpath, 2017).

In all, the obesity level among women in Ghana is 40%. This rate has increased by 15% since 2003. Obesity is recognized, particularly among women, as a driver of already high health inequities generated by nutritional deficiencies (Forde et al., 2012). Obesity correlates positively with household wealth. About 13% of the rural poor were obese. Similarly, the proportion of overweight/obese women increased with education, affecting 27% of women with no education. In rural Ghana about 14% of woman had no education and, therefore, a limited ability to secure adequate food due to limited income.

### **4.3.4 Determining Factors of Women Farmers' Profit at Local Markets**

I then tried to find out if standard weights and measures has significant influence on the profits of women farmers in Ghana. A hypothesis test was done to validate my null hypothesis (*H<sub>0</sub>*). To establish factors that influence women farmers' profits, a multiple regression analysis was conducted. This analysis looked at correlations between profits and socio-economic variables like age, education, farmers, use of standard weights, farmer associations and market associations. A significant level of <0.05 shows a strong evidence against the null hypothesis. A typical value of >0.05 project weak evidence against the null hypothesis.

Table 4.5 indicates that women's profit will increase when they use standard weights and measures in transacting business at local markets. Education and farm size were similarly significant to women's profit. These results indicate that the enforcement of standard weights and measures can improve women's profits and increase their purchasing power. Replacing ad hoc measures with standardized ones can minimize the influence of bargaining and negotiations of marketers and market.

## **4.4 Summary**

Using recent household surveys from rural Ghana on health, employment, household agriculture, household expenditure, and income, I examined the level of Ghana's food security among rural women. From this chapter I conclude that standard weights and measures significantly affect women's profit. This connection can be significantly heightened by such factors as education and farm size. Although Ghanaian culture and traditions have limited opportunities for women's education, women hold a majority share at local market transactions. Their in-depth knowledge about in situ market practices motivates them to remain or pursue in agriculture-based business. This corresponds with the Ghana Living Standard Survey (GLSS) that showed women in Ghana tended to trade at local markets based on their traditional gender roles.

This chapter also found that about 40% of Ghanaian women are overweight or obese. About 27% of rural women with no education are overweight. These women lack education on nutritional values. Women at Ghana's local markets tend to eat foods with high percentage of fats. Wage differentials in Ghana showed that agricultural workers received the least amount. This indicates that all women are more likely to be paid less than males. The econometric results confirm that women spend \$287 per month for a decent basic standard of living, however, receive \$90 as profits for sale of their products at the local market. From these findings, standard weights and measures not only have the potential to help improve women's profit but also ensure access to quality foods at local markets.

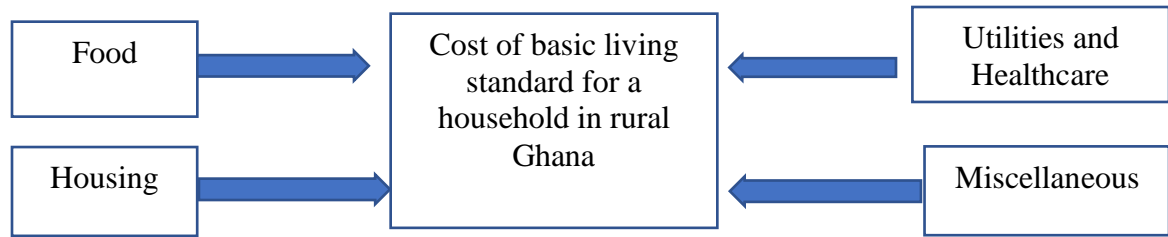


Figure 4.1 Structure of a living standard estimate for rural Ghana (Anker, 2011)

Table 4.1 Estimated Wage Differentials by Gender

Industry	Hourly Income in US\$		
	Male	Female	Wage differential in %
Legislator/manager	0.76	0.40	47
Professional	0.66	0.56	17
Technician/associate professional	0.46	0.40	14
Clerical support worker	0.38	0.34	11
Service/sales worker	0.23	0.17	25
Skilled farm/fishery worker	0.13	0.08	37.5
Craft and related trade worker	0.30	0.17	43
Plant machine operator/assembler	0.29	0.24	16

Source: Ghana Living Standards Survey 6, 2014.

\*Workers in the agriculture industry work less than 40hours weekly which may be related to underemployment.

Table 4.2 Wage farmers' cost and return at Techiman Market

Variable	Cost (US\$)	Return (US\$)
Gross revenue for female respondents		814
Seed cost	25	
Insecticide cost	40	
Fertilizer cost	45	
Land price per acre	32	
Labour cost	97	
Transportation cost	35	
Total variable cost (TC)	274	
Net Profit for a season (GR-TC)		540
Net Profits per month (NR/6)		90
Rate of profit by gender	383	814
Male	243	47%
Female	534	66%

Exchange rate GHS  $\text{¢}5.6 = \$1$  (July, 2020)

Table 4.3 Summary of estimated living cost per month for rural Ghana

Variable	Living cost (US\$)
Food cost per month	122
Food costs per person per day	0.8
Housing rents per month for 2 rooms	21
Rent per month for acceptable living	11
Utilities cost (e.g., electricity, water)	30
Estimated non-food and housing cost (e.g., health care, education)	100
5% for miscellaneous	14
Total monthly household cost for decent living (family of 5)	287

Exchange rate GHS  $\phi$ 5.6 = \$1



Table 4.5 Determining factors of women farmers' profit at Techiman District

Variable	Description	Coefficients	Standard error	t Stat	P-value
Intercept		764.237	471.854	1.620	0.114
Age		7.520	10.730	0.701	0.488
Education	Years of schooling	106.542	41.968	-2.539	0.016*
Experience	Years of farming experience	-1.502	12.887	-0.117	0.908
Farm size	Area of farm cultivation	23.645	7.459	3.170	0.003*
Use standard weights	No (0), Yes (1)	23.470	137.343	0.171	0.005*
Farmer association	No (0), Yes (1)	-42.898	139.883	-0.307	0.761
Market assess	No (0), Yes (1)	153.893	122.818	1.253	0.219

\* $P$ -value < 0.05

## **Chapter 5 Marketers' Crop Pricing Practices and Food Security in Ghana**

### **5.1 Introduction**

Does market price affect food security? Some studies agree that price somewhat determines food availability at market and food system sustainability (Timmer, 2012; Timmer, 2014; Hebebrand and Wedding, 2010). Some even argue that market price is potentially a predominant factor for farmer's production decisions or consumer's purchase decisions (Tomek and Wedding, 2010).

During the colonial period, colonial governments in Africa set rules for agricultural markets (Afeikhenana and Ogunkola, 2000; Fafchamps and Hill, 2008). Co-operatives and marketing boards were established to regulate prices at markets. These institutions continued to influence pricing practices at markets until the 1980s when independent governments dismantled the colonial institutions and left individual farmers' responsible for marketing their crops.

These changes affected African countries differently. In South Africa, for example, the deregulation of these boards in the maize market resulted in a viable market mechanism by increasing competition (Jordaan and Grové, 2010). In Uganda deregulation resulted in price manipulation by local authorities without properly informing farmers' about price setting standards (Fafchamps and Hill, 2008). Nigeria's local markets experienced highly unstable price fluctuations for rice, maize, and beans (Akintunde et al., 2012). Senegal experienced high price instabilities at vegetable markets (David-Benz et al., 2005).

In 2013 the Ghanaian government attempted to standardize weights and measures that are to be used at local markets so that price fluctuation can be minimized, making it more reliable for the international trade to have access. However, this policy has not been incorporated into local market transactions. Government authorities have been puzzled by this quiet resistance to this new policy as its new policy sounded beneficial for both customers and farmers. No study so far has analysed factors that help better understand how market queens *Ohenemaa* and individual marketers set prices. For this, I need to understand the socio-cultural aspects of market transactions.

Considering some socio-cultural factors that are integral part of Africa's local market transactions, my understanding of Africa's food security future can be enhanced by a further investigation of traditional food pricing practices. The objective of this chapter, therefore, is to understand how local marketer's pricing practices occur at Ghana's local markets. What are the

main factors that make marketers decide prices? Before discussing the result of field survey, I first discuss how historically these local market pricing practices took shape.

## **5.2 Concept of Survey**

### **5.2.1 Study Areas**

This research focuses on two local markets in the Brong Ahafo Region. As discussed in chapter 1, this region is one of the critical food supply areas in Ghana. Two municipalities (Berekum and Techiman market centres) were selected for the survey. In this Region, moderately rising food prices have been observed partly because local agricultural production has decreased (Timmer, 2014).

Berekum market is the major market centre for all farmers in the Municipality and one of the biggest markets in the Brong Ahafo Region. It is located in the north-western part of the Region with a population of 159,950 (GSS, 2019). About 57% of its working population belongs to the agricultural sector. The major crops cultivated are maize, yams, vegetables, cassava, cocoyam, plantains, cacao, cashews, citrus, and mangos. There are eleven market centres in the Municipality. The market attracts people from all neighbouring districts and adjoining Cote D'Ivoire. It is closely connected to other local markets, such as Berekum Central Market, Berekum Newtown Market, Jiniini Market, Koraso Market, Senase Market, and Kato Market.

Techiman market supplies food from northern to southern Ghana. It also supplies food to Techiman Municipality residents. The Municipality has a population of 182,810. The history of this market hub goes back to the fifteenth century when the trans-Saharan trade route was actively used (Nezic and Kerr, 1996). Techiman market is one of the largest agricultural produce markets in the country. It attracts people from other West African countries like Mali, Burkina Faso, Nigeria, Cote D'Ivoire, Togo, and Niger. Within Ghana, it influences the product supply and demand from major cities like Kumasi, Accra, and Cape Coast.

### **5.2.2 Data Collection and Analysis**

A questionnaire survey was carried out in September and October 2018 among 137 marketers (60 at Berekum and 77 at Techiman). About eight officers from the Ministry of Food and Agriculture (MOFA) helped conduct the survey. Random sampling was employed. Informal interviews were intended to allow marketers to express their free opinions. Also, I partnered with some of the marketers to observe their activities during marketing hours (8 am-5 pm). A

more extensive discussion on bargaining assumptions was elicited. Marketers interviewed were categorized into wholesalers, retailers, and market queens *Ohenemaa*. Some of them were both wholesalers and retailers.

The questionnaire had four parts. The first part attempted to identify the socio-demographic characteristics of the respondents, including their age, role at the market, experience, education, and association membership. The second part sought to identify their practices at the market. In the third part, I tried to understand how the respondents set prices when they buy products from farmers' and sell them to consumers. The last part attempted to clarify their perceptions about adopting standardized weights or measures. All questions were designed in English and translated into the local language called *Twi* to communicate better with the respondents at the two markets. This is the dominant language used in these two markets. I obtained permission and support from local extension officers in distributing the questionnaire.

The responses to my questionnaire were coded and analyzed by using Excel. Frequencies and percentages were used for the analysis of respondents socio-demographic characteristics, price determination, and perceptions about using weights and measures.

## **5.3 Result and Discussion**

### **5.3.1 Socio-demographics of Respondents**

The first part of the questionnaire identified the respondents' socio-demographic characteristics. I found that 87% were women (Table 5.1). Female dominance at local markets is the norm in many parts of Africa, including the two markets I surveyed (Ondiba and Matsui, 2019). Techiman Market, however, tends to have a number of male marketers who tend to deal with large-scale trades. Regarding the age distribution of the respondents, 40% belonged to 30-39 age group, and about 35% to 40-49 age group. Here no substantial difference between the two markets was observed. The education level of the respondents showed that 36% had no formal education and another 29% had only primary education. These marketers mainly learned about trading from their parents. Two individuals at Techiman had bachelor's degree. In both markets, about half of the respondents had 1 to 10 years of experience. The rest had mainly 11 to 30 years of experience at the markets. Only 2% had more than 30 years.

At both markets, marketers roles were clearly defined. About 62% of the respondents were involved in retail activities, and 18% worked as both retailers and wholesalers. Compared with Berekum, Techiman market had more marketers who worked both as retailers and

wholesalers. They transport products directly to major market centres across Ghana and other countries.

### **5.3.2 Marketers' Price Decision Factors**

Beside demand and supply or seasonality, I observed that marketers at these two markets set prices based on four methods: (1) negotiations with market queens *Ohenemaa*, (2) negotiations with individual buyers, (3) the use of traditional weights/measure, and (4) the compliance with market association/trade union rules (Table 5.2). I asked the respondents about which methods they used in setting prices with multiple choice. The result shows that about 99% used traditional weights and measures and 91% negotiated with individual farmers. About 39% negotiated with market queens *Ohenemaa*, and 40% followed association rules.

Here I found substantial differences between the two markets. Compared to Techiman, Berekum marketers tended to negotiate with market queens *Ohenemaa* (73%) and followed association rules (83%). At Techiman a small proportion of marketers did so with market queens *Ohenemaa* (10%) and followed association rules (6%). I observed that Berekum marketers were more closely connected to local practices where traditional leaders tend to have a substantial influence on economic activities. Also, rural areas in Ghana tend to have many agricultural associations for specific crops or tribes. These associations are headed by market queens *Ohenemaa* who decide membership and trade items. These queens sometimes negotiate prices for their members. They also manipulate prices especially for products they bring into the market.

### **5.3.3 Marketers' Perceptions about Standard Weights and Measures**

In the final section of the questionnaire survey, I tried to understand how the respondents perceived the meaning of introducing standard weights and measures to their businesses. The respondents were presented with four statements and asked about their agreement/disagreement by using Likert-scale (Table 5.3).

The result shows that 81% of the respondents strongly agreed that the standard weights and measures could improve their profits. About 69% strongly agreed or agreed that standard weights and measures better inform consumers about their product quantity and quality. Also, 73% strongly agreed or agreed that the introduction of standards would allow local markets to compete with the supermarket. About half (55%) saw standard weights and measures as a tool to encourage commercial trade internationally. My responding marketers who had previous

experiences in using standard weights and measures suggested that these could reduce market transaction inefficiencies for agricultural products.

#### **5.3.4 Factors Influencing the Use of Standard Weights and Measures**

Ghana's successful implementation of the use of standard weights and measures at all local markets requires the involvement and participation of all marketers more importantly "market queens *Ohenemaa*." As this policy is yet to be implemented, I tried to identify marketer's socio-factors that can influence the implementation. In particular, I tried to find out how respondent's age, education, gender, experience and social role can influence the level of policy implementation (Table 5.4). The multiple regression analysis results showed that all the above were significant at a P-value of 5% ( $p < 0.05$ ). However, the coefficient value for education showed negative. This shows that inadequate training and information on the use of standard weights and measures may affect marketer's usage and price decision-making. Likewise, age and gender were negative. These results indicate that the enforcement of standard weights and measures requires the involvement of the youth and both males and females. Replacing ad hoc measures with standardized ones involves all at the local markets.

#### **5.4 Summary**

This paper has examined current pricing practices at two typical local markets in Ghana: one plays an important role in selling local produce and the other influences nation-wide transactions. The result of my questionnaire survey confirmed my field observation that marketers at the two local markets set prices largely by using traditional weights and measures. Regarding the future prospect of using standardized weights and measures at these markets, 81% of the respondents strongly believed that these standards would improve their profits. In my interview, they emphasized the relevance of having standards to help inform consumers about products and compete with supermarkets or international markets where standards are well established. Another important finding was that standard weights and measures could benefit both farmers' and marketers during price transactions. In Ghana and many other parts of African countries, rural families depend on local markets for supplies. Therefore, based on these findings, I argue that government authorities engage more seriously in discussion with farmers' and marketers organizations about benefits of introducing standard weights and measures at local markets.

Table 5.1 Socio-demographic characteristics of the respondents at two markets

Characteristic	Berekum (N)	Techiman (N)	Total % Response
<b>Gender</b>			
Male	1	17	13%
Female	59	60	87%
<b>Age (years)</b>			
20-29	0	3	2.2%
30-39	19	36	40.1%
40-49	22	27	35.8%
50-59	14	8	16.1%
Above 59	5	3	5.8%
<b>Education</b>			
None	23	26	35.7%
Primary	9	31	29.2%
Senior high	10	12	16.1%
Tertiary	0	2	1.5%
Others	18	6	17.5%
<b>Experience (years)</b>			
1-10	35	34	51%
11-20	12	36	35%
21-30	12	5	12%
Above 30	1	2	2%
<b>Role at the Market</b>			
Wholesale	10	11	15.3%
Retail	45	40	62%
Market queen	3	3	4.4%
Both wholesale and retail	2	23	18.3%

Table 5.2 Marketers price determination at Berekum and Techiman markets

<b>Mechanism for setting prices</b>	Berekum		Techiman		Total Response	
	(%)		(%)		(%)	
	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
Negotiation with market queens	73	27	10	90	39	61
Negotiation with individual buyers	97	3	86	14	91	9
Traditional weights/measures	100	0	99	1	99	1
Standard weights and measures	0	0	0	0	0	0
Market association/Trade union	83	17	6	94	40	60



Table 5.3 Respondents perceptions about using standardized weights and measures

	Strongly		Not		Strongly
	agree	Agree	sure	Disagree	disagree
Percentage Responses (%)					
Improve profit	81	0	0	0	19
Better inform consumers	24	45	25	8	1
Can compete with supermarkets	29	44	9	13	5
Encourage commercial sales	55	0	0	0	45

Table 5.4 Factors influencing the use of standard weight and measure

<b>Variables</b>	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-value</b>	<b>Lower 95%</b>	<b>Upper 95%</b>
Intercept	3.155	0.260	12.115	3.9E-23	2.639	3.670
Education	-0.013	0.006	-2.096	0.038	-0.027	-0.001
Age	-0.026	0.004	-5.719	6.9E-08*	-0.035	-0.017
Gender	-0.424	0.108	-3.904	0.001*	-0.639	-0.209
Experience	0.012	0.005	2.258	0.025	0.001	0.023
Social status at the market	0.106	0.039	2.707	0.007*	0.028	0.183

\**P-value* < 0.05

## **Chapter 6 Conclusion and Recommendations**

### **6.1 Conclusion**

The previous four chapters examined the impact of weights and measures on food security at Ghana's local markets. In this chapter I discuss the main findings in these chapters. Regarding some shortcomings in terms of policy implementation, I also discuss my recommendations for possible solution or alleviation. Overall, my findings can be categorized into three aspects: (A) pricing practices among farmers' and marketers, (B) perceptions on the benefits of using the standard weights, and (C) women food security in Ghana food.

### **6.2 Findings on Pricing Practices among Farmers and Marketers**

In chapter 2, I argued that standard weights and measures should replace the traditional form of measuring in agricultural trade. This introduction of standards can better address equity and quality among farmers, marketers and consumers as well as the quality and competitiveness of local markets. Although the Ghanaian government has instituted many programs and laws to address food security, I showed that all these programs failed to ensure a good pricing structure.

Chapters 3 and 4 focused on pricing practices among farmers and marketers who come to local weekly markets to sell agricultural products. The survey results showed that about 19% of the respondents had used international standard weights and measures. However, about 99% of marketers did not follow standardized pricing. The chapters also found the strong influence of market queens *Ohenemaa* on farmers' income. At the local market, market queens *Ohenemaa* influence is strong in governing transaction activities and market entry of product. They continue to influence the market pricing system that led to the loss of farmers' profits, limiting farmers' purchasing ability. Also, traditional weights and measures tended to take advantage of farmers. About 67% of the respondents did not receive fair price for their products and 68% felt cheated in negotiation. In chapter 5 I found that about 61% of the marketers did not follow the prices market queens *Ohenemaa* set though they tended to use traditional weights and measures. Although traditional weights and measures allow arbitrary pricing practices.

### **6.3 Findings on the Perception of Using Standard Weights and Measures**

For most corresponding farmers, the current traditional price-setting methods led to the loss of profits. They did not receive fair price. They did not find their income increased from selling their agricultural products. An important finding on respondents' perceptions was that standard weights and measures could benefit both farmers and marketers in price transactions. Also, these standards were perceived as a tool to ensure easy trade transactions. The use of standard weights and measures meant transparency, reliability, maximized profits, and quality distinction. About 81% of marketers strongly believed that these standards would improve their profits. In my interview, marketers emphasized the relevance of having standards to help inform consumers about products and compete with supermarkets or international markets where standards are well established. This is because in Ghana rural families depend on local markets for supplies. Another side of having a standard weight and measures in some form is to obtain information about the value of products.

Similarly, chapter 2 exemplified the potential of the standard weights and measures. Standard weights and measures enhance production. These ensure the protection of equity and quality to buyers and traders. Increasing purchasing power and nutritional benefits of food rural farmers buy can be addressed by improving accessibility and utilization. Nevertheless chapters 2, 3, 4 and 5 revealed that the non-compliance of standards has impeded effective market transaction and access to safe and quality food at the local markets. It also imposes implications on future pricing of food crops in Ghana.

### **6.4 Findings on Women's Food Security in Ghana**

Similar to the past studies that emphasized women's inequity issues in terms of payment, this study discovered that a lack of standard weights and measures at the local market led to women's low income. The survey found that women received \$90 per month as profits for selling their products at local market. This was significantly lower than the amount they spent for \$287 per month on a decent basic standard of living (\$287). Regarding health conditions, I found that women in Ghana were overweight. About 27% of rural women with no education were overweight. The survey emphasized a lack of women's purchasing capacity for vegetables and fruits to balance their diet.

## 6.5 Recommendations

Overall, the above findings indicate that farmers, marketers and women are somehow affected by traditional weights and measures in conducting market transactions. Contrary to the current ad hoc pricing, which makes it harder for farmers and marketers to establish an agreed value basis, standard weights and measures potentially better protect the benefits of both. Market queens *Ohenemaa* have induced power to influence the entry and transactional process at the Ghana's local markets.

Accessibility to food in Ghana will be realized when all people can have physical and financial access to food at all times or purchasing power to procure what they need for themselves and household. To achieve this, MOFA needs to establish an appropriate mechanism for price-setting in Ghana. For rural farmers a regulatory mechanism of setting prices to increase their income and therefore their purchasing power. Also, it encourages efficiency among farmers. With good prices farmers are able to invest into new technologies and organic farming which ensures high-quality products. Below I discuss some recommendations that may enhance accessibility for farmers and women in rural areas.

1. The Ghanaian government may further promote reliable weights and measures at local markets. In doing so effectively, the government may take robust and detailed measures to eliminate ad hoc traditional measures. These measures will ensure strategies to deal with traditional elements in markets. They should be backed with sound evidence base through the generation of information and a common understanding of the underlying causes.
2. This research found that one of the most influential factors on implementing standard weights and measures at the local market is education. For a successful implementation, the Ministry of Food and Agriculture and local assemblies may invest in training programs. These may focus on improving bargaining positions of farmers with local and regional importers. Female farmers should be trained about reducing local market transaction costs they face.
3. The Ministry of Food and Agriculture should strengthen its accountability mechanism and monitoring capacities. In order to more effectively implement its policies, it may

engage more collaboratively with market queens *Ohenemaa* to gain their support. *Ohenemaa* in general have good managerial skills.

4. The national and local governments can introduce useful weights and measures programs. They may introduce simple weighing scales with specifications related to the current traditional weights and measures. These policies should effectively work with farmers and marketers.
5. Interventions with food-insecure individuals should include nutrition education as well as increased access and availability to healthier foods. Given that local markets supply about 70% of Ghana's diet, local people can be more informed about (1) the market determination of quality and quantity of a product, (2) a fair price for the actual product, and (3) transparency and fairness of product pricing. The better-informed local people can incentivize farmers to grow healthy foods.

## **Acknowledgement**

I would like to express my sincere gratitude to my supervisor, Professor Kenichi Matsui for his invaluable guidance throughout my research. His dynamism, sincerity and motivation have deeply inspired me. It was a great privilege to work and study under his guidance. Also, my gratitude to my sub- supervisors, Professors Watanabe Kazuo, Zhongfang Lei, and Helmut Yabar for their critical comments and instructions that improved this dissertation. I am also grateful to my evaluation committee members, Professors, Keiko Yamaji, Yokoi Tomoyuki and Myra Villareal for their great suggestions, comments and thoughtful questions.

Much appreciation to the staff of the Doctoral Program in Sustainable Environmental Studies at the University of Tsukuba. I extend my appreciation to the Ajinomoto Foundation for providing me with scholarship. Through this scholarship I was able to finish my program requirements in time.

I acknowledge generous support provided by the Ministry of food and Agriculture, Berekum. I thank all my colleagues and respondents for their participation and contribution of this research.

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## **Appendix 1: Questionnaire Survey for Farmers at Berekum and Techiman Weekly Markets**

Investigation on “Impacts of Weights and Measures on Food Security at Ghana’s Local Markets”

This survey is to better understand the roles weights and measures at local markets may play in improving food security in Ghana. By conducting this survey, we intend to benefit farmers by improving/saving their income and market competition. The results from this survey will be part of my doctoral dissertation and published in peer-reviewed journals. Your personal information will not be shared with any individual or organization.

Please write response codes and indicate details where necessary.

### **A. Socio- Economic profile of respondents**

- I. Respondent code Number ..... Name of market .....
- II. District ..... Region .....
- III. Date of interview .....
1. Sex  
1=Male                    2=Female
2. Age
3. Education  
1=No formal education    2=primary    3=secondary    4=tertiary  
5=Other (specify) .....
4. Years of experience in farming
5. Marital status  
1=Married                2=Single            3=Divorced    4=Widow
6. Household size (person)
7. Farm size (acre)

### **B. Production and sale Procedure**

8. Please indicate your main crops for sale and your annual profit

Product 1	
Product 2	
Product 3	
Product 4	
Product 5	

9. Please indicate your own last production and distribution

Last harvest	Product 1	Product 2	Product 3	Product 4	Product 5
Quantity harvested					
Quantity sold					
Quantity consumed by household					
Quantity given as gifts					

10. Regarding product 1, please explain how you sell.

Sale process	Description
How much was this product?	
Where did you sell it?	
What type of buyer did you sell it?	
What was the method of payment?	
How much was your transportation cost?	
Municipal revenue charges	

### C. Current Price Determination

11. How do you set price?



Method	1=Yes, 2=No	1=Important 2=Not important
Negotiate with market queens		
Negotiate with individual buyers		
Use traditional weights and measures		
Use standard weight and measure		
Follow market association/trade union		
Follow the farmers' association		
Others		

12. When you sell, which of the following factors do you emphasize?

- (a) Taste: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
- (b) Appearance/Size: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
- (c) Quantity: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
- (d) Price: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
- (d) Others (specify) .....

13. Do you receive a fair price for your products at the local market? 1=Yes, 2=No

14. Do the traditional measures optimize your profits?

15. Has your profit margin increased in the last 5-10 years?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

16. Is price negotiation beneficial for you?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

17. Do you ever feel cheated in price negotiation? 1= Yes, 2=No

**D. Prospects and Advantages of a Standard Weight and Measure**

18. Do you think selling your product at supermarkets with standard weight and measure can improve your profit? Yes=1, No =2

19. Can this standard weight and measure be applied to this local market?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

20. Does your sale on the basis of a standard weight and measure better inform marketers and consumers about your products? 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
21. Can the use of standard weight and measure help compete with the supermarket? 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree
22. Overall, selling your products with standard weights and measures encourage your commercial production activities? Yes=1, No=2
- If yes, please describe how (if possible) .....

## **Appendix 2: Questionnaire Survey of Marketers at Berekum and Techiman Weekly Markets**

Investigation on “Impacts of Weights and Measures on Food Security at Ghana’s Local Markets”

This survey is to better understand the roles weights and measures at local markets may play in improving food security in Ghana. By conducting this survey, we intend to benefit marketers by improving/saving their income and market competition. The results from this survey will be part of my doctoral dissertation and published in peer-reviewed journals. Your personal information will not be shared with any individual or organization.

**Instruction:** Please write response codes and indicate details where necessary.

### **A. Socio- Economic profile of respondents**

B. Respondent code number ..... Name of market .....

C. Region ..... District .....

D. Date of interview .....

1. Sex:            1=Male                            2=Female

2. Age: \_\_\_\_\_

3. Education

1=No formal education    2=Primary    3=Secondary    4=Tertiary

5=Other (specify) .....

4. Marital status

1=Married            2=Single            3=Divorced    4=Widow

5. Household size (person)

6. Years of experience in trade

7. Role in the market

1=Wholesaler, 2=retailer, 3=Market queen,

4=Wholesaler and retailer, 5=Market queen and wholesaler,

6=Agent, 7=Other (specify) .....

**Types of agricultural products and weight/measure used**

8. Who supply your merchandize?

1=Individual farmers 2=Farmer’s group 3=Market queen 4=Agents

5=other (specify) \_\_\_\_\_

9. Please indicate products you sell and weight/measure you use

Products	Weight/Measure

10. Do you belong to any association? 1=Yes, 2=No

(If no, please go to question 13.)

11. Please indicate services this association provides their members

Services	1=Yes; 2=No; 3=Not sure
Informs about crop prices	
Fixed rate for selling prices	
Negotiates transaction business	
Provides types and rules on weight and measure	
Provides loan or credit	
Others (specify)	

**Price Determination**

a. How do you set price?

Mode	1=Yes, 2=No	1=Important, 2=Not important
------	----------------	---------------------------------

After negotiation with market queens		
After negotiation with individual buyers		
By using traditional weights/measures		
By using modern standard weight/measure		
Follow market association/trade union		
Follow farmers association		
Others (specify)		

12. When you sell your merchandize which of the following do you consider?

(a) Taste: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

(b) Appearance/Size: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

(c) Quantity: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

(d) Price: 1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

(e) Others (specify) .....

13. Has your profit margin increased by using this method of pricing?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

14. Do you pay a fair price for farmers' products? 1=Yes, 2=No

15. Do market queens influence your price setting? 1=Yes, 2=No

16. Can you negotiate price with market queens? 1=Yes, 2=No

17. Does the use of traditional weight and measure help fairly secure your income?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

18. Do you think poor prices can affect your food availability and accessibility?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

## 10. Prospects and Advantages of a Standard Weight and Measure

*Indicate Yes=1 or No=2 for the following:*

19. Would you be willing to adopt international standards for pricing you merchandize?

20. Do you think a national standard weight and measure can increase your income?

21. Can a standard weight and measure ensure price fairness at the local market?

1=Strongly agree, 2=Agree, 3=No sure, 4=Disagree, 5=Strongly disagree

22. Do you think a standard weight and measure can inform decisions of consumers on your products?

If yes how? .....

23. Can a standard weight and measure affect pricing by market queens?

If so, please explain how? .....

24. What market tool or strategy can enhance marketing transactions on the local market?

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