



# **Tea Prices and Household Consumption Patterns in Tanzania**

***Mamello A. Nchake and Threza L. Mtenga***

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## **Abstract**

Tea production is a significant contributor to Tanzania's output and income. The country is a price taker in regional and international tea markets, and this makes it vulnerable to price shocks, which can have a detrimental impact on smallholder farmers, especially those who heavily rely on tea production for their income. This vulnerability is particularly critical for net producers who lack alternative income sources, especially in rural areas. The study uses a panel dataset from the Tanzania National Panel Survey (TNPS), collected over the periods 2008-2009, 2010-2011 and 2012-2013. The study's main findings indicate that tea

price shocks have a strong negative effect on consumption patterns of smallholder farming households in Tanzania. The results also highlight that the impact of price shocks is not uniform across all households. It varies based on factors such as the gender of the household head and the location (rural or urban). The study underscores the importance of government intervention to support households affected by price shocks. Safety net programmes and welfare management initiatives can be vital in assisting these households to cope with economic uncertainties. Moreover, policies that encourage savings and the accumulation of productive assets can serve as a cushion against future shocks. Recognizing the variations in the effects of price volatility among different households, the study suggests the need for policies and strategies that are specifically designed to address the uncertainties in the tea market. This implies a nuanced approach to policies that address the diverse needs and vulnerabilities of tea-producing households.

## Introduction

Agriculture in Tanzania is an important sector, which plays a significant role in the country's economy, employment, and income distribution. It contributes approximately 29% of Tanzania's Gross Domestic Product (GDP) and 30% of its export earnings. The sector is a major source of employment, employing about 75% of total labour force. It provides income to more than 80% of the country's population, with most of these individuals (70%) residing in rural areas. This highlights the role of agriculture in sustaining livelihoods, particularly in rural communities.

Tea production is a significant component of Tanzania's agriculture sector. It is one of the major sources of growth and income in developing countries that produce tea, including Tanzania. The cultivation of tea is widespread in Africa and Asia, covering approximately 2.5 million hectares of land (Vernarelli and Lambert, 2013; Khan and Mukhtar, 2013; Gramza-Michalowska, 2014). The global demand for tea products creates opportunities for export earnings, contributing to economic growth and overall welfare. The global market for tea is substantial, with a production value estimated at US\$ 15.4 billion (as of 2013 data). The retail value of tea products is even higher, estimated at US\$ 40.7 billion (as of 2014 data). This underscores the global demand for tea products. The production and export of tea have played a significant role in enhancing food security and the welfare of farming households in Africa and Asia. Income generated from tea production helps ensure that farming communities have access to food and other essential necessities. Kenya and Sri Lanka are examples of countries where tea export earnings have a substantial impact on food expenditure. In 2011, tea export earnings contributed to 51% of Kenya's food expenditure and an even higher 71% of Sri Lanka's food expenditure (FAO, 2015a).

Despite evidence of increased growth in production and export of tea in international markets, tea prices have fluctuated greatly in the past decade. The FAO composite tea price, which is an indicative price for black tea in international markets, increased significantly from 2006 to 2012, reaching a record high of US\$ 3.18/kg in 2009 (FAO, 2015c). However, in the first half of 2013, international tea prices declined significantly by 2.5%, and further declined by 5.3% in 2014 (FAO, 2015b). The fluctuation in tea prices in international and regional markets can be attributed to several factors, and it highlights the vulnerability of the tea industry to various external influences. The growth of middle-class populations and changing consumer preferences in emerging markets, such as China and India, has led to increased demand for tea. This surge in demand can put upward pressure on prices, especially if supply does not keep pace. Adverse weather conditions, such as droughts in major tea-producing countries such as India, Sri Lanka, and Kenya can significantly impact tea production. Reduced supply due to weather-related issues can cause prices to rise as demand remains stable or increases (FAO, 2016). Tea markets, like other commodity markets, can attract speculators and investors looking to profit from price volatility. Their participation in the market can amplify price fluctuations, as their actions may not always align with the fundamentals of tea supply and demand. Regional markets, such as the Mombasa market, can also experience price fluctuations due to various factors, including changes in auction prices and production costs (Mwangi, 2016). The average price of tea rose by 15.2% from 2010 to 2011 and by 6.7% from 2011 to 2012 but declined by 14% in 2014 and 4% in 2015 (FAO, 2016). These dynamics can vary from one region to another, leading to divergent price trends. Broader economic factors such as changes in exchange rates, inflation, and global economic uncertainty can impact tea prices. Currency fluctuations, for example, can affect the cost of production and export competitiveness. Different grades and qualities of tea may experience varying price movements (Mwangi, 2016). Higher quality teas often command better prices, and their prices may be less volatile compared to lower grade teas. Government policies related to tea production, trade, and taxation can also influence prices. Export restrictions or subsidies, for instance, can affect the supply and demand dynamics in international markets. Changing consumer preferences, such as a shift towards healthier beverages or specialty teas, can also affect the demand and pricing of certain types of tea. The combination of these factors can lead to volatility of tea prices in international and regional markets. It underscores the importance of monitoring and managing these risks for both tea producers and traders in the industry. Additionally, efforts to improve production practices, diversify export markets, and implement strategies for climate resilience can help mitigate the impact of price fluctuations on the tea sector.

Unpredictable changes in commodity prices can create uncertainty for countries that rely heavily on commodity exports, making it challenging for these countries to plan and implement effective sales policies (ICC, 2009). Input costs account for an average of 43% of the gross production value in these countries, suggesting

that fluctuations in commodity prices can directly affect the cost of producing goods, which can further compound the economic challenges faced by producers (Angerer *et al.*, 2009). Developing countries, in particular, are highly dependent on primary commodity exports. Therefore, when commodity prices are volatile, these countries are particularly vulnerable to economic shocks. Consequently, high movement in agricultural commodities is a concern for policy makers and international organizations worldwide. To address these challenges, policy makers and researchers must have a comprehensive understanding of the welfare effects of commodity price dynamics and how households respond to these fluctuations. This understanding is crucial for designing effective counter-cyclical stabilization policies (Beck *et al.*, 2016).

Volatile commodity prices affect tea producers differently depending on their individual risk preferences. Generally, when international tea prices are higher, tea producers can benefit. Higher prices mean potentially higher revenues for their tea products in the global market. High-risk tea producers may respond differently from low-risk producers when international prices rise, mainly due to their varying attitudes towards risk. High-risk producers are more likely to realize increased benefits from higher prices, since they might be willing to invest more and take greater risks to capitalize on these higher prices (Magrini *et al.*, 2016). This is because they are more inclined to see higher prices as an opportunity to earn more despite the associated risks. Low-risk producers tend to be more conservative. They may employ fewer inputs or strategies to hedge against price variations (Bellemare *et al.*, 2013). While this approach may provide low risk producers with some level of stability, they could miss out on potential income during periods of higher prices (Moghadam and Canuto, 2011).

High tea prices accompanied by significant fluctuations can be detrimental to tea producers. The production risks associated with such price volatility may discourage some producers from increasing their supply, despite the potential for higher profits. The literature based on African, Asian, and Latin American data has revealed that men and women are affected by shocks differently (Due and Gladwin, 1991; Thomas *et al.*, 2000; McKenzie, 2003). Incentives from changes in crop prices differ due to disparities in labour requirements between women and men, where women often bear the greater burden than men (Ongile, 1999; Sandys, 2008; Hill, 2011). Women play a complex and fundamental role in the production, marketing, trading, and consumption of most food crops around the world (Cohen and Smale, 2014). Yet, more often, they have less access to and control over the resources. Women generally experience gender-based vulnerabilities, including managing non-income household responsibilities and occupying low paying farm work, limited legal benefits and protections, limited decision-making authority, and lack of control of financial resources (Chant, 2008; Cohen and Smale 2014). As a result, in the presence of income shocks, women are more likely to lose assets

than men, and their workloads are likely to increase more significantly than those of men (Cohen and Smale, 2014). Women, especially those who lack alternative sources of income, face increased uncertainty when it comes to allocating resources for essential needs such as food, education, and healthcare when they experience income shocks that disrupt their ability to meet these basic needs (Sandys, 2008; Hill, 2011). Nonetheless, many studies that examine how households respond to income shocks often overlook the gender perspective. Thus, the unique challenges and responses of women in the face of income shocks may not be adequately addressed in research and policy making (Cohen and Smale, 2014). One key reason for the neglect of the gender dimension in such studies is the lack of proper data that provides gender-disaggregated effects, without which it becomes difficult to assess and understand the specific impacts on women.

Tanzania is a significant player in the global tea market and is recognized as one of the main producers of certified tea in Africa, positioning the country as an important contributor to the global tea industry. Tea production plays a crucial role in Tanzania's economy as it is the fourth largest export agricultural product in the country, indicating its importance for generating foreign exchange earnings and contributing to the nation's economic output. The tea industry in Tanzania is a major employer, particularly in rural areas, where it provides livelihoods for over 30,000 smallholder farmers involved in tea production, collectively producing a significant portion of the country's tea output. In recent years, Tanzania has experienced significant growth in tea production where output increased by 8.18% (2,743,423 kg) from 2013/2014 to 2014/2015 financial year (FAO, 2016). As a result, exports and foreign exchange earnings also increased by 6,810,393 kg and US\$ 1,561,475, respectively. Despite being a significant tea producer, Tanzania being a price taker in the regional (Mombasa auction market) and international tea markets does not have the influence to set or control tea prices through traditional demand and supply mechanisms. Instead, tea producers would prefer high prices to low prices, as they would be able to sell their surplus tea (tea more than their own household consumption) and realize higher income for non-tea consumption goods. It is apparent that the recent volatility in tea prices can have adverse effects on smallholder farmers in rural Tanzania, particularly those who heavily rely on the income generated from tea production. These farmers may lack alternative sources of income and depend on the export proceeds from tea.

Nonetheless, studies that evaluate the impact of tea price changes on smallholder farming households in Africa are limited. This study aims to contribute to the limited literature by evaluating how rural farming households adjust their consumption patterns when faced with frequently changing tea prices. The primary research question focuses on understanding how changes in the prices of tea influence the consumption decisions made by rural farming households. The study intends to examine whether there are differences in how male-headed and female-headed

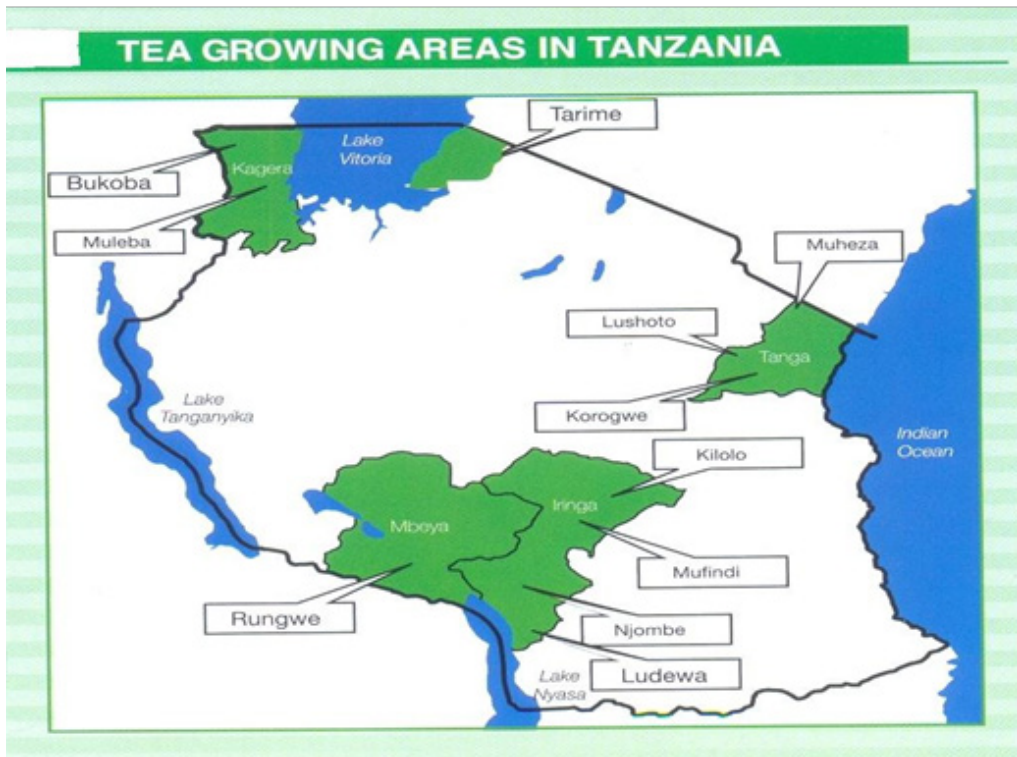
households respond to tea price shocks. This question acknowledges potential gender-based variations in consumption patterns and decisions in response to economic shocks. Another research question seeks to understand how urban and rural households differ in their responses to tea price variations. Finally, the study aims to identify and analyze the coping strategies adopted by smallholder farming households to mitigate the effects of tea price shocks. These strategies may include alternative income sources and ownership of productive resources by households to manage their economic situation and consumption needs during periods of negative price changes.

## **Overview of Tanzania tea industry**

Agriculture is a foundation of the Tanzanian economy. It plays a vital role in various aspects, including food production, supplying raw materials for industries, generating income, and providing employment opportunities. As a result, the economy heavily relies on this sector. Tanzania's agriculture benefits from its diverse range of climatic conditions and geographical locations, which allow for the cultivation of a wide variety of agricultural products, including tea, and thereby contributing to the resilience of the sector and the overall economy.

Tea is a high impact crop in the Tanzanian economy; it is the fourth largest export crop and contributes to a third of the country's permanent crop production (TBT, 2017). Currently, Tanzania is the 5th largest producer of tea in Africa and the 14th largest in the world, producing around 0.73% of global production (EATTA, 2016). During the financial year 2015/2016, total exports of tea amounted to 30,057,921.33 kg with exports earnings of US\$ 51.7 million, or increases of 1.65% and 12.00%, respectively, from 2014/2015 (TBT, 2017).

Tea in Tanzania is grown by individual smallholder farmers and privately-owned cooperative estates. The unprocessed tea leaves are sold to tea industry processing factories. There are about 23,000 acres of tea, with smallholder farms and privately-owned tea estates occupying approximately half or 11,500 acres of tea each (FAO, 2016). There are 23 primary processing factories, 19 of them owned by large-scale farmers and 4 jointly owned with smallholder farmers. There are 9 licensed blending and packaging factories owned by private companies, located in the 8 tea producing districts across the six regions (see map next page).

**Figure 1: Tea producing areas in Tanzania.**

Source: Tea Board of Tanzania

Note: Green shaded are regions that grow tea; in the boxes are specific districts that grow tea in that region

There are three main tea growing geographical zones in Tanzania. The Southern Highlands Zone (Mufindi, Njombe and Rungwe districts) is the largest tea producing zone with over 80% of total production followed by the North-East Zone (Lushoto, Korogwe and Muheza districts) with almost 20% while Northwest Zone (Bukoba and Muleba districts) contributes an insignificant share (less than 1%). This study will focus on the farming households growing tea in the Southern Highlands Zone.

**Table 1: Tea production by geographical zone for harvesting seasons 2013/2014 – 2015/2016**

Season \ Zone			
	Northern Zone	Southern Zone	Total
July 2013-June 2014	6,397,519 kg	27,134,949 kg	33,532,468 kg
July 2014-June 2015	5,819,069 kg	29,930,700 kg	35,749,769 kg
July 2015-June 2016	5,921,869 kg	26,706,759 kg	32,628,628 kg
Contribution (2013/2014)	19%	81%	100
Contribution (2014/2015)	16%	84%	100
Contribution (2015/2016)	18%	82%	100

Source: Tea Board of Tanzania



Cooperative estates produce at large scale for commercial purposes and sell the tea leaves locally through tea processing factories and internationally through the Mombasa auction market. On the contrary, smallholder tea farmers are not involved anywhere beyond community selling centres, nor are they involved in the price-setting of the farm gate tea prices. Instead, the local price of raw and processed tea is set by the Tea Board. The price for processed (dry) tea varies according to grade, from TZS 6,000 to TZS 8,000 per kg. It takes 4.5kgs of unprocessed tea leaves to manufacture 1kg of dry (processed) tea leaves. The 2017 local price for unprocessed tea was TZS 240 per kg, yet the processing companies bought it at a higher price of TZS 250 per kg. This was relatively higher compared to TZS 232 per kg in 2016. However, according to the Tea Research Institute of Tanzania (TRIT), many smallholder tea farmers have abandoned their farms due to recent fluctuating tea prices, and the increased costs of maintaining tea trees. As a result, their tea production has declined significantly in the past few years. The contribution of the smallholder to the total production in the tea sector was 33% in 2014/2015 and 30% in 2015/2016, while that of the estates' sub-sector was 70% and 67% in 2014/2015 and 2015/2016, respectively (Table 2).

**Table 2: Tea production by sector for harvesting seasons, 2013/2014–2015/2016**

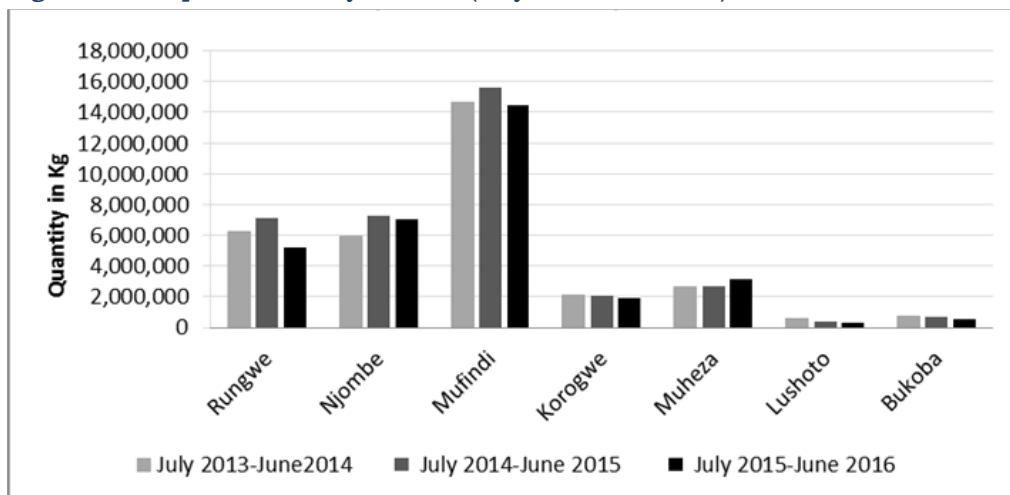
Season	Estates	Smallholders	Total
July 2013-June 2014	22,933,216 kg	10,591,525 kg	33,524,741 kg
July 2014-June 2015	24,830,273 kg	11,919,496 kg	35,749,769 kg
July 2015-June 2016	22,815,677 kg	9,812,951 kg	32,628,628 kg
Contribution (2013/2014)	68%	32%	100
Contribution (2014/2015)	67%	33%	100
Contribution (2015/2016)	70%	30%	100

Source: Tea Board of Tanzania

At the district level, Mufindi and Njombe, both located within the Iringa region in rural Tanzania, were the highest producing districts, accounting for over 60% of total tea production in the country (FAO 2014/2015 statistics). Rungwe District also contributed a relatively large share of tea production (20%) while Korogwe, Muheza, Lushoto and Bukoba accounted for 17%.

Tea trees need a significant amount of time to grow (at least three years) before they can yield any harvest and have a lifespan of around 100 years. The existing trees were planted in the 1950s and require extensive maintenance to ensure quality produce. This suggests that tea supply and demand is price inelastic since production is not easily reversible once the trees are planted. This also means that once the tea trees are planted, tea producers are unable to switch between tea production and any alternative crop and, therefore, need to resort to other strategies to raise income for consumption smoothing during periods of low prices.



**Figure 2: Tea production by district (July 2013–June 2016)**

Source: Tea Board of Tanzania

Tea is harvested by hand, and once handpicked, the tea leaves must be delivered to the tea factory the same day otherwise any delay after harvesting destroys the quality because the harvested tea has to be maintained within a prescribed temperature. The raw tea leaves are sold at the selling centre to the processing industry, and the farmers incur all the transport costs of transferring the leaves from the farm to the selling centre. Tea harvesting is predominantly carried out by women in many tea-producing regions, including Tanzania; women account for three quarters of workers in tea farms. For many women in tea-growing communities, tea cultivation is a critical source of livelihood. A drop in tea prices can directly impact their ability to earn a living, potentially forcing them to seek alternative and often less secure employment opportunities. Payment to farm workers is based on each kilogramme harvested, and the payment varies from TZS 100 to TZS 120 per kg. On average, a female farm worker harvests between 100kg and 250kg per week and is paid on a weekly basis. For the smallholder farming households, men are responsible for transporting the tea leaves to the community selling centre, where they negotiate the price and collect the proceeds.

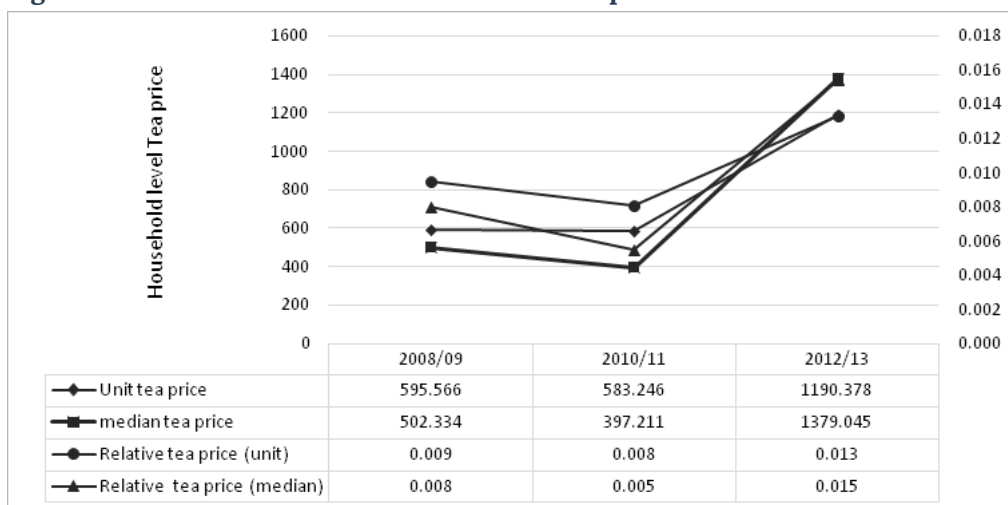
Given this background, it is apparent that tea production is an important source of income to rural smallholders, providing a safety net to smallholder farmers who contribute over 30% of total tea production in the country. As a result, failure to attract higher bidding price in the tea markets would mean that smallholder rural households in Tanzania are unable or unwilling to invest in higher technology (for example, fertilizer, irrigation system) that would increase tea productivity. In turn, low prices reduce income available for consumption of other basic goods such as health and education to smallholder households.

## Data sources

We use a panel data obtained from three waves of the Tanzania National Panel Survey (TNPS) collected over the periods 2008-2009, 2010-2011 and 2012-2013 across 26 regions. A balanced panel is used of 2,946 households in each period, amounting to a sample of 8,838 households (6,749 males and 2,089 females), which were sampled over the three survey periods. This data includes information on household characteristics of sampled households, including ownership, employment, wages, and sources of expected income from tea, non-tea production and non-agricultural activities, asset ownership, household consumption patterns on tea and non-tea products, gender dimensions and other household characteristics. We use household expenditure to estimate household consumption patterns (Srivastava and Mohanty, 2010).

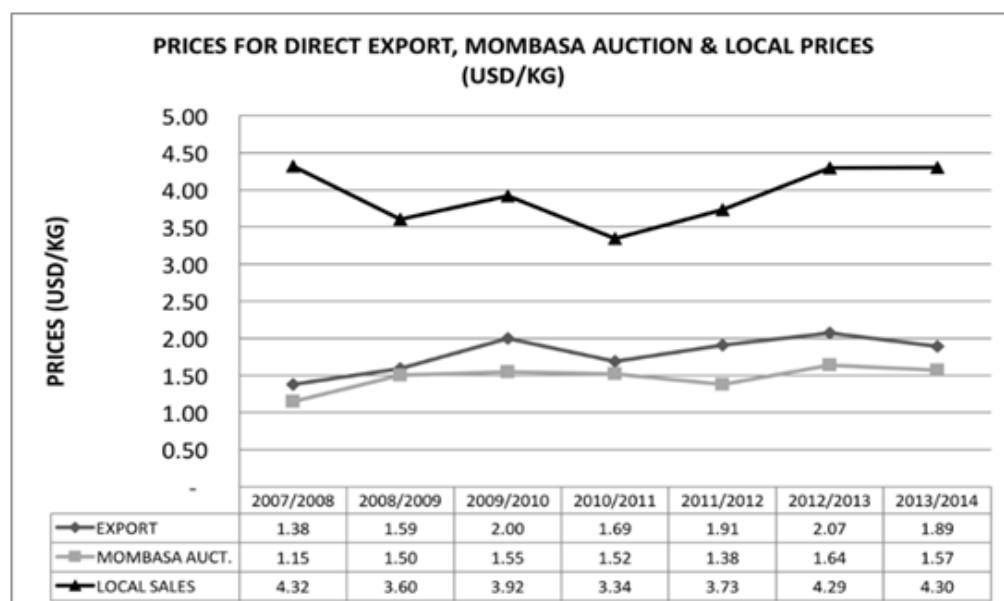
The dataset also has information on output yield, harvest and losses, use of technology (such as irrigation system, organic fertilizers, soil erosion controls/water harvesting machines, pesticides/herbicides), storage availability for inventory stock, farming capacity, among others. Importantly, data on international, Mombasa auction prices and local tea prices charged by tea processing factories and community traders was collected from the FAO statistical database, East African Tea Trade Association and Tea Board of Tanzania, respectively.

Figure 3 presents the trends in annual average tea prices in Tanzanian Shillings per kg at the household level price in terms of the unit value (total revenue from tea sales divided by total quantity of tea sold). We also compute the median of the unit value computed at the district level. This is the price at which local farmers in Tanzania receive for selling their unprocessed tea in the tea market. Finally, we compute the relative price (tea unit price divided by the food prices facing that household) for local tea growers during the period 2008/2009 to 2012/2013. The relative price of tea is measured in terms of the basket of selected basic food commodities (such as maize, rice, potatoes, beans and sorghum). The data reflects the fluctuating trends over the sampled period for both measures of tea prices, suggesting that during the period 2008/09 to 2012/13, tea growers faced uncertainty in the local tea markets. The diagram shows that, generally, all tea prices facing tea growers in Tanzania were unstable during the three periods, particularly declining at the household level but increasing in the exports markets.

**Figure 3: Measurements of household level tea prices**

Source: Authors' own calculations

Figure 4 presents the trends in annual average tea prices in US dollars per kg, charged for exported tea to the rest of the world, tea sold at the Mombasa auction market and for tea sold in the local market by the tea processing factories and community traders during the period 2007/2008-2013/2014. The results show that tea growers faced uncertainty in the local markets, and also in regional and international markets over this period.

**Figure 4: International tea prices**

Source: Tea Board of Tanzania (2018)

After extensive sorting and cleaning, the final sample shows that in the three waves of data used in this study, the distribution of sample is similar across the different regions, except for Dar es Salaam, which constituted around 15% of the total sample.

The problem of non-response and attrition is a key limitation of longitudinal data. Attrition creates a problem of missing data and can potentially have serious consequences when researchers use only data of responding individuals (Little and Rubin, 1989). Attrition reduces the effective sample size and limits the ability to observe longitudinal patterns in outcomes of interest. Attrition may also result in attrition bias, which may impede the ability to draw valid inference from econometric analysis. There are several approaches used to handle attrition, but their relevance depends on the assumptions made about the origins and causes of the missing data problem. In this study, we apply inverse probability weighting. This approach involves estimation of the probability of response as a function of observed characteristics (Jones *et al.*, 2004).

## Conceptual framework

One of the pioneering studies on the distributional impact of price changes is Deaton (1989) on the rice price in Thailand. The approach proposed by Deaton combines information on the price change of specific goods, rice in his study, with households' data to calculate welfare changes. The key feature of this approach is the use of a household survey to calculate the welfare impact on each single household in the sample. The unit value of a consumption can be seen as the highest acceptable price, or simply a 'subjective price'. However, unit values are not the same as prices, as unit values reflect both quality and price variations (Deaton, 1988; 1997). Thus, Deaton (1988) developed a method that considers both quality and measurement errors when unit price is used as a proxy for market price. The method is widely used in existing literature. For this reason, this paper uses the same method, which is to compute the median unit value for each cluster. This is used as a measure of the price of a given good for each district in Tanzania.

To conceptualize the effects of tea price change on farming households' outcomes in Tanzania, this study explores the various channels through which tea price changes may affect household consumption. The basic economic theory explains the effect of price changes on consumption through the budget constraint. This study focusses on two channels. The first channel is where changes in tea price affect household consumption through an income shock. The uncertainty in tea prices could lead to ambiguity in household income for tea growers. The negative income shock can potentially reduce household consumption, particularly if tea growers do not have any mechanism to smoothen consumption over time. In such cases, tea growing households may not be able to cope with these shocks. The larger the price fluctuation, the more uncertainty in terms of income, and the more important it becomes to search for strategies to maintain a stable consumption for family members. The strategies

may include access to credit, wage employment, savings or reduction of consumption itself. The second channel where tea price changes can potentially affect household consumption is through production shock. Decisions on whether to increase or reduce investment in tea production may be affected by the uncertainty in tea prices. This may also lead to alterations in the diversification strategies by tea growing households, such as growing food crops that could act as safeguards for households against tea price shocks. The study focuses more on the income shock channel as a means through which changes in tea prices may affect household consumption.

## Conclusions and policy recommendations

This study analyses the impact of tea price fluctuations on consumption expenditure of tea growing farming households in Tanzania. We use a sample of farming households extracted from very detailed data from the Tanzania National Panel Survey (TNPS) collected over the periods 2008-2009, 2010-2011 and 2012-2013. The descriptive statistics are based on the combined database and the individual datasets for each period to show trends in various indicators used in the study. The results indicate that at the household level, there are significant differences in terms of household consumption expenditure and access to resources and participation in farm and off-farm activities. The descriptive results further show a positive relationship in tea price shocks and household consumption among tea growing households in Tanzania. Overall, the results show that tea price shocks negatively affect household consumption among tea growing households in rural Tanzania. The results are consistent across different measures of household unit price of tea. Household consumption increases with household size and level of education of head of household, but no statistically significant evidence that consumption varies with age of household head.

However, consumption is relatively lower for households that are female-headed, and the coefficient of tea prices is statistically insignificant. Tea price shocks affect households differently across locations as consumption for rural households are more affected by tea price shocks than urban households. One reason for this systematic difference could be the ability of urban households to cope with shocks compared to rural households. We take into consideration alternative resources available to households for consumption smoothing over time, in the presence of tea price shocks. The results reveal that in the absence of government support, having access to credit and income from family enterprise may provide the necessary safety nets for tea farming households against tea price shocks.

Important implications for policy can be derived from the results. Welfare effects of tea price shocks vary considerably across households in terms of gender and location. Without clear understanding of the composition of farming households, effective measures to mitigate the vulnerability of various households cannot be properly

identified. The inability of households to cope against shocks given their available resources confirms the importance of government response in terms of providing sufficient safety nets through welfare management programmes for the affected households. Indeed, government policies can play a pivotal role in encouraging savings and the accumulation of productive assets as a means of building resilience for farming households against various economic shocks, including those related to agricultural market fluctuations. Addressing the differential impacts of tea price fluctuations on households requires a holistic approach that combines targeted policies, market interventions, and community development strategies. By recognizing the unique vulnerabilities of smallholder farmers and tea workers, policy makers and stakeholders can work together to create a more equitable and resilient tea sector.

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## Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

Bringing Rigour and Evidence to Economic Policy Making in Africa

- Improve quality.
- Ensure Sustainability.
- Expand influence.

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African Economic Research Consortium  
Consortium pour la Recherche Economique en Afrique  
Middle East Bank Towers,  
3rd Floor, Jakaya Kikwete Road  
Nairobi 00200, Kenya  
Tel: +254 (0) 20 273 4150  
[communications@ercafrica.org](mailto:communications@ercafrica.org)