# GHANA'S ONION MARKET

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*Onion is a common vegetable crop used globally as seasoning and for medicinal purposes (van der Meer 1997; Cheema et al. 2003). The bulb is also used widely in Ghana in the preparation of stews and soups, accounting for around one-fifth of vegetable expenditure by households (van Asselt et al. 2018). Despite being widely consumed, onion production in Ghana falls well short of demand with imports coming in from neighboring Niger and Burkina Faso even during the peak local production season. Although trade statistics are notoriously weak, some estimates suggest as much as 80 to 90 percent of onion in the local market is imported. The two main varieties cultivated in Ghana are Bawku Red and Galmi. Major production challenges include varietal issues, the seasonal nature of production, and high post-harvest losses. The importance of onion and the significant potential for growth in the subsector has long since been recognized, and the crop was one of the first to be prioritized under Ghana's Planting for Food and Jobs (PFJ) program.*

## POLICY ENVIRONMENT

The second phase of Food and Agricultural Sector Development Policy (FASDEP), launched in 2007, provides the general implementation framework for agricultural policies in Ghana. While the framework broadly targets smallholder productivity, including that of vegetables, Ghana lacks a specific strategy for vegetables, hampering development of the sub-sector. This sentiment is echoed in a recent report by the Ghana-based Agency for Health and Food Security (AHEFS 2020), in which it is argued that although agricultural policies and strategies, such as the FASDEP, the Ghana Poverty Reduction Strategy (GPRS), and the Medium-Term Agricultural Sector Investment Plan (METASIP), have prioritized food security, they have failed to address the specific needs of the vegetables sub-sector.

Onions are a key vegetable in Ghana in terms of production volumes, value, and consumer demand. Onions are also highly perishable and require specific and targeted value chain intervention or policies, as is the practice in other countries. Ghana's flagship agriculture program—Planting for Food and Jobs (PFJ)—seeks to accelerate agricultural growth in the face of increasing demands from consumers. The PFJ is one of the first initiatives to have explicitly targeted vegetables, including onions, as strategic priority crops for Ghana. Alongside other government interventions, such as the "One Village One-Dam", which promotes irrigation farming through investment in small earth dams (MoSDI 2020), PFJ could potentially expand onion production and reduce Ghana's large onion import bill, especially during the dry season when domestic cultivation slows down.

## PRODUCTION AND CONSUMPTION

In terms of area cultivated, onion is the third largest vegetable crop in Ghana after tomatoes and chili pepper. Onion is produced predominantly under rain-fed conditions, which accounts for 75 percent of the annual crop (DAI 2014; van Asselt et al. 2018). Most onion producers are smallholders with an average land area of 0.46 hectares (ha). Unlike other vegetables that are grown across the country, such as tomatoes, onion cultivation is largely limited to Ghana's northern regions. Most onion farmers only plant a single crop each year, planting around January and harvesting in April. Although onion production has been shown to be profitable outside of the main growing season, farmers usually choose to grow other field crops during the rest of the year, resulting in onion supply shortfalls. Even during peak production in Ghana, local onion production falls well short of local demand. Consequently, traders rely on imported onions to meet demand (van Asselt et al. 2018).

Local studies report widely varying estimates of onion yields; for example, DAI (2014) reports yields of 10 metric tons per hectare (mt/ha) for the Bawku red variety; Balana et al. (2020) report yields of 3.7 mt/ha under rain-fed production and 12 mt/ha under irrigation; van Asselt et al. (2018) estimate average yields of 3.3 mt/ha; while official statistics (MoFA 2019) put current yields at around 19 mt/ha. Despite this variation in local onion yield estimates, there is consensus that these yields lag far behind those in neighboring countries; for example, in Niger, a major source of imports, onion farmers obtain yields as high as 35 mt/ha.

This yield gap in Ghana has been attributed to varietal issues and farm management practices. With respect to varieties, the local Bawku red variety is smaller and has a shorter maturity period than the imported Galmi variety. Concerns about the general absence of varietal development in the vegetables sector are well-documented (see Robinson and Kolavalli 2010). Beyond that, lack of appropriate storage technologies for onions has led to unacceptably high post-harvest losses, estimated at between 25 and 50 percent of the annual crop (Abu et al. 2006).

Domestic production challenges notwithstanding, onion has tremendous market potential in Ghana. It is consumed widely across all households, while population growth and the expanding hospitality industry will ensure sustained demand. However, according to the Greater Accra Onion Importers and Sellers Association, most consumers in Accra, Ghana's largest consumer market, prefer onions from Niger due to their yellowish color, better taste, and larger bulb sizes (Citi News 2017). Exploiting market potential would require a shift to all-year production and adoption of varieties preferred by consumers.

There have been some positive developments. Figure 1, which is based on official crop estimates, shows that production has gradually expanded over the last decade, driven largely by yield increases. Yields jumped significantly in 2017, the year PFJ was introduced, but returned to their longer-term trend in 2018 and 2019. Widespread flooding in 2018 also may have affected crop yields in that year (MoFA 2018). However, thanks to rapid expansion of onion cultivation—by about 1,000 ha in 2018 compared to 2017—production volumes continued to grow. The three-year average yield for onion during the PFJ era is 19 mt/ha. Although this level of productivity is much higher than during the pre-PFJ era, it remains significantly lower than levels seen in neighboring countries. It is also not evident why the unofficial studies of onion production in Ghana cited earlier reported much lower yields.

*Figure 1: Onion production, area harvested, and yields, Ghana, 2009-2019*


Source: MoFA (2019)

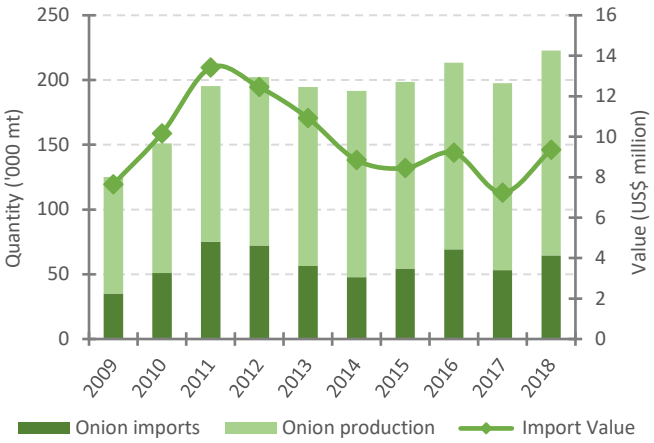
In the absence of a systematic program to develop and conduct trials of improved vegetable varieties, the Council for Scientific and Industrial Research (CSIR) has not developed any new onion varieties for several years (Robinson and Kolavalli 2010; van Asselt et al. 2018). As a result, some farmers have been recycling onion seeds, resulting in low yields and production. Despite this, onion production remains more profitable than that of staple crops, such as maize and rice (van Asselt et al. 2018). Furthermore, onion production provides employment opportunities for youth and women, in particular, and should be promoted to improve the income and livelihoods of smallholders (Balana et al. 2020).

## Domestic and International Trade

Ghana is a net importer of onion. Ghana's larger consumer markets are in Accra in the south and Kumasi in the middle of the country. With onion production concentrated in the north, and imports originating from Ghana's northern borders, there are significant opportunities for trade and spatial arbitrage. The Upper East region in the savannah zone is a particularly important feeder area from where domestically produced onion is aggregated and transported to consumer markets. However, with significant shortfalls in local production, large volumes of imports are needed to close the gap.

The value of onion imported into Ghana annually is thought to be the highest across all vegetables. However, poor regional trade monitoring, illicit trade, porous borders, and under-reporting makes it difficult to accurately estimate trade volumes. Hence, estimates vary significantly. Officially, onion imports are valued at around USD 52.9 million per year (van Asselt et al. 2018), but anecdotal evidence compiled by the Ghana Agricultural Producers and Traders Organization's (GAPTO) suggests imports from Burkina Faso and Togo alone could be worth over USD 120 million each year (Gonzales et al. 2014; Citi News 2017). International sources (UN-Comtrade 2020), by contrast, report onion import values of between USD 7 million and 13 million between 2009 and 2018 (Figure 2).

*Figure 2. Onion production and import from 2009-2018*



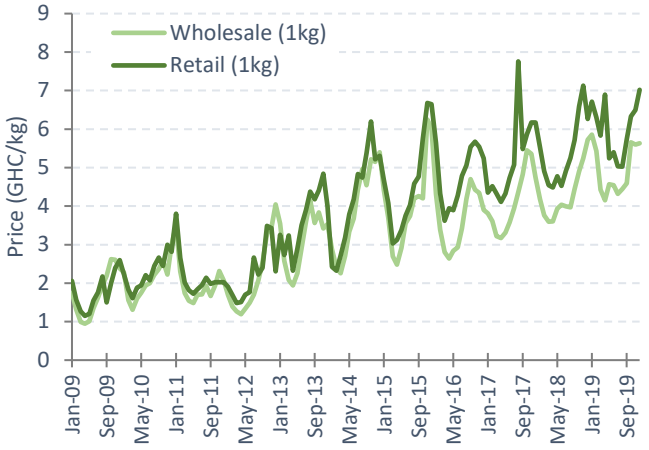

Source: FAOSTAT (2020) and UN-Comtrade (2020)

## Price Trends

We analyze monthly price data collected by MoFA's Statistics, Research, and Information Directorate (SRID) to gain a better understanding of market structure, trends, and seasonality. Figure 3 shows that retail and wholesale prices are highly correlated ($r$ = 0.97). The markup of retail over wholesale prices reflects the costs of handling and repackaging onion into smaller retail quantities. However, whereas the markup was around 13 percent between 2009 and 2016, it increased to 26 percent between 2017 and

2019. This coincides with the implementation of the PFJ program and may be associated with a relative decline in wholesale prices as on-farm production costs may have declined due to increased availability of subsidized fertilizer and onion seeds.

*Figure 3: Average wholesale and retail onion prices (nominal) in Ghana, 2009 to 2019*



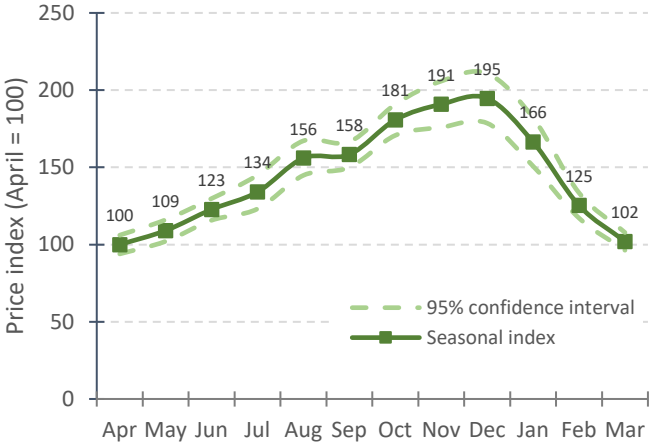

Source: MOFA (2019)

Onion production, like other vegetables in Ghana, is seasonal; therefore, prices tend to be lower immediately after harvest when supply is abundant but rise over the course of the marketing season. Compared to cereals, for example, onions are more perishable, and, hence, storage and temporal arbitrage opportunities are more limited, thus amplifying the seasonal price patterns. Most local production occurs from January to April. As such onion prices are lowest, on average, in April or May and peak in November or December.

To better understand price movements in Ghana's onion market, we apply a price decomposition method to isolate seasonal and trend components, which can be used to predict future price movements (Tschirley 1995). The multiplicative model defines price ($P_t$) at time t as $P_t = (T_t \times C_t) \times (S_t \times R_t)$. $T_t$ and $C_t$ are long-term trend and cyclical components, and $S_t$ and $R_t$ are short-term seasonal and random (or unpredictable) components. We apply the model to observed onion wholesale prices from 2006 to 2016, i.e., prior to the 2017 launch of PFJ, and then create a predicted price path for 2017 to 2019. The objective is to see whether price patterns after 2017 deviate from expected trends.

Our interest is in the short-term predictable ($S_t$) and unpredictable ($R_t$) variations from the long-term onion price trend ($T_t$). Figure 4 plots the seasonal index and associated confidence interval, where the latter is constructed from information in the random component. The April index value is arbitrarily set at 100. Prices are lowest during harvest in April and rise gradually through August to peak in December at 195. The interpretation is that onion wholesale prices, on average, will increase by 95 percent over the course of the marketing season. Price increases, of course, relate to the growing supply shortage over the course of the season, the gradual shift to more costly imported varieties, and the lack of appropriate storage facilities that would permit temporal arbitrage.

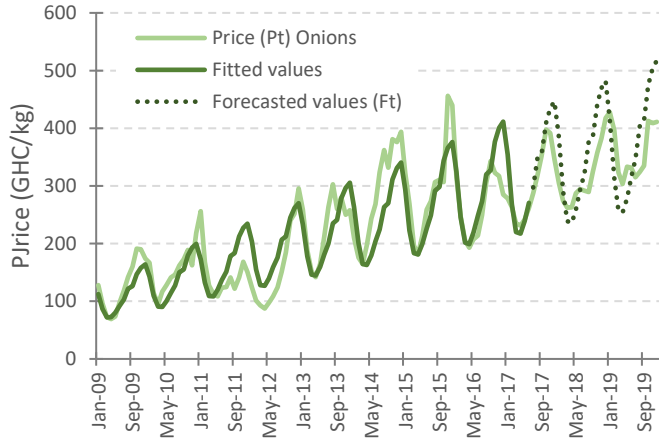
*Figure 4: Short-term seasonal onion price expectations ($S_t$)*




Source: MoFA (2019)

Figure 5 plots forecasted prices $F_t = T_t \times S_t$ against observed prices $P_t$. Since the model was calibrated against 2006 to 2016 prices, the forecasted values over this period give an indication of the goodness-of-fit of the model, while the comparison of the forecasted and observed prices for 2017 to 2019 reveal how the observed price deviated from the expected price path since the introduction of PFJ.

*Figure 5: Forecasted onion prices ($F_t$) against observed*




Source: MoFA (2019)

A few observations can be made. First, with respect to the goodness of fit of the model, we note that observed prices closely follow the predicted path. Secondly, the forecast for 2017 to 2019 also fits observed prices reasonably well, suggesting prices followed a predicted *pattern* each season. However, observed prices are marginally *lower* than predicted prices, which may be indicative of a slight downward pressure on onion farm gate prices as a result of increased supply and a decrease in production costs for input subsidy beneficiaries under the PFJ program.

## Conclusions

Ghana's flagship agricultural sector program, Planting for Food and Jobs (PFJ), has prioritized onion production. This prioritization is justified given the domestic market potential of onion, on one hand, and the production challenges farmers face, on the other. Onion is an important commodity from both a production and consumption perspective. With concerted support from government, private sector production can be expanded and opportunities for import substitution can be exploited.

Despite the significant disparities between official and unofficial estimates of onion production, the challenges facing the sector are evident. Main challenges on the production side include the lack of appropriate varieties available to farmers and the highly seasonal nature of production. Therefore, more research is needed to develop and disseminate high-yielding varieties that are preferred by consumers and explore options for extending the growing season. Post-harvest losses are another challenge facing the onion industry, and the availability of effective and affordable technologies to address this problem could encourage many producers to enter the onion sector.

Early indications are that the introduction of PFJ has resulted in a marginal increase in onion production and yields. However, prices remain highly seasonal, which suggests that complementary interventions may be needed to allow local farmers to compete year-round.

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