

Analysis of growth patterns in the African Onions Market

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Abstract

The Onions market in Africa is growing each year, showing economic potential. However, there has been no research on the growth patterns (acceleration, deceleration, stagnation) in onion production (yield, harvested area, and output) consumption and trade (export, export value, import, and import value) in the African market. Understanding these patterns can help investors and other market stakeholders make better informed production, consumption and trade decisions. This study analyzed 62 years of data (1961-2022) from faostat database across the various African regions: East Africa, West Africa, Southern Africa, North Africa, and Middle Africa using a log-quadratic model. The findings show that West Africa and Africa overall had stagnant growth in harvested area. East Africa, Middle Africa, North Africa, and West Africa experienced rapid yield growth, while Southern Africa's growth was slow. Middle Africa, Southern Africa, and West Africa had stagnated output growth. Southern Africa also saw slow import growth and West Africa had slow export value growth. Middle Africa faced stagnant import value, and Southern Africa had slow consumption growth. The study suggests investing in areas with slow growth in yield, output, exports and consumption.

Key words: Acceleration, Deceleration, Stagnation, North Africa, Middle Africa, Southern ,Africa, East Africa, West Africa

Introduction : The vegetables market in Africa as at 2025 was projected to exceed revenues of \$113 billion with an expected annual growth rate of 10.51% from 2025 to 2030 (Index box, 2026) . While the onions market is considerably smaller, it remains an essential and influential component of the continent's agricultural and economic framework. Onions generally command a higher price than certain other produce, including tomatoes, particularly in export markets, due to their prolonged shelf stability and transportability over great distances. Nevertheless, onion prices are highly volatile and can vary significantly due to factors such as seasonal supply, storage methods, and transportation hurdles (Yadav, Kushwaha, Supriya & Singh, 2025). The Significance of onions within the African economy lies in income generation thus; cultivation of onions is a crucial income source for millions of smallholder farmers throughout Africa, from a nutritional standpoint, onions are rich in chemicals that can help protect the heart, lower risks of some cancers and make it easier for the body to make insulin (Gupta, Kaldete, Volaguthala & Mahajan, 2025). They are vegetables that belong to the genus *allium* and are closely related to garlic, shallots, and leeks (Nicastro, Ross & Miller, 2015). The average person consumes roughly 10 kilogram of this versatile food per year and can be eaten raw, cooked, pickled, or powdered (Cattivelli, Conte, Martini & Tagliazucchi, 2021). In addition, the production of onions enhances food security; education and health care; thereby generating considerable socio-economic effect for agricultural communities. More importantly, onions cultivation also generates jobs for many individuals because onion farming is heavily labour intensive. Some key studies on acceleration, deceleration and stagnation show that global agricultural productivity has increased. However the rate of growth has stagnated in significant areas. For example, major crops such as soybeans, rice, maize and wheat have experienced 24-39% slow or stagnated yields

(Schauberger, Ben-Ari, Makowaki, Kato, Kato & Ciaisi, 2018; Gerber, Ray, Makowski, Butler, Mueller, West, Johnson, Polasky, Samberg, Siebert & Sloat, 2024). Implying that while global aggregate yield growth has not experienced clear deceleration, regional and crop-specific stagnation is more evident (Fuglie, 2018; Baffes & Etienne, 2024). Accordingly, within Asia; India and China the countries with the largest global population have experience a mix of acceleration and stagnation. In China for instance, half of rice and maize area have stagnated, while wheat yields are accelerating (Sheng, Tian, Qiao & Peng, 2019; Madhukar, Kumar & Dashora, 2020). In India, crop yields have experienced deceleration following the Countries post-economic reforms; while more recently stagnation in maize, wheat and rice have occurred (Khan, Ansari & Ali, 2022; Gupta & kannan, 2024). With respect to Africa, the sub-Saharan Africa region largely experienced decelerated yield growth in the 1960s; followed by acceleration in the 1980s due largely to policy reforms and increased research and development; however, patterns of growth are skewed, with some regions experiencing persistent stagnation (Adetutu & Ajayi, 2020; Myeki, Bahta & Matthews, 2022).

In general, drivers of acceleration, deceleration and stagnation include technological changes that advance the pace of agricultural growth; but this pace of growth is slow in some regions (Liu, Wang, Yang, Rahman & Sriboonchitta, 2020). In the same vein, climate change has slowed global agricultural growth by about 21% since the 1960s, and is heightened in warmer regions particularly Africa (Hoffman, Kemanian & Forest, 2020), while environmental degradation as well as land and water limitations further contribute to stagnation on the continent (Rahman, Anik & Sarker, 2022). Policy reforms on agriculture and investment in human and infrastructural capital also influence the pace of growth

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leading to labour shifts; with acceleration experienced in some regions and stagnation in other regions attributed to policy gaps and misplaced priorities (Heinen, 2022). The consequence of stagnation and deceleration in agricultural growth in Africa appears in food insecurity, poor rural welfare and weak economic development; suggesting that regions that experience accelerated growth tend to see improvements in food supply, rural development and poverty alleviation (Rada, Helfand & Magalhães, 2019; Antia-Obong, Hubbard & Garrod., 2021; Hemathilake & Gunathilake, 2022). During the 2016 Africa Green Revolution Forum, key note speech in Nairobi, Akinwumi Adesina the then president of the Africa Development Bank noted that Africa should be able to feed itself as well as be the bread basket for the world due to the continent holding about 65% of all arable land in the world. Accordingly, he further buttressed his position as follows; *“Accelerating agricultural production will reduce the food import bills, revive the rural economies, slow down rural to urban migration, expand foreign earnings and create jobs especially for the youth”* It is on this premise that this study investigates the pace of growth in the African onions markets in order to identify the patterns of growth (acceleration, deceleration, stagnation) in onions production, consumption and trade using the five broad regions that make up the African continent. By so doing, the study addresses a considerable knowledge gap in the empirical literature because most studies on agricultural growth patterns focus on individual countries or regions; hence, comparative studies across different continental regions are limited. Furthermore, research on growth patterns can help inform both national and regional policies. For example, crops experiencing accelerated growth may lead to targeted investment interventions, while deceleration and stagnation highlights areas needing support. For instance, the modelling of climate change adaptation, may guide crop selection and land use to mitigate deceleration and stagnation caused by environmental stress (Bryne, Efreteui., Walz & Clay, 2020; Ekwere, Udounang, Efreteui & Umoh, 2023; Ekwere, Efreteui, Udounang & Akpaninyang, 2023; Feng, Tian, Cong & Zhao, 2023; Efreteui, Udoh & Ekwere, 2024; Ben, Udounang, Efreteui, Ekwere & Effiong, 2024; Taniushkina, Lukashevich, Shevchenko, Belalov, Sotiriadi, Narozhnaia, Kovalev, Krenke, Lazarichev, Bulkin & Maximov, 2024). Likewise, stagnation and deceleration in agricultural growth has been linked to poor public investment; leading to policy recommendations that clearly show the need to boost capital formation in the affected sectors (Udoh & Offor, 2020; Akber & Paltasingh, 2021; Udoh, Antia-Obong & Udo, 2022; Udoh, 2022; Patrick, Ataire & Sunday, 2024; Okon, Ataire & Ernest, 2026; Ataire, Umoh, Antia-Obong & Akpaeti, 2026; Ataire & Okon, 2026; Ataire, Ataire & Otoy, 2026; Udoh, Okon & Ekong, 2026). Hence, the little or no research on onions growth patterns across regions on Africa presents a clear contextual gap. By investigating growth patterns in this context, it is possible to better inform policy outcomes specific to the regions in focus that may not apply to other geographical areas possibly due to socio-economic or political conditions. Accordingly, the following study objectives are to: examine the patterns of growth in area, yield and output of onions across the five regions and the four periods; assess the patterns of growth for onions consumption across the five regions and the four periods; analyze the

patterns of growth in onions trade (export and import) across the five regions and the four periods; estimate the patterns of growth in onions trade (export value and import value) across the five regions and the four periods

Methodology: Study area : The study area is the African Continent covering a total land area of about 30.37 million Km² (Ngundu & Cilliers, 2025), Africa is divided into five regions, namely; West Africa, North Africa, East Africa, Central or Middle Africa and Southern Africa. Each region has some form of economic bloc and often develops common economic policies aimed at driving development in the region.

Data Source: The study made use of secondary data from the Food and Agriculture Organization of United Nations statistical database (*Faostat*). The dataset covered 1961 to 2022 a total period of 62 years. The data for area harvested was measured in hectares, data on yield was measured in kilogram per hectare, data on onions output was measured in tonnes. In addition, data on consumption, import and export was measured in tonnes, while value of export and import was measure in United States dollars.

Modelling Patterns of growth: In order to determine the three patterns of growth i.e. acceleration (rapid growth), deceleration (slow growth) and stagnation (absence of acceleration or deceleration), the log-quadratic model is generally fitted for this our purpose (Antia-Obong & Otung, 2019; Antia-Obong, 2019; Antia-Obong, Eno & Obot, 2024).

The log-quadratic model is fitted as follows:

$$LNY_{t(1,2,3)} = b_0 + b_1t + b_2t^2 + e \text{ -----} \\ \text{-----} (1)$$

Where,

$LNY_{t(1)}$ = Natural logarithm of onions area measured in hectares

$LNY_{t(2)}$ = Natural logarithm of onions yield measured in kg/hectare

$LNY_{t(3)}$ = Natural logarithm of onions output (production) measured in tonnes

$$LNY_{t(4,5)} = b_0 + b_1t + b_2t^2 + e \text{ -----} \\ \text{-----} (2)$$

$LNY_{t(4)}$ = Natural logarithm of onions export measured in tonnes

$LNY_{t(5)}$ = Natural logarithm of onions import measured in tonnes

$$LNY_{t(6,7)} = b_0 + b_1t + b_2t^2 + e \text{ -----} \\ \text{-----} (3)$$

$LNY_{t(6)}$ = Natural logarithm of onions export value measured in US dollars

$LNY_{t(7)}$ = Natural logarithm of onions import value measured in US dollars

$$LNY_{t(8)} = b_0 + b_1t + b_2t^2 + e \text{ -----} \\ \text{-----} (3)$$

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$LN Y_{t(8)}$ = Natural logarithm of onions consumption measured in tonnes

b_0 = estimated constant regression line for each period

b_1 = estimated growth coefficient for each period

b_2 = estimated quadratic growth coefficient for each period

t = linear time trend for each period

t^2 = quadratic time trend for each period

Accordingly, the quadratic time trend (t^2) measures acceleration, deceleration and stagnation; as such, the coefficient of interest in the quadratic model is (b_2).

Therefore, acceleration is determined when (b_2) is positive and statistically significant; deceleration is determined when (b_2) is negative and statistically significant; while stagnation is determined when (b_2) is either negative or positive but not statistically significant.

Results and Discussion: Table 1; show the patterns of growth for area, yield and output of onions for the five African regions and the four periods. The results for the pooled period covering 62 years reveal that East Africa and Northern Africa experienced rapid growth in area, yield and output. This finding means that in both regions, rapid growth in onions output was accompanied by rapid expansion in area harvested and output. Epule, Chehbouni & Dhila (2022) also found that between 1961 to 2019, a 58 year period; maize yields across Africa increased, while in East Africa maize yields and area were positively correlated and was the reverse in North Africa, indicating that production growth was less dependent on land expansion. Middle Africa experienced slow area growth, accompanied with rapid yield growth and stagnated output, this finding suggests that the Middle African onions market is somewhat efficient due to rapid yield growth and slow area growth. Implying that as area was rapidly slowing; yield was rapidly growing, albeit with a stagnated output. Southern Africa on the other hand experienced the reverse wherein onion harvested area rapidly expanded, while yield growth was slow and output stagnated. According to Dabalén, Fuglie & Goyal (2026), area expansion rather than yield gains are how agricultural growth occurs in Sub-Saharan Africa in stark contrast to other regions in the world that are transitioning to yield growth. West Africa equally showed levels of efficiency due to area harvested stagnating and yields rapidly growing but with stagnated output. On the whole, the pattern of onions growth in Africa show that while area harvested stagnated, yield and output experienced rapid growth. In a closely related study on growth trends in African onions market, Antia-Obong, Akpaeti, Atairet & Marcus (2025) applied the log-linear model to estimate compound growth rates in onions production, consumption and trade. The study findings diverge and showed that growth rate in onions yield has not kept up with growth in harvested area across Africa, despite Africa experiencing increased growth in consumption and trade. Table 2 show the patterns of onion export and import quantity growth across Africa regions; the pooled period reveal that East Africa, North Africa and Africa experienced rapid growth in the export and import of

onions over the 62 years covered in the study. Middle Africa, West Africa and Southern Africa experienced stagnated, slow and accelerated export growth respectively; while Southern Africa is the only region where import was slow. According to (Yeshiwas, Alemayehu & Adgo, 2024; Lugreyt, Sahaly & Batash, 2026), North Africa experienced rapid export growth with Egypt and Algeria leading, while East Africa experienced strong trade growth with Ethiopia leading. The findings indicate that stagnated and slow export growth may be attributed to post-harvest losses coupled with a weak market infrastructure and low productivity (Abirha, Emana & Gegre, 2020; Yeshiwas, *et al.*, 2024).

The value of export and import as shown in table 3 reveal similar growth patterns with export and import quantity for the pooled period. The only exception being Middle Africa where export value accelerated and import value stagnated. Export value is a product of exported quantity and price, hence accelerated export value in Middle Africa may be due to lower prices of onions in the region that encouraged rapid export demand for onions from Middle Africa and due to possible lower domestic prices, import value for onions stagnated because onions from abroad is more expensive. In addition, Boneudi, Kamasa & Opoku, (2020), reveals that minimizing the paperwork needed for trade and cutting down on delays for exports and imports greatly enhances food security results in countries throughout Africa, with the greatest benefits achieved by simplifying the processes for complying at borders.

Table 4 reveal the growth pattern in onions consumption across African regions. The pooled period show that onions consumption has been rapidly growing over the 62 years covered in the study, the only region where onions consumption has witnessed slow growth is Southern Africa. This finding points to the growing importance of onions in the everyday diet of Africans due to their relative affordability and availability. In addition, Mehraban & Ickowitz, (2021) posits that the slow consumption growth in Southern Africa may be attributed to urban developments and specialized farming practices that are prevalent in Southern Africa, that may decrease the local production of a variety of foods, resulting in a lesser consumption of fruits, vegetables and legumes, even with increasing income levels.

Conclusion: The study set out to investigate if production, consumption and trade is accelerating, decelerating or stagnating in the African onions market. The key findings reveal that over the 62 years covered in the study; area, yield and output experienced accelerated growth in East Africa. The implication of the finding is that East Africa experienced rapid expansion in area under onion production which may likely have contributed to the rapid growth in yield and output. Middle Africa and Northern Africa revealed rapid growth in yield when area was decelerating; implying that as the rate of area expansion was slowing, yield was experiencing rapid growth; suggesting that Middle Africa uses less land yet still maximizes onions yield. Southern Africa performed rather poorly, since rapid area growth was accompanied with slow yield; implying that the region suffers from technological gaps in onions production. West Africa also showed levels of technical know-how since stagnated area growth accompanied rapid yield growth; implying possible improved technology adoption in the region. In general, onions production on the African continent

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reveals that stagnated land resources accompanied accelerated yield and output growth. Implying that technological know-how overtime exist in the production of onions on the continent. In addition, export on the continent experienced stagnated and slow growth in Middle Africa and West Africa respectively. Southern Africa showed slow growth in onions import, suggesting that the region may be self-sufficient in onions production as well as experience slow onion consumption growth in the region. The study recommends technological changes in land use to reduce the rapid area expansion in East Africa, North Africa and Southern Africa. Furthermore, there is need for investment in onion yielding initiatives in order to accelerate onion yields particularly in Southern Africa.

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Table 1: Patterns of onions area, yield and production growth across Africa regions

Regions	Period I (1961-1980)			Period II (1981-2000)			Period III (2001-2022)			Pooled (1961-2022)		
	A	Y	P	A	Y	P	A	Y	P	A	Y	P
EA	-0.0039*** DE	0.0009 ST	-0.0030*** DE	0.0014*** AC	0.0002 ST	0.0016*** AC	-0.0021*** DE	0.0011*** AC	-0.0009*** DE	0.0002*** AC	0.0001*** AC	0.0003*** AC
MA	-0.0025 ST	0.0029* AC	0.0005 ST	-0.0018*** DE	0.0022*** AC	0.0004 ST	0.0036*** AC	-0.0026*** DE	0.001 ST	-0.0007*** DE	0.0007*** AC	-0.0001 ST
NA	0.0000 ST	0.0014* AC	0.0014 ST	0.0014** AC	-0.0004 ST	0.0009 ST	-0.0013*** DE	-0.0009*** DE	-0.0023*** DE	0.0004*** AC	0.0002*** AC	0.0006*** AC
SA	-0.0021** DE	0.0016* AC	-0.0005 ST	0.0008** AC	-0.0001 ST	0.0007 ST	-0.0009** DE	-0.0007*** DE	-0.0017*** DE	0.0001** AC	-0.0001* DE	0.0000 ST
WA	0.0013** AC	0.0032*** AC	0.0046*** AC	0.0005 ST	0.0008 ST	0.0012 ST	-0.0013 ST	0.0012 ST	-0.0001 ST	-0.0004 ST	0.0005* AC	0.0001 ST
AF	-0.0012** DE	0.0023*** AC	0.0011 ST	0.0005 ST	0.0004 ST	0.0009 ST	-0.0014 ST	-0.0001 ST	-0.0015*** DE	0.0000 ST	0.0004*** AC	0.0005*** AC

ST= stagnation, AC = acceleration, DE= deceleration. A=area harvested, Y=yield, P= production output

EA= East Africa, MA= Middle Africa, NA= North Africa SA= Southern Africa, WA= West Africa AF= Africa

***indicate 1% level of significance, **indicate 5% level of significance, *indicate 10% level of significance.

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Table 2: Patterns of onions export and import quantity growth across Africa regions

Regions	Period I (1961-1980)		Period II (1981-2000)		Period II (2001-2022)		Pooled (1961-2022)	
	Export	Import	Export	Import	Export	Import	Export	Import
EA	0.0065**	0.0012	0.0037	0.004***	-0.0012	-0.0022*	0.002***	0.0029***
	AC	ST	ST	AC	ST	DE	AC	AC
MA	-0.0542***	-0.0024*	0.0071	-0.0016	0.0298***	-0.0037*	0.0012	0.0009***
	DE	DE	ST	ST	AC	DE	ST	AC
NA	-0.0042**	-0.0242**	-0.0035	-0.016	0.0017	-0.0099**	0.0020***	0.006***
	DE	DE	ST	ST	ST	DE	AC	AC
SA	-0.0036	0.0166	0.0025	-0.0000	-0.0002	0.0034	0.0019***	-0.0029***
	ST	ST	ST	ST	ST	ST	AC	DE
WA	-0.0082	0.0029***	0.0049	0.0023	0.0002	-0.0011	-0.0006**	0.0011***
	ST	AC	ST	ST	ST	ST	DE	AC
AF	-0.0035**	0.0021**	-0.0011	0.0022	0.0011	-0.0014*	0.0017***	0.0014***
	DE	AC	ST	ST	ST	DE	AC	AC

ST= stagnation, AC = acceleration, DE= deceleration

EA= East Africa, MA= Middle Africa, NA= North Africa SA= Southern Africa, WA= West Africa AF= Africa

***indicate 1% level of significance, **indicate 5% level of significance, *indicate 10% level of significance.

Table 3: Patterns of onions export and import value growth across Africa regions

Regions	Period I (1961-1980)		Period II (1981-2000)		Period II (2001-2022)		Pooled (1961-2022)	
	Export Value (\$)	Import Value (\$)	Export Value (\$)	Import Value (\$)	Export Value (\$)	Import Value (\$)	Export Value (\$)	Import Value (\$)
EA	0.0095***	0.0066***	0.0055*	0.0037**	-0.0004	-0.0044***	0.0012***	0.0018***
	AC	AC	AC	AC	ST	DE	AC	AC
MA	-0.0311***	0.0021*	-0.0058	-0.0033	0.0132	-0.0065***	0.0014*	-0.0000
	DE	AC	ST	ST	ST	DE	AC	ST
NA	-0.0057**	-0.0186	-0.006**	-0.0077	-0.0097***	-0.0103*	0.0019***	0.0046***
	DE	ST	DE	ST	DE	DE	AC	AC
SA	0.0018	0.0221*	0.003	-0.0021	-0.0043**	-0.0025*	0.0014***	-0.0027***
	ST	AC	ST	ST	DE	DE	AC	DE
WA	-0.0101**	0.0089***	0.0092	-0.0021	-0.0003	0.0006	-0.0011***	0.0004***
	DE	AC	ST	ST	ST	ST	DE	AC
AF	-0.0039*	0.0068***	-0.0014	-0.0013	-0.0074***	-0.0017**	0.0014 ***	0.0006***
	DE	AC	ST	ST	DE	DE	AC	AC

ST= stagnation, AC = acceleration, DE= deceleration

EA= East Africa, MA= Middle Africa, NA= North Africa SA= Southern Africa, WA= West Africa AF= Africa

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Table 4: Patterns of onions consumption growth across Africa regions

Regions	Period I (1961-1980)	Period II (1981-2000)	Period III (2001-2022)	Pooled period (1961-2022)
	Consumption	Consumption	Consumption	Consumption
EA	-0.0026***	0.0013***	-0.0001	0.0005***
	DE	AC	ST	AC
MA	0.0036**	0.0034***	0.0012	0.0007***
	AC	AC	ST	AC
NA	0.0013	0.0006	-0.0028***	0.0006***
	ST	ST	DE	AC
SA	-0.0002	0.0007*	-0.0017***	-0.0002***
	ST	AC	DE	DE
WA	0.0011***	-0.0008	-0.0008*	0.0006***
	AC	ST	DE	AC
AF	0.0009*	0.0003	-0.0018***	0.0005***
	AC	ST	DE	AC

ST= stagnation, AC = acceleration, DE= deceleration

EA= East Africa, MA= Middle Africa, NA= North Africa SA= Southern Africa, WA= West Africa AF= Africa

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