Africa's agrifood trade: The state of play

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Introduction

The role of trade in food and nutrition security has sparked considerable debate, especially in Africa. The proponents of protectionism argue that some trade restrictions are necessary to foster local production and achieve food self-sufficiency, which they believe is key to ensuring food and nutrition security. Conversely, the advocates of trade liberalization view trade as vital to food and nutrition security, as it enables people to access a wider variety of affordable food options, thereby enhancing food security and dietary diversity. This discussion has been heightened by the recent events, including the Russia–Ukraine conflict and the rise of noncooperative trade policies in various countries, prompting more nations to advocate for food self-sufficiency or sovereignty.

The debate over the role of trade in achieving food and nutrition security in Africa has triggered another discussion on the level of Africa agrifood trade, and especially the level of intra-African trade. According to many analysts and institutions, the latter is particularly low (Brenton and Isik, 2012; Barka, 2012; UNECA-AfDB, 2010), with estimates of the share of intra-continental trade ranging from 10 to 18%. Yet another strand of the academic literature comes to a different conclusion. Foroutan and Pritchet (1993) find no evidence of Africa's low level of intraregional trade once countries' levels of development (income levels) are considered. Furthermore, Iapadre and Luchetti (2009) pointed out the biases related to the use of trade shares as a measure of trade integration and proposed more refined indicators which tend to show that the integration of Africa's regional trade is relatively high (Bouet et al; 2017). In addition, Bouet et al (2020) highlighted the importance of informal cross border trade which is pervasive in Africa and absent from most official trade statistics.

Against the aforementioned backdrop, the objective of this report is to establish a state of play of African trade by giving the most accurate picture possible and propose a typology of countries in terms of their degree of openness. It is preliminary work, the first in a series of documents, to pave the way for an in-depth analysis of the role of trade and trade policies in achieving food security and improved diets in Africa. The analysis is based on the rigorous exploitation of the best available data on trade in Africa (formal and informal), the use of the best analytical tools (gravity models) as well as recent indicators for measuring regional integration.

The report is organized as follows. In the next section we set the scene by presenting an overview of the complex (positive and negative) links between trade, food security and nutrition. We then analyze Africa agrifood trade, examining first international flows, then regional patterns. In the following section we formally test whether Africa is "undertrading" or not. We next establish a typology of countries according to their degree of self-sufficiency and openness. The fifth - and final- section of the report provides some conclusions and recommendations.

Trade, food security and nutrition

Evolution of food security

The failure of agri-food systems in several African countries have led to an increase in poverty and in food and nutrition insecurity (AGRA 2023). These failures are the consequence of the inability of agri-food systems to provide sufficient food for populations. As such, as can be seen in Figure 1 below, the prevalence of severe food insecurity has continued to increase over the past decade. In countries like Kenya and Nigeria whose figures are well above the continent average, the ratio has increased by 13 percentage points, respectively. In absolute terms, these increases represent 8.4 and 34.2 million people. More broadly, over the past decade 110 million additional people have been suffering from severe food insecurity in Africa.

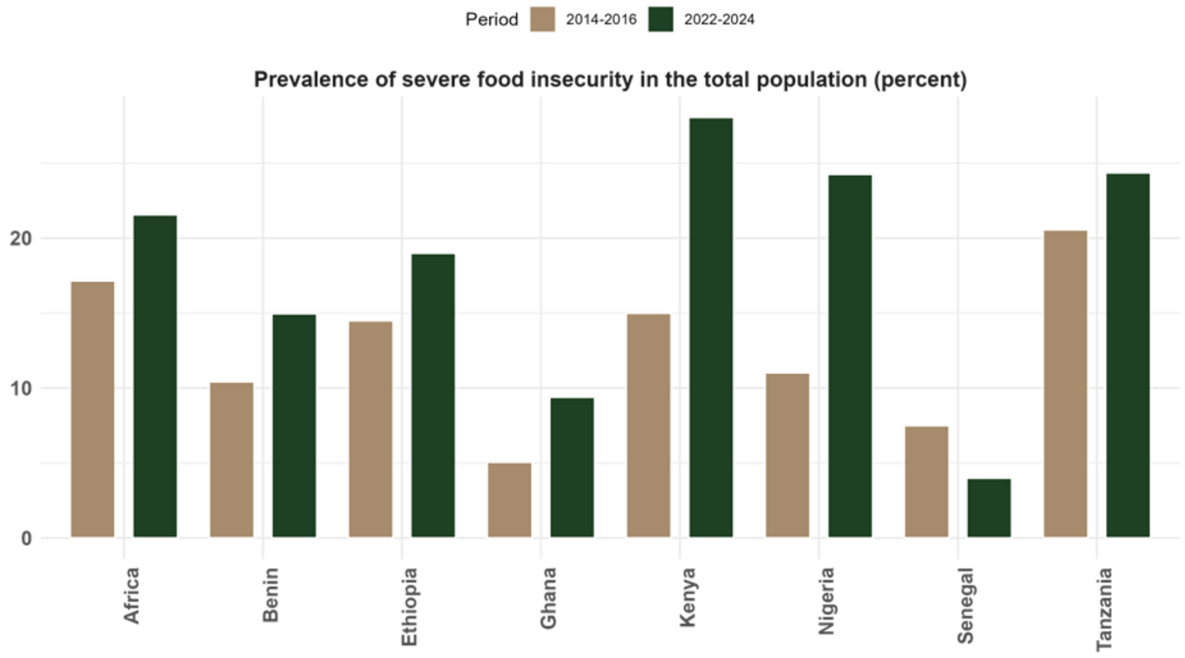
High rates of food insecurity and sub-optimal dietary outcomes stem from several factors, such as poor agricultural practices, the lack of quality production inputs, and climatic and environmental aspects (IPCC 2019). The economic slowdown exacerbated by Covid-19 has also been a major driver of the increase of food insecurity (SOFI,2021). Indeed, in 2020, the number of additional people moderately or severely food insecure more than doubled relative to 2019, and the prevalence of severe food insecurity rose as much as in the previous three years combined.

Meanwhile, the percentage of children under 5 years of age who are stunted has been decreasing in Africa between last two decades (Figure 2). Indeed, stunting prevalence has been falling in Africa since 2000, with Ghana, Ethiopia and Kenya performing well above the continental average. However, despite progress, stunting prevalence is decreasing slowly (-0.25 percentage point per year during the past decade) and it even increased between 2022 and 2024, probably also exacerbated by COVID-19. Therefore, the continent is off track to meet the 2030 SDGs target for stunting among children under five years.[1]

[1] Stunting is a complex outcome which is the result of poor maternal health and nutrition, inadequate infant and young child feeding practices, and repeated infections interacting with a variety of other factors over a sustained period (FAO, AU, WFP and UNECA, 2023).

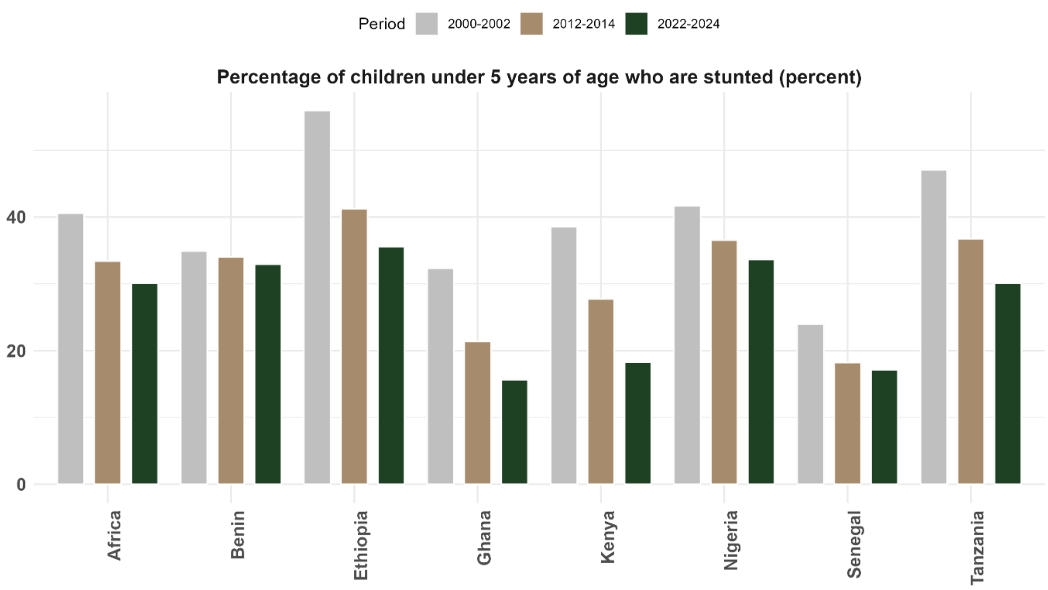
While stunting reflects chronic malnutrition, child wasting represents acute malnutrition caused by insufficient nutrient intake or absorption with potentially life-threatening risks. The prevalence of wasting among children under five years of age has also been decreasing since 2000 in Africa, falling from 8.0 to 5.5% (Figure 3). However, the continental decline has not been homogenous across countries. In Ghana, Kenya and Senegal, the prevalence has increased at the end of the period, exacerbated by the COVID-19 pandemic and its consequences.

Figure 1: Prevalence of severe food insecurity in total population (in percent)



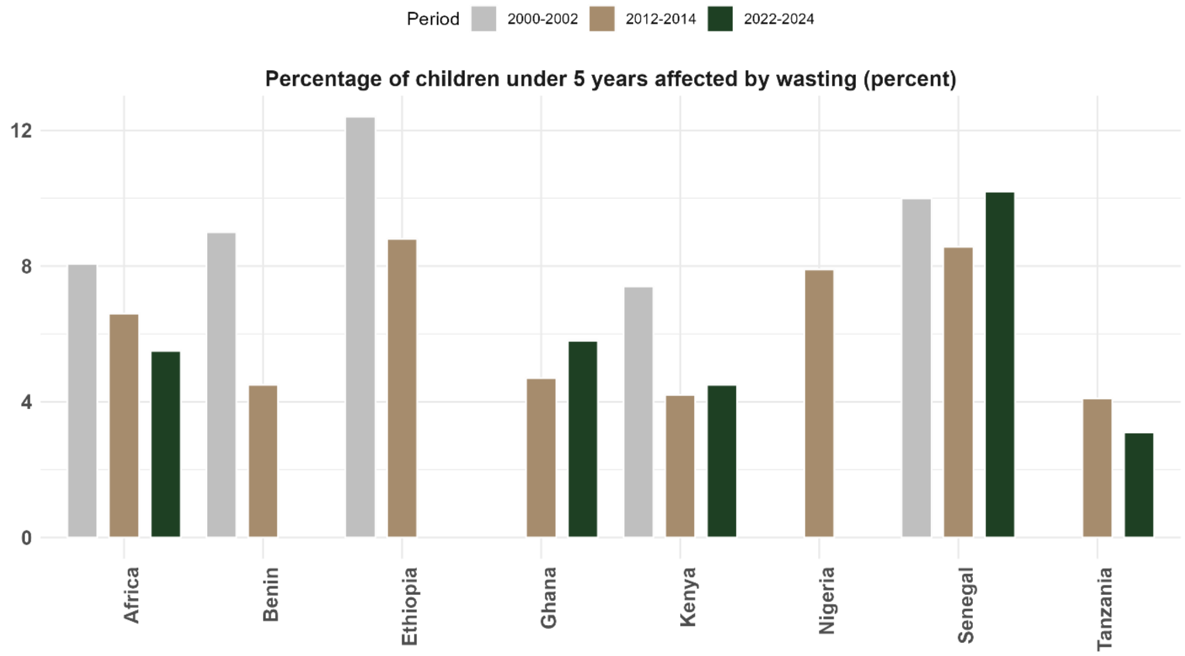
Source: Authors calculations using FAOSTAT (2025).

Figure 2: Prevalence of children under 5 years of age who are stunted (percent)



Source: Authors calculations using FAOSTAT (2025).

Figure 3: Prevalence of children under 5 years affected by wasting (percent)

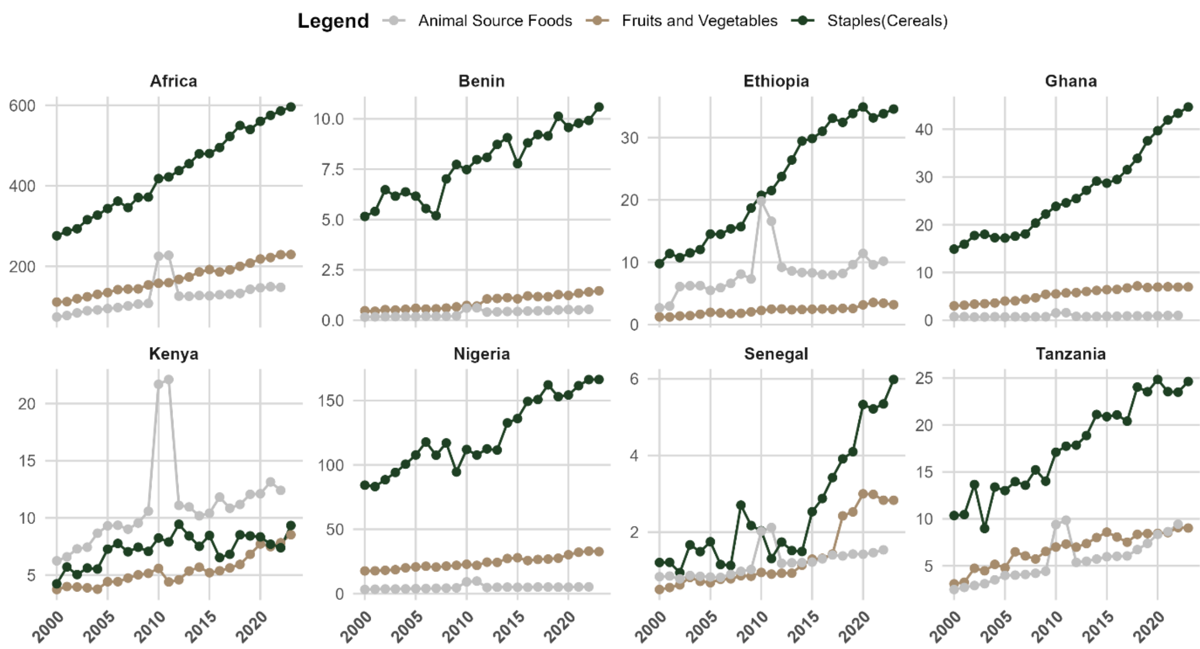


Source: Authors calculations using FAOSTAT (2025).

Paradoxically, the deterioration of food security indicators is occurring in a context in which we are observing an increase in agricultural production and yields across the continent. Figures 4 and 5 below present the evolution of production of different food groups. It is noted that the most produced food group in Africa is staples. Production continues to increase steadily, except in 2008 when it declined due to the global food price crisis that drove the increase of seed and fertilizers and limited access to credit for poor farmers (FAO,2009). The production and yields of staple are not stable due to climate change that is affecting productivity (IPCC,2019).

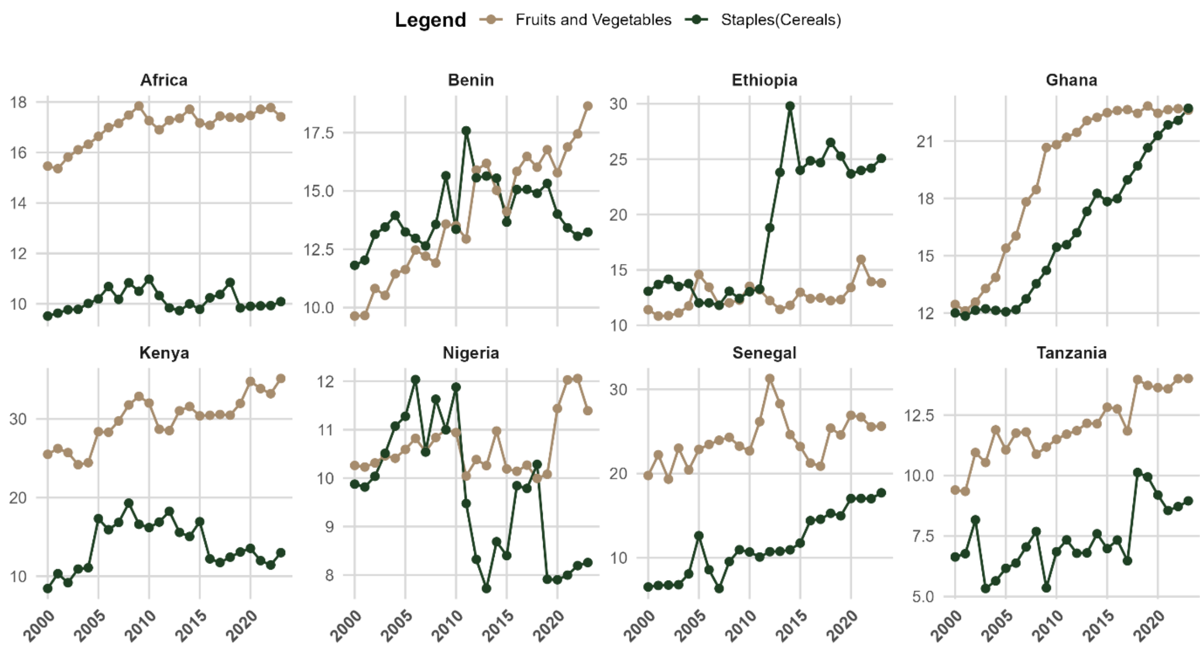
At the country level, we observe the same patterns apart from Kenya where the production of animal source food is the most important. Indeed, with the urban population share continuing to increase, the demand for animal-based foods will grow continuously and livestock farming will likely become the most important sector of agriculture (FAO, 2019). Figure 5 highlights the high variability of the yield of fruits, vegetables and staple foods over the period, amplified by climate change (IPCC, 2019). At the country level, yield instability is most pronounced in Nigeria, Ethiopia and Tanzania for staple foods.

Figure 4: Evolution of agricultural production (in millions of tons)



Source: Authors calculations using FAOSTAT (2025).

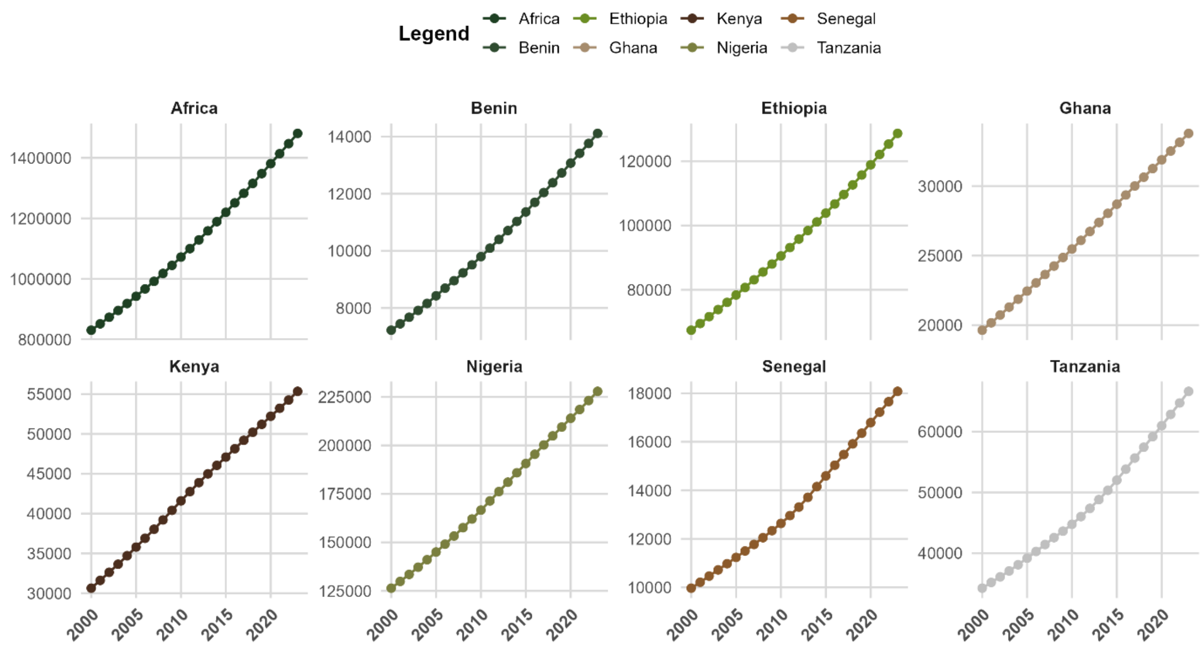
Figure 5: Evolution of agricultural yield (in tons/ha)



Source: Authors calculations using FAOSTAT (2025).

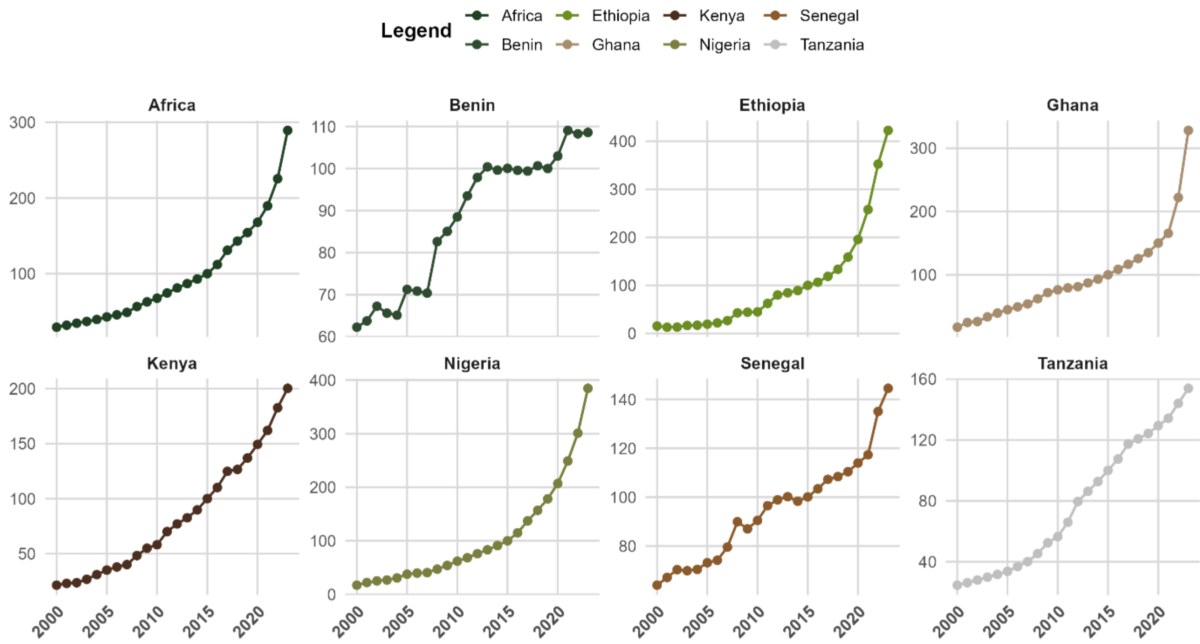
Parallel to the continuous increase in production, the population growth has been slowing over time. Indeed, as Figure 6 shows, population growth in Africa is lower than that of agricultural production. While between 2000 and 2023, the production of staples and fruits and vegetables more than doubled, population had increased by only 78%, highlighting an access issue. In several African countries, the population is growing at a slower rate than agricultural production. In Benin, for example, aggregate population growth between 2000 and 2023 is 95.4% (Figure 6). Meanwhile, agricultural production of staple foods, fruit and vegetables has more than doubled. In countries such as Ethiopia, Ghana, Kenya, Senegal and Tanzania, staple food and fruit and vegetable production have more than doubled, while the population is growing at a slower rate. Only Nigeria constitutes an exception with the evolution of its fruit and vegetable production close to that of the population (80.3%). Despite this increase in production per capita, African countries continue to import staple foods (rice, maize, wheat, etc.) due to the combined effects of high demand linked to population growth, food losses and the abovementioned access issues (AGRA, 2022. In addition, there has been upward pressure on relative agricultural prices (see Figure 7), which are most often above the general price index, further preventing access to food and weakening food security.

Figure 6: Population dynamic in Africa (in thousands)



Source: Authors calculations using FAOSTAT (2025).

Figure 7: Evolution of food price index in Africa (base year 2015=100)

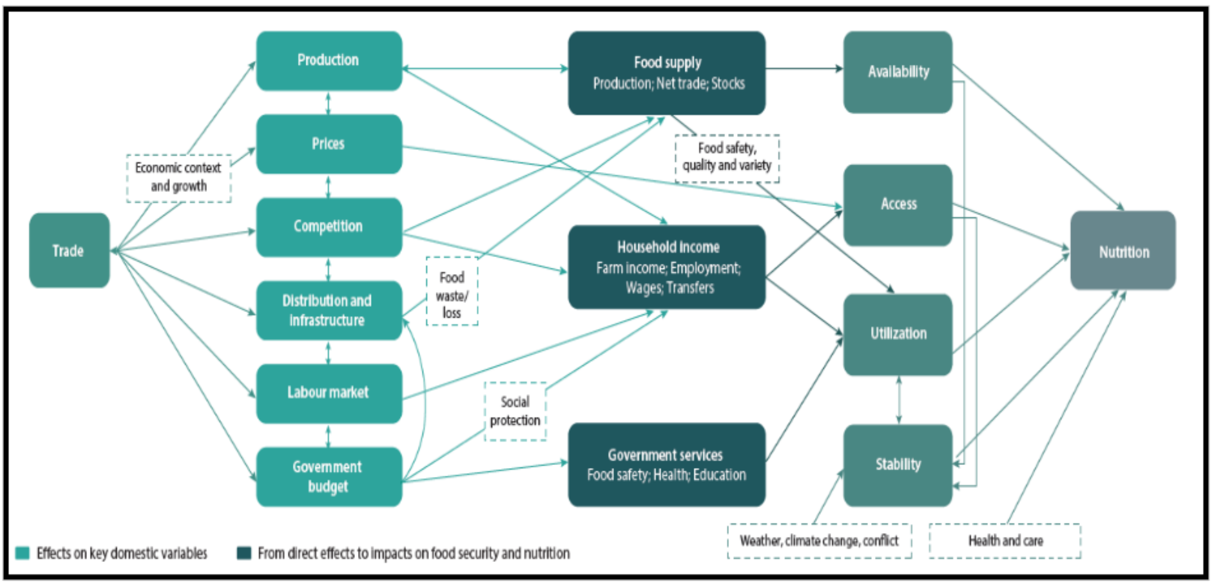


Source: Authors calculations using FAOSTAT (2025).

The complex links between trade, food security and nutrition

The links between trade, food security and nutrition are complex (figure 6), based on multiple channels of interaction that simultaneously affect the different dimensions of food security: availability, access, utilization and stability (FAO, 2017; Sukanya 2024). As illustrated in figure 6 below, trade development, through trade policies that promote the opening of economies, can address distributional problems, particularly in countries with limited biophysical resources (d'Amour and Anderson 2020). Indeed, the availability of agri-food products on local markets depends on both domestic production and external supplies.

Figure 8: Trade links for food security



Source: FAO (2017).

Let us first consider food availability. The goal of opening an economy to more international trade is to increase the quantity of food available to consumers, either by complementing or substituting for some domestic production. Trade improves availability in two ways: it brings in new types of foods and increasing the total amount of food products. With climate change, we expect disruptions in both production and trade in many areas in the world because of shifting comparative advantages. In Africa, where the difficulties are expected to be significant, trade can be extremely important in mitigating the effects of these disruptions and preserving food supplies (Gouel and Laborde, 2021). However, according to opponents of trade liberalization, the impact of increased trade on food supply is complex and sometimes risky. Dependence on international markets might make local markets more vulnerable to volatility and price shocks. Furthermore, a few numbers of exporting nations control a large portion of the world's markets, and during times of crisis, they may use trade restrictions that hurt net importing countries.

The second channel concerns food accessibility, which includes both financial and physical dimensions. Physically, low transaction costs and strong infrastructure are required for trade to transfer and store food from places with surplus to those in deficit. Economically, it is expected that trade will result in more affordable food options by leveraging arbitrage possibilities and producing food depending on each nation's comparative advantages. Furthermore, nations can purchase more nutrient-dense food for their people by using the money they make from exporting items for which they have a comparative advantage. This viewpoint is similar to people balancing the use of comparative advantage to increase market sales and obtain higher-quality food, against the inherent or intrinsic value of producing their own food. At the macroeconomic level, this important channel represents the effects of trade on an economy's overall income growth (FAO, 2017; Castilho et al., 2019; Bjornlund et al., 2022). Indeed, by impacting household incomes, trade policies affect poverty dynamics, which have consequences on the structure of diets, and are reflected in aggregate diet quality.

The stability of food supply and prices is paramount for food security. Since consumers are mostly risk-averse, they tend to value stable supplies and prices for their welfare. However, there are divergent opinions on the best way to achieve stability. On one hand, domestic food production can be more unpredictable than global production because it may not correlate well with external shocks and is influenced by various domestic conditions. If so, trade could help reduce the volatility of domestic food prices while improving economic access to food (Hoang and Meyers 2015; FAO, 2017; Lidiema, 2020). This stabilizing effect can also be observed regionally, particularly when regional production is less variable than domestic production (Mamboundou, Traore and Zaki, 2024). In such cases, diversification of supply can enhance stability. On the other hand, if external markets are more unstable than domestic production, opening domestic markets to trade might increase that volatility and the resulting risk of dependency can foster a source food and nutritional vulnerability (Dorodnykh, E. 2017; Hellegers, 2022). In these instances, governments have a range of policy options available, but caution is necessary, as poorly implemented measures can worsen both domestic and global market fluctuations (Martin et al. 2024). For instance, during periods marked by high and volatile prices, removing import duties or putting export bans—the most common policy reactions—might spur demand and/or exacerbate tensions in local and international markets.

Finally, trade can play a significant role in improving food utilization. It can enhance the availability of and access to more nutritious foods, contributing to better dietary diversity and nutrient adequacy (Ruel, 2003). However, there are potential downsides; increased trade could lead to higher consumption of ultra-processed foods high in fat, sugar, and other components linked to a greater risk of noncommunicable diseases (Shankar, 2017). Therefore, the net impact of trade on food utilization remains complex, highlighting the need for supportive policies aimed at improving nutritional outcomes.

Africa’s agrifood trade

International trade

Figure 9 presents the evolution of Africa's international agrifood trade over the past two decades, disaggregated into three food groups (all, animal source foods, cereals, fruits and vegetables). Aggregate imports rose sharply in the second half of the 2000s peaking at a value of US$59.1 billion in 2014, before declining to US$46.7 billion in 2016. Imports started rising again and reached a peak at US$69.4 billion in 2022. This import pattern reflects the changes in the global FAO Food Price Index over the same period, suggesting a significant price effect. Note that for all food, imports consistently exceed exports over the entire period, with the gap widening over time. Over this period, the net trade deficit increased eightfold in nominal terms, from US$2.3 billion to US$19.7 billion. The persistent trade deficit reflects the structural dependency of the continent on external markets to meet aggregate food demand, driven by the growing population and rising incomes, in combination with changing consumption patterns and accessibility issues on the supply side. These drivers of domestic markets are expected to remain persistent in the near future.

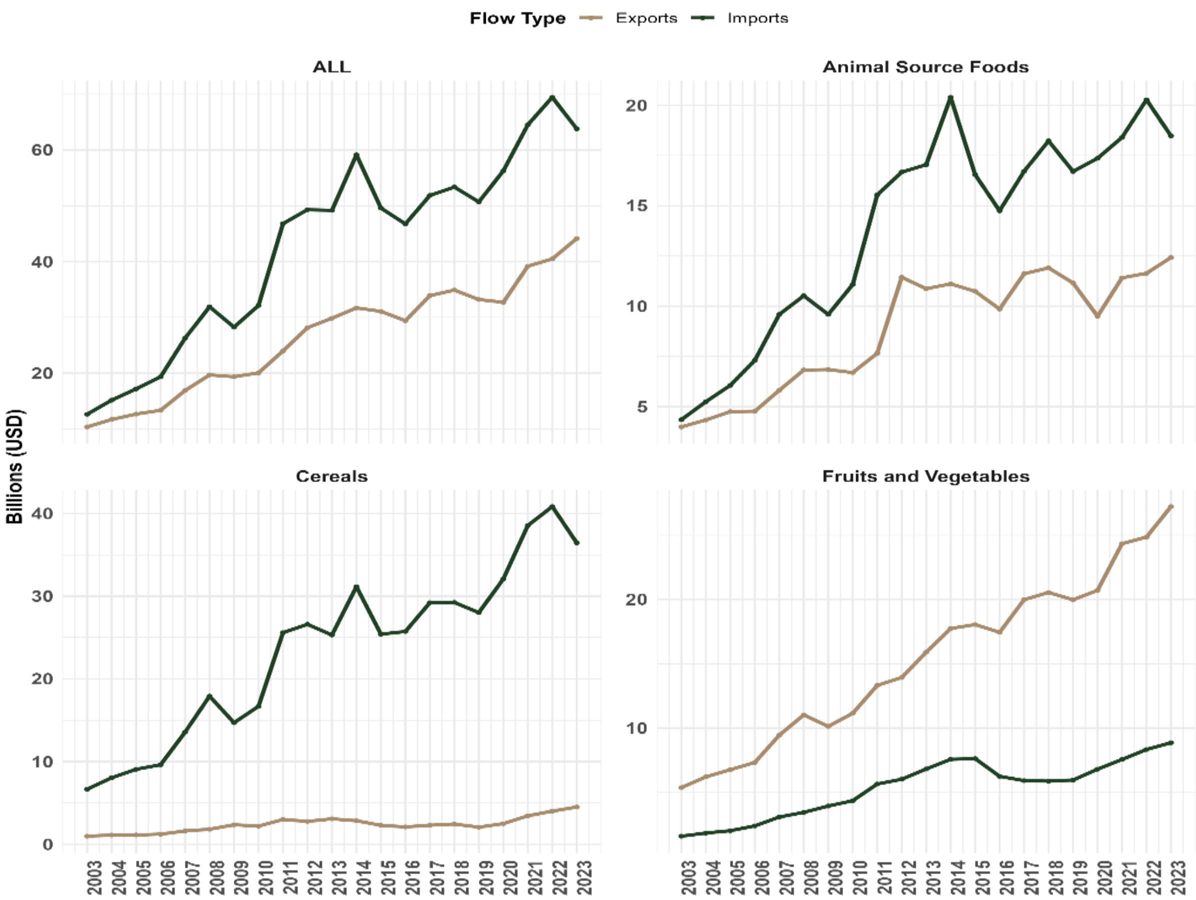
In the case of animal source foods, imports from the rest of the world first sharply increase between 2003 and 2014, decrease from 2014 to 2016, and then begin to rise again. Imports appear volatile relative to exports, probably reflecting the higher elasticity in Africa compared to export markets. As with food in aggregate, animal source foods present a persistent deficit, indicating the limited competitiveness of the regional livestock and animal product markets, as well as challenges faced by livestock value chains (domestic and trade policies, lack of investment in livestock systems, veterinary services, and regional trade harmonization). Since 2003, the deficit in animal source food is mainly driven by dairy products, followed by poultry and meat (Kurtz et al., 2021). Given the nutritional importance and the high cost and low intake of animal-based products in Africa (Zemene et al., 2024), the inability of the domestic market to meet demand represents a challenge worth addressing to help improve diet quality.

Cereal trade follows a similar pattern, with imports rising 8.9% annually, relative to 7.9% for exports over the period. As a result, cereals exhibit the highest trade deficit among the three food groups, contributing to 162% of the total in 2023. The widening import gap is the consequence of low land productivity, input access, farm management practices and climate shocks. It also highlights the need for further agricultural investment, though despite several domestic and regional initiatives, the investment level in agriculture remains low. In the last CAADP Review monitoring progress between 2015 and 2023, only three Member States (Burundi, Ethiopia, Mauritania) achieved the 10% target for government agriculture expenditures as a share of total expenditures (AU, 2023).

Fruits and vegetables remain a special case. Contrary to animal source foods and cereals, Africa exhibits a constant trade surplus with a predominance of unprocessed fresh products. Exports are driven by the high demand and prices in European countries for fresh products, and Middle Eastern and Asian countries for semi-processed and processed products (Zaki et al., 2024). Imports are increasing at a slow pace, but are likely to grow due to rising income, urbanization and changing diets because of consumer awareness.

Overall, Africa's agrifood trade landscape from 2003 to 2023 reveals a consistent pattern marked by a rising deficit across all major food groups, apart from fruits and vegetables. Domestic production remains insufficient to meet rising demand, yielding structural production deficits. To reverse these trends, countries must prioritize investments in domestic agricultural systems, improve trade facilitation both at the domestic and international levels to reduce the cost of importing and exporting, and foster regional integration.

Figure 9: International agrifood trade in Africa across food groups over the period 2003-2023



Source: African Agricultural Trade Monitoring (AATM) database, Authors calculation.

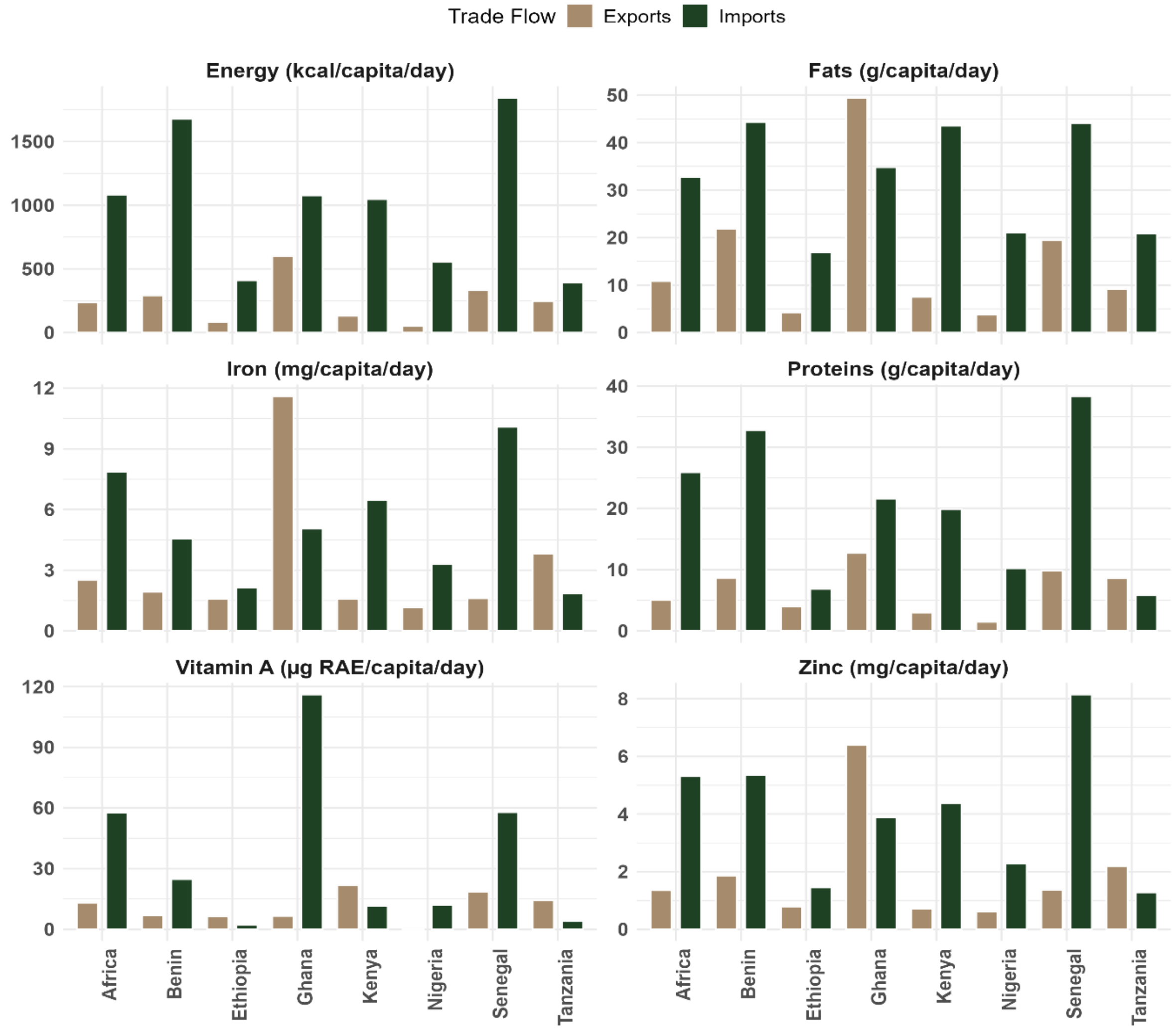
As trade can also affect diet quality, Figure 10 compares the nutrient content of agrifood imports and exports across Africa and in seven specific countries (Benin, Ethiopia, Ghana, Kenya, Nigeria, Senegal, and Tanzania) over the period 2012-2022. At the continental level, Africa's imports consistently deliver higher per capita macro- and micronutrients than exports. This suggests that the continent relies heavily on global markets to meet dietary needs, with a certain degree of heterogeneity across countries. Africa's exports, by contrast, tend to be lower in nutrient density, reflecting a pattern marked by the export of raw or minimally processed commodities while importing more processed, nutrient-rich foods. Previous studies show that Africa is importing more protein-rich foods (meat, eggs and milk) because of higher economic growth and incomes (Bouet et al., 2014). African countries also tend to export low-value, high-calorie agricultural products to each other, such as peanuts, cashew nuts, sugar, rice, vegetable oil, and corn while exporting high-value, low-calorie (or non-calorie) agricultural products such as coffee, cotton, tobacco, flowers, tea, and fruits and vegetables, to the rest of the world.

Trade plays a significant role in supplying macronutrients to Africa, contributing more than half of the caloric requirements (56 percent) and over 90 percent of the protein requirements with a high degree of heterogeneity across regions (Olivetti et al, 2023). While the Arab Maghreb Union (UMA) countries import more than their requirements, trade supplies only 21 and 26% of the caloric and protein requirements in the East Africa Community (EAC).

All seven example countries experienced similar paths for macronutrients. Apart from Ghana, imported foods contribute more significantly to daily energy supply compared to exports. These countries are net importers of macronutrients. Ghana and Tanzania represent exceptions. While Tanzania is a net exporter of proteins, the status holds for Ghana for fats, due to the predominance of cocoa butter, fats and oil exports. In addition, Ghana and Tanzania show a more balanced nutrient profile between exports and imports, compared to the rest of the countries that exhibits significant gaps between the two flows.

Countries' profiles are more diversified for micronutrients. While globally the dominant profile is net importing countries, some exceptions hold. Both Ghana and Tanzania are net exporters of iron and zinc, with a higher surplus for Ghana in both cases. For vitamin A, Ethiopia, and Tanzania appear as net exporters. Overall, Tanzania is the sole country with a net exporter status for the three micronutrients we consider, and it also has a more balanced profile for macronutrients. This singular result for vitamin A is in line with previous studies that find that for Africa as a whole, trade contributes to less than 3% of the requirement (Olivetti et al., 2023).

Figure 10: Nutrient content in Africa and in targets counties by trade flow type over the period 2012-2022



Source: FAOSTAT, author's calculation.

Regional trade: Does Africa "undertrade"?

Intraregional trade in Africa has been the subject of heated debate both in the literature and among policymakers. For some, the share of Intra-African trade is low, and the continent structurally trades below its potential (UNECA-AfDB, 2010), given its population and level of development. For other analysts, the reality is more nuanced, once the problems of data and indicators are resolved (Bouet et al., 2017). In this subsection, we examine the level of intra-African trade and conduct a formal test to determine whether Africa is "undertrading" or not, i.e if for the same level of trade determinants, the amount of trade occurring between African countries is lower relative to the rest of the world. Knowing the true level of agricultural trade in Africa will allow analysts to assess the real contribution to trade in food security, how various trade restriction measures are dampened by informal trade and build accurate food balance sheets. We first show there is a data issue using descriptive analysis, and then we perform a test using gravity modeling.

Descriptive analysis

To begin our descriptive analysis, we first note that given the magnitude of informal cross border trade in Africa (Bouet et al, 2020), we should pay particular attention to the data. To obtain a more accurate estimate of intra-

African agricultural trade, we integrate Informal Cross Border Trade data from the ECO-ICBT[2] and FEWSNET datasets to complement and improve the formal intra-African agricultural trade covered by the AATM database.

The AATM database is a comprehensive dataset developed by IFPRI in collaboration with Akademia2063, aiming to track and monitor trade flows between African countries and the rest of the world. Starting with UN COMTRADE, the data is first harmonized as countries report in different nomenclature (versions) of the harmonized system, and outliers are discarded. Trade flows are then reconciled using mirror data. Finally, a unique trade flow is constructed on a cost, insurance, and freight (CIF) basis, building upon the importer declaration as the latter is generally more reliable due to customs duties. When the exporter's free on board (FOB) declaration has been used, a CIF/FOB correction is applied, with estimates obtained from a gravity equation.

The ECO-ICBT is a dataset built by CILLS[3] to collect cross border trade in agricultural products among ECOWAS countries, Chad, Cameroon and Mauritania. Trade data on 178 products, corresponding to 67 HS6 codes, are collected by WACTAF[4] every day in main marketplaces and along corridors of the region, in collaboration with apex organizations in agrifood sectors. The information is collected daily on trade values and volumes in real time, in a way to avoid double counting and identifying outliers. Once collected, the ECO-ICBT data is harmonized according to international standards. A correspondence between products and the HS6 nomenclature is to facilitate the inclusion of the data into official statistics.

The FEWS NET database, developed in collaboration with a network of regional partners, provides data on informal cross-border trade of food commodities across selected border points in East and Southern Africa. The collaboration includes the Food Security and Nutrition Working Group (FSNWG), the Eastern Africa Grain Council (EAGC), the Food and Agricultural Organization of the United Nations (FAO), the National Bank of Rwanda (NBR) and the World Food Program (WFP). The database includes informal cross border trade among 19 African countries (Burundi, Chad, Djibouti, Ethiopia, Malawi, Rwanda, South Africa, Suda, Uganda, Zambia, Central African Republic, Democratic Republic of Congo, Eritrea, Kenya, Mozambique, Somalia, South Sudan, Tanzania, and Zimbabwe) in East and Southern Africa.

To assess the extent to which formal trade statistics underreport intra-African flows, a consolidation process was undertaken. For each product covered by the informal trade datasets, the maximum value reported across sources was retained. This approach provides a proxy of the magnitude of trade not reflected in official records, thereby highlighting discrepancies between formal and informal sources. However, this approach offers only a partial view of informal trade, as the available datasets do not comprehensively cover all African countries or border corridors.

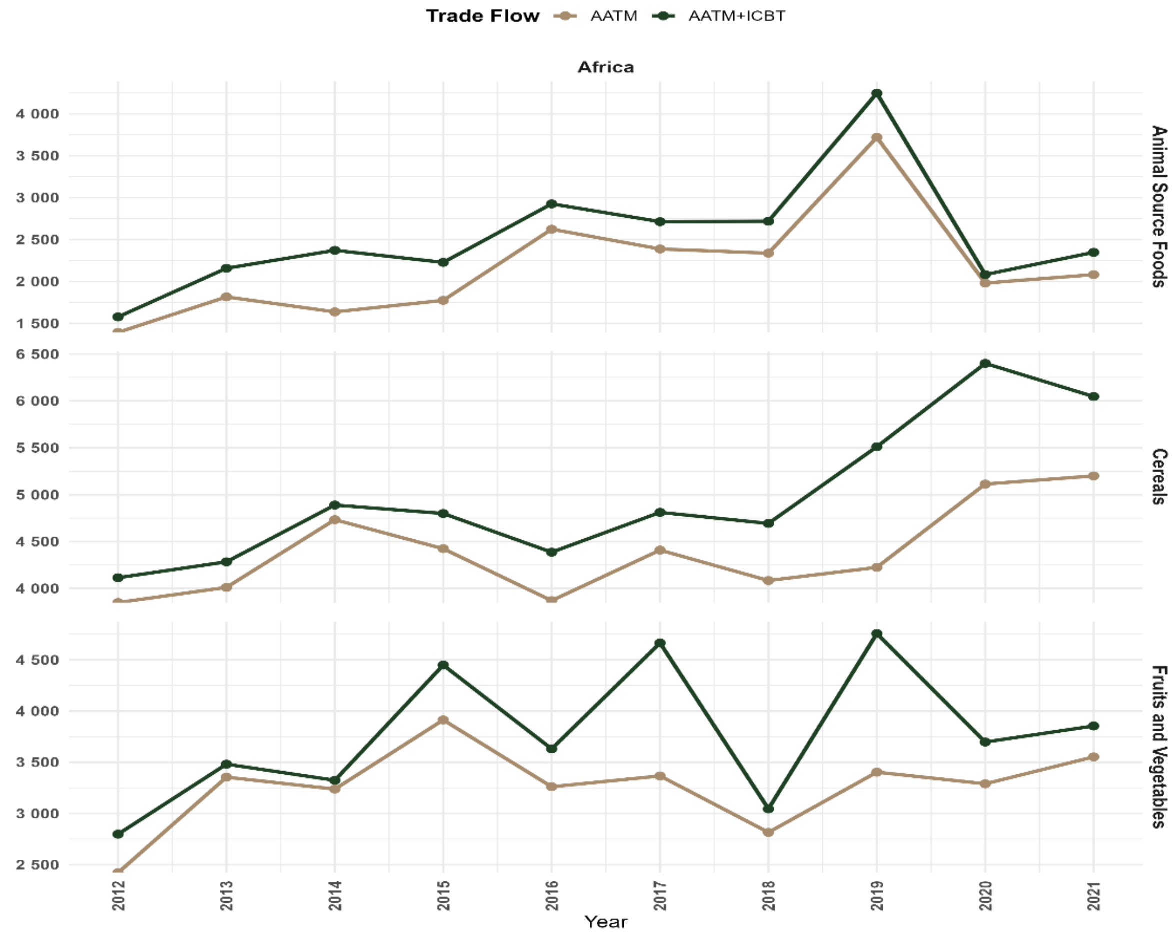
Figure 11 presents the Intra-regional trade of animal source foods, cereals, and fruits and vegetables between 2012 and 2021, considering AATM formal trade flows and the available (partial) informal trade data integrated, respectively. Trade flows with integrated informal flows consistently lie above the formal trade flows for all three three groups of products. This confirms that official data sources underestimate the real level of intra-African trade. However, the magnitude of the gaps differs by products. For cereals, the gap between the two sources represents a substantial portion of total intra-African trade flows, especially over the period 2016-2021. In contrast, for fruits and vegetables, more volatility is observed with pronounced dips and peaks largely driven by seasonal and sensitive harvest variability and perishability. On average ICBT (the difference between AATM+ICBT and AATM databases) represented 17.6%, 13.5% and 15.4% of total intra-African trade for animal source, cereals and fruits and vegetables, respectively. In terms of volume, cereals dominate intra-African trade (averaging 5 million tons annually over the past decade), followed by fruits and vegetables (3.8 million tons) and animal source foods (2.5 million tons). Animal source foods and fruits and vegetables show a more gradual upward trend from 2012 to 2019, followed by a peak in 2019, a steep fall in 2020, then a modest recovery in 2021. These fluctuations align with major disruptions (e.g. COVID19 pandemic, regional border closures, logistics interruptions) that occurred during the period.

[2] ECOWAS-Informal Cross Border Trade

[3] Comité Inter Etats Permanent de Lutte contre la Sécheresse au Sahel

[4] West African Association for Cross-Border Trade, in Agro-forestry-pastoral and Fisheries Products.

Figure 11: Intra-regional trade in Africa over the period 2012-2021 (1,000 metric tons)



Source: AATM+ECO-ICBT+FEWS NET, author's calculation.

We next turn to how well trade within Africa is integrated. First, note that a commonly used, simple metric for assessing regional integration is the Share of Intra-regional Trade (SIT), defined as the ratio of intraregional trade over total trade. For any given region, such as a Regional Economic Community, it reflects the proportion of trade that occurs between its member states, serving as a useful metric for assessing the level of regional market integration and connectivity. The ratio is given by:

$$SIT_R = \sum_{s\epsilon R} \sum_{s' \in R} (X_{s,s'} + X_{s',s}) \Big/ \left(\sum_{r \in R} (X_{r,.} + X_{.,r}) \right)$$

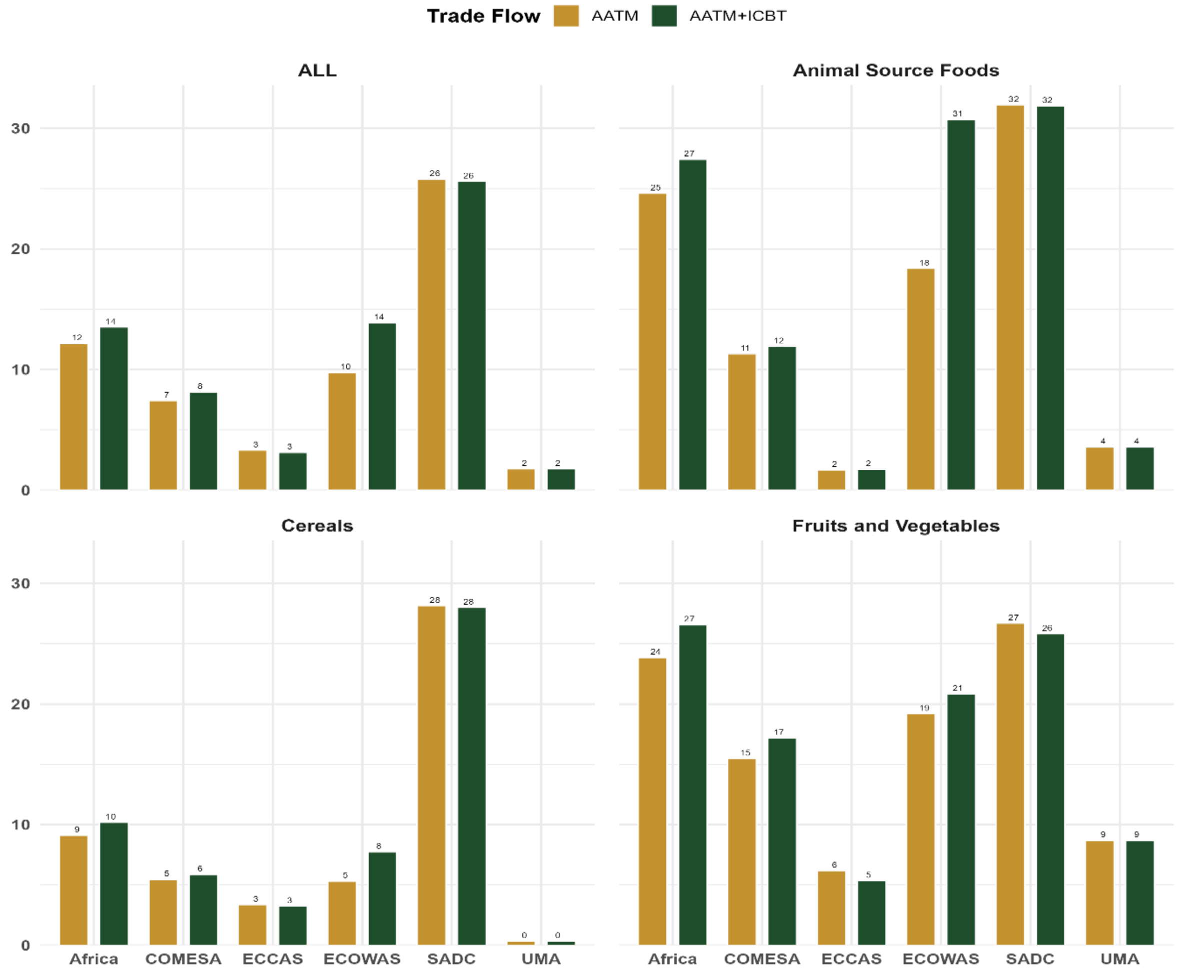
where r and s represent countries; R is region R; $X_{s,s'}$ is the total of country to the country s'; $X_{r,.}$ is total exports of country r; and $X_{.,r}$ is total imports of country r.

Figure 12 spotlights the share of intra-regional trade across African Regional Economic Communities (REC) over the period 2012-2021, providing a complementary perspective to the preceding analysis of intra-African trade flows. Apart from SADC (Southern African Development Community), which shows high scores consistently above 25%, the share of intra-regional trade in Africa is below 15%, with the UMA being the least integrated region. In addition to cross country heterogeneity, an interesting fact is the differences across products. Indeed, fruits and vegetables and animal source foods both present higher shares relative to cereals in most cases, suggesting better integration for those products.

While the inclusion of informal cross-border trade (ICBT) tends to push the ratio up, this configuration is not systematic. First, in the Economic Community of Central African States (ECCAS) and UMA for instance, the inclusion of ICBT data does not significantly enhance the reported formal trade flows largely due to the limited geographic coverage of the ECO-ICBT and FEWSNET datasets, which do not capture intra-regional trade among ECCAS and UMA member countries. Moreover, integrating ICBT can cause intra-regional trade shares, in some cases, to fall below formal trade shares due to the influence of extra-regional trade within Africa. A notable illustration is SADC, where the share of formal intra-regional trade in fruits and vegetables stands at approximately 27%, while the figure including ICBT slightly declines to 26%, reflecting high trade flows with partners within Africa not in the REC.

While the share of intraregional trade indicator tries to take into consideration several dimensions for each REC in a comprehensive way, it does not meet three key criteria from a trade integration perspective. Indeed, it lacks a clear theoretical foundation, does not provide any benchmark, and its interpretation remains ambiguous (Odjo, Traore, and Zaki, 2019). Therefore, this analysis should be interpreted with caution.

Figure 12: Share of intra-regional trade in Africa across food groups over the period 2012-2021 (%)



Source: AATM+ECO-ICBT+FEWS NET, author's calculation

A meaningful trade indicator should be grounded in economic theory, with clear linkages to trade theory. Without that foundation, its interpretive value is limited. Second, it should have a clear benchmark for comparison. In the absence of a reference point, it becomes difficult to assess whether it is low or high, and to make comparisons over time. For instance, a rising share of intraregional trade does not necessarily lead to deeper regional integration. It can reflect a decline in competitiveness in external markets, rather an improvement of the regional trade policies and infrastructure, (Walkenhorst, 2013).

Beyond the limitations cited above, the SIT also exhibits a structural weakness. It remains sensitive to the number and size of countries within a given REC (Anderson & Norheim, 1993; Frankel, 1997; Iapadre & Luchetti, 2009). This limitation is especially problematic when comparing different RECs. For instance, a REC composed of many small countries may appear more integrated than another with similar aggregate GDP but fewer member states, mainly due to geographical fragmentation. Therefore, the SIT is better used for tracking the evolution of a single REC over time, rather than for cross-regional comparisons.

Given the limitation of SIT, Iapadre and Luchetti (2009) proposed the regional trade introversion (RTI) index. This indicator is based on a modified version of the intra-regional intensity index ($MIRTI_R$) and the extra-regional intensity index ($MERTI_R$). The RTI index is defined as follows:

$$RTI_R = \frac{MIRTI_R - MERTI_R}{MIRTI_R + MERTI_R}$$

where:

$$MIRTI_R = \frac{SIT_R}{\beta_R} = \frac{\dfrac{\sum_{s\epsilon R}\sum_{s'\in R}\left(X_{s,s'}^{\cdot} + X_{s',s}^{\cdot}\right)}{\left(\sum_{r\in R}\left(X_{r,.}^{\cdot} + X_{.,r}^{\cdot}\right)\right)}}{\dfrac{\sum_{s\epsilon R}\sum_{s'\notin R}\left(X_{s,s'}^{\cdot} + X_{s',s}^{\cdot}\right)}{\left(\sum_{r\notin R}\left(X_{r,.}^{\cdot} + X_{.,r}^{\cdot}\right)\right)}}$$

$$MERTI_R = \frac{(1 - SIT_R)}{(1 - \beta_R)}$$

With β_R representing region r's share in trade with the rest of the world.

Since both $MIRTI_R$ and $MERTI_R$ are positive, RTI_R is bounded and falls between −1 and +1. Values between −1 and 0 suggest that the region is more extroverted than introverted, and values between 0 and +1 reflect that the region is more introverted than extroverted.

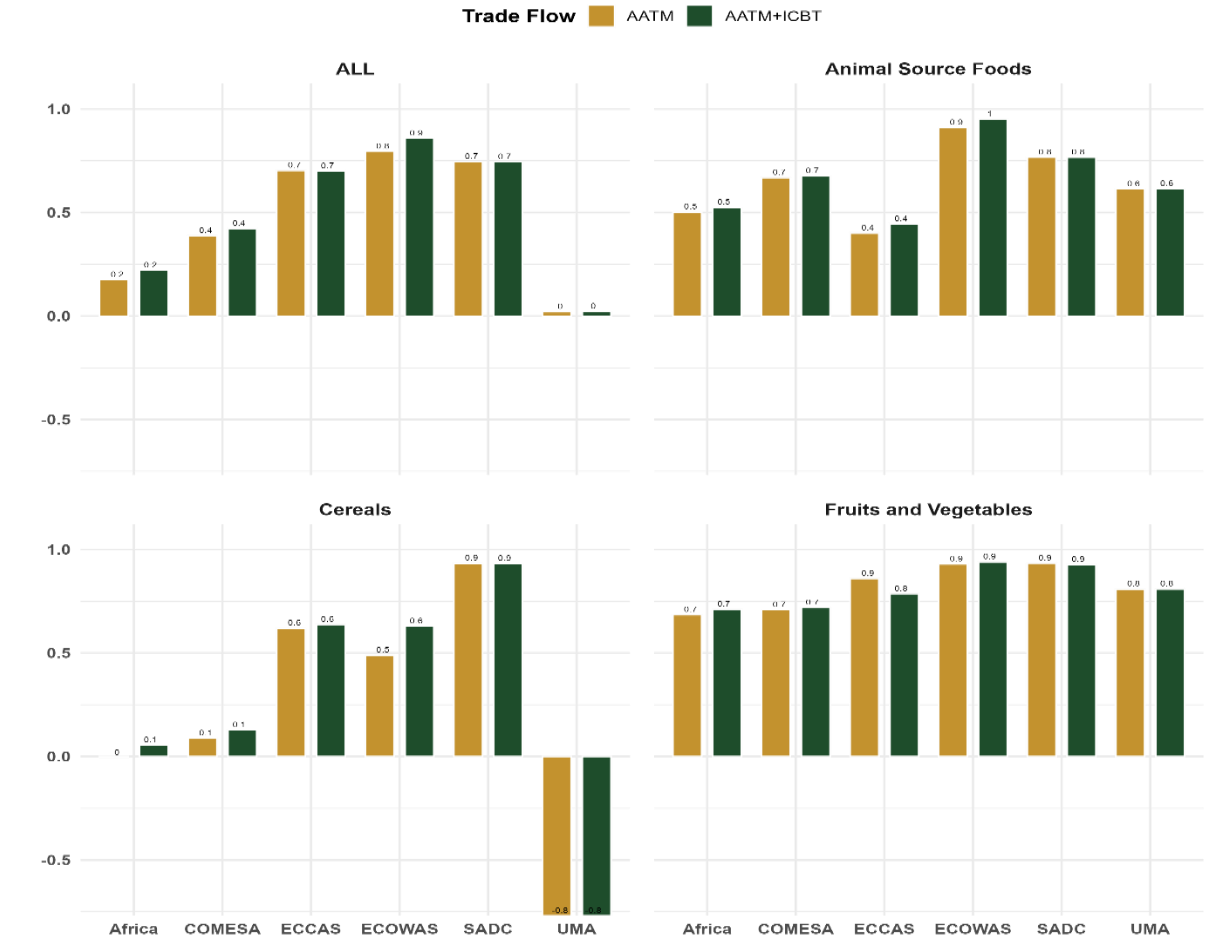
Figure 13 presents the regional trade introversion in Africa between 2012 and 2021 across the three product groups and in aggregate. It reinforces the argument that the SIT, while useful for tracking trends within a single REC, is not reliable for comparing regions. The figure suggests that most RECs exhibit relatively high trade introversion, both with and without the inclusion of ICBT. ECCAS, COMESA, ECOWAS, and SADC display stronger internal trade dynamics, as evidenced by their high levels of regional trade introversion, especially when informal flows are accounted for. In contrast, intraregional trade within UMA remains persistently low aligning with previous assessments of limited economic interdependence in North Africa. Despite the strong performance among certain RECs, the overall picture reveals that Africa, when viewed as a continent, remains lowly introverted across all product categories.

When examining animal source foods, ECOWAS shows a notable increase in introversion. SADC and COMESA also experience high levels of the RTI, highlighting the relative dynamic nature of trade in the region. This pattern reinforces the importance of livestock trade, both formal and informal, in West Africa and South Africa. Despite limited ICBT coverage in ECCAS and AMU, their introversion levels are not as low as expected, suggesting that even partial data can reveal meaningful internal trade dynamics when more refined indicators are considered.

For cereals, both COMESA and ECOWAS again show a high level of introversion, especially when informal flows are included. For COMESA, there is still a low level of regional trade introversion while the AMU remains extraverted, underscoring the external trade dynamic in the AMU region confirming the results of the SIT index. Overall, for cereals, Africa remains relatively introverted in terms of trade.

Regarding fruits and vegetables, all six RECs remain consistently introverted, even in formal flows only. The inclusion of ICBT further amplifies this trend, highlighting the importance of informal networks in facilitating short-distance, cross-border exchanges of fresh products.

Figure 13: Regional trade introversion in Africa over the period 2012-2022



Source: AATM+ECO-ICBT+FEWS NET, author's calculation.

Insights from a gravity model

The previous subsection highlighted the necessity to use the right data and indicator to monitor regional trade integration. In this subsection, we go beyond the descriptive analysis and formally test whether Africa is undertrading or not, meaning that given the determinants of trade, whether Africa still undertrades relative to the rest of the world. Bouet, Mishra and Roy (2008) find that globally Africa is an under-exporter, meaning that when one compares African trade with the rest of the world when accounting for observable and unobservable determinants of trade, Africa exports less than what one would expect. Their result is mainly explained by the low quality of trade-related infrastructure (transport and communication) in Africa. Their results confirm a series of related studies (Subramanian and Tamirisa, 2001; Sachs and Warner, 1997) and contrast with others which argue that Africa participates in international trade as much as can be expected according to its income levels, country sizes, and geography (Rodrik, 1998; Coe and Hoffmaister, 1998). While our approach adopts a similar methodology, two differences are worth noting. First, we focus on agrifood products, instead of all goods. The difference is important as the former group is more subject to criticism, faces higher tariffs and other trade costs, and is more subject to informal trade. Second, instead of testing if African countries are "underexporters" regardless of trade partner, we test for "undertrading" within the continent.

a. Model

To conduct the test, we first need a benchmark from a thorough theoretical framework. The gravity model, which has become the workhorse model of trade, is the natural candidate to perform the analysis. Like in Newtonian gravity where particles in the universe attract each other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them, the international trade gravity model states that countries trade in proportion to their respective market size (such as gross domestic products) and geographic proximity. Since the seminal works of Tinbergen (1962) and Anderson (1979), the gravity model has gained in micro foundations and can now be derived from any of the well-known international trade models (Armington, 1969; Krugman, 1980; Melitz, 2003).

The equation to be estimated is:

$$X_{ij,t} = \exp[\pi_{i,t} + \chi_{j,t} + \beta_1 lndist_{ij}\ \beta_2\ Contig_{ij} + \beta_3\ comlang\_off_{ij} + \beta_4\ comlang\_ethno_{ij} + \beta_5\ Comcol_{ij} + \beta_6\ col45_{ij} + \beta_7 AFR_{ij}] * \epsilon_{ij,t}$$

where

- $X_{ij,t}$: Exports from country i to country j at time t.
- $\pi_{i,t}$ and $\chi_{j,t}$: Exporter-time and importer-time fixed effects
- Country-pair fixed effects.
- $lndist_{ij}$: the logarithm of bilateral distance between trading partners i and j
- $Contig_{ij}$: an indicator variable capturing the presence of contiguous borders between countries i and j.
- $comlang\_off_{ij}$: an indicator variable if both countries share the same official language
- $comlang\_ethno_{ij}$: an indicator variable if both countries share a common language spoken by at least 9% of the population
- $Comcol_{ij}$:an indicator variable if both countries share a common colonizer
- $col45_{ij}$:an indicator variable if both countries are or were in colonial relationship post 1945
- AFR_{ij} : an indicator variable when both exporter and importer are African countries
- $\epsilon_{ij,t}$: mean zero error term.

The use of panel data improves estimation efficiency and enables the use of pair fixed effects that help address the issue of endogeneity of trade policy variables. The exporter-time and importer-time fixed effects account for outward and inward multilateral resistance (Yotov et al; 2016), the failure of which may lead to severe biases as pointed out by Anderson and van Wincoop (2003). They also control for any observable and unobservable exporter and importer characteristics that may vary over time. Given the presence of these fixed effects, unilateral time varying variables such as GDP cannot be included as they will be absorbed.

The Poisson Pseudo-maximum likelihood (PPML) estimator (Santos Silva and Tenreyro, 2006) is used in estimation to solve both the heteroskedasticity and zero trade flows issues. We estimate the equation for all agrifood products and for three specific agrifood groups (staples-mainly cereals; fruits and vegetables, and animal source foods) as outcomes. The disaggregation by food groups does not introduce any bias thanks to the separability property of the gravity model (Anderson and van Wincoop, 2004).

b. Data

We explore two databases for trade – the Base pour l'Analyse du Commerce International5 (BACI) and the International Trade and Production Database6 (ITPD). The BACI database, like most international trade data sets, does not include domestic trade and focuses only on international flows. Domestic flows must be retrieved from other sources. The ITPD data includes data on international and domestic trade at the industry level and covers agriculture. Therefore, it allows gravity model estimation with intra-national trade. BACI database provides comprehensive and disaggregated reconciled values and quantities of international trade, which is primarily sourced from Comtrade data. BACI data is given for 200 countries and at 6-digit HS code level.

On the other hand, the ITPD database contains consistent data for 264 countries between 1986 and 2022, and 170 industries or commodities. It includes international and domestic trade data at the industry level covering agriculture, mining, energy, manufacturing, and services. The ITPD data is constructed using reported administrative data and intentionally does not include estimated information, making it well suited for estimation of economic models, such as the gravity model of trade. The use of ITPD data to include intra-national trade ensures consistency with gravity theory where consumers can choose between domestic and foreign varieties. It is also required for the consistent identification of the effects of bilateral trade policies (Dai et al., 2014).

Trade data from both sources are mapped to three food groups – animal source foods (SITC division 00, 01, 02, and 03), fruits and vegetables (SITC division 05), and staples: cereals (SITC division 04). Aggregation is performed for each bilateral trade data by these food groups.

Regarding tariff data, we use ad valorem tariff equivalents in percentage terms of applied protection for each triplet (importer-exporter-product) in the model. The data is sourced from the MAcMAP-HS6 released in 2019, which is published by CEPII. Where tariff data is not available for specific trading partners, we use data from the

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[5] The BACI database is developed and maintained at CEPII (https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=37).

[6] The ITPD database is developed and maintained by United States International Trade Commission.

World Integrated Trade Solution (WITS) of the World Bank, Tariff data is then averaged (simple average) by food group for each bilateral trade flow.

Finally, the CEPII Gravity Database is used for gravity related variables such as distance (between the most populated city of each country, in km), contiguous borders (neighbors), common language (if countries share common official or primary language), language (if countries share common language spoken by at least 9% of the population), common colonizer, and colonial relationship (post 1945).

c. Results

Table 1 presents the results from our preferred specification which is based on interval estimation (data from every five years) and panel averages, instead of data pooled over consecutive years. The interval type specification is recommended when fixed effects are present and the dependent and independent variables cannot fully adjust in a single year's time like in gravity models (Yotov et al, 2016; Cheng and Wall, 2005).

Overall, the results are in line with theoretical predictions. Distance, contiguity and having a common colonizer represent significant determinants of trade flows, with an elasticity close to unity for distance. The coefficient on the common language variable (shared by at least 9% of the population) does not systematically appear as statistically significant. While this could likely be due to the potential collinearity with the common colonizer variable, a VIF test indicated that all values are typically below 1.3, with a mean VIF of 1.16. Estimated coefficients on tariffs do not always appear significant. They can be too low to affect trade flows, especially for staples for which exemptions are common. Staples are also often included in free trade agreements and/or are more subject to non-tariff measures relative to tariffs.

The indicator for intra African trade, which represents the test for Africa trading below its potential, presents mixed results. If the comparator set of countries is the rest of the world and extra-regional trade, Africa is not systematically an under-exporter in the continent. The results tend to suggest that Africa is "undertrading" only for fruits and vegetables. In contrast, for animal source food, Africa is instead "overtrading.".There is no evidence of" undertrading" for cereals either. These results are robust to the specification of the model (Table 2), apart from animal source foods for which Africa is no longer "overtrading.".Therefore, contrary to the claims made by many observers and policy makers, although the absolute value of intra-African trade might be seen low, it is not low once development levels and the main determinants of trade are considered.

Table 1: Model results with panel intervals

	Animal source foods	Fruits and vegetables	Staples (cereals)
Intra-Africa trade	0.67*	-0.58*	0.34
	(2.21)	(-2.13)	(1.02)
Tariff rate	-1.3	-7.4***	-0.38
	(-1.51)	(-10.59)	(-0.97)
Distance (log)	-1.08***	-0.86***	-1.17***
	(-14.85)	(-16.72)	(-15.2)
Contiguity	1.3***	0.64***	0.61***
	(8.39)	(4.82)	(4.24)
Shared Language	-0.04	0.33***	0.02
	(-0.31)	(2.57)	(0.22)
Comon colonizer	0.53*	0.7**	0.74**
	(2.04)	(3.34)	(3.35)
Colony post 1945	1.14***	0.95***	0.96***
	(5.67)	(4.68)	(5.84)
N	81,208	90,731	60,496
Exporter-year	Yes	Yes	Yes
Importer-year	Yes	Yes	Yes

Note: Z statistics values are given in parenthesis. Panel average data for 2004-08, 2009-13, 2014-18, 2019-23. The *p*-values read as follows: * $p < 0.05$; ** $p < 0.01$; and *** $p < 0.000$.

Source: Authors' computation.

Table 2: Model results with panel averages

	Animal source foods	Fruits and vegetables	Staples (cereals)
Intra-Africa trade	0.52	-0.61*	0.42
	(1.54)	(-2.24)	(1.43)
Tariff rate	-1.39	-7.3***	-0.56
	(-1.7)	(-10.71)	(-1.29)
Distance (log)	-1.11***	-0.87***	-1.13***
	(-15.34)	(-16.8)	(-14.18)
Contiguity	1.23***	0.63***	0.58***
	(7.92)	(4.7)	(4.21)
Shared Language	-0.04	0.3***	0.04
	(-0.29)	(2.32)	(0.39)
Comon colonizer	0.43	0.74***	0.65**
	(1.66)	(3.76)	(2.82)
Colony post 1945	1.14***	0.93***	0.97***
	(5.69)	(4.65)	(5.72)
N	67,481	73,747	49,910
Exporter-year	Yes	Yes	Yes
Importer-year	Yes	Yes	Yes

Note: Z statistics values are given in parenthesis. Panel average data for 2004-08, 2009-13, 2014-18, 2019-23. The *p*-values read as follows: * $p < 0.05$; ** $p < 0.01$; and *** $p < 0.000$.

Source: Authors' computation.

Trade openness and self-sufficiency

In this section, we complement the previous analysis by examining the typology of African countries in terms of trade openness and self-sufficiency, including the nutritional content of trade. To analyze openness, the net trade position relative to the total food availability is used to capture the dependence of regions or countries to the rest of the world. We use the Food Self-Sufficiency Ratio to proxy for nutritional self-sufficiency in this analysis.

Trade openness trends

Various indicators have been used to measure trade openness, or how regions or countries are exposed to world markets. While the absolute trade balance provides a snapshot of a country's trade status, relative measures offer deeper insight into the degree of openness or isolation from international markets and enables cross-country comparisons. Here, the Net Trade Position (NTP) is designed to assess how much a country relies on trade (exports and imports) relative to its total food availability. It is defined as follows: $NTP = \frac{X-M}{C+Y}$, where X represents exports, M, imports, C, consumption, and Y, production.

This approach offers several advantages. First, it enables normalization. By dividing net trade by total availability, the formula adjusts for country size and consumption levels. Small countries with high trade volumes and large countries with modest trade volumes can be meaningfully compared. Second, including consumption and production in the denominator accounts for the fact that countries may import during lean seasons and export during surplus periods, smoothing out short-term fluctuations.

To interpret the NTP values, we consider three categories:

- Countries in pure autarky: NTP=0
- Countries almost in equilibrium: |NTP|<5% [7]

[7] This threshold is due to unavoidable measurement error. Therefore, a country below the 5% threshold could be considered as in equilibrium. Another threshold could also be determined after an analysis of the variable distribution.

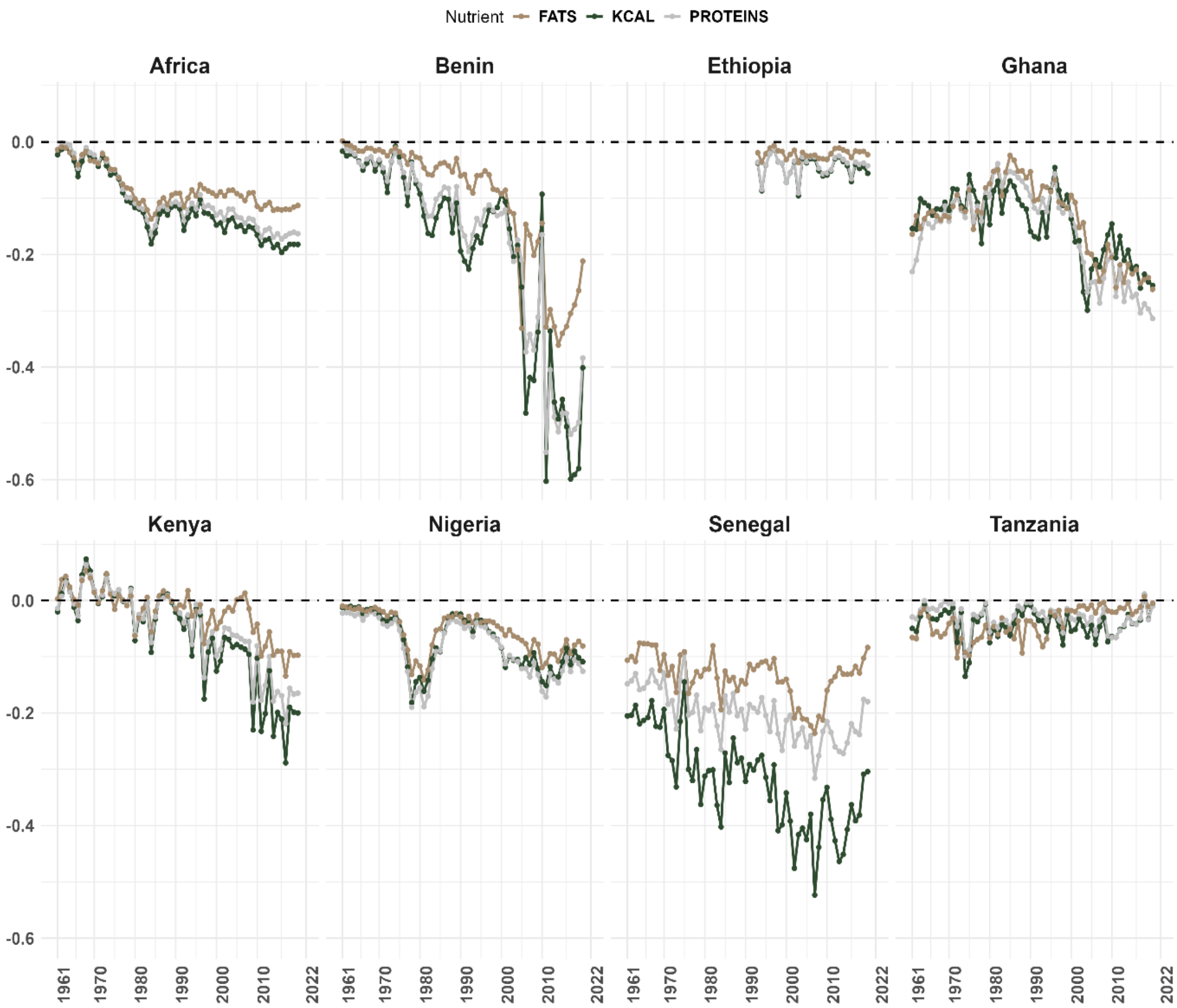
- Countries open to trade |NTP|>5%

Figure 12 presents the Net Trade Position trends for three macronutrients (calories, protein, and fat) across Africa and in the seven countries considered in this study, from 1961 to 2022. Africa experienced a sharp decline in its NTP for all macronutrients during the early decades, transitioning from a near equilibrium status to dependency. Calories represent the largest deficit, followed by proteins and fats. Interestingly, after a continuous deterioration, the latter slightly improved in the mid-eighties and stabilized over the past decade. However, despite the stabilization of the NTP for fats, the index still suggests a chronic deficit in lipid-rich food imports.

Individual countries show different patterns. First, no country is in autarky. While Ethiopia and Tanzania are near equilibrium with a slight deficit, Benin, Senegal and Ghana are largely dependent on trade for all nutrients, with Benin and Senegal exhibiting the sharpest drops in the indicator. Kenya shows consistent downward trends across all nutrients, starting from a surplus position in the sixties. Nigeria, Africa's most populous country, presents a unique case. Starting from an equilibrium situation, the index plummeted in the seventies in the wake of the civil war and during the severe drought that affected the country with 60% reduction of farm production and 13% in livestock population (Agajo et al., 2022), before stabilizing around -10% for the rest of the period.

Overall, most countries tend to follow the continental trend of openness and high dependency on trade, suggesting that they rely on imports to meet their needs. The dependency and growing exposure to trade is corroborated by previous research (e.g. OECD-FAO, 2018) which notes the difficulty and complexity for countries to stabilize their status or switch from being a net food importer to becoming a net food exporter. In Africa, this depends on changes in production and consumption associated with low response of supply to increasing demand, rapid population growth, and low agricultural productivity.

Figure 14: Net Trade Position by Nutrient across the target countries (1961–2022)



Source: FAOSTAT.

Food Self-Sufficiency Ratio Trends

The analysis of Net Trade Positions (NTP) across nutrients revealed how African countries have become increasingly dependent on global markets to meet their nutritional needs, especially for calories. However, trade dependency alone does not tell us directly how capable a country is of feeding itself from its own production. For that, we turn into the Food Self-Sufficiency Ratio (FSSR) trends analysis. To do so, the Food Self-Sufficient Ratio is defined as follows:

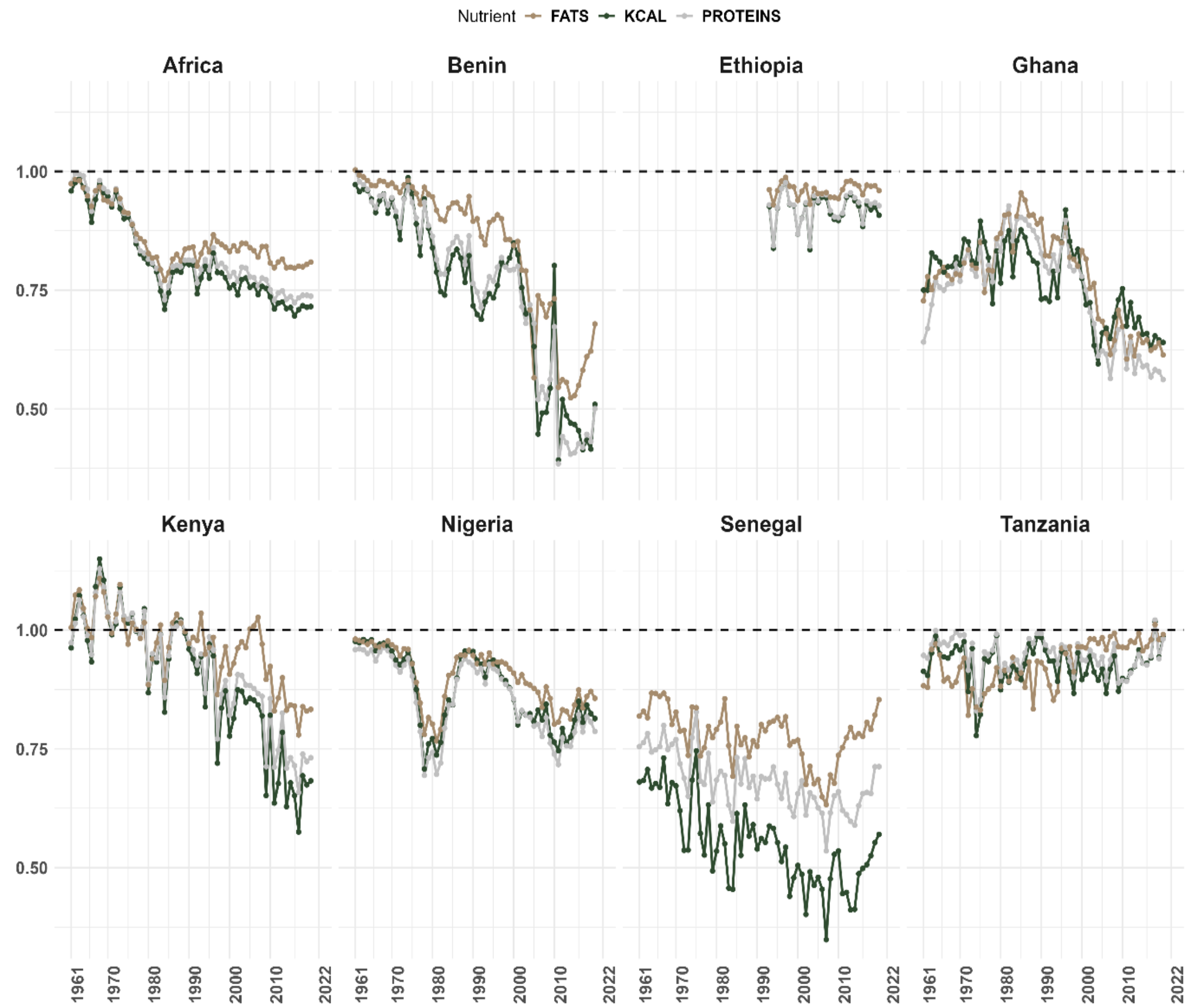
$$FSSR = \frac{Production}{Production + Imports - Exports}$$

This ratio measures the share of domestic production in total food supply. A value close to or greater than 1 indicates (high) self-sufficiency: most food is produced locally. A value below 1 signals dependence on imports to cover domestic demand. Of course, a value of 1 does not necessarily mean that all national food consumption is provided by domestic producers. Indeed, a country with a ratio of 1 can export and import, with exports as high as its imports, resulting in a situation where all domestic production is not sold locally because part of it is exported, but an equivalent amount is imported.

Figure 13 spotlights the Food Self-Sufficiency Ratio (FSSR) trends for calories, proteins, and fats, across Africa, and in the seven target countries from 1960 to 2022. In Africa, FSSR values have declined sharply since the 1960s, with calories and proteins consistently showing the lowest self-sufficiency. Domestic production provides only 75% of total supply. This trend confirms that Africa's increasing trade dependency stems primarily from insufficient domestic production. Figures are slightly better for animal source foods.

The absence of self-sufficiency is observed in all the seven African countries in the last two decades, apart from Tanzania at the end of the period. Overall, the recent trends show a downward shift toward dependency indicating that domestic production was not largely sufficient to meet nutrient needs stemming from the combined pressures of population growth, urbanization, and changing dietary preferences. In Benin and Senegal less than half of supply comes from domestic production for calories and proteins, respectively. In contrast Ethiopia and Tanzania maintain higher FSSR values, indicating stronger domestic production capacity and greater resilience in locally meeting macro nutritional needs. These countries demonstrate potential pathways toward nutrient self-sufficiency, possibly due to more robust agricultural policies, favorable agroecological conditions, and targeted investments in staple and nutrient-dense crops.

Figure 15: Food Self-Sufficiency Ratio Trends by Nutrient and Region across target countries (1960–2020)



Source: FAOSTAT Food Balance Sheets

Conclusion

Despite significant progress, Africa has not progressed as expected towards achieving both Sustainable Development Goal 2 (Zero Hunger) by 2030 and the Malabo Declaration for eradicating hunger and improving nutrition by 2025. Indeed, with the combined effects of population growth and urbanization, conflicts, climate change and low productivity, food and nutrition security indicators are almost stagnant. The COVID-19 pandemic constituted an extra challenge, pushing additional millions into food and nutrition insecurity.

To reverse these trends and decrease the exposure of Africa to global shocks (2008 food crisis, COVID-19 pandemic, Russia-Ukraine war), the role of trade has been questioned. While some analysts argue that countries should pursue food self-sufficiency, others push for more trade integration, both globally and (especially) in the continent, raising another debate about the actual level of intra-continental trade, and whether it is low or not.

This study constitutes a first step in the debate. It presents a state of play of Africa agrifood trade in value and in terms of nutrient content. The results show that Africa has been a net agrifood importer for decades and the trade deficit is widening over time. The production gap filled by imports exists for all the major product groups considered (cereals, animal source foods and fruits and vegetables). In terms of nutritional content, the continent runs a deficit for the main macro and micronutrients. All these results are confirmed by the high dependency and low self-sufficiency indicators of Africa to external trade.

A closer and thorough analysis of intra-African trade flows highlighted that although the level of intra-regional trade flows seems low, the latter should be analyzed with care. First, informal cross border trade is pervasive in Africa and official data systematically underestimate the true value of flows. Furthermore, when refined indicators are used instead of intraregional trade shares, it appears that Africa is more introverted than extraverted and more integrated than expected. A formal test suggests that compared to other regions, Africa tends to “undertrade” only for fruits and vegetables. For animal source foods, Africa is rather “overtrading” given its main characteristics and development level.

The study presented a broad picture of Africa’s agrifood trade and concluded that most countries rely on trade for their food needs. It does not answer the question which goes beyond the scope of the study, as to whether this is optimal or not. While a growing number of analysts and policy makers are pushing for strengthening domestic production through various means and restricting trade to achieve food self-sufficiency, a cautionary note is required here. First, food self-sufficiency is neither necessary nor sufficient to achieve food security and good nutritional outcomes (Bouet et al., 2025). Furthermore, trade restrictions can increase the volatility of the domestic markets (Martin et al, 2024), and, consequently, amplify food crises.

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About BDN

The CGIAR Science Program on Better Diets and Nutrition (BDN) identifies, co-designs and tests consumer-oriented solutions to ensure sustainable healthy diets for all while enhancing livelihoods, social equity, and environmental sustainability. Through evidence-based research and collaboration, BDN supports country-led food system transformation in low- and middle-income countries. To learn more about BDN, please visit https://www.cgiar.org/cgiar-research-porfolio-2025-2030/better-diets-and-nutrition/.

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