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Fruit and Vegetable Value Chains in Africa

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Introduction

The patterns of Africa's participation in fruit and vegetable value chains (FVVCs) clearly reflect the continent's colonial past. The restructuring of African exports around a few commodities to serve European markets during the colonial period largely undermined the farming of local food crops, including indigenous fruits and vegetables. Postcolonial governments focused on cash crops as the main source of foreign exchange earnings, reinforcing the status quo. However, the mid-1980s witnessed a major shift in global demand away from traditional cash crops and toward high-value products, including fruits and vegetables. This shift was an opportunity for developing countries, including those in Africa, to diversify their exports and reduce their vulnerability to global commodity price fluctuations. Participation in FVVCs can also have positive impacts on employment creation, income mobility, and poverty reduction. Yet, Africa's participation in FVVCs is undermined by a number of structural challenges, some of which are typical of FVVCs, and some related to long-standing issues facing African economies in general, and the agriculture sector in particular.

From a theoretical perspective, it is important to understand the determinants of FVVCs in Africa before analyzing trade data. Three main theoretical frameworks can be evoked: the factor content theory, gravity models, and global value chain determinants. First, the factor content theory argues that countries export products that use their relatively abundant factors of production. Thus, if fruits and vegetables are intensive in land and water, they will be exported by African countries that are abundant in these factors. Second, the gravity model predicts that bilateral trade flows are based on the economic sizes and distance between two countries, which is reflected in trade costs. Trade costs include transport and storage infrastructure, such as cold storage facilities, as well as trade policies and trade barriers, and are affected by common borders, historical colonial links, and common languages. Trade policies that increase trade costs include tariffs and nontariff measures. Thus, gravity considerations play an important role explaining African trade patterns, given that African countries generally trade with countries characterized by large markets (the United States and China) or with countries with which they had colonial links (France, Portugal, Italy, and the United Kingdom). Third, the literature examines the determinants of upgrading—that is, participating in the downstream nodes—in a global value chain. These are mainly the skills of the labor force, trade policy at the origin and the destination, and technology transfer (Gereffi 2019). Clearly, in Africa, the lack of research and development (and thus innovation) in the agriculture sector and the presence of high tariffs on processed agrifood products help to explain the specialization of most countries in unprocessed products in the early stages of the value chain.

Against this background, this chapter analyzes Africa's participation in FVVCs and discusses challenges and opportunities in this sector, including new prospects with the advent of the African Continental Free Trade Area (AfCFTA). The chapter is structured as follows. We begin with a brief overview of the importance of the fruit and vegetable sector for Africa and summarize the main findings on the benefits from participation in FVVCs, as well as the risks faced by African countries in this sector, with special attention to smallholders. The core of the chapter analyzes FVVCs at the global and African levels, including trends in exports and imports of fruits and vegetables, top exporters, and top export destinations. Throughout the analysis, we examine trade in fruits and vegetables at three levels of processing: unprocessed, semi-processed, and processed products.¹ We also compare two time periods² with a 10-year

¹ There is no standard definition of the three levels of processing. Throughout this chapter, we define “unprocessed” fruits and vegetables as raw commodities, “processed” fruits and vegetables as products that are ready to consume, and “semi-processed” goods as goods that are neither raw nor ready to consume.

² This methodology was used in previous editions of the AATM. In principle, the underlying logic is to choose a 5-year period of the most recent data and compare it with a 5-year period with a 10-year interval. This can help us track whether trade data reflect a longstanding pattern or whether there may have been disruptive changes during and after 2020.

interval: the first from 2008 to 2012, and the second from 2018 to 2022. Next, we highlight the different categories of fruits and vegetables that may present an opportunity for Africa, taking into account both supply and demand sides. Based on Africa's comparative advantage and global demand, we distinguish between the various processed, semi-processed, and unprocessed fruits and vegetables that Africa should develop and those it should not prioritize, both in the short and long term. The last part of the analysis focuses on the challenges affecting Africa's participation and upgrades in FVVCs. These range from production-specific issues to more general challenges related to poor infrastructure and restrictive trade policies. Finally, the chapter's conclusions provide some policy recommendations, focusing on opportunities for improved intra-African integration in FVVCs.

Why Do Fruit and Vegetable Value Chains Matter for Africa?

African countries' current production and trade of fruits and vegetables reflect the focus of colonial powers on a few export commodities in each colony, beginning in the early 19th century. In the colonial period, African agriculture had to shift from the production of traditional food crops to export crops—primarily fiber (such as cotton), vegetable oils (such as palm oil and peanut oil), sugar, rubber, cocoa, coffee, and tea (Bjornlund, Bjornlund, and Van Rooyen 2020). The colonial export-oriented policies had major impacts on Africa's rich food system and food security. Following independence, African governments continued to implement the same policies, focusing on exporting one or two cash crops, to maintain the flow of foreign currency needed to fund their industrialization policies.

Since the mid-1980s, international trade in fruits and vegetables has grown substantially, driven by rising incomes worldwide (Joosten et al. 2015) and by the rise of supermarkets in developing countries, which has further increased demand for high-quality food products (Swinnen, Colen, and Maertens 2013). The shift in global demand from traditional export crops to high-value products, including fruits and vegetables, has several implications for African countries. On the one hand, the shift creates new opportunities for African farmers to increase their participation in agrifood value chains. On the other, these developments entail potentially severe repercussions for smallholders, who constitute the majority of producers in Africa.

To better understand these opportunities and challenges, it is important to understand the structure and governance of FVVCs. Rising trade in fruits and vegetables between developing and developed countries has shaped these value chains around structures that have left most African producers "stuck" in upstream, typically low value-added segments of FVVCs. First, growing international trade in fruits and vegetables was accompanied by rising flows of foreign direct investment (FDI) toward developing countries, including Africa. These investments are typically controlled by a small number of multinational companies. Second, the organization and governance of FVVCs is controlled by these large exporting companies, which adopt either a vertical integration structure³ or rely on contract farming with smallholders (Van den Broeck and Maertens 2016). Third, exports of fruits and vegetables to developed countries require tighter food quality and safety standards, especially as the level of processing increases. This concentration of actors along the value chain, together with stringent standards and regulations, may explain in part why African exporting countries are largely positioned in upstream segments of the value chain, that is, where fruit and vegetable exports are mostly unprocessed, as we demonstrate in the next sections of this chapter.

³ Vertical integration refers to a situation in which the whole supply chain is integrated and owned by one firm.

Nevertheless, participation and upgrade along FVVCs may have several positive implications for Africa. In addition to revenues from their traditional export crops, production of fruits and vegetables can help to diversify African countries' exports and reduce their vulnerability to global commodity price fluctuations. Moreover, compared with traditional cash crops, the value of fruits and vegetables per unit or per weight is higher (Swinnen, Colen, and Maertens 2013). As the demand for processed agrifood products grows, African countries can also benefit from upgrading along FVVCs to promote smallholder commercialization and rural development (Jenane, Ulimwengu, and Tadesse 2022). Ongoing shifts in global demand (especially in emerging markets) toward healthier diets including fruit and vegetable products present an opportunity for Africa to engage in processing activities along global and regional FVVCs.

The horticulture sector is typically intensive in low-skilled labor, meaning that participation in FVVCs has potential to increase incomes and reduce poverty, especially for African smallholders. A recent study (Mossie et al. 2021) found that participation in apple and mango value chains in Ethiopia's Upper Blue Nile Basin is associated with 17 percent and 18.5 percent higher household consumption expenditures, respectively. Maertens et al. (2012), in a study in Madagascar, found that vegetables produced under contract farming systems with exporting companies accounted for 47 percent of the household income of involved farmers; and in Senegal, found that participation in bean and tomato value chains had important implications for female empowerment within rural households, due to the female labor intensity of these sectors. Moreover, Van den Broeck and Maertens (2016) suggest that the shift from smallholder contract farming to vertically integrated estate farming affects the labor intensity of FVVCs, as more workers are needed for postharvest activities. Unlike in contract farming, women provide most of the labor in these export companies. Consequently, FVVCs can improve income and food security outcomes not only for smallholders working in contract farming, but also for women through wage employment. Moreover, participation in FVVCs can improve African countries' foreign exchange earnings and trade balance, thus increasing their capacity to import food, among other vital products. Van den Broeck et al. (2018) found that participation in FVVCs increased food security in Senegal through the country's capacity to import food.

Notwithstanding the positive outcomes of fruit and vegetable exports, Africa's participation in FVVCs is undermined by several issues. First, fruits and vegetables are seasonal, and their supply chain is characterized by high perishability and susceptibility to waste and loss. Loss can occur due to poor production and harvesting conditions, lack of adequate transportation or poor road conditions, improper packaging, and lack of appropriate storage and cooling. For example, losses in Kenyan production of mangoes are estimated to reach up to 60 percent, most of which occurs before or during harvesting (Ridolfi, Hoffmann, and Baral 2018). Given the agriculture sector's high labor intensity, important income fluctuations can result from yield variations, losses, and waste, which increase the vulnerability of African agricultural communities. In addition, seasonality and perishability are among the main obstacles preventing African firms engaged in processing activities from operating at full capacity year-round (Jenane, Ulimwengu, and Tadesse 2022).

Finally, climate change is a major cause of yield variations and among the main challenges facing African agriculture and participation in global value chains. Africa is particularly vulnerable to climate change-related drought shocks, flooding, and extreme weather, which can have severe repercussions on the livelihoods of small farmers. In their study of two districts in Ghana, Williams et al. (2018) found that exposure to climate variability and low capacity to adapt to climate change are among the main factors increasing livelihood vulnerability among smallholder horticultural farmers. Similarly, results from a survey conducted in the Limpopo province of South Africa (Randela 2018) suggest that temperature variability has had a negative and significant impact on avocado yields.

In sum, Africa's participation and upgrading along FVVCs entails several benefits and opportunities for different stakeholders, including African governments, investors, smallholders, and consumers. However, Africa's performance along the value chain is undermined by multiple factors, including the current governance structure of the value chains, in addition to other structural challenges, most notably, poor access to technology and know-how, inadequate infrastructure and logistics, restrictive trade policies (both in African countries and their main export destinations), stringent food safety and quality in destination countries, and intra-African sanitary and phytosanitary measures, among others. Following a thorough analysis of African trade and value chain participation and of potential in the fruit and vegetable sector, we offer a more detailed discussion of some of these challenges and limitations.

Overview of Africa's Fruit and Vegetable Value Chains

This section provides an in-depth analysis of global and African trade along FVVCs. We begin with an overview of African exports and imports of fruits and vegetables by level of processing and then look at the major exporters and importers at the global level. We then apply this analytical framework to Africa, investigating the major actors at the continental level and the main export destinations for African fruit and vegetable products. We also explore the evolution of intra-African trade in fruits and vegetables and identify the major intracontinental exporters and importers. Throughout this analysis, we look at two periods with a 10-year time interval (2008-2012 and 2018-2022) and at processed, semi-processed, and unprocessed fruits and vegetables in order to identify any changes in the main trade trends over this time period.

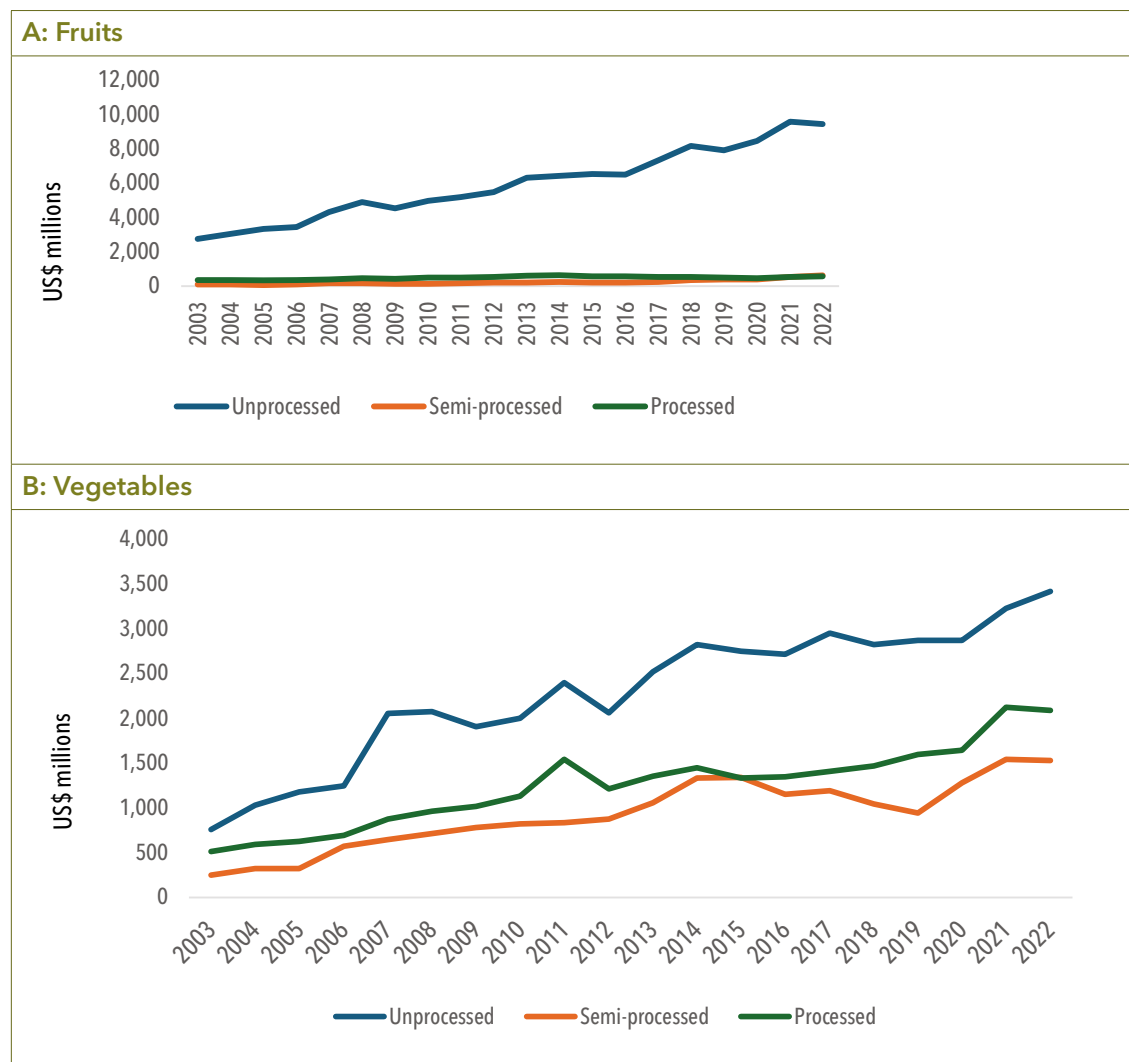
African trade in fruits and vegetables

Figure 4.1 depicts the evolution of African exports of fruits and vegetables, by level of processing, between 2003 and 2022.⁴ Generally, Africa's exports of fruits and vegetables were dominated by unprocessed commodities over this 20-year period. Moreover, the value of unprocessed fruit exports exceeds that of unprocessed vegetables. In the case of fruit (Figure 4.1, panel A), the gap between the exports of unprocessed goods, on the one hand, and semi-processed and processed products, on the other, is substantial: exports of unprocessed goods increased from US\$2.752 billion in 2003 to \$9.433 billion in 2022.⁵ Over the same period, the value of semi-processed fruit exports increased from \$90.9 million to \$627 million and that of processed fruit exports from \$359.3 million to \$581 million. For vegetables (Figure 4.1, panel B), the value of unprocessed exports also remained above the values of semi-processed and processed products. In 2003, exports of unprocessed vegetables amounted to \$759 million, while those of semi-processed and processed vegetables were \$250 million and \$513 million, respectively. By 2022, exports of unprocessed vegetables reached \$3.419 billion, while those of semi-processed and processed products were \$1.527 billion and \$2.088 billion, respectively.

⁴ See Appendix Table A4.1 for the full list of fruits and vegetables by level of processing.

⁵ Dollar values refer to US dollars throughout this chapter.

Figure 4.1 Exports of African countries by level of processing, US\$ millions



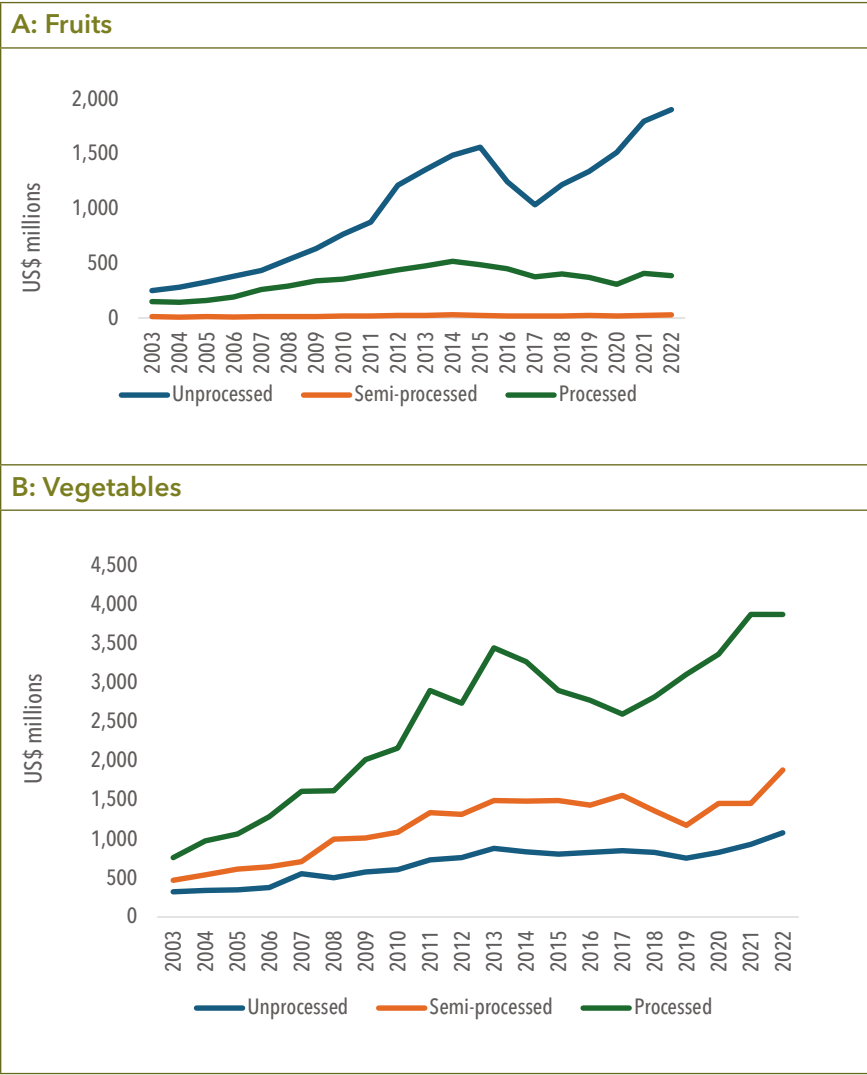
Source: Authors' elaboration using the 2024 AATM database.

Figure 4.2 depicts import flows. Africa's unprocessed fruit imports (Figure 4.2, panel A) were on an upward trend over the past 20 years, interrupted by a sharp drop in 2016 and 2017.⁶ However, imports of processed and semi-processed fruits increased much less. In 2022, imports of unprocessed fruits reached \$1.904 billion, while the value of semi-processed fruit imports was only \$28.6 million (up from \$10.5 million in 2003), and that of processed fruit imports was \$385 million (up from \$150 million in 2003). The picture for vegetable imports is quite different. The value of processed vegetable imports has always exceeded the values of unprocessed and semi-processed vegetables, and the gap widened over the 20-year period. In 2022, imports of

⁶ The drop in 2017 may have been caused by adverse weather conditions in the world's main fruit-growing regions in 2016 and 2017, which disrupted global production of all major tropical fruits. Mango, papaya, and avocado production were affected by drought in parts of South America and Asia, while pineapple cultivation suffered from flooding in Central and South America. Moreover, tropical storms in the Caribbean in September and October 2017 affected fruit production in small island states (Altendorf 2017). Among the major challenges facing tropical fruit production is that these fruits are mostly grown by smallholders with little access to weather-resilient production systems. Aside from climate shocks, the drop in imports may also have been caused by changes in Egyptian imports. Data on top African importers show that Egypt was on average the top importer of unprocessed fruits in both periods and was likely to be among the top importers in 2016 and 2017 (this period is not covered). However, in 2016, Egypt raised tariffs on 53 lines of food and agricultural products, including fresh and processed fruits considered "luxury" products (USDA Foreign Agricultural Service 2016), and also devaluated its exchange rate, with impacts on imports.

processed vegetables reached \$3.871 billion (up from \$759 million in 2003). At the same time, semi-processed and unprocessed vegetable imports amounted to \$1.881 billion and \$1.077 billion, respectively.

Figure 4.2 Imports of African countries by level of processing, US\$ millions



Source: Authors' elaboration using the 2024 AATM dataset.

In sum, except for vegetable imports, Africa's participation in FVVCs is marked by a concentration of trade flows in unprocessed goods. The predominance of unprocessed exports may reflect the global shift in consumer preferences driven by an increasing awareness of the nutritional benefits of fresh fruit and vegetable consumption (especially tropical produce). In developed countries and also a number of developing countries, demand for fresh, high-quality fruits and vegetables is increasing. In the particular case of tropical fruit, the unit price is also typically higher for fresh than for processed items, which increases profit margins from unprocessed exports (Altendorf 2017).

At the same time, the relatively modest value of semi-processed and processed fruit and vegetable exports may also reflect the multiple challenges facing African countries in upgrading along FVCs, including the lack of processing capacities and necessary logistics (such as storage and transport) and the difficulty in meeting international standards for processed fruits and vegetables, or the escalation of tariffs in export destinations (Fukase and Martin 2018). A more detailed discussion of these challenges follows later in this chapter.

Finally, the structure of imports may be largely attributed to several factors, including rising incomes, urbanization, and shifts in consumer preferences in Africa. On the one hand, imports of unprocessed fruits may reflect increasing awareness of the benefits of fresh fruit consumption or the growing demand for tropical (mostly imported) varieties, especially in the largest African economies. On the other hand, the predominance of processed vegetable imports could reflect shifts in consumer preferences toward new varieties that are not domestically available, in addition to increasing income and urbanization, which drive up demand for vegetable preparations. Finally, the structure of trade flows may also reflect the lack of domestic vegetable processing capacities.

In the following section, we identify the world's major exporters and importers of fruits and vegetables by level of processing in order to investigate, first, whether African countries feature among top exporters or top importing markets, and second, how the top exporters and importers have changed over time.

World's top exporters and importers

Figures 4.3 and 4.4 rank the top exporters of fruits and vegetables for two periods (2008–2012 and 2018–2022) and by level of processing. The figures suggest three key findings, including, above all, the absence of African countries among the top 10 exporters. Second, the group of top exporters has changed very little over time. Exports are largely dominated by Europe, the United States, and Canada, in addition to China and several Asian and Latin American countries (such as Brazil, Mexico, and Thailand). Third, the world's exports of fruits and vegetables tend to be highly concentrated in a small number of countries, especially for unprocessed exports. For example, the top three exporters of unprocessed fruits (Figure 4.3, panel B) together constituted more than 35 percent of the world's exports. For unprocessed vegetables (Figure 4.4, panel B), this share is as high as 47.3 percent.

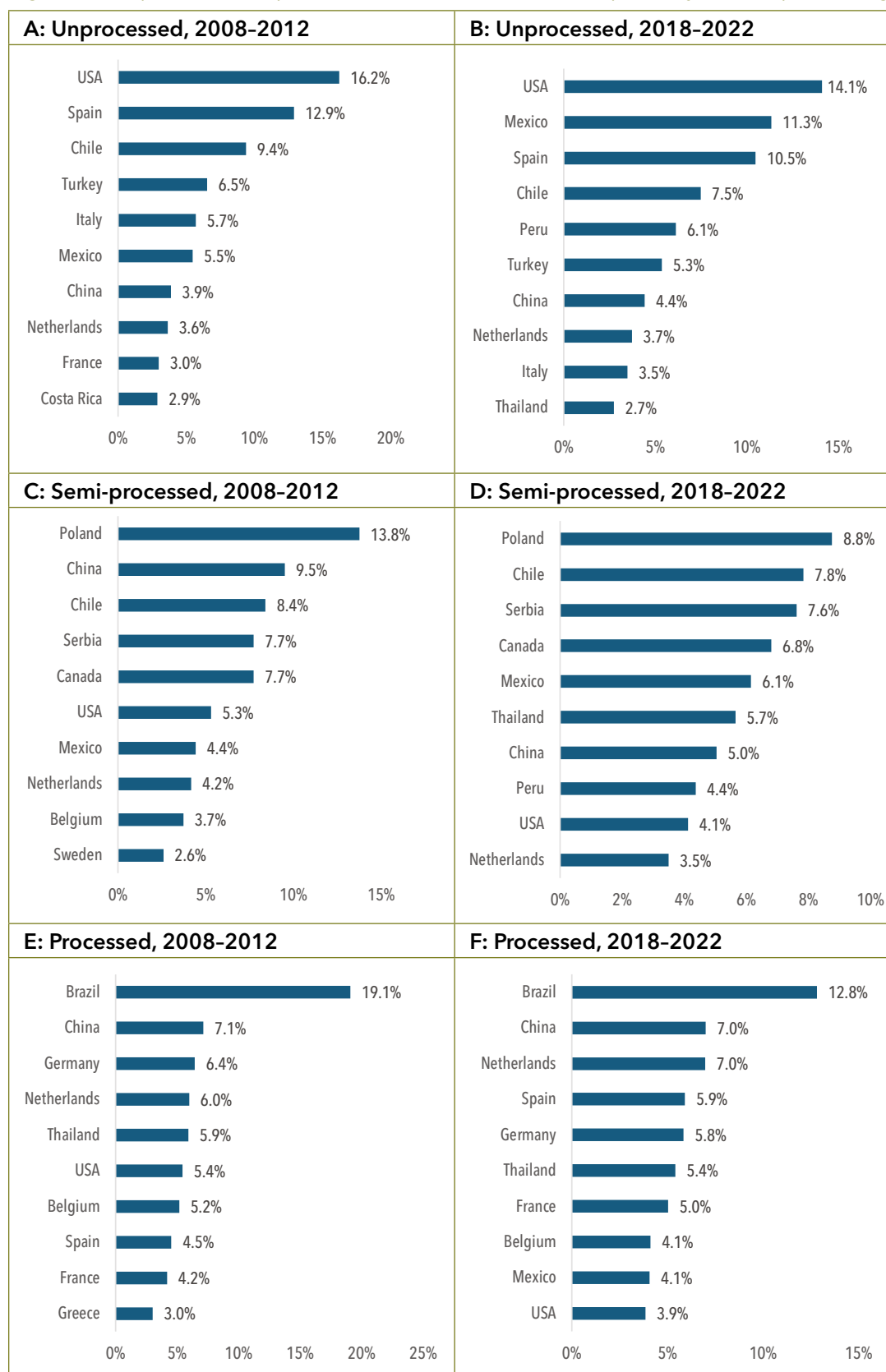
The presence of China among the top 10 exporters can be traced back to the country's efforts to raise its profile in the global market for agricultural commodities, as part of the agricultural reforms including (but not limited to) the liberalization of agricultural input and output markets in the 1990s and improvements in irrigation and agricultural technology (Guo 2020). Since the 2000s, Chinese exports of fruits and vegetables have been growing rapidly and marked by an increasing diversification of export markets (Mu and Jin 2020). Moreover, China's agriculture sector relies increasingly on intelligent agricultural production, networked agricultural operations, digital technology, big data, and artificial intelligence (Lyu 2020). In Brazil, the agribusiness sector represents 21 percent of the country's GDP (Barros 2020; Mu and Jin 2020). The important role of Brazilian agricultural exports dates to colonial times. Since the 1980s, however, Brazil's agribusiness sector has increased its focus on goods for which there is global demand, such as processed fruits, including orange juice and sugar.

Figures 4.5 and 4.6 show the top 10 importers of fruits and vegetables by level of processing. As we found for the world's top exporters of fruits and vegetables, African countries also are not among the top 10 importers. The United States and Germany often occupy the top two spots, and most of the other top importers are developed countries. Imports of fruits and vegetables

are also concentrated among the top 10 (and sometimes, the top 3). For example, the top 10 countries accounted for more than 60 percent of the world's imports of unprocessed and processed fruits (Figure 4.5, panels B and F). In the case of semi-processed fruits (Figure 4.5, panel D), the top 10 importers accounted for as much as 70 percent of the world's imports. For unprocessed vegetables (Figure 4.6, panel B), the United States and Germany together accounted for 32.5 percent of the world's imports, and in the case of processed vegetables (Figure 4.6, panel F), the top three importers accounted for 39.1 percent of the world's imports. China is also a prominent importer of fruits and vegetables at all levels of processing, a trend that reflects increasing incomes, especially in urban areas, and a growing domestic demand to try "novelty products" such as tropical fruits (Altendorf 2017).

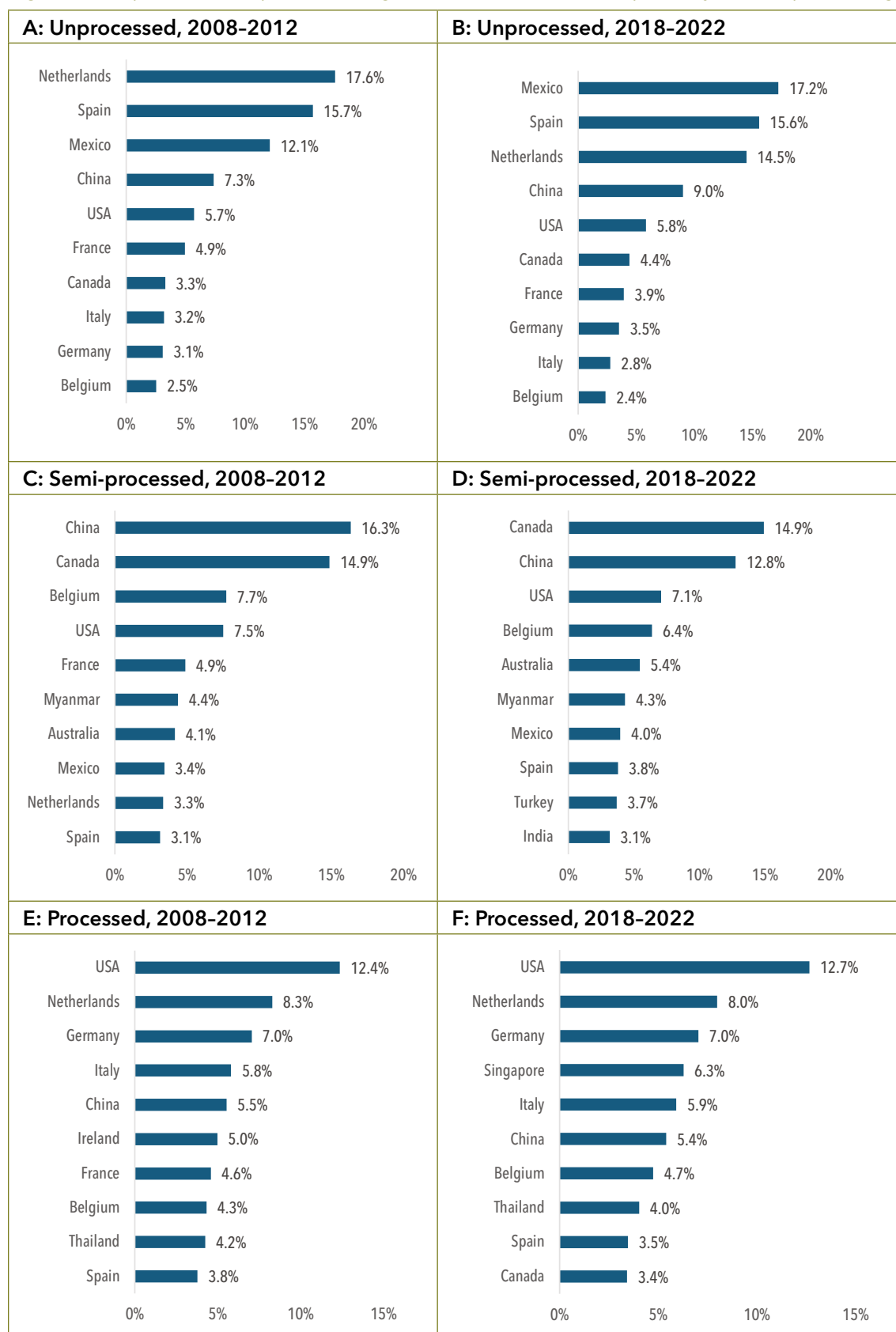


Figure 4.3 Top 10 world exporters of fruits, share of world exports, by level of processing



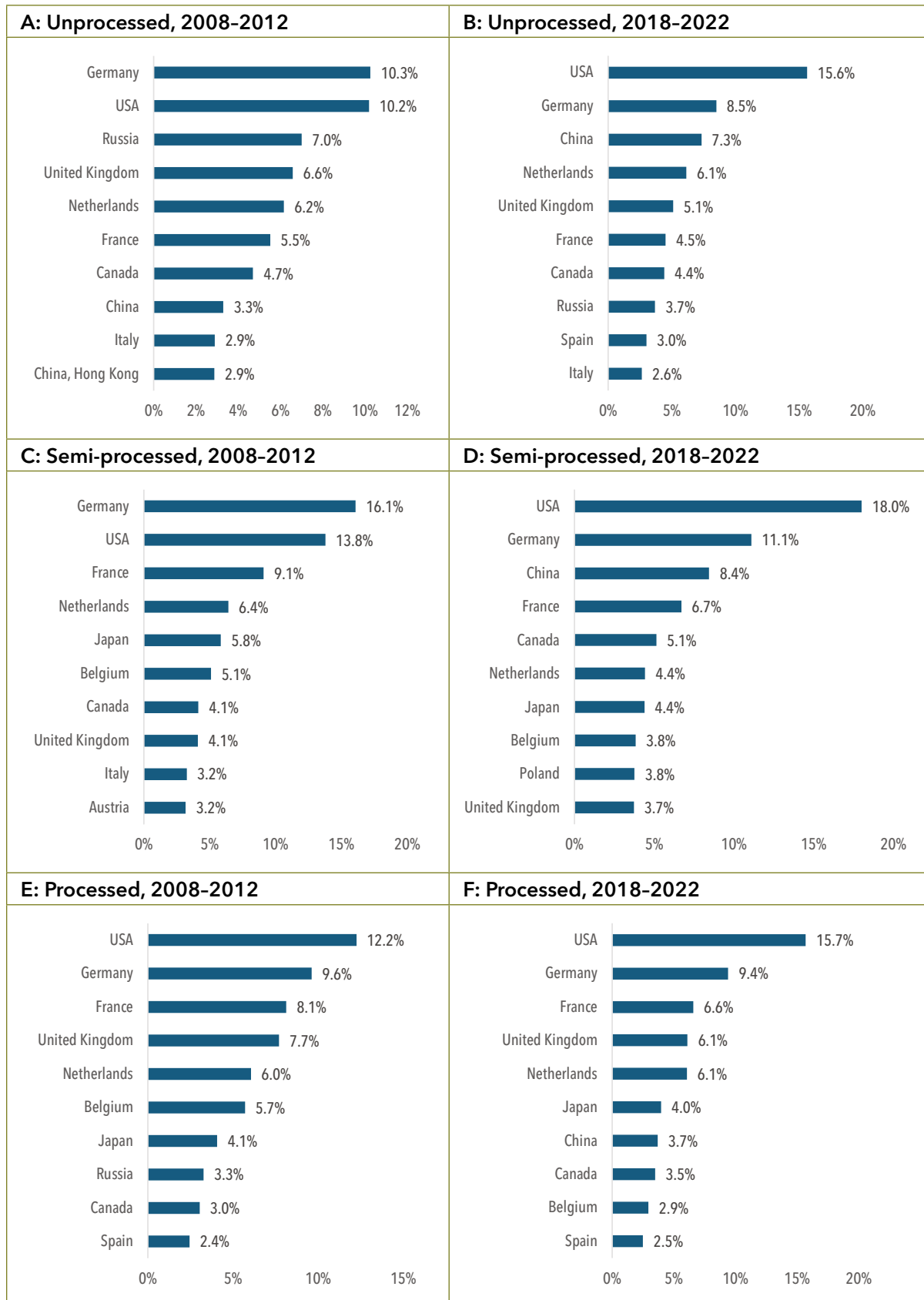
Source: Authors' elaboration using the 2024 AATM database.

Figure 4.4 Top 10 world exporters of vegetables, share of world exports, by level of processing



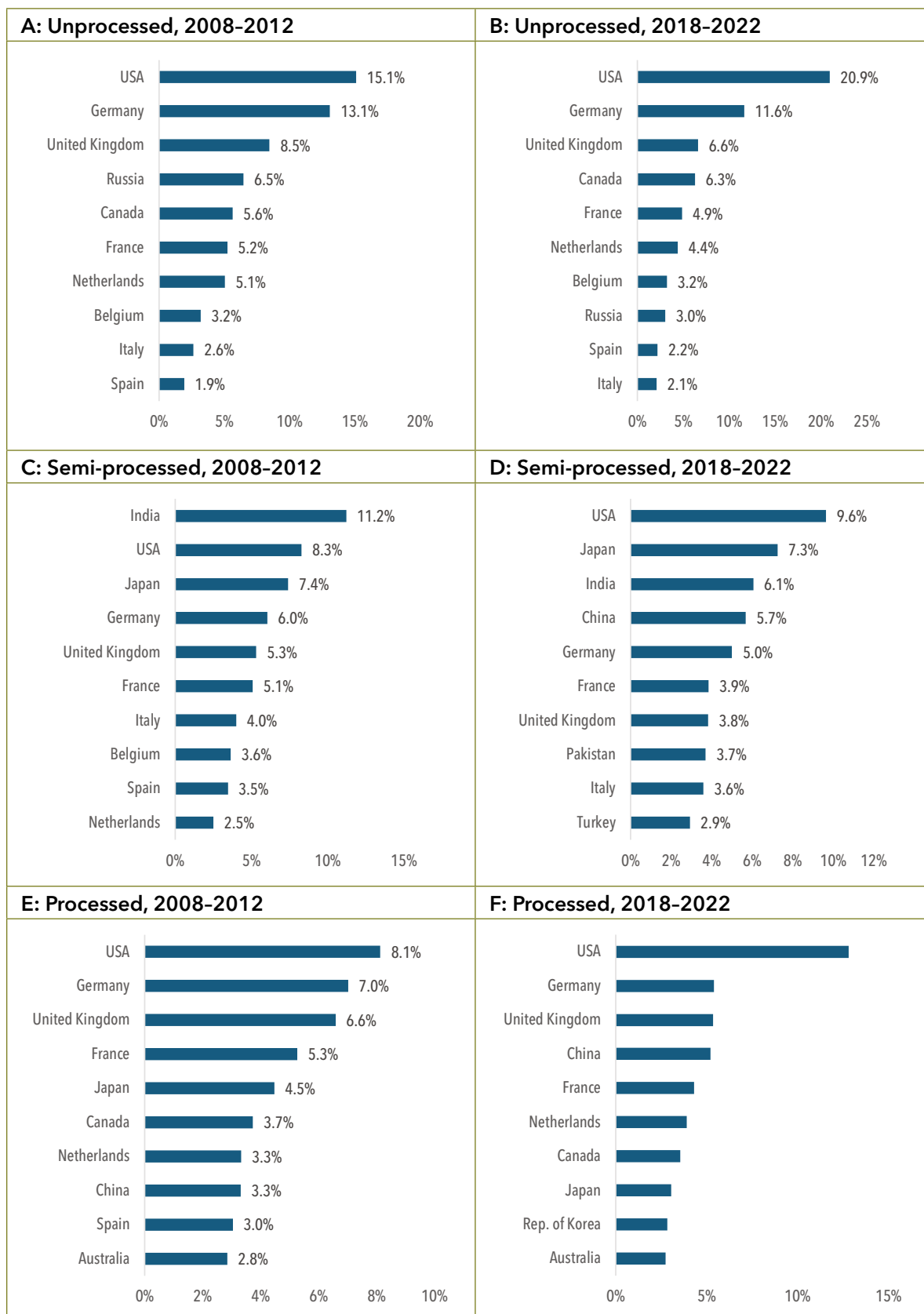
Source: Authors' elaboration using the 2024 AATM database.

Figure 4.5 Top 10 world importers of fruits, share of world imports, by level of processing



Source: Authors' elaboration using the 2024 AATM database.

Figure 4.6 Top 10 world importers of vegetables, share of world imports, by level of processing



Source: Authors' elaboration using the 2024 AATM database.

In the next section, we look at the top exporters and importers of fruits and vegetables among African countries.

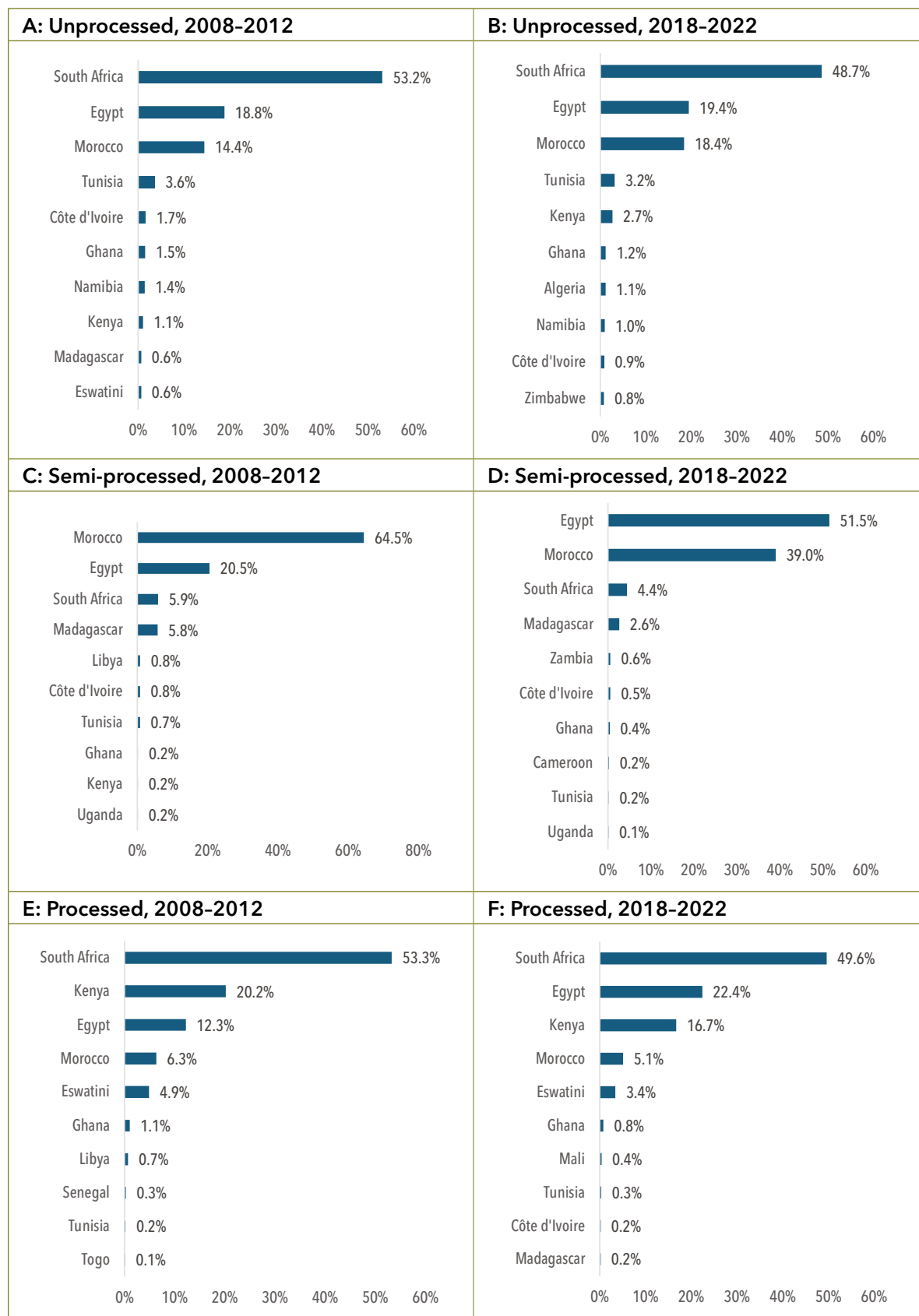
Top African exporters and importers

Since Africa is not among the world's top participants in FVVCs, this section provides a separate analysis of the top-performing African countries, regardless of their share in global trade in these categories. Figure 4.7 shows the top 10 African exporters of fruit by level of processing for both periods (2008–2012 and 2018–2022). Overall, the data suggest a concentration of top African exporters in a limited number of countries.

For exports of unprocessed fruits (Figure 4.7, panels A and B), South Africa is by far the largest exporter, accounting for about half of the continent's exports, followed by Egypt and Morocco. Grapes and citrus fruits are among these countries' top exports. South Africa upgraded citrus fruit exports by planting high-quality varieties and responding to rising international standards (Chisoro and Roberts 2024). In the case of Egypt, the production of fruit (especially citrus and grapes) exceeds domestic consumption and is among the main sources of agricultural export revenues (Kassim et al. 2018). Similarly, Morocco is one of the main exporters of oranges and grapes, especially to the European Union (EU) (Santeramo and Lamonaca 2023). In the case of semi-processed fruit exports (Figure 4.7, panels C and D), the composition of the top 10 exporters is similar, but the ranking is different, with Morocco and Egypt together constituting more than 90 percent of these exports during the second period. Finally, South Africa exports nearly half of the continent's processed fruits (Figure 4.7, panels E and F), followed by Egypt (22.4 percent) and Kenya (16.7 percent). South Africa and Kenya, for example, account for 85 percent of Africa's exports of pineapple juice concentrate, while South Africa also accounts for more than half of the continent's orange juice exports, followed by Egypt (Schreinemachers et al. 2022).

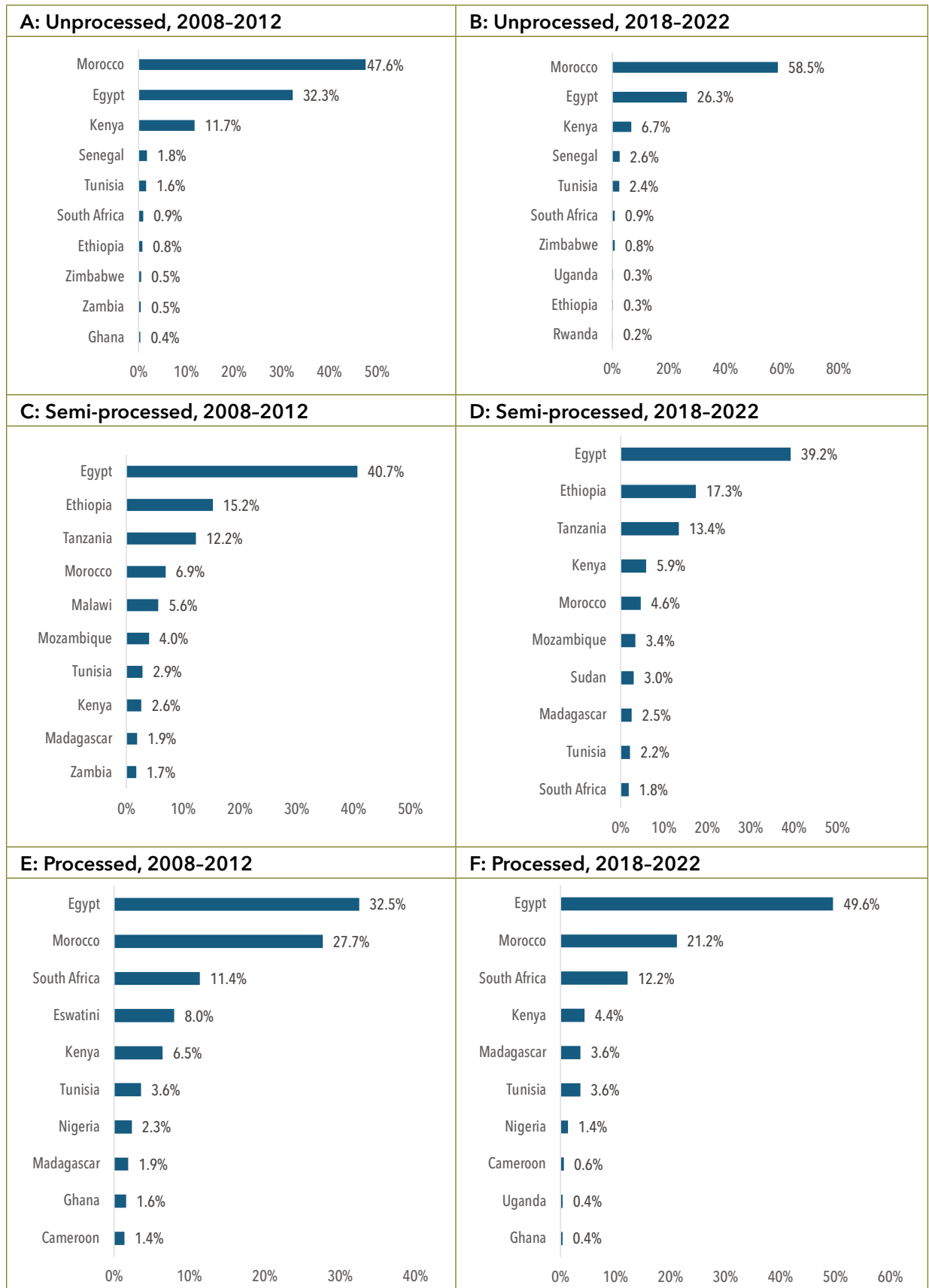
Figure 4.8 depicts the top 10 African exporters of vegetables by level of processing. Similar to our findings on fruit, exports of vegetables remain concentrated in two to three exporters whose shares are substantially higher than the rest. For unprocessed vegetable exports (Figure 4.8, panels A and B), the composition and ranking remained largely unchanged in both periods, with Morocco being the top exporter and accounting for 58.5 percent during the second period. Together, Morocco, Egypt, and Kenya export more than 90 percent of the continent's total exports of unprocessed vegetables. For example, Morocco and Egypt are the top exporters of fresh tomatoes (Schreinemachers et al. 2022). For semi-processed vegetables (Figure 4.8, panels C and D), Egypt is the top exporter, with a share of about 40 percent during both periods, followed by Ethiopia and Tanzania. Finally, for processed vegetables (Figure 4.8, panels E and F), Egypt is also the top exporter, accounting for 49.6 percent of total exports during the second period. Other top exporters include Morocco and South Africa.

Figure 4.7 Top 10 African exporters of fruits, share of African exports, by level of processing



Source: Authors' own elaboration using the 2024 AATM database.

Figure 4.8 Top 10 African exporters of vegetables, share of African exports, by level of processing



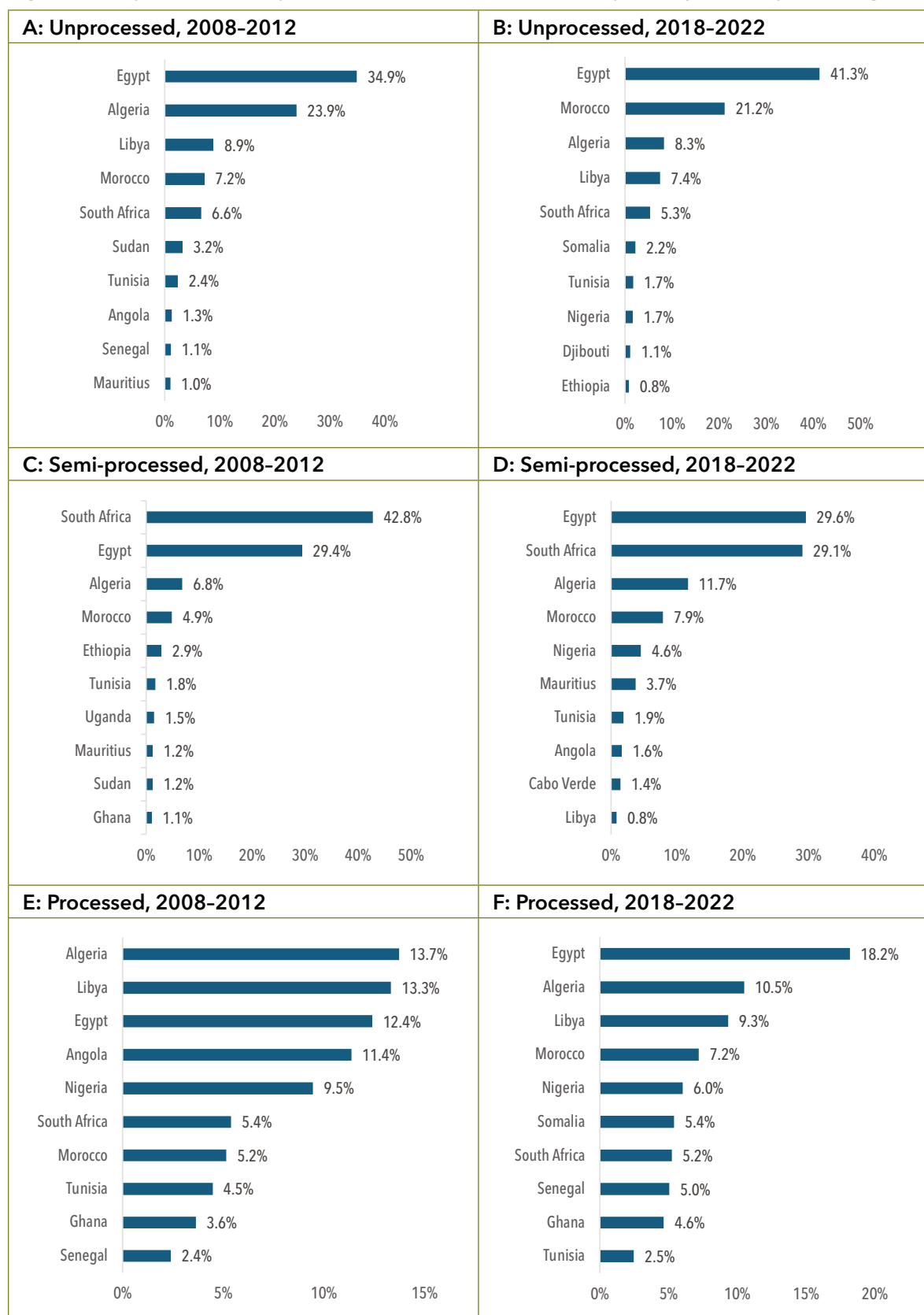
Source: Authors' elaboration using the 2024 AATM database.

In the case of fruit imports (Figure 4.9), North African countries (such as Egypt and Morocco) are also among the top-ranked countries. For unprocessed fruits (Figure 4.9, panels A and B), Egypt, Algeria, Libya, and Morocco constitute 78.2 percent of African imports for the 2018–2022 period. For semi-processed fruit imports (Figure 4.9, panels C and D), South Africa was the top importer, with a share of 42.8 percent during the first period, followed by Egypt (29.9 percent). During the second period, Egypt and South Africa had comparable shares (about 29 percent), followed by Algeria and Morocco. The list of top importers of processed fruits (Figure 4.9, panels E and F) also reveals a strong presence of North African countries, with Egypt, Algeria, and Libya among the top importers in both periods. Together, the top 10 importers constitute 73.9 percent of the total African imports within this category for the second period.

Finally, Figure 4.10 shows the top 10 African importers of vegetables by level of processing. These countries are mostly in North and West Africa. The data for unprocessed vegetables (Figure 4.10, panels A and B) suggest a more balanced share of each country in total African imports within this category. Whereas, in the first period, North African countries like Egypt and Algeria dominated these imports, data for the second period suggest a lower concentration of imports among the top 10 countries. Egypt was still the top importer, followed by Senegal and Algeria. The imports of semi-processed vegetables (Figure 4.10, panels C and D) reflect a strong presence of North and East African countries. Egypt ranks first, with 33.9 percent of total African imports within this category, followed by Algeria (17.4 percent). Finally, the imports of processed vegetables (Figure 4.10, panels E and F) reveal a relatively more balanced geographic distribution, with East African countries like Kenya and Southwestern countries like Angola among the top 10 exporters. Unlike unprocessed and semi-processed imports, processed vegetable imports are dominated by Nigeria and South Africa, followed by North African countries, such as Libya, Egypt, and Morocco.

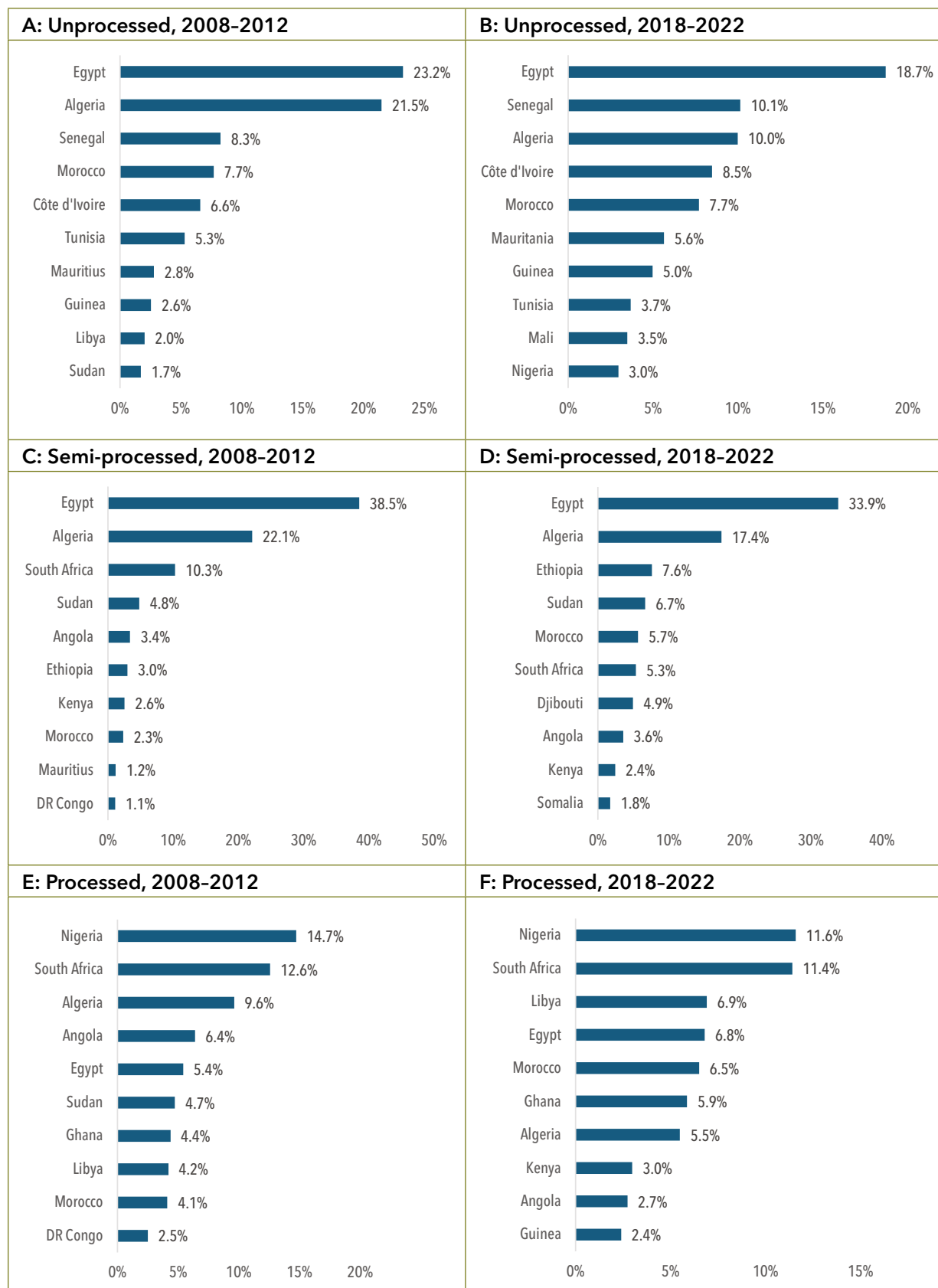


Figure 4.9 Top 10 African importers of fruits, share of African imports, by level of processing



Source: Authors' elaboration using the 2024 AATM database.

Figure 4.10 Top 10 African importers of vegetables, share of African imports, by level of processing



Source: Authors' elaboration using the 2024 AATM database.

Our analysis of the main African exporters and importers of fruits and vegetables highlights several interesting findings: on the one hand, North African countries (primarily Egypt and Morocco) play a major role in exports of fruits and vegetables, along with South Africa (in the fruit sector). The concentration of exports in the top 10 countries can be as high as 90 percent. On the other hand, imports of fruits and vegetables are more balanced. While North African countries and South Africa have a major presence, some countries in West Africa (Guinea, Nigeria, and Senegal) and in East Africa (Ethiopia and Kenya) are also among the top 10 importers.

These findings have important implications for value chains. The concentration of fruit and vegetable exports in a relatively small number of countries—together with the predominance of unprocessed exports depicted in Figure 4.1—could be attributed to several factors. First, endowments play an important role, as trade in agriculture is primarily driven by factor endowments (land, climate conditions, and thus the ability to produce and export). Clearly, this explains why these countries have a high comparative advantage in agriculture exports.

Second, income is one of the major determinants of the status of African participation in global value chains (GVCs). Our findings suggest that the income levels of the African exporters are the highest in the continent. South Africa, which has a heavy presence in FVVCs, has the highest GDP in the continent, followed by Egypt (which is also among the top African performers in agricultural GVCs). Income levels were also found to correlate with a higher per capita demand for fruit and vegetable products (Mensah et al. 2021), without these trade flows being necessarily related to other processing activities along GVCs (such as in the case of Algeria and Nigeria). This may explain why economies that are larger in terms of GDP per capita, such as South Africa, Egypt, Algeria, and Nigeria, are also among the top importers of vegetables across different levels of processing, although Africa as a whole has the lowest per capita production and consumption of fruits and vegetables in the world (Schreinemachers et al. 2022).

Third, it is also important to note that a sufficient and predictable domestic demand for fruits and vegetables is essential for the development of competitive value chains in the first place. These, once developed, could realize economies of scale and later compete internationally. Integration in the global economy also contributes to technology transfers and efficiency gains. For example, countries engaged in FVVCs have higher levels of input and irrigation technology use, which are of particular importance for these value chains (Baumüller et al. 2020). South Africa, for example, has invested in planting high-quality varieties to meet rising international standards. Countries that export and import fruits and vegetables across different stages of processing are also more likely to be engaged in FVVCs, due to endowments in specific crops (such as pineapple in South Africa and oranges and tomatoes in South Africa, Egypt, and Morocco). Thanks to the availability of necessary capital and technology, these countries have better fruit and vegetable processing capacities and are therefore engaged in different processing stages along the value chain. However, for most African countries, innovation among agrifood processing firms is generally low, due to low investments in research and development and limited access to technology (Jenane, Ulimwengu, and Tadesse 2022). Most African countries also rely on small-scale fruit and vegetable production. Given the high perishability of most fruit and vegetable produce and the absence of processing capacities and reliable market outlets for smallholders, domestic and intraregional trade is usually more realistic than international trade (Schreinemachers et al. 2022).

Fourth, infrastructure is a significant challenge for Africa's fruit and vegetable trade and for upgrading along value chains due to long distances between producers and consumers coupled with poor road conditions and a lack of refrigerated transportation. Top exporters

in Africa, however, have more suitable logistics, transport, and storage conditions than other African countries.

Finally, it is important to note that trade policy plays a limited role, as will be shown later in this chapter. On the one hand, the top exporting countries perform better than other African countries due to their endowments and comparative advantage rather than their trade policies. On the other hand, other African countries benefit from preferential access to export markets—through the African Growth and Opportunity Act,⁷ the Generalized System of Preferences, or the Everything but Arms⁸ initiative—yet are not strong exporters, as they face several nontariff measures that reduce their competitiveness.

Destination of African fruit and vegetable exports by level of processing

In this section, we explore the main destination markets for African exports of fruits and vegetables for the two time periods. Figure 4.11 shows the top 10 destinations for African fruit exports. Regardless of the level of processing, the top 10 importers are mostly European countries, the United States, and Canada. The imports of African unprocessed and semi-processed fruits for both periods of the analysis (Figure 4.11, panels A–D) are concentrated in Europe and the United States and, to a lesser extent, Japan. Other countries, including China and Russia, are also among the top importers. For processed fruit exports (Figure 4.11, panels E and F), the second period shows a diversification of top importing countries, with four African countries among the top importers.

The top 10 destinations for Africa's vegetable exports are shown in Figure 4.12. While the top importers of African unprocessed vegetables (Figure 4.12, panels A and B) are predominantly European countries, those of semi-processed and processed vegetables (Figure 4.12, panels C–F) are more diversified and include Arab, African, and Asian countries. Thus, as the level of processing increases and food safety and quality standards become more stringent, the top destinations are more diversified and reflect a stronger presence of Asian and Arab countries as the main importers.

Overall, we find that African countries are positioned upstream along FVVCs (that is, more toward the origin of the value chain). The growth of exports of unprocessed fruits and vegetables is significantly greater than exports of semi-processed and processed products. Moreover, Africa's top importers of unprocessed fruits and vegetables are predominantly Europe and the United States, suggesting an upstream position of African countries in the value chain, with their specialization in raw, unprocessed commodities, which are later processed in developed countries and may even be re-exported to Africa for domestic consumption.

As was mentioned, gravity considerations play an important role in explaining these trade patterns, given that African countries trade generally with countries characterized by large markets (the United States and China) or with countries with which they had colonial links (France, Portugal, Italy, and the United Kingdom). In fact, these trade patterns are largely in line with the historical role European countries played as the main destination for African exports of (especially unprocessed) fruits and vegetables. Despite the relative maturity and high degree of competition in European markets, these are likely to remain attractive to Africa's fruit and vegetable exports due to increased interest in plant-based diets and healthy foods, in addition

⁷ The African Growth and Opportunity Act provides eligible sub-Saharan African countries with duty-free access to the US market for several products, in addition to other products that are eligible for duty-free access under the Generalized System of Preferences program. This scheme is extended until 2025.

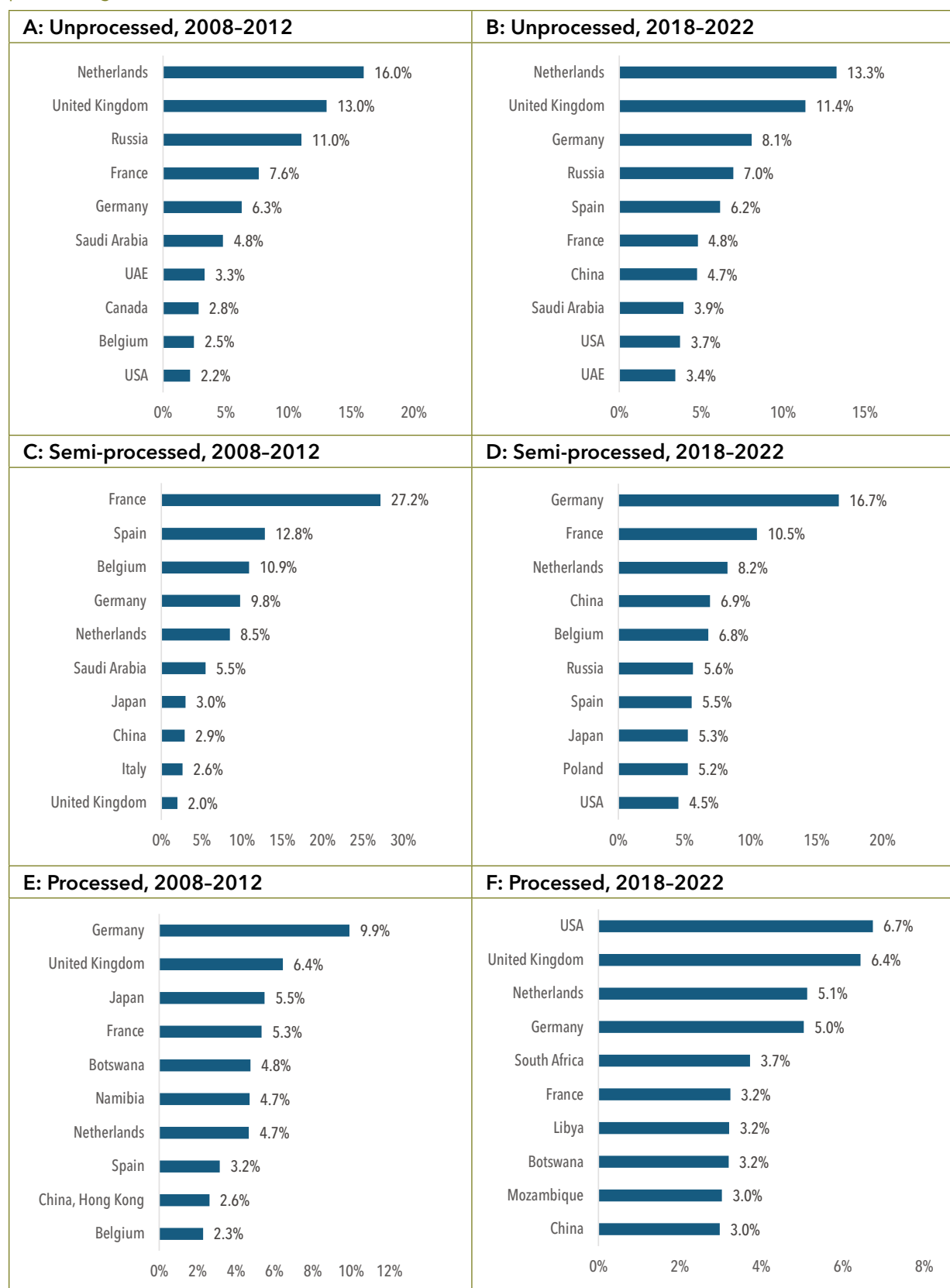
⁸ The Everything but Arms scheme removes tariffs and quotas for all imports of goods (except arms and ammunition) coming into the European Union from least developed countries, mainly African ones.

to their relative profitability (COLEACP 2020). At the same time, trade with other regions has been growing rapidly, especially at the higher levels of processing. Between 2002 and 2017, Africa's exports of fruits and vegetables (processed and unprocessed) to East Asia grew at an average rate of 9.6 percent per year, compared with only 1.1 percent for exports to the EU (COLEACP 2020). For the 2018-2022 period, Asian and Arab countries are also among the top destinations for Africa's semi-processed and processed fruit and vegetable exports. This reflects the ability of African countries to cater to markets with less stringent standards and sanitary restrictions and highlights the potential for developing vegetable processing industries and serving geographically close markets in the Middle East or rapidly growing markets in Asia. Despite this potential to upgrade along FVVCs, it is important to note that tariff escalation contributes to the concentration of African exports in unprocessed products. Tariff escalation refers to situations in which lower tariffs are imposed on unprocessed products and higher tariffs on processed ones, which is common in Africa's main export destinations, including China, the EU, and the United States (Antimiani, Di Maio, and Rampa 2011).

Our initial analysis also suggests the presence of regional value chains, with some African countries among the top importers of Africa's processed and semi-processed fruits and vegetables, which we discuss in the next section.

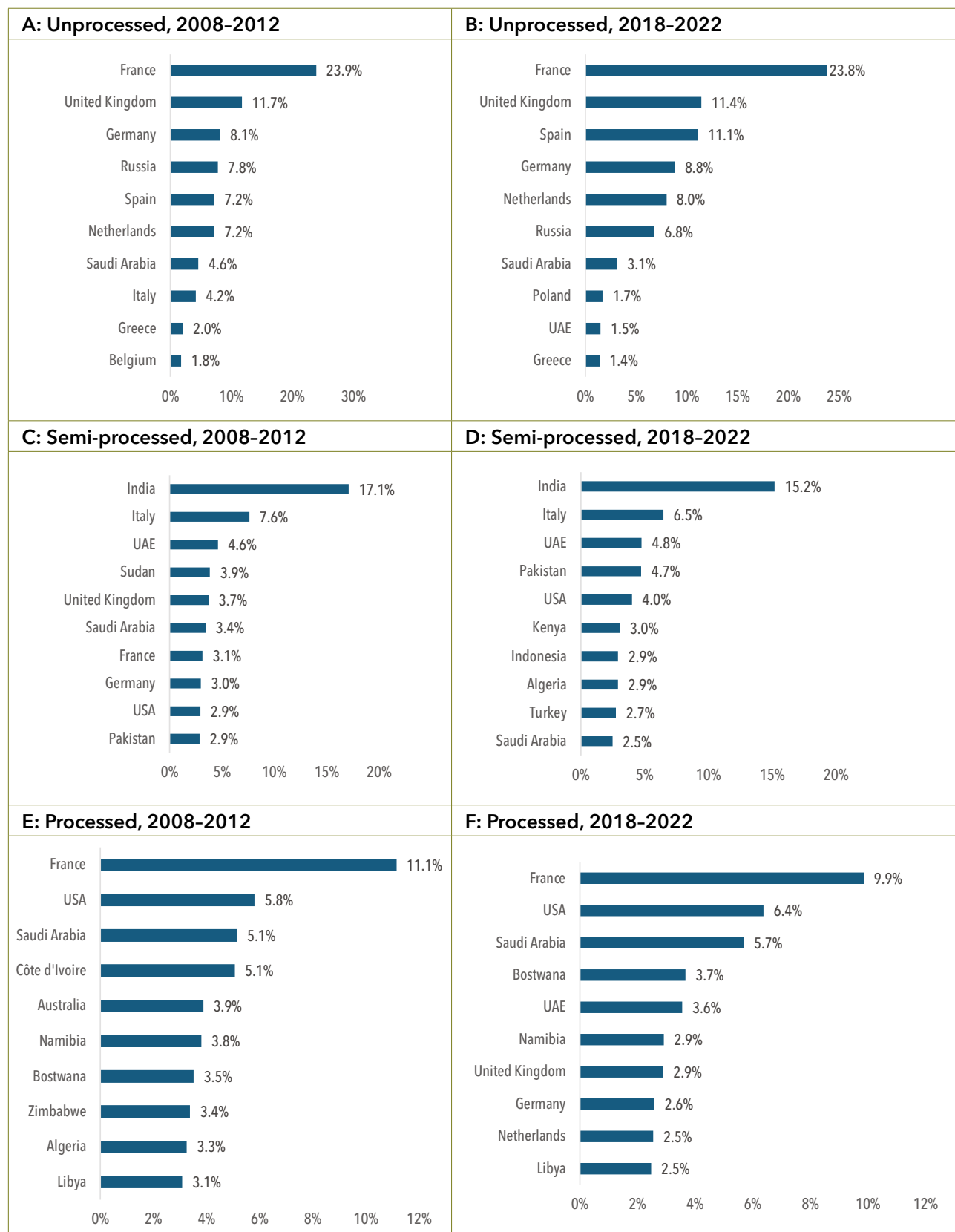


Figure 4.11 Top 10 importers of African exports of fruits, share of African exports, by level of processing



Source: Authors' own elaboration using the AATM 2024 database.

Figure 4.12 Top 10 importers of African exports of vegetables, share of African exports, by level of processing



Source: Authors' own elaboration using the AATM 2024 database.

Intra-African fruit and vegetable value chains

In this section, we examine intra-African trade patterns and compare the observations with the findings on global trade above in order to better understand the challenges facing intra-African trade in fruits and vegetables.

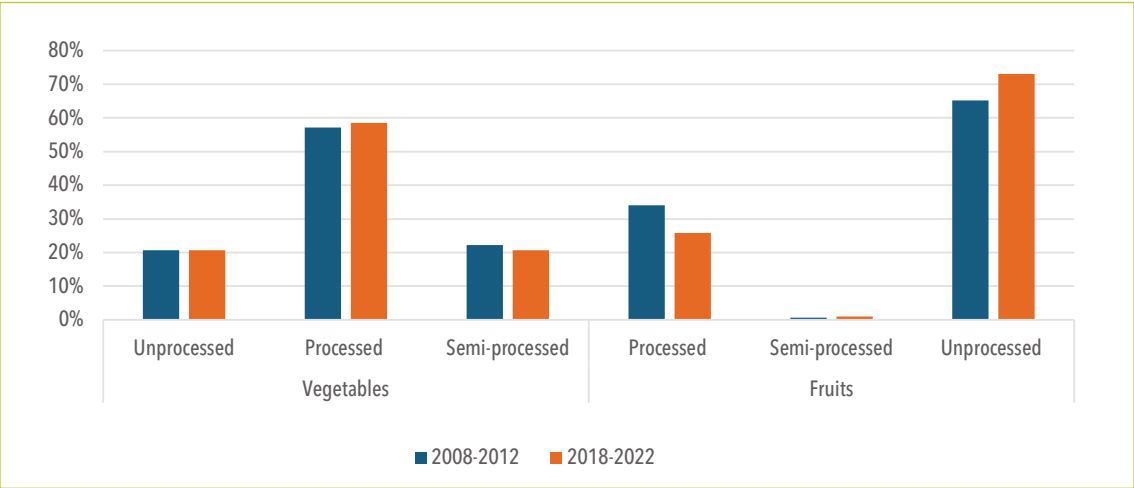
Trade by level of processing

Total intra-African fruit and vegetable trade amounted to \$2.36 billion in 2022, of which \$1.55 billion was trade in vegetable products and \$812 million was trade in fruit products. This is an increase of \$750 million, almost 50 percent, since 2012. Of total African exports of fruits and vegetables, intra-African trade accounts for only about 6 percent of trade in fruits and 17 percent of trade in vegetables. About 21 percent of fruit imports and about 11 percent of vegetable imports are sourced from another African country.⁹ However, intra-African trade statistics are likely underestimating the total level of intra-African trade due to the high level of informal trade (Bouët, Cissé, and Traoré 2020). Over the 2018-2020 period, overall, about 40 percent of intra-African fruit and vegetable trade was in the form of unprocessed commodities, 50 percent in processed products, and about 10 percent in semi-processed products. This has not changed substantially over the past 20 years, with only a few variations in individual years.

There are a few differences between intra-African trade in fruit and vegetable products (Figure 4.13). Among fruit products, there is virtually no trade in semi-processed products, while about 20 percent of intra-African vegetable trade is in semi-processed products. Furthermore, intra-African fruit trade is primarily unprocessed, and the share of unprocessed fruits even increased between the 2008-2012 and 2018-2022 periods. Conversely, about 60 percent of intra-African vegetable trade is in processed products (about the same in both periods). This is both a consequence of the definition of semi-processed products, which are fewer in number than unprocessed and fully processed products, and the fact that regional FVVCs in Africa are very limited. For instance, Odjo and Diallo (2022) discuss Africa's role in GVCs and show, despite an increasing trend, limited African participation. As a result, FVVC products are either fully processed or unprocessed. They argue that this is caused by small, narrow manufacturing sectors that require additional cross-border foreign direct investment. Limited cross-border infrastructure and complex trade regimes, including rules of origin regulations, also contribute to limited participation in regional value chains (Kornher and von Braun 2020). The implementation of the AfCFTA in coming years offers an opportunity to address these policy constraints and improve intra-African trade.

⁹ To approximate the share, we use the total intra-African exports (imports) of the top 10 intra-African exporters (importers) and the total African exports (imports) presented in Figures 4.1 and 4.2.

Figure 4.13 Share of intra-African FVVC trade, by level of processing

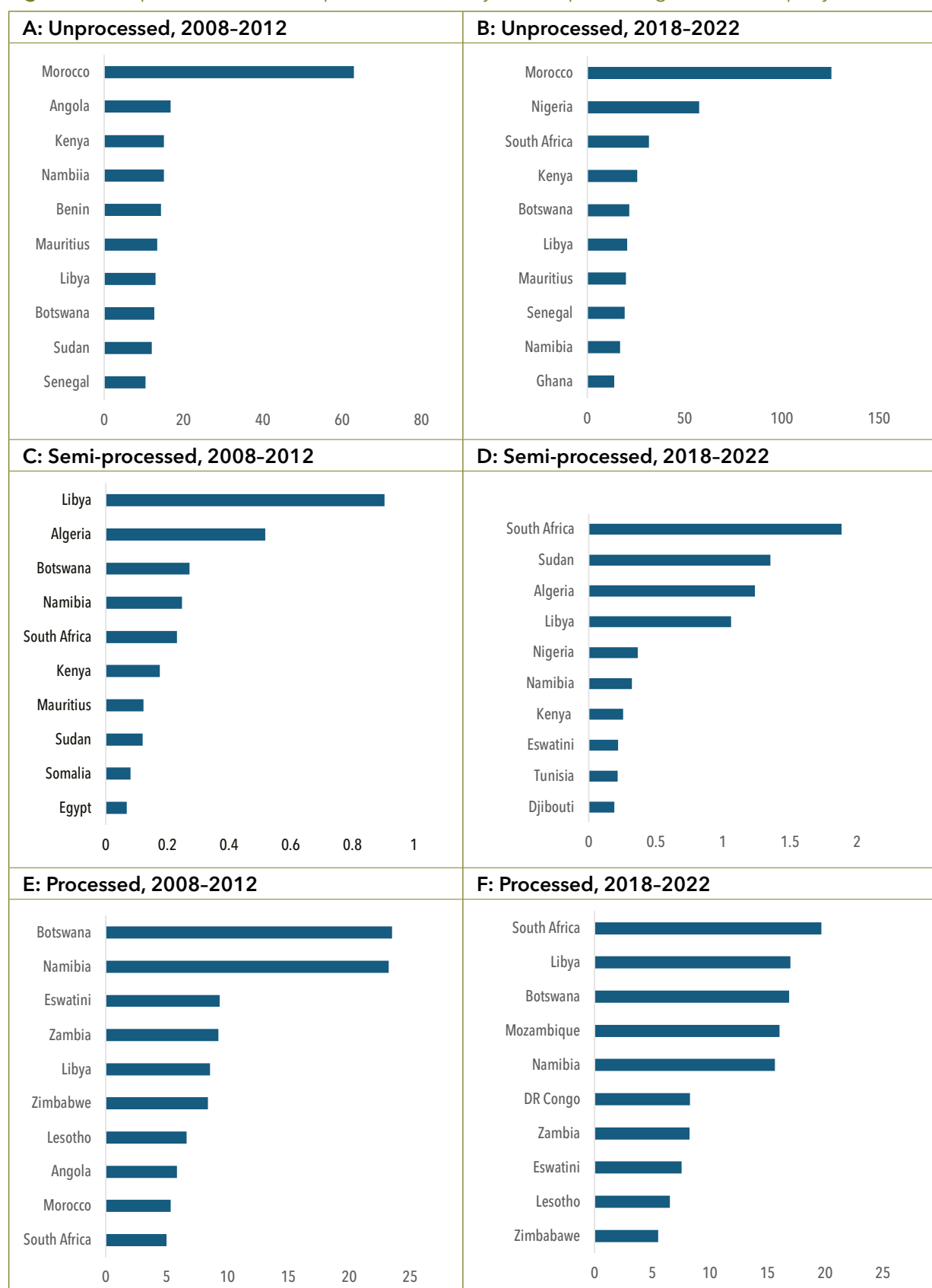


Source: Authors’ elaboration using the 2024 AATM database.

Destinations by level of processing

The top 10 intra-African fruit and vegetable trade destinations are shown in Figures 4.14 and 4.15. Botswana, Kenya, and Mozambique are the main destinations of intra-African vegetable trade for processed, semi-processed, and unprocessed products. Several countries appear in the top 10 list for two levels of processing: Mozambique, Morocco, South Africa, Somalia, Libya, Botswana, and Namibia (Figure 4.15). Three of these countries—South Africa, Libya, and Namibia—are also in the top 10 of intra-African fruit destinations (Figure 4.14). These findings differ from those in the previous section on top African importers (both intra- and extra-African trade). Many of the top African exporters from North Africa are less relevant for intra-African trade. This hints at better trade integration of these countries within the Mediterranean region than with sub-Saharan African countries. Generally, all African regions, except Central Africa, are frequently ranked among the top 10 destinations. While the size and purchasing power of the import market may explain why several of the wealthier African economies are among the top fruit and vegetable import markets (for example, Morocco, Nigeria, and South Africa), it is remarkable that several small countries—Eswatini, Lesotho, and Djibouti—are also ranked among the top 10 intra-African import destinations. The low level of fruit and vegetable imports overall signifies demand-side constraints among African importers, evident from the low levels of per capita fruit and vegetable consumption across the continent. There is no clear clustering of top importers of unprocessed and semi-processed fruit and vegetable products, which again supports the supposition that regional FVVCs are not well developed. Therefore, enabling and promoting African regional FVVCs should be a priority in the AfCFTA implementation process.

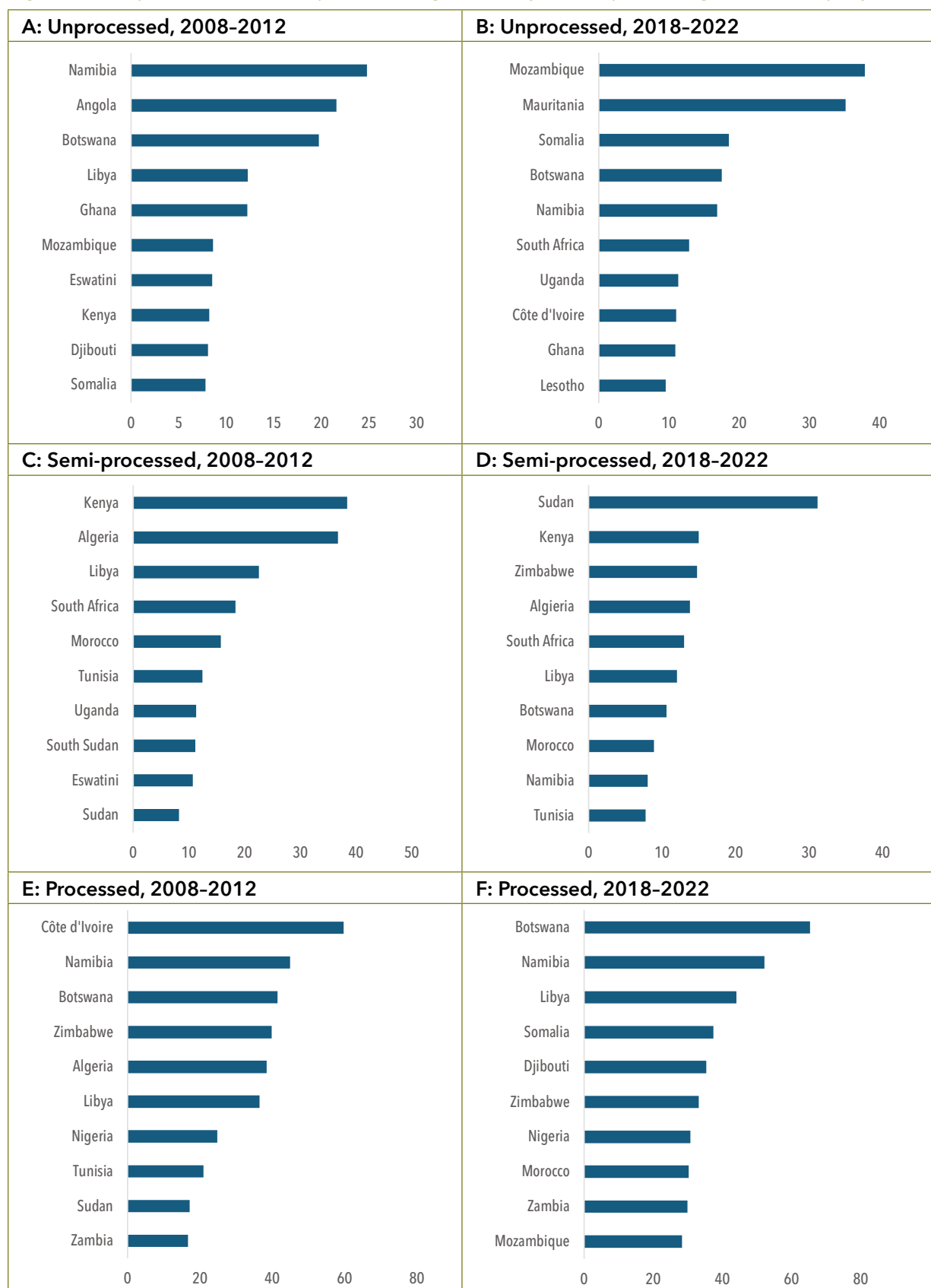
Figure 4.14 Top 10 intra-African importers of fruits, by level of processing (US\$ million per year)



Source: Authors' elaboration using the 2024 AATM database.

Note: Figures present official (formal) intra-African trade only.

Figure 4.15 Top 10 intra-African importers of vegetables, by level of processing (US\$ million per year)



Source: Authors' elaboration using the 2024 AATM database.

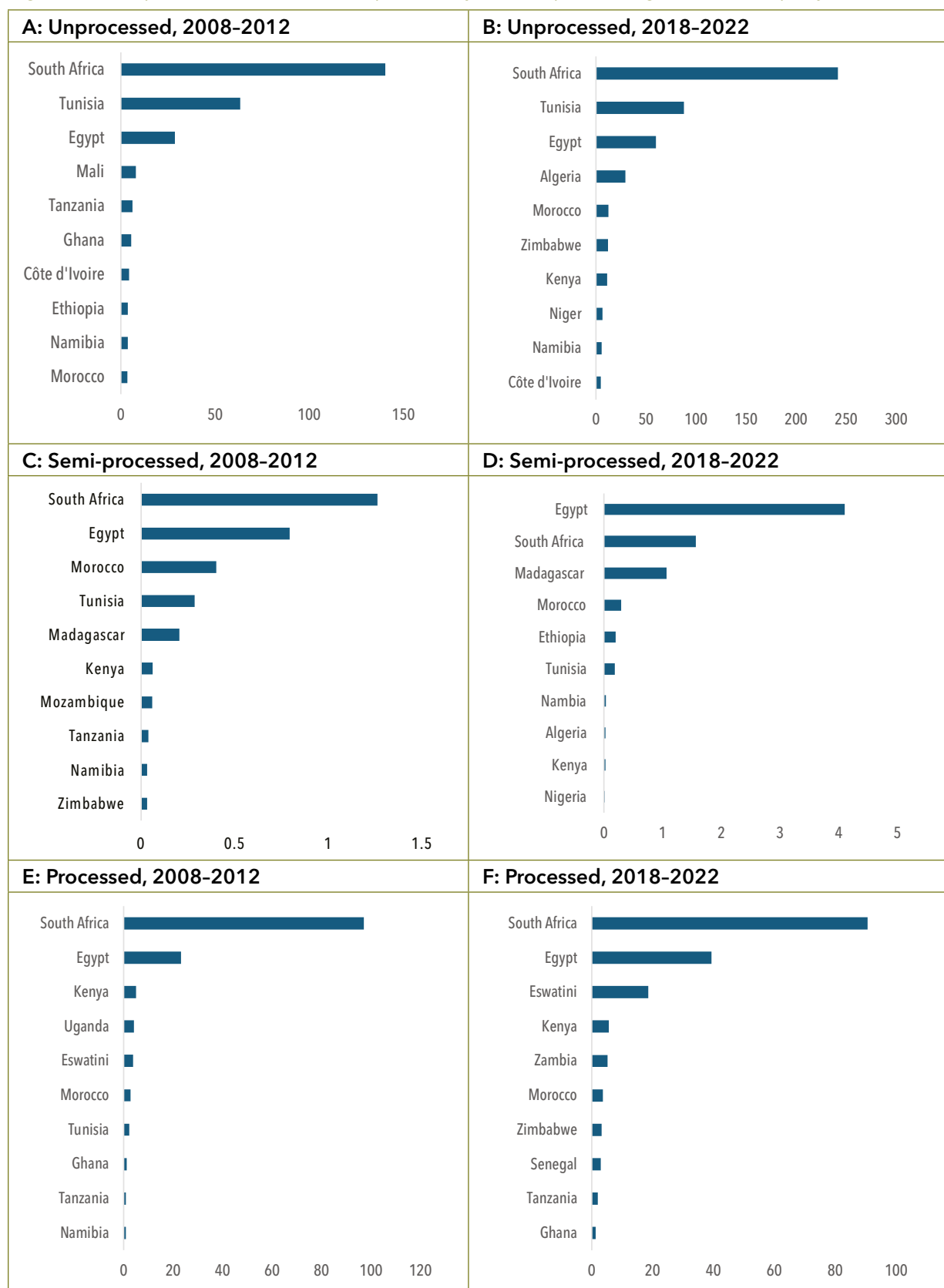
Note: Figures present official (formal) intra-African trade only.

Intra-African top exporters

The group of top 10 intra-African exporting countries is quite different and much more concentrated than the top 10 intra-Africa import destinations (Figures 4.16 and 4.17). For instance, Egypt and South Africa are among the top three intra-African exporters of fruits and vegetables at all levels of processing. It is not surprising to see these countries in the lead for intra-African fruit trade, as we have seen they are among the top African exporters (Figures 4.7 and 4.8). Hence, the top African fruit and vegetable exporters also lead in intra-African fruit and vegetable trade. In fact, these countries are global fruit exporters, specifically of citrus fruits, and therefore have developed internationally competitive FVVCs (Seleka and Obi 2018). At the same time, many other African countries lack the production capacity, such as irrigation and inputs, and value chain requirements, such as cold storage transport and facilities, to produce and trade fruit and vegetable products at large scale (Baumüller et al. 2021).

Regarding the top 10 import destinations, no Central African country is ranked among the top intra-African exporters. In a few instances, West African countries are among the top 10, namely Ghana, Burkina Faso, and Niger for vegetable exports and Ghana, Nigeria, Niger, Senegal, and Côte d'Ivoire for both fruits and vegetables. On the other hand, North, East, and Southern African countries are frequently among the top importers, indicating that FVVC trade in the Southern Africa Development Community (SADC) and East African Community (EAC) have reached an advanced stage (COLEACP 2020). The development of this regional trade may have several causes: better infrastructure and improved market access of smallholders; more efficient and liberal trade policy frameworks in SADC and EAC; and comparative advantages in terms of geography as well as land and labor productivity. The first two will be directly addressed if the AfCFTA is successfully implemented. Generally, the concentration of intra-African exports is less pronounced than it was 20 years ago. Among the most traded vegetable products within Africa are food preparations and sauces as well as onions, beans, and tomatoes. The top intra-African-traded fruit products are dates, apples, and fruit juices.

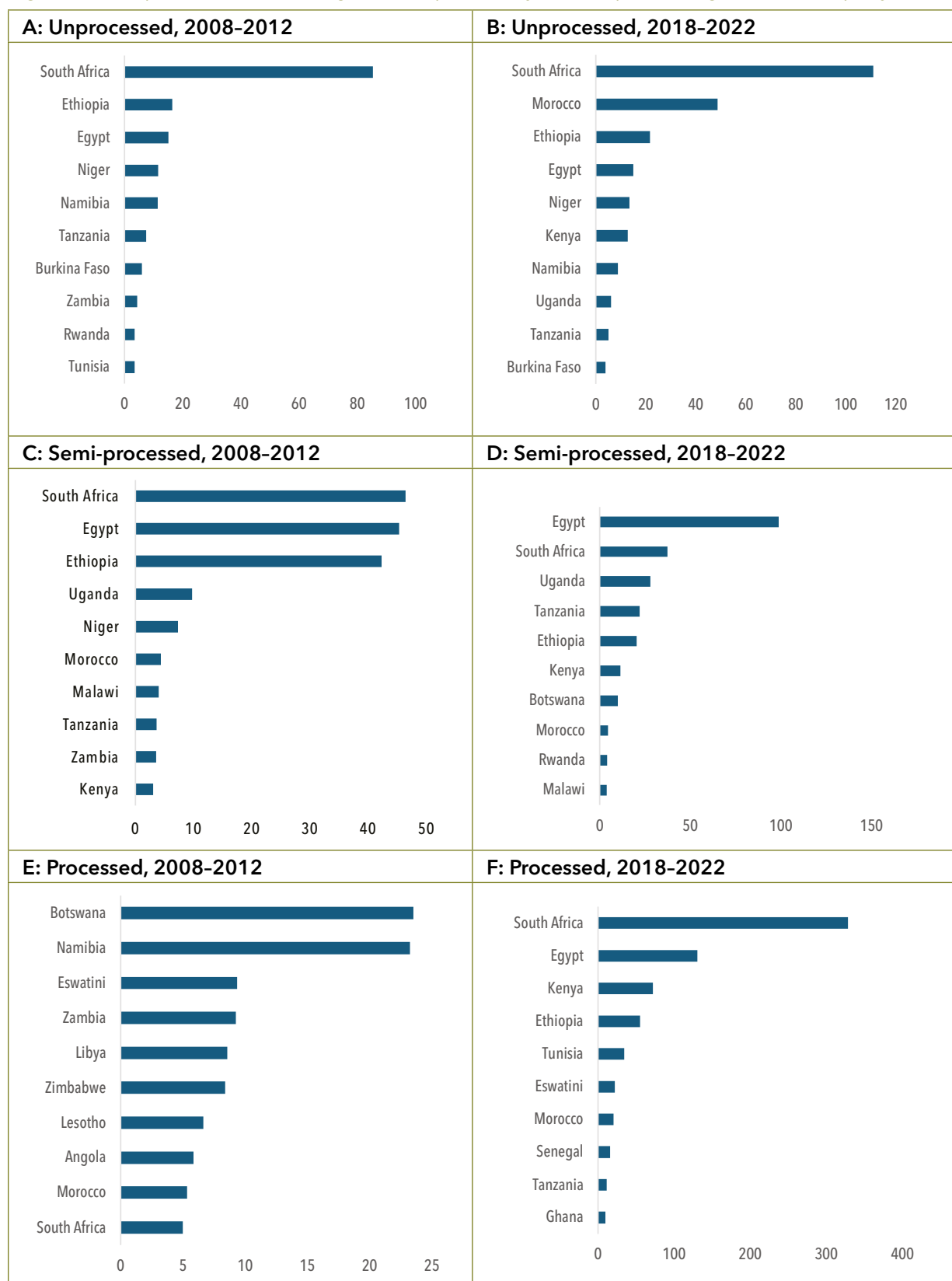
Figure 4.16 Top 10 intra-African fruit exporters, by level of processing (US\$ million per year)



Source: Authors' elaboration using the 2024 AATM database.

Note: Figures present official intra-African trade only.

Figure 4.17 Top 10 intra-African vegetable exporters, by level of processing (US\$ million per year)



Source: Authors' elaboration using the 2024 AATM database.

Note: Figures present official intra-African trade only.

Does Africa Meet World Demand?

In this section, we compare African supply to global demand for processed, semi-processed, and unprocessed fruits and vegetables in order to highlight those products for which there is potential for Africa to expand exports. We begin the analysis by categorizing all fruits and vegetables according to Africa's revealed comparative advantage (RCA)¹⁰ and global demand, as measured by world imports.¹¹ This yields four categories: (1) All fruits and vegetables for which Africa has an RCA and global demand is high. This category constitutes a true opportunity for Africa, and countries should focus on these products and promote their export. (2) All fruits and vegetables for which Africa does not have an RCA, but global demand is high. This category has potential for development, should the available endowments permit. (3) All fruits and vegetables for which Africa has an RCA, but global demand is low. Products in this category could be beneficial to African countries in the short term, but if demand remains the same, have no potential for long-term growth. (4) All fruits and vegetables for which Africa does not have an RCA and global demand is low. Clearly, this category does not have potential for increasing African exports, as neither the supply nor demand sides favor African countries.

Figure 4.18 shows the share of products categorized under each of these four groups in total African fruit and vegetable exports. One of the main findings is that, in both time periods, African countries did not export any processed or unprocessed fruits or vegetables for which they have an RCA and that enjoy high global demand. A modest share of semi-processed products (2 percent of all exported fruit and vegetables in the first period and 1 percent in the second period) satisfies both conditions. Fruits and vegetables for which Africa has an RCA, but for which global demand is low, also represent a relatively minor share in total exports of these goods. This share does not exceed 3 percent for any of the three levels of processing in either time period. While this category of exports may be useful in the short term, focusing on these products in the long term is not recommended, given the low global demand.

A considerable share of fruits and vegetables exported by Africa do not have an RCA and face low global demand, meaning they should not be prioritized given the weak potential on the supply as well as on the demand side. Product shares in this category range from 11 percent for semi-processed products to 15 percent and 16 percent for unprocessed and processed products, respectively.

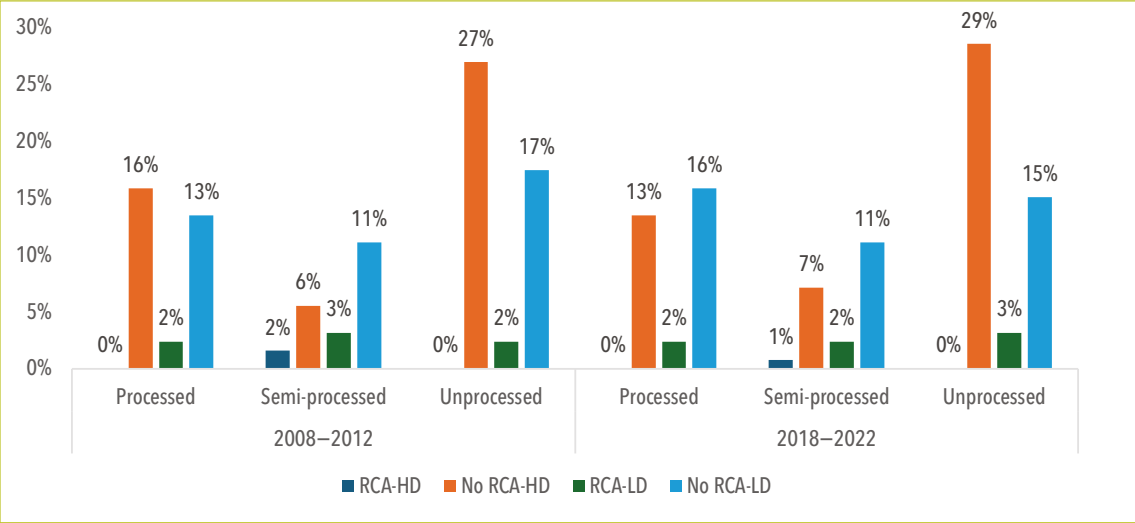
Fruits and vegetables for which global demand is high but African countries do not have an RCA constitute a large share of all exported products. For both periods, this category represented 49 percent of all fruit and vegetable products, with a major share of unprocessed products (27 percent during the first period and 29 percent during the second period). This category of products has potential benefits for African countries, as they could be developed in the long term. However, two important factors may limit this potential: first, the ability of African countries to use their resources and endowments to develop these products and increase their exports; and second (and more importantly), the availability of water and suitable climate conditions to grow these crops. As mentioned, Africa is among the regions most exposed to extreme weather fluctuations, with severe consequences for agriculture, especially for smallholders. Water availability can also be problematic, as several African countries are characterized by either a high level of water stress (North Africa) or a low level of water productivity (sub-Saharan Africa). This affects products that are water intensive, such as oilseeds, nuts, rice, and oats.

10 The RCA index is measured using the Balassa index. A country is said to have an RCA in a given product i when its ratio of exports of product i to its total exports of all goods (products) exceeds the same ratio for the world as a whole.

11 High (low) demand refers to products whose world imports are greater (lower) than the median world imports over the period of analysis.

In addition, the impact of climate change on agricultural markets may lead to a 0.26 percent reduction in total global GDP, with several African countries severely affected, according to Costinot et al. (2016). Similarly, Mahofa (2022) argues that, by the 2050s, climate change will affect production and thus increase African countries’ cereal imports. In the same vein, Gouel and Laborde (2021) show that export shares for maize, wheat, and rice will decrease for Africa by 2080 due to declining yields. Chapter 5 of this report presents a thorough discussion on the impact of climate change on African comparative advantage.

Figure 4.18 Product classification by category



Source: Authors’ elaboration using the 2024 AATM database.

Note: (1) RCA-HD refers to products for which Africa has a comparative advantage and with high global demand. No RCA-HD refers to products for which African countries do not have a comparative advantage but with high global demand. RCA-LD refers to products for which African countries have a comparative advantage but with low global demand. No RCA-LD refers to products for which African countries do not have a comparative advantage for Africa and with low global demand. (2) High (low) demand refers to products whose world imports are greater (less) than the median world imports over the period of analysis. With (without) RCA refers to products whose revealed comparative advantage index is greater (less) than 1.

Table 4.1 provides a more detailed classification of fruit and vegetable exports using these four categories. This detailed presentation can help to identify specific products for African countries to focus on in the long term. As mentioned, African countries do not have any processed or unprocessed fruit and vegetable exports for which their supply is competitive and global demand is high. Among semi-processed products, both mushrooms and truffles and specific bean species were the two product categories for which Africa had a comparative advantage and global demand was high during the 2008–2012 period.¹² During the 2018–2022 period, only semi-processed mushrooms and truffles were in this category.

Some other products may be beneficial to export in the short term but should not be promoted in the long term, given relatively low global demand. These include specific processed roots and tubers (including arrowroot and Jerusalem artichokes, tapioca preparations) and some bean preparations, adzuki beans, and legumes (semi-processed) and unshelled hazelnuts, dried prunes, and dried apples (unprocessed).

¹² See Table A4.2 in Appendix 4.1 for the first period (2008–2012).

Another category of interest are products for which Africa could potentially build a comparative advantage in the long term to benefit from the high global demand. For processed fruits and vegetables, this category includes, among others, preserved vegetables, fruits, and nuts; preserved tomatoes; mixed frozen vegetable preparations; frozen potatoes; preserved olives; preserved sweet corn; fruit jams, purees, and pastes; preserved pineapples; orange juice; and some sauces (including tomato sauce and ketchup). Top African exporters of these products, such as Egypt and South Africa for orange juice and Egypt and Morocco for tomato products, could work on overcoming the challenges (related to resources or food safety, for example) to increase their share in the global market. The same applies to processed vegetables, for which the market is expanding both worldwide and in Africa with increasing urbanization and preference for easy-to-prepare meals. For semi-processed fruit and vegetables, potential products include frozen cooked or uncooked vegetables, dried mixtures of vegetables, dried peas, some types of dried beans (including kidney beans), dried lentils, berries (including frozen strawberries), and some types of frozen fruit and nuts. Finally, for unprocessed exports, this category includes numerous fruits (such as apples, oranges, mandarins, grapefruit, grapes, peaches, plums, strawberries, almonds, and shelled hazelnuts), some of the major tropical fruits (pineapples, mangoes, and guavas), and vegetables (such as potatoes, tomatoes, onions and shallots, garlic, broccoli and cauliflower, lettuce, carrots, cucumbers, and mushrooms). As mentioned, tropical fruits are typically more profitable in their fresh than processed state. Despite the multiple challenges facing the agriculture sector in Africa, some countries may seize this opportunity and work on scaling up their exports in this category.

It is important to note that while we have assessed the potential evolution of supply and demand for fruits and vegetables in Africa in order to identify which sectors can generate higher benefits, the indicators we used do not account for other important factors, including the comparative advantage of competitors or possible changes in endowments or external conditions (such as climate change).

Table 4.1 Classification of fruits and vegetables by processing stage, supply and demand approach, 2018-2022

| | A: Processed fruits and vegetables | |
|----------|--|--|
| | High demand | Low demand |
| With RCA | 0 | 3 |
| | No products | Vegetable roots and tubers, arrowroot Food preparations, tapioca and substitutes Vegetable preparations, beans |
| No RCA | 17 | 20 |
| | Vegetable roots and tubers; manioc (cassava) Vegetable prep., vegetables, fruit, nuts, and edible parts of plants Vegetable prep., tomatoes, whole or in pieces Vegetable prep., tomatoes, other than whole or in pieces Vegetable prep., potatoes Vegetable prep., vegetables and mixtures of vegetables, excluding potatoes Vegetable prep., potatoes, not frozen Vegetable prep., olives, not frozen Vegetable prep., sweet corn, not frozen Jams, jellies, marmalades, purees and pastes (excluding homogenized) n.e.s. in heading no. 2007 Fruit, pineapples, prepared or preserved Juice; orange, frozen, unfermented Juice; orange, not frozen, unfermented Juices; mixtures, unfermented Sauces; tomato ketchup and other tomato sauces Sauces and preparations; mixed condiments and mixed seasonings Food preparations; n.e.s. | Vegetable roots and tubers; sweet potatoes Vegetable prep., cucumbers and gherkins Vegetable prep., mushrooms Vegetable prep., homogenized vegetables, not frozen Vegetable prep., peas, not frozen Vegetable prep., beans, not frozen Vegetable prep., asparagus, not frozen Fruit, nuts, fruit peel, and other parts of plants; preserved by sugar Jams, fruit jellies, marmalades, fruit or nut puree (homogenized) Jams, jellies, marmalades, purees and pastes (excluding homogenized) Fruit, citrus, prepared or preserved Fruit, pears, prepared or preserved Fruit, apricots, prepared or preserved Fruit, cherries, prepared or preserved Fruit, peaches, prepared or preserved Fruit, strawberries, prepared or preserved Palm hearts, prepared or preserved Juice, tomato, unfermented Sauces; soya Mustard flour and meal; prepared mustard |

| B: Semi-processed fruits and vegetables | | |
|---|---|--|
| | High demand | Low demand |
| With RCA | 1 | 3 |
| | Vegetables, leguminous; chickpeas (garbanzos), dried | Vegetables, leguminous; small red (adzuki) beans, shelled, dried Vegetables, leguminous; n.e.s., dried, shelled. Fruit, edible; fruit and nuts n.e.s. in heading no. 0812, provisionally preserved but unsuitable in that state for immediate consumption |
| No RCA | 9 | 14 |
| | Vegetables, frozen, n.e.s. in Chapter 7 Vegetables, mixtures of vegetables n.e.s. in heading no. 0712, whole, cut, sliced, broken, or in powder but not further prepared, dried Vegetables, leguminous; peas, dried Vegetables, leguminous; beans, dried, shelled Vegetables, leguminous; kidney beans, dried, shelled Vegetables, leguminous; lentils, shelled, dried Fruit, edible; strawberries, frozen Fruit, edible; raspberries and other berries, whether containing added sugar or other sweetening matter Fruit, edible; fruit and nuts n.e.s. in heading no. 0811, frozen | Vegetables, potatoes, frozen Vegetables, leguminous; peas, frozen Vegetables, leguminous; beans, frozen Vegetables, leguminous (other than peas or beans), frozen Vegetables; spinach, frozen Vegetables; sweet corn, frozen Vegetable mixtures, frozen Vegetables, olives, provisionally preserved but unsuitable in that state for immediate consumption Vegetables, cucumbers, and gherkins, provisionally preserved but unsuitable in that state for immediate consumption Vegetables and mixed vegetables; n.e.s. in heading no. 0711, provisionally preserved but unsuitable in that state for immediate consumption Vegetables, onions, not further prepared, dried Vegetables, leguminous; broad beans, dried, shelled Vegetables, leguminous; n.e.s. in heading no. 0713, shelled, dried Fruit, edible; cherries, provisionally preserved but unsuitable in that state for immediate consumption |

| | C: Unprocessed fruits and vegetables | |
|----------|---|--|
| | High demand | Low demand |
| With RCA | 0 | 4 |
| | No products | Nuts, edible; hazelnuts or filberts (<i>Corylus</i> spp.), fresh or dried, in shell Fruit, edible; citrus fruit n.e.s. in heading no. 0805, fresh or dried Fruit, edible; prunes, dried Fruit, edible; apples, dried |
| No RCA | 36 | 19 |
| | Vegetables; potatoes (other than seed), fresh or chilled Vegetables; tomatoes, fresh or chilled Vegetables, alliacious; onions and shallots, fresh or chilled Vegetables, alliacious; garlic, fresh or chilled Vegetables, brassica; cauliflowers, headed broccoli, fresh or chilled Vegetables, brassica; edible, n.e.s. in heading no. 0704, fresh or chilled Vegetables; lettuce (other than cabbage lettuce), fresh or chilled Vegetables, root; carrots and turnips, fresh or chilled Vegetables; cucumbers and gherkins, fresh or chilled Vegetables, leguminous; beans, shelled or not, fresh or chilled Vegetables; asparagus, fresh or chilled Vegetables; mushrooms, fresh or chilled Vegetables; fruits of the genus <i>Capsicum</i> or <i>Pimento</i> Nuts, edible; almonds, fresh or dried, in shell Nuts, edible; almonds, fresh or dried, shelled Nuts, edible; hazelnuts or filberts (<i>Corylus</i> spp.), fresh or dried, shelled Nuts, edible; walnuts, fresh or dried, in shell Nuts, edible; walnuts, fresh or dried, shelled Nuts, edible; n.e.s. in heading no. 0801 and 0802, fresh or dried, whether or not shelled or peeled Fruit, edible; dates, fresh or dried | Vegetables, seed potatoes, fresh or chilled Vegetables, alliacious; leeks and other kinds n.e.s., fresh or chilled Vegetables, brassica; brussels sprouts, fresh or chilled Vegetables, cabbage (head) lettuce (<i>Lactuca sativa</i>), fresh or chilled Vegetables, Witloof chicory, fresh or chilled Vegetables, chicory (other than witloof chicory), fresh or chilled Vegetables, root; salad beetroot, salsify, celeric, fresh or chilled Vegetables, leguminous; peas, shelled or unshelled, fresh or chilled Vegetables, leguminous (other than peas and beans), fresh or chilled Vegetables; aubergines (eggplants), fresh or chilled Vegetables; celery (other than celeriac), fresh or chilled Vegetables; spinach, New Zealand and orache spinach, fresh or chilled Fruit, edible; figs, fresh or dried Fruit, edible; papaws (papayas), fresh Fruit, edible; apricots, fresh Fruit, edible; black, white, or red currants and gooseberries, fresh Fruit, edible; apricots, dried Nuts, edible; mixtures of nuts or dried fruits of Chapter 8 Peel of citrus fruit or melons (including watermelons), fresh, frozen, dried, or provisionally preserved in brine, sulfur water, and other preservative solutions |

| No RCA | High demand | Low demand |
|-----------|---|------------|
| | Fruit, edible; pineapples, fresh or dried Fruit, edible; avocados, fresh or dried Fruit, edible; guavas, mangoes, and mangosteens, fresh or dried Fruit, edible; oranges, fresh or dried Fruit, edible; mandarins (including tangerines and satsumas), clementines, wilkings, and similar citrus hybrids, fresh or dried Fruit, edible; grapefruit, fresh or dried Fruit, edible; grapes, fresh Fruit, edible; grapes, dried Fruit, edible; apples, fresh Fruit, edible; peaches including nectarines, fresh Fruit, edible; plums and sloes, fresh Fruit, edible; strawberries, fresh Fruit, edible; raspberries, blackberries, mulberries, and loganberries, fresh Fruit, edible; cranberries, bilberries, and other fruits of the genus <i>Vaccinium</i> , fresh Fruit, edible; fruit n.e.s. in heading no. 0801 to 0810, fresh Fruit, edible; fruit n.e.s. in heading no. 0812, dried | |

Source: Authors' own elaboration using the 2024 AATM database.

Note: (1) High (low) demand refers to products whose world imports are greater (less) than median world imports over the period of analysis; (2) With/without RCA refers to products whose revealed comparative advantage index is greater (less) than 1. n.e.s. = not elsewhere specified. Numbers above each block indicate the number of products.

Challenges of Fruit and Vegetable Value Chains

The description of past and current fruit and vegetable trade patterns of African countries and the market demand analysis clearly show the limited capacity of African countries to engage in global and regional value chains. The reasons for this are multifaceted and include sectoral, institutional, and structural issues. In this section, we discuss the challenges in detail, looking at production processes, post-production processes, and trade policy.

Production processes

Africa's agricultural sector is not performing at its full potential due to a variety of interrelated factors, including the lack of adoption and investment in production-enhancing technologies and inadequate institutional frameworks (Baumüller et al. 2020). As a result, African fruit and vegetable yields are far below yields in other regions (FAOSTAT 2024), which limits Africa's capacity to produce sufficient fruits and vegetables to meet consumption needs. A simulation using the International Food Policy Research Institute (IFPRI)'s IMPACT model shows that many countries around the world will need to increase fruit and vegetable production to achieve the World Health Organization's dietary recommendations, even if waste is reduced to zero (Mason-D'Croz et al. 2019). There are specific challenges to increasing FVVC productivity and production, which we discuss below.

Seeds, seed systems, and seed varieties

Access to seeds of high-quality improved varieties that are adapted to local agroecologies, pest risk, and farmer preferences is a key element to increasing fruit and vegetable yields in Africa. Current limitations reflect the lack of selection and breeding studies for fruits and vegetables that are suited for the region, and particularly for traditional African vegetables (Dinssa et al. 2016). Very few seed companies operate in Africa, and even fewer have invested in research and development to create locally adapted varieties. Instead, most of these seed companies have based their businesses on trading and distributing seeds (Afari-Sefa et al. 2012). Despite the arrival of multiple international seed corporations, there is still very little breeding of vegetables or other crops for the local market in sub-Saharan Africa (Access to Seeds Foundation 2019).

Inputs

The low adoption of agricultural inputs to increase soil fertility and of pesticides to control pests is another contributor to poor fruit and vegetable yields in Africa. Given the low levels of fertilizer use prevalent in Africa compared with other regions (Kirui, Kornher, and Bekchanov 2023), agricultural production is very responsive to increasing chemical fertilization (Kornher and von Braun 2024). For example, Rosegrant et al. (2014) show that the yield increases that could be achieved through nitrogen-efficient technologies in Africa are higher than in other regions. This is important for fruits and vegetables because they deplete soil nitrogen more than other products, and therefore low fertilization contributes to ongoing soil degradation in Africa (Elrys et al. 2020). Regarding pesticide use, African farmers applied the lowest levels in terms of cropland area, population, and the value of their agricultural production between 1990 and 2020 (FAO 2022). Among all pesticides, herbicides, fungicides, bactericides, and insecticides have relatively equal shares. Most of the pesticides applied in Africa are imported from outside Africa, with only about 10 percent of the pesticide trade occurring within Africa.

The constraints to enhanced fertilizer and pesticide availability in Africa are similar to those limiting adapted seeds: Fertilizer and pesticide production is limited in Africa. However, unlike adapted seeds, fertilizers and pesticides are less context-specific. Therefore, decisions about

fertilizer and chemical input use at the farm are subject to country factors, suggesting the importance of national policies and institutions for increased chemical input availability and use (Sheahan and Barrett 2017).

Irrigation

FVVCs largely depend on frequent water applications in many parts of the world. Water is required in different stages of FVVCs, including growing, processing (produce washing, packhouse wash down, sanitation), and distribution (wash down). Many fruit and vegetable crops, such as tomatoes and cucumbers, have high water content, and their yields and quality deteriorate under water stress. Therefore, a secure and reliable water supply is important to ensure productivity and quality. In Africa, however, crop cultivation is primarily rainfed, and only about 5 percent of agricultural land is irrigated (FAOSTAT 2024). With progressing climate change and uncertain precipitation, fruit and vegetable yields, particularly in semi-arid areas, will be under stress, and the expansion of irrigated cropland will be essential to mitigate climate change effects on yields (Hess and Sutcliffe 2018). For instance, North African countries, which have substantially more crop area under irrigation, have higher fruit and vegetable yields than countries in sub-Saharan Africa and export vegetable products to the European Union (ZEF and ICRIER 2021). This suggests that irrigation is essential to lift fruit and vegetable farming from the subsistence to commercial level.

Irrigation expansion can be achieved through large-scale irrigation schemes that employ water diversion and dams, as well as through the adoption of small-scale irrigation systems in the form of local pumps with substantial impact. For example, the Bwanje Valley Irrigation Scheme in Malawi increases the agricultural incomes of participating farmers by 65 percent and their caloric intake by 10 percent (Nkhata 2014). For small-scale irrigation, studies have shown that the adoption of simple irrigation technologies in Burkina Faso contributed to an increase in national vegetable production of between 60,000 and 160,000 tons within nine years. Households in Tigray, Ethiopia, that use irrigation earn double the income of households that do not have access to irrigation, with overall income gains of around \$150 per household per year (Malabo Montpellier Panel 2018).

IMPACT model simulations run by IFPRI show that under current conditions, sub-Saharan Africa will require net imports of 36 million tons of vegetables in 2050. In contrast, if irrigation is expanded, the region could become a net vegetable exporter.¹³ Besides the macroeconomic effects of irrigation through yield increase, the adoption of irrigation technologies is also found to have strong microeconomic effects. For instance, smallholder households that adopt irrigation can increase crop diversity and expand fruit and vegetable production. Smallholders, who frequently practice irrigation, grow more vegetables, fruit, and other micronutrient-rich crops, particularly during the dry season. This increases the consumption of nutritious foods and offers additional income opportunities when selling these products in the market (Ringler et al. 2022).

Postharvest losses

Food loss and waste (FLW) is a major challenge to sustainable food systems and is estimated to reach about 20 percent of total production quantities in Africa, which is substantially higher than the global average (FAO 2024). Postharvest losses are caused by high perishability. For

¹³ This is because vegetable products are of high value and profits outweigh investment costs, even under high internal rates of return. Within sub-Saharan Africa, East and Central Africa will remain net importers, but at much lower rates than before, and West and Southern Africa become net exporters. In this scenario, West Africa could turn into a net exporter of up to 17 million tons of vegetables (Xie et al. 2018).

instance, reported losses for FVVC products vary between 0 and 80 percent but are related to several other factors, such as weather and production and transportation mode (Santacoloma et al. 2021). In low- and middle-income countries, and Africa specifically, most FLW occurs in the field and postharvest and not during consumption. Causes include inadequate production methods, the incidence of diseases, poor on-farm storage after harvesting and before marketing, excessive temperatures and humidity during storage and handling, weather conditions, the type of packaging, and time delays and handling during transportation, such as delays caused by road harassment (Bouët, Sall, and Traoré 2023). Many of these factors are more relevant in Africa than in other regions, where storage facilities are better equipped, management is more professional, and infrastructure and energy are available to manage temperatures during transport and storage.

Fruit and vegetable products are highly perishable, so losses are higher than for cereal and legume crops (Houngbo 2019). Houngbo (2019) estimates that FLW for fruits and vegetables in sub-Saharan Africa could be up to 50 percent. Specifically, they reach 55 percent for fruits and about 45 percent for vegetables (Santacoloma et al. 2021). These estimates are in line with a systematic literature analysis by Kitinoja and Kader (2015), who found that reported FWL globally is between 30 and 40 percent, with little change since 1970.

Postharvest losses result in monetary losses at the production, processing, and wholesale level. In addition, perishability also leads to substantial quality deterioration in fruits and vegetables, which also contributes to monetary losses. Estimates suggest that monetary losses from both quality deterioration and losses range from 4.8 to 81 percent for tomatoes, amaranth leaves, okra, oranges, and mangoes that suffer damage, spoilage, or decay at the farm level; between 5.4 and 90 percent at the wholesale level; and between 7 and 79 percent at the retail level (Santacoloma et al. 2021). These losses, also high compared with those of other food crops, are a disincentive to the production and marketing of fruit and vegetable products in Africa.

Post-production processes: Market access and infrastructure

Constraints to agricultural production are only one element that hinders growth of FVVCs. Fruits and vegetables are produced worldwide, but not all producers and traders have equal access to markets because value chains are seldom organized efficiently. For instance, many small farmers cultivate different species and produce in small quantities, which makes formal vertical market linkages less likely. Small producers often sell through middlemen, and most of their transactions are informal and do not fulfill food safety or quality control (grading) requirements. However, in fruit and vegetable supply chains, we must distinguish between value chains intended for export and those intended for domestic markets.

Market access and value chain participation

Agriculture in Africa remains largely at the subsistence level, although market participation has increased in recent years (Carletto, Paul, and Guelfi 2017). Formal and informal links to local and global value chains are important to encourage producers to allocate resources toward fruit and vegetable cultivation and invest in production technologies. Traditionally, vegetables are mainly grown for subsistence, often at a small scale in kitchen gardens close to the homestead (Issahaku et al. 2023), and therefore move along traditional value chains. However, many tropical fruit products are produced for international export, and the creation and expansion of GVCs has increased vertical market linkages for these products.

There are several causes for the limited market participation of African vegetable farmers. First, transaction costs of trading with smallholder farmers, many of them located in remote

areas, are high. This is because vegetable farmers are seldom organized into producer groups and lack vertical linkages. Second, poor transport infrastructure increases the trade costs for many smallholder producers. The distance from farms to buyers as well as output markets without adequate storage infrastructure further increase trade costs for fruit and vegetable products. Third, domestic agrifood supply chains in Africa are characterized by both small and medium food-processing enterprises and substantial wholesale trade in open wet markets (Reardon, Bellemare, and Zilberman 2020). These are transitional domestic supply chains, without contractual market linkages between actors and without common quality standards, which hinders integration of FVVCs. In comparison, modern supply chains have accepted food standards and quality grades and are well integrated.

Infrastructure

Infrastructure quality is highly relevant for fruit and vegetable marketing, as these perishable products are particularly prone to damage during transportation. However, road and storage infrastructure in Africa is poor compared with other regions. Long transportation times related to poor road infrastructure and road blockages and trade bureaucracy are associated with high losses during transport of fruit and vegetables, though losses differ between products and value chains (Santacoloma et al. 2021). One particular culprit is the lack of frozen storage, which can reduce loss and damage, for many FVVCs in Africa.

Numerous studies show that improved rural infrastructure increases agricultural output and/or revenue by lowering market transaction costs and increasing access to both input and output markets. Thus, improved infrastructure lowers the cost of inputs and increases the income farmers receive from their products but also enables smallholders in low- and middle-income countries to profit from more nonfarm opportunities (van Berkum 2021). Given the importance of transport and storage infrastructure for fruit and vegetable trading, improved infrastructure is clearly critical for development of FVVCs. For instance, Barrett et al. (2022) argue that the selection of areas for fruit and vegetable production in exporting countries is largely explained by infrastructure factors, such as road infrastructure and electricity.

Demand constraints

Fruits and vegetables are the most consumed nonstaple food crop in Africa. The EAT-Lancet Commission recommends consuming at least 240 to 300 grams of vegetables per capita per day. Low demand for fruits and vegetables is largely associated with relatively high prices. For instance, the relatively high prices for fruits and vegetable products, compared with other foods, in Africa and elsewhere contributes to low demand (Headey and Alderman 2019). In turn, limited demand in Africa for local fruit and vegetable products reduces the size of local markets and does not create incentives for local producers and value chains to increase production. However, when compared to other food products, the demand for fruits and vegetables in low- and middle-income countries is price- and income-elastic. Thus, even slight price adjustments for these goods can have a significant impact on demand. For instance, some studies indicate that a 10 percent increase in the cost of fruits and vegetables could result in an 8 to 10.5 percent decrease in consumption (Magrini, Balié, and Morales-Opazo 2017). Similarly, a small increase in income can lead to substantial increases in fruit and vegetable consumption.

Trade policy and certification requirements

Trade policy challenges

Trade policy issues are eminently relevant to Africa's FVVCs. Intra-African trade liberalization and international market access could create incentives to expand fruit and vegetable production and improve allocative efficiency. Currently, tariff escalation in high-income export markets promotes trade in raw products and hinders trade of processed fruit and vegetable products that could lead to increased value addition in Africa (van Berkum 2009). Nontariff measures (NTMs) and associated trade bureaucracy increase trade costs and may be used by importing countries to protect local producers. The trade costs associated with NTMs are exacerbated by the limited institutional export capacity, such as port efficiency, of African producers (Kornher, Sakyi, and Tannor 2024). In addition, ad hoc border closures, such as the situation between Uganda and Rwanda where the border has been closed for three years, disrupt trade flows and create uncertainty for traders.

Globally, tariffs on agricultural products have been reduced substantially as a consequence of international trade liberalization, including World Trade Organization (WTO) reforms and the increasing number of regional and preferential trade agreements. Several African countries are granted market access to export markets under unilateral preferential trade agreements, such as the Everything but Arms agreement, and multilateral regional trade agreements, like the African Growth and Opportunity Act agreement with the United States and the Economic Partnership Agreements with the EU (Kornher and von Braun 2020). For the remaining trade partners, FVVCs are subject to tariff escalation, with tariffs on processed produce generally higher than on the raw commodities, which limits Africa's participation in value added from agricultural trade (Fusacchia, Balié, and Salvatici 2022). In addition, the EU's entry price system restricts fruit and vegetable imports from North Africa if prices fall below a set price threshold (Santeramo et al. 2023). In intra-African trade, FVVC trade within regional economic communities (RECs) benefits from reduced or suspended tariffs, but preferential access is not commonly expanded to countries outside an individual REC. However, these REC agreements will be subject to changes with the upcoming AfCFTA.

Apart from tariffs, agricultural trade in general, and fruit and vegetable trade in particular, are subject to significant nontariff trade costs, primarily related to sanitary and phytosanitary standards (SPS). SPS is necessary due to the food safety issues and health risks associated with perishable products and is motivated by the precautionary principle in high-income importing countries, especially the EU (Otsuki, Wilson, and Sewadeh 2001). Between 1995 and 2000, nearly 270 SPS measures were imposed on imports of fresh fruit and vegetables worldwide (UNCTAD Trains). Often these standards and required certification deviate from the joint FAO/WHO Codex Alimentarius Commission for food safety, which sets the international standards promoted by the WTO Agreement on Sanitary and Phytosanitary Standards. For instance, the EU's pesticide maximum residue levels are stricter than international standards in sectors where EU producers compete with African exporters (Kareem, Martínez-Zarzoso, and Brümmer 2018). Exporters must navigate numerous requirements and regulations, including soil quality checks and certification standards compliance, which increase operational costs. At the same time, agricultural exporters must comply with the quality standards of the private sector, such as the Global G.A.P.¹⁴ Ensuring quality control and adherence to standards remains a challenge. Substandard farming inputs and poor awareness among farmers regarding approved chemicals and farming practices result in the use of banned or inappropriate inputs, which leads to rejected produce and compromises both local food safety and export potential.

¹⁴ www.globalgap.org

Intra-African SPS regulations

In the intra-African context, SPS and quality regulations are less strict, yet differences exist among and within RECs, posing challenges to harmonization and smooth cross-border trade in FVVC products within and between regions. Additionally, differences in other regional trade policies, such as food standards, grading systems, and border procedures, further complicate intraregional trade in fruit and vegetable products. The lack of uniformity in these policies creates barriers and inefficiencies in trade flows, hindering the sector's growth potential. These costs increase when countries are members of overlapping RECs that apply different standards.

Some RECs, such as the Economic Community of West African States (ECOWAS), have advanced quality infrastructure—institutional and physical systems to ensure products are safe and of high quality—that supports the continental quality infrastructure. Within ECOWAS, regional quality infrastructure has been established to ensure compliance and safety of products, particularly in the fruit and vegetable sector. Under the auspices of the ECOWAS Scheme for Harmonization of Standards (ECOSHAM), more than 90 standards have been harmonized, covering various areas including agricultural and food products. ECOSHAM certification ensures broad acceptance of products in all ECOWAS member states, thereby facilitating access to other markets in ECOWAS. The ECOWAS SPS guide outlines comprehensive procedures for phytosanitary inspection, focusing on plants, plant products, and regulated articles in international traffic.

In 2013, the EAC Partner States adopted the EAC SPS Protocol, with the primary aim of enforcing SPS measures and standards as well as promoting both intra- and interregional trade. As of 2021, all partner states had ratified the protocol, clearing the way for implementation and domestication of various SPS instruments (EAC 2024). To lay the groundwork for effective implementation and enforcement of the protocol, several key instruments were developed and adopted, including SPS measures and procedures for fish and fisheries, phytosanitary measures and procedures for plants, and food and feed safety measures. Additionally, a draft SPS bill that provides a legal framework for the enforcement of EAC SPS measures and instruments was adopted by the Sectoral Council on Agriculture and Food Security and is currently awaiting enactment by the East African Legislative Assembly. Moreover, harmonized SPS regulations and standard operating procedures necessary to facilitate the implementation of the SPS bill have been developed.

The SADC Protocol on Trade (SADC Protocol) emphasizes the harmonization of SPS measures for agricultural and livestock production based on international standards, guidelines, and recommendations, with provisions for consultations to achieve agreement on the recognition of equivalent SPS measures (Article 16). This protocol also offers a framework for collaboration and cooperation on SPS issues, focused on facilitating the protection of human, animal, or plant life or health, enhancing the implementation of the WTO Agreement on the Application of SPS Measures, building technical capacity, providing a regional forum for addressing SPS matters, and resolving trade-related SPS issues (Annex VIII). The SADC SPS Coordination Committee—tasked with addressing regional SPS issues, promoting transparency, and strengthening cooperation between national regulatory agencies responsible for SPS measures—plays a pivotal role. National Committees on SPS Measures are also established in each member state, responsible for their WTO SPS National Notification Authorities and Enquiry Points, with representatives appointed to serve on the SADC SPS Coordinating Committee. The SADC Protocol includes provisions such as Article 11 on Control, Inspection, and Approval Procedures, which improve on the WTO SPS Agreement by facilitating the acceptance of equivalent procedures and reviewing inspection, testing, certification, and approval systems to enhance access to traded products (CFTA 2017).

The Economic Community of Central African States (ECCAS) coordinates SPS activities in Central Africa through regional programs that support member states, with the assistance of technical and financial partners such as the Food and Agriculture Organization of the United Nations (FAO). While 9 of the 11 ECCAS member states are also members of the WTO and also implement the WTO SPS Agreement, the ECCAS SPS program is still in its early stages. Achievements include the development of a joint phytosanitary regulation project, capacity-building activities, establishment of National SPS Committees and Focal Points, launch of a regional pesticide registration system, establishment of an interstate Committee on Pesticides in Africa in Central Africa, operationalization of a Regional Animal Health Centre, adoption of coordinated approaches in monitoring cross-border diseases and zoonoses, implementation of regional programs on health safety during disease outbreaks and for vector-borne diseases, and operationalization of the Regional Food Safety Program in Central Africa (CFTA 2017).

Conclusions

This chapter has analyzed Africa's participation in FVVCs, highlighting challenges and opportunities for increased fruit and vegetable trade and upgrading along these value chains. One of our main findings is that, over the past 20 years, African exports of fruits and vegetables have been consistently dominated by unprocessed goods. This is more pronounced for exported fruits than for vegetables. At the same time, imports are dominated by unprocessed fruits and processed vegetables. This means that Africa is in an upstream position along FVVCs. While this may be profitable in the case of tropical fruit exports, African countries may be still missing opportunities to secure a place in the expanding market for processed fruit and vegetable products.

As far as the global market is concerned, African countries are entirely absent from the list of the top 10 fruit and vegetable exporting and importing countries, regardless of the level of processing. Exports are largely dominated by Europe, the United States, and Canada and, to a lesser extent, China and a few Asian and Latin American developing countries.

Our analysis of African trade in fruits and vegetables suggests a strong presence of North African countries (primarily Egypt and Morocco), in addition to South Africa, as the top exporters and importers. These countries may be engaged in FVVCs due to resource endowments, suitable agricultural and export upgrade policies, and better processing capacities, logistics, and transport and storage conditions compared with other African countries. At the global level, Europe and the United States are the main importers of African unprocessed fruits and vegetables. As the level of processing increases, top importers are more diversified, with a larger presence of Asian and Arab countries as importers. This suggests the ability of African countries to meet demand for processed products in countries with less stringent standards and sanitary restrictions. At the intra-African level, fruit trade is primarily unprocessed, whereas nearly 60 percent of intra-African vegetable trade is in processed products, reflecting the growing urbanization and demand for easy-to-prepare meals. Egypt and South Africa are among the top fruit and vegetable intra-African exporters for all levels of processing, and some SADC and EAC countries are among the top intracontinental exporters.

We combine data on global demand and African supply to single out specific fruit and vegetable products that Africa should focus on developing and exporting in the long term. Our findings suggest that Africa's exports of fruits and vegetables with an RCA and for which global demand is high are quite minimal. However, the structure of African exports reflects a strong presence of fruits and vegetables that could be expanded in the long term. These include a rich variety of fruits and their semi-processed and processed products (such as apples, citrus

fruits, bananas, peaches, strawberries), some of the main tropical fruits (such as mangoes, guavas, and pineapples), vegetables (including potatoes, tomatoes, onions, shallots, broccoli, cauliflower, and carrots), and mixed and frozen vegetable preparations.

The potential to increase exports of these fruits and vegetables and their products will depend on several factors, including access to good quality seeds and adequate pest control. More important, many of these fruit and vegetable crops have a high water content (such as tomatoes), and the potential to further increase production and exports will depend on a reliable water supply. In Africa, however, crop cultivation is primarily rainfed, and climate change and water stress can be expected to undermine attempts to expand these crops.

Current trade policies are also among the main obstacles facing African trade and participation in FVVCs. At the extra-Africa level, tariff escalation on the part of Africa's main trade partners fosters the concentration of exports in unprocessed commodities. In addition, the inability of African producers to meet stringent SPS regulations undermines Africa's participation in higher value-added segments of FVVCs and limits exports of processed fruits and vegetables to a number of African and Asian developing countries.

At the intra-Africa level, prolonged border closures, high trade costs, poor quality control and adherence to standards, lack of sectoral organization, and uneven access to digital technologies are among the main obstacles to the fruit and vegetable trade. These challenges hinder market growth and sustainability in the sector, impacting economic development and regional integration efforts within RECs. Efforts to address these challenges include harmonizing SPS policies and regulations within RECs like ECOWAS, EAC, COMESA, SADC, AMU, IGAD, and CEN-SAD, along with initiatives to improve quality infrastructure and streamline trade processes. Indeed, the harmonization of SPS regulations and mutual recognition of food standards will also be crucial to facilitate export growth in the sector. At the continental level, the African Organization for Standardization (ARSO) plays a crucial role in harmonizing standards, including those related to agricultural and food products. The Technical Harmonization Committee for Agricultural and Food Products (THC) has developed 294 harmonized standards, demonstrating a commitment to the quality of traded products (Diop 2020).

African trade integration through the AfCFTA opens a window of opportunity to correct market failures that limit intra-African trade potential in the fruit and vegetable sector. Trade integration efforts should focus on increasing market access and export opportunities within Africa, even outside existing RECs.

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Appendix 4.1

Table A4.1 Product list by level of processing

| Processed | |
|-----------|---|
| 071410 | Vegetable roots and tubers; manioc (cassava), with high starch or inulin content, whether or not sliced or in the form of pellets, fresh or dried |
| 071420 | Vegetable roots and tubers; sweet potatoes, with high starch or inulin content, whether or not sliced or in the form of pellets, fresh or dried |
| 071490 | Vegetable roots and tubers; arrowroot, salep, Jerusalem artichokes, and similar roots and tubers, high starch or inulin content, whether or not sliced or in the form of pellets, fresh or dried; sago pith |
| 190300 | Food preparations; tapioca and substitutes thereof, prepared from starch in the form of flakes, grains, pearls, siftings, or similar |
| 200110 | Vegetable preparations; cucumbers and gherkins, prepared or preserved by vinegar or acetic acid |
| 200120 | Vegetable preparations; onions, prepared or preserved by vinegar or acetic acid |
| 200190 | Vegetable preparations; vegetables, fruit, nuts, and other edible parts of plants, prepared or preserved by vinegar or acetic acid (excluding cucumbers, gherkins, and onions) |
| 200210 | Vegetable preparations; tomatoes, whole or in pieces, prepared or preserved otherwise than by vinegar or acetic acid |
| 200290 | Vegetable preparations; tomatoes (other than whole or in pieces), prepared or preserved otherwise than by vinegar or acetic acid |
| 200310 | Vegetable preparations; mushrooms, prepared or preserved otherwise than by vinegar or acetic acid |
| 200320 | Vegetable preparations; truffles, prepared or preserved otherwise than by vinegar or acetic acid |
| 200410 | Vegetable preparations; potatoes, prepared or preserved otherwise than by vinegar or acetic acid, frozen |
| 200490 | Vegetable preparations; vegetables and mixtures of vegetables (excluding potatoes), prepared or preserved otherwise than by vinegar or acetic acid, frozen |
| 200510 | Vegetable preparations; homogenized vegetables, prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200520 | Vegetable preparations; potatoes, prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200530 | Vegetable preparations; sauerkraut |
| 200540 | Vegetable preparations; peas (<i>Pisum sativum</i>), prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200551 | Vegetable preparations; beans, shelled, prepared, or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200559 | Vegetable preparations; beans (not shelled), prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200560 | Vegetable preparations; asparagus, prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200570 | Vegetable preparations; olives, prepared or preserved otherwise than by vinegar or acetic acid, not frozen |

| | |
|--------|--|
| 200580 | Vegetable preparations; sweet corn (<i>Zea mays</i> var. <i>saccharata</i>), prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200590 | Vegetable preparations; vegetables and mixtures of vegetables n.e.s. in heading no. 2005, prepared or preserved otherwise than by vinegar or acetic acid, not frozen |
| 200600 | Fruit, nuts, fruit peel, and other parts of plants; preserved by sugar (drained, glaze or crystallized) |
| 200710 | Jams, fruit jellies, marmalades, fruit or nut puree, and fruit or nut pastes; homogenized, cooked preparations, whether or not containing added sugar or other sweetening matter |
| 200791 | Jams, jellies, marmalades, purees and pastes; of citrus fruit, cooked preparations (excluding homogenized), whether or not containing added sugar or other sweetening matter |
| 200799 | Jams, fruit jellies, marmalades, purees and pastes; of fruit or nuts n.e.s. in heading no. 2007, cooked preparations (excluding homogenized), whether or not containing added sugar or other sweetening matter |
| 200820 | Fruit; pineapples, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200830 | Fruit; citrus, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200840 | Fruit; pears, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200850 | Fruit; apricots, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200860 | Fruit; cherries, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200870 | Fruit; peaches, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200880 | Fruit; strawberries, prepared or preserved in ways n.e.s. in heading no. 2007, whether or not containing added sugar, other sweetening matter, or spirit |
| 200891 | Palm hearts; prepared or preserved, whether or not containing added sugar, other sweetening matter, or spirit |
| 200892 | Fruit; mixtures, prepared or preserved, whether or not containing added sugar, other sweetening matter, or spirit |
| 200911 | Juice; orange, frozen, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200919 | Juice; orange, not frozen, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200920 | Juice; grapefruit, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200930 | Juice; of single citrus fruit (excluding orange or grapefruit), unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200940 | Juice; pineapple, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200950 | Juice; tomato, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |

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| 200960 | Juice; grape (including grape must), unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200970 | Juice; apple, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200980 | Juice; of any single fruit or vegetable n.e.s. in heading no. 2009, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200990 | Juices; mixtures, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 210310 | Sauces; soya |
| 210320 | Sauces; tomato ketchup and other tomato sauces |
| 210330 | Mustard flour and meal and prepared mustard |
| 210390 | Sauces and preparations therefor; mixed condiments and mixed seasonings |
| 210690 | Food preparations; n.e.s. in item no. 2106.10 |
| Semi-processed | |
| 071010 | Vegetables; potatoes, uncooked or cooked by steaming or boiling in water, frozen |
| 071021 | Vegetables, leguminous; peas (<i>Pisum sativum</i>), shelled or unshelled, uncooked or cooked by steaming or boiling in water, frozen |
| 071022 | Vegetables, leguminous; beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.), shelled or unshelled, uncooked or cooked by steaming or boiling in water, frozen |
| 071029 | Vegetables, leguminous (other than peas or beans), shelled or unshelled, uncooked or cooked by steaming or boiling in water, frozen |
| 071030 | Vegetables; spinach, New Zealand spinach and orache spinach (garden spinach), uncooked or cooked by steaming or boiling in water, frozen |
| 071040 | Vegetables; sweet corn, uncooked or cooked by steaming or boiling in water, frozen |
| 071080 | Vegetables; uncooked or cooked by steaming or boiling in water, frozen, n.e.s. in Chapter 7 |
| 071090 | Vegetable mixtures; uncooked or cooked by steaming or boiling in water, frozen |
| 071110 | Vegetables; onions, provisionally preserved by sulfur dioxide gas but unsuitable in that state for immediate consumption |
| 071120 | Vegetables; olives, provisionally preserved but unsuitable in that state for immediate consumption |
| 071130 | Vegetables; capers, provisionally preserved but unsuitable in that state for immediate consumption |
| 071140 | Vegetables; cucumbers and gherkins, provisionally preserved but unsuitable in that state for immediate consumption |
| 071190 | Vegetables and mixed vegetables; n.e.s. in heading no. 0711, provisionally preserved but unsuitable in that state for immediate consumption |
| 071210 | Vegetables; potatoes, whether or not cut or sliced but not further prepared, dried |
| 071220 | Vegetables; onions, whole, cut, sliced, broken, or in powder but not further prepared, dried |
| 071230 | Vegetables; mushrooms and truffles, whole, cut, sliced, broken, or in powder but not further prepared, dried |

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| 071290 | Vegetables; mixtures of vegetables n.e.s. in heading no. 0712, whole, cut, sliced, broken, or in powder but not further prepared, dried |
| 071310 | Vegetables, leguminous; peas (<i>Pisum sativum</i>), shelled, whether or not skinned or split, dried |
| 071320 | Vegetables, leguminous; chickpeas (garbanzos), shelled, whether or not skinned or split, dried |
| 071331 | Vegetables, leguminous; beans (<i>Vigna mungo</i> L. Hepper or <i>Vigna radiata</i> L. Wilczek), dried, shelled, whether or not skinned or split |
| 071332 | Vegetables, leguminous; small red (adzuki) beans (<i>Phaseolus</i> or <i>Vigna angularis</i>), shelled, dried, whether or not skinned or split |
| 071333 | Vegetables, leguminous; kidney beans, including white pea beans (<i>Phaseolus vulgaris</i>), dried, shelled, whether or not skinned or split |
| 071339 | Vegetables, leguminous; n.e.s. in item no. 0713.30, dried, shelled, whether or not skinned or split |
| 071340 | Vegetables, leguminous; lentils, shelled, whether or not skinned or split, dried |
| 071350 | Vegetables, leguminous; broad beans (<i>Vicia faba</i> var. <i>major</i>) and horse beans (<i>Vicia faba</i> var. <i>equina</i> and <i>Vicia faba</i> var. <i>minor</i>), dried, shelled, whether or not skinned or split |
| 071390 | Vegetables, leguminous; n.e.s. in heading no. 0713, shelled, whether or not skinned or split, dried |
| 081110 | Fruit, edible; strawberries, uncooked or cooked by steaming or boiling in water, frozen, whether or not containing added sugar or other sweetening matter |
| 081120 | Fruit, edible; raspberries, blackberries, mulberries, loganberries, black, white, or red currants and gooseberries, uncooked or cooked, whether or not containing added sugar or other sweetening matter |
| 081190 | Fruit, edible; fruit and nuts n.e.s. in heading no. 0811, uncooked or cooked, frozen, whether or not containing added sugar or other sweetening matter |
| 081210 | Fruit, edible; cherries, provisionally preserved, but unsuitable in that state for immediate consumption |
| 081220 | Fruit, edible; strawberries, provisionally preserved but unsuitable in that state for immediate consumption |
| 081290 | Fruit, edible; fruit and nuts n.e.s. in heading no. 0812, provisionally preserved but unsuitable in that state for immediate consumption |
| Unprocessed | |
| 070110 | Vegetables; seed potatoes, fresh or chilled |
| 070190 | Vegetables; potatoes (other than seed), fresh or chilled |
| 070200 | Vegetables; tomatoes, fresh or chilled |
| 070310 | Vegetables, alliaceous; onions and shallots, fresh or chilled |
| 070320 | Vegetables, alliaceous; garlic, fresh or chilled |
| 070390 | Vegetables, alliaceous; leeks and other kinds n.e.s. in heading no. 0703, fresh or chilled |
| 070410 | Vegetables, brassica; cauliflowers and headed broccoli, fresh or chilled |
| 070420 | Vegetables, brassica; brussels sprouts, fresh or chilled |
| 070490 | Vegetables, brassica; edible, n.e.s. in heading no. 0704, fresh or chilled |
| 070511 | Vegetables; cabbage (head) lettuce (<i>Lactuca sativa</i>), fresh or chilled |
| 070519 | Vegetables; lettuce (<i>Lactuca sativa</i>) (other than cabbage lettuce), fresh or chilled |

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| 070521 | Vegetables; Witloof chicory (<i>Cichorium intybus</i> var. <i>foliosum</i>), fresh or chilled |
| 070529 | Vegetables; chicory (<i>Cichorium</i> spp.) (other than Witloof chicory), fresh or chilled |
| 070610 | Vegetables, root; carrots and turnips, fresh or chilled |
| 070690 | Vegetables, root; salad beetroot, salsify, celeriac, radishes and similar edible roots, fresh or chilled |
| 070700 | Vegetables; cucumbers and gherkins, fresh or chilled |
| 070810 | Vegetables, leguminous; peas (<i>Pisum sativum</i>), shelled or unshelled, fresh or chilled |
| 070820 | Vegetables, leguminous; beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.), shelled or unshelled, fresh or chilled |
| 070890 | Vegetables, leguminous (other than peas and beans), shelled or unshelled, fresh or chilled |
| 070910 | Vegetables; globe artichokes, fresh or chilled |
| 070920 | Vegetables; asparagus, fresh or chilled |
| 070930 | Vegetables; aubergines (eggplants), fresh or chilled |
| 070940 | Vegetables; celery (other than celeriac), fresh or chilled |
| 070951 | Vegetables; mushrooms, fresh or chilled |
| 070952 | Vegetables; truffles, fresh or chilled |
| 070960 | Vegetables; fruits of the genus <i>capsicum</i> or <i>pimenta</i> |
| 070970 | Vegetables; spinach, New Zealand spinach and orache spinach (garden spinach), fresh or chilled |
| 070990 | Vegetables; edible, n.e.s. in Chapter 7, fresh or chilled |
| 080110 | Nuts, edible; coconuts, fresh or dried, whether or not shelled or peeled |
| 080120 | Nuts, edible; Brazil nuts, fresh or dried, whether or not shelled or peeled |
| 080130 | Nuts, edible; cashew nuts, fresh or dried, whether or not shelled or peeled |
| 080211 | Nuts, edible; almonds, fresh or dried, in shell |
| 080212 | Nuts, edible; almonds, fresh or dried, shelled |
| 080221 | Nuts, edible; hazelnuts or filberts (<i>Corylus</i> spp.), fresh or dried, in shell |
| 080222 | Nuts, edible; hazelnuts or filberts (<i>Corylus</i> spp.), fresh or dried, shelled |
| 080231 | Nuts, edible; walnuts, fresh or dried, in shell |
| 080232 | Nuts, edible; walnuts, fresh or dried, shelled |
| 080240 | Nuts, edible; chestnuts (<i>Castanea</i> spp.), fresh or dried, whether or not shelled or peeled |
| 080250 | Nuts, edible; pistachios, fresh or dried, whether or not shelled or peeled |
| 080290 | Nuts, edible; n.e.s. in heading no. 0801 and 0802, fresh or dried, whether or not shelled or peeled |
| 080300 | Fruit, edible; bananas (including plantains), fresh or dried |
| 080410 | Fruit, edible; dates, fresh or dried |
| 080420 | Fruit, edible; figs, fresh or dried |
| 080430 | Fruit, edible; pineapples, fresh or dried |
| 080440 | Fruit, edible; avocados, fresh or dried |
| 080450 | Fruit, edible; guavas, mangoes, and mangosteens, fresh or dried |
| 080510 | Fruit, edible; oranges, fresh or dried |

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| 080520 | Fruit, edible; mandarins (including tangerines and satsumas), clementines, wilkings, and similar citrus hybrids, fresh or dried |
| 080530 | Fruit, edible; lemons (<i>Citrus limon</i> , <i>Citrus limonum</i>), limes (<i>Citrus aurantifolia</i>) |
| 080540 | Fruit, edible; grapefruit, fresh or dried |
| 080590 | Fruit, edible; citrus fruit n.e.s. in heading no. 0805, fresh or dried |
| 080610 | Fruit, edible; grapes, fresh |
| 080620 | Fruit, edible; grapes, dried |
| 080710 | Fruit, edible; melons (including watermelons), fresh |
| 080720 | Fruit, edible; papaws (papayas), fresh |
| 080810 | Fruit, edible; apples, fresh |
| 080820 | Fruit, edible; pears and quinces, fresh |
| 080910 | Fruit, edible; apricots, fresh |
| 080920 | Fruit, edible; cherries, fresh |
| 080930 | Fruit, edible; peaches including nectarines, fresh |
| 080940 | Fruit, edible; plums and sloes, fresh |
| 081010 | Fruit, edible; strawberries, fresh |
| 081020 | Fruit, edible; raspberries, blackberries, mulberries, and loganberries, fresh |
| 081030 | Fruit, edible; black, white, or red currants and gooseberries, fresh |
| 081040 | Fruit, edible; cranberries, bilberries, and other fruits of the genus <i>vaccinium</i> , fresh |
| 081090 | Fruit, edible; fruits n.e.s. in heading no. 0801 to 0810, fresh |
| 081310 | Fruit, edible; apricots, dried |
| 081320 | Fruit, edible; prunes, dried |
| 081330 | Fruit, edible; apples, dried |
| 081340 | Fruit, edible; fruit n.e.s. in heading no. 0812, dried |
| 081350 | Nuts, edible; mixtures of nuts or dried fruits of Chapter 8 |
| 081400 | Peel; of citrus fruit or melons (including watermelons), fresh, frozen, dried, or provisionally preserved in brine, in sulfur water and other preservative solutions |

Source: Authors' own elaboration using the 2024 AATM database.

Note: The first column includes the HS6 code and the second column the product label.

Table A4.2 Classification of fruits and vegetables: Supply and demand approach.

| Products | 2008-2012 | | | 2018-2022 | | |
|----------------|-----------|--|---|-----------|---|---|
| Processed | | High demand | Low demand | | High demand | Low demand |
| | With RCA | 0 | 3 | With RCA | 0 | 3 |
| | | No products | 071420;200559;200891 | | No products | 071490;190300;200559 |
| | No RCA | 20 | 17 | No RCA | 17 | 20 |
| | | 071410;200190;200210;200290; 200310;200410;200490;200520; 200570;200580;200799;200820;200830 ;200870;200911;200919; 200990;210320;210390;210690 | 071490;190300;200110;200510; 200540;200551;200560;200600; 200710;200791;200840;200850; 200860;200880;200950;210310; 210330 | | 071410;200190;200210;200290; 200410;200490;200520;200570; 200580;200799;200820;200911; 200919;200990;210320;210390; 210690 | 071420;200110;200310;200510; 200540;200551;200560;200600; 200710;200791;200830;200840; 200850;200860;200870;200880; 200891;200950;210310;210330 |
| Semi-processed | | High demand | Low demand | | High demand | Low demand |
| | With RCA | 2 | 4 | With RCA | 1 | 3 |
| | | 071320;071331 | 071332;071350;071390;081290 | | 071320 | 071332;071339;081290 |
| | No RCA | 7 | 14 | No RCA | 9 | 14 |
| | | 071080;071290;071310;071333; 071340;081120;081190 | 071010;071021;071022;071029;071030; 071040;071090;071120;071140;071190; 071220;071339; 081110;081210 | | 071080;071290;071310;071331;071333; 071340;081110;081120; 081190 | 071010;071021;071022;071029; 071030;071040;071090;071120; 071140;071190;071220;071350; 071390;081210 |
| Unprocessed | | High demand | Low demand | | High demand | Low demand |
| | With RCA | 0 | 3 | With RCA | 0 | 4 |
| | | No products | 080211;080590;081400 | | | 080221;080590;081320;081330 |
| | No RCA | 34 | 22 | No RCA | 36 | 19 |
| | | 070110;070190;070200;070310; 070320;70410;070490;070511;070519; 070610;070700;070820;070920;070951 ;070960;080212;080222;080232;08041 0;080430;080440; 080450;080510;080520;080540; 080610;080620;080810;080930; 080940;081010;081020;081040; 081090 | 070390;070420;070521;070529; 070690;070810;070890;070930; 070940;070970;080221;080231; 080290;080420;080720; 080910;081030;081310;081320; 081330;081340;081350 | | 070190;070200;070310;070320; 070410;070490;070519;070610; 070700;070820;070920;070951; 070960;080211;080212;080222; 080231;080232;080290;080410; 080430;080440;080450; 080510;080520;080540;080610; 080620;080810;080930; 080940;081010;081020;081040; 081090;081340 | 070110;070390;070420;070511; 070521;070529;070690;070810; 070890;070930;070940;070970; 080420;080720;080910;081030; 081310;081350;081400 |

Note: High (low) demand refers to products whose world imports are greater (lower) than the median world imports over the period of analysis. With (without) RCA refers to products whose revealed comparative advantage index is greater (lower) than one. Numbers above each block indicate the number of products.