# Impact of Export Restriction Measures in the Agricultural and Food Sector on Global Food Security

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#### **Abstract**

In 2022, 30 countries had enacted export restriction measures in the agriculture and food sector. As a result, food prices in global markets have destabilized. Although some countries have implemented such restriction measures to ensure domestic food availability and stability, they had a negative impact on global food security. We argue that not all export restriction measures should be regulated. We propose that the international society identify countries that should be restricted or allowed to conduct these measures based on the prevalence of undernourishment (POU). Furthermore, we advocate that the impact of these measures on caloric intake should be considered risks of availability and stability, according to the new Food and Agriculture Organization Food Security Indicators, and should be assessed.

Discipline: Social Science

**Additional key words:** availability, domestic food security, Food Security Indicators, prevalence of undernourishment, stability

### Introduction

Agricultural commodities and food prices in the global and domestic markets have been trending upward since the latter half of 2020. Additionally, due to Russia's invasion of Ukraine in February 2022, many exporting countries imposed restrictive measures on agricultural and food exports in May 2022, causing further rises and instability in international agricultural commodity and food prices. There is a concern in the international community that these actions will have a significant impact on global food security, especially in least developed countries.

Some studies have been conducted on the impact of export restriction measures in the agricultural and food sectors on agricultural commodity markets. Timmer (2008) noted that restrictive export policies were key contributors to the price spikes in 2008 and 2011. Martin

& Anderson (2011) argued that the use of export restrictions by all countries would be ineffective in domestic prices while international reference price instability associated with exogenous shocks to food markets. Only a few studies have analyzed the effect of restrictive export measures on agricultural and food products from the perspective of global food security risks. Koizumi & Furuhashi (2024) reviewed the effect of such measures on global food security. However, there is a need for further analysis of their impact on agricultural commodity markets and policy recommendations. Therefore, this study reviews the impact of export restriction measures1 in the agriculture and food sector on global food security, demonstrates their economic theory by presenting demand and supply curves, and makes policy recommendations.

<sup>&</sup>lt;sup>1</sup> Policies that restrict exports include quantitative restrictions, export bans, export taxes, surcharges on exports, and export licensing. This study focuses on quantitative restrictions and export bans.

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# Impacts of export restriction measures on food security

# 1. Impacts of export restrictions on domestic food security

In the 1970s and early 1980s, the US implemented five measures restricting the exports of cereals and soybeans against the USSR and other countries. As a result, the US government lost its export share of global cereal and soybean markets and held excess stocks at a considerable stock cost. Therefore, since then, the US has not implemented any export-restricting measures for agricultural commodities. During the food crisis of 2006 to 2008, international agricultural commodity prices soared and became unstable because of the measures taken by 27 countries to restrict the export of agricultural commodities. During the COVID-19 pandemic in 2020, 20 countries imposed restrictive measures on agricultural and food exports, and in 2022, 30 countries imposed measures to restrict grain exports, such as wheat, rice, corn, oilseeds, wheat products, vegetable oil and others (Table 1). These policies remain in effect in 14 countries (as of May 2024). Measures implemented to restrict exports from 2006 to 2008 are significantly different from those imposed by the US for "diplomatic and national security reasons" in the 1970s and early 1980s in that these measures were imposed to ensure "food security at a national level."

Food security is defined as a situation when all people have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Based on this definition, four food security dimensions can be identified: availability, access utilization, and stability (FAO et al. 2023). Food security can be measured at global, regional (geographic divisions), national, district, municipal, household, and individual levels. Most policies restricting exports of agricultural and food products have been implemented to prevent the flow of agricultural commodities and food out of a country and stabilize domestic food supplies and prices to ensure the availability and stability of food supply, which are crucial components of food security in the home country.

Figures 1 to 5 demonstrate the impact of policies restricting exports on domestic and international agricultural commodities and food prices by presenting demand and supply curves. The following analysis assumes that the demand curves are fixed and focus on supply changes because of export restriction measures. Figure 1 shows the shift of the export supply and import demand curve of commodity X in country A by the

imposition of export-restricting policies. We assume that country A is a net food exporter and a "large" country with a significant export share in the world market of commodity X, which can affect international reference price. The supply curve for exports of agricultural commodity X from country A before the imposition of policies restricting exports is  $EXS_0$ , while the import demand curve for its trading partners is  $IMD_0$ , with the export price of commodity X in equilibrium at  $P_0$  (Fig. 1). If country A implements measures that restrict exports from  $Q_0$  to  $Q_1$  for commodity X to prevent excessive outflows to stabilize domestic food supply and price, the supply curve for exports shifts vertically by  $EXS_0 - EXS_1$  and at the point of  $Q_1$ , the export price of commodity X increases from  $P_0$  to  $P_1$ .

Figure 2 shows the shift of the domestic supply and demand curve of commodity X in country A by the imposition of export-restricting policies in the short- to mid-term. The domestic supply curve of country A before the implementation of a policy restricting exports of commodity X is given by  $S_0$ , while the domestic demand curve is given by  $D_0$ , with the price in equilibrium at  $DP_0$  (Fig. 2). We assume that country A is "large" country, which accounts for a significant share of commodity X, and that its domestic policies can affect the international reference price of X. In country A's domestic supply and demand, the implementation of export restrictions causes

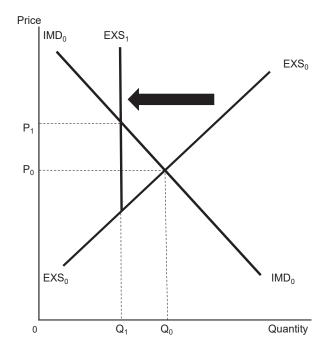


Fig. 1. Impact of export restriction measures on export supply, import demand, and price of commodity X in implementation of export restriction country A (Net food exporter and "large" country)

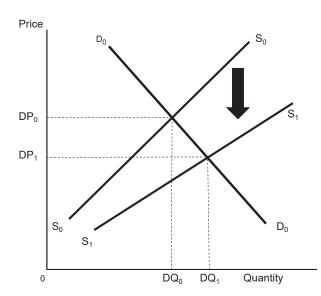


Fig. 2. Impact of export restriction measures on domestic market of commodity X in implementation of export restriction country A in the short-mid term

the domestic supply curve to shift to the right from  $S_0$  to  $S_i$ , while the domestic supply increases from  $DQ_0$  to  $DQ_i$ . Figure 2 depicts that the domestic supply curve is more elastic than it was before the imposition of export restrictions. This is because the domestic supply shifts to the  $S_i$  curve and becomes more elastic with respect to given prices in country A after the imposition of the export restrictive measures due to the inelastic export curve in  $Q_{i}$ , as shown in Figure 1. As a result, the domestic price of commodity X decreases from  $DP_0$  to DP<sub>1</sub>. Decreasing domestic prices has a negative incentive to increase planting area, agricultural inputs (e.g., fertilizers and pesticides), and agricultural investments. Figure 3 shows the shift of the domestic supply and demand curve of commodity X in country A by the imposition of export-restricting policies in the long term. Figure 3 depicts the role of the domestic market in implementing export restrictions in the long term. The domestic supply curve shifts right from  $S_i$  to  $S_2$ , and  $S_3$  is more elastic than  $S_i$  because it is a long-term supply curve. As a result, the domestic price of commodity X increases from  $DP_1$  to  $DP_2$ .

Figure 4 targets the global market of commodity X and depicts the relationship between the global supply, demand, and international reference price for commodity X after the implementation of export restriction<sup>2</sup>. The supply curve for exports before the imposition of policies

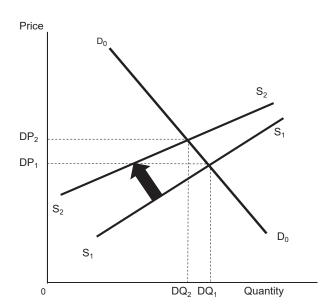


Fig. 3. Impact of export restriction measures on domestic market of commodity X in implementation of export restriction country A in the long term

restricting exports is  $TS_0$ , and the demand curve is  $TD_0$ , with international reference price in equilibrium at  $IP_0$ . Here, country A's imposition of restricting exports decreases the global supply of exports from  $TQ_0$  to  $TQ_1$ , the global supply curve shifts to the left to  $TS_1$ , and the international reference price of commodity X increases from  $IP_0$  to  $IP_1$ .

Figure 5 targets the domestic market, a net food importing country of commodity X, and does not implement restrictive exports (country B). Figure 5 depicts how the imposition of these export restrictions changes domestic supply, demand, and price in country B. We assume that country B is "small country," accounting for a minimal share of the world agricultural commodity of X, and its domestic policies cannot affect the international reference price of X. In country B, before export restriction measures take effect, the original domestic supply curve is  $S_3$ , and the domestic demand curve is  $D_i$ , with the price in equilibrium at  $DP_3$ . Domestic supply covers domestic production and imports. Restricting exports by country A shifts the supply curve of country B to the left from  $S_3$  to  $S_4$ , reducing the supply of agricultural commodities from international markets from  $Q_3$  to  $Q_4$ . As a result, domestic prices increase from  $DP_{3}$  to  $DP_{4}$ .

The increase in the international reference price of X leads some countries that are net importers and not

<sup>&</sup>lt;sup>2</sup> Figure 1 shows the shift of export supply and import demand curve of commodity *X* in country *A* ("Large" country) by the imposition of export-restricting policies. Figure 4 shows the shift of the global supply and demand curve of commodity *X* by the imposition of export-restricting policies.

#### T. Koizumi et al.

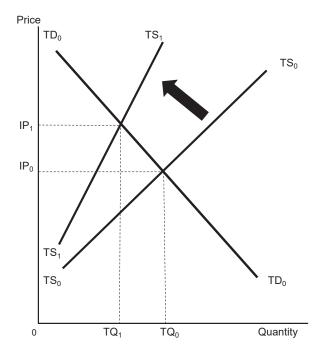


Fig. 4. Impact of export restriction measures on the global market of commodity X

subject to export restrictions to consider imposing measures to restrict exports of their commodity X to prevent an excessive outflow of agricultural commodities and food beyond their borders, stabilizing domestic food supplies and prices. In response to changes in country A, even countries that are net food exporters and have not yet imposed policies to restrict exports may consider imposing the same measures due to the increase in the price of agricultural commodity X in the international market. Furthermore, if an increase in the domestic price of agricultural commodity X causes an increase in the domestic price of substituted agricultural commodity Y as well, some countries may consider imposing restrictions on exports of commodity Y. Thus, policies restricting exports of commodity X can spread not only to other countries as a chain reaction but also to substitute commodity Y.

Most of the 30 countries that imposed policies restricting agricultural commodities and food exports in 2022 (Table 1) were emerging and developing economies. These policies were triggered in both net exporter and net importer countries. These countries imposed such restrictions to ensure food availability and stability, prevent an excessive outflow of agricultural commodities and food from their countries, and stabilize domestic food supply and prices. Table 1 indicates that the consumer price index (all items) increased substantially from 2021 to 2022. Changing rate in the consumer price index (food) decreased slightly in Kyrgyzstan, Kuwait,

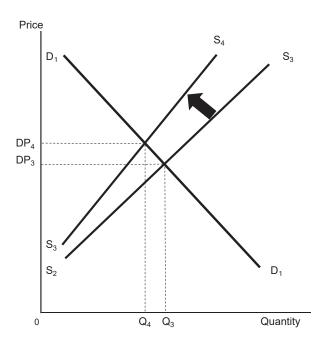


Fig. 5. Impact of export restriction measures on domestic market of commodity X without export restriction in country B (Net food importer and "small" country)

and Lebanon in 2022 but increased substantially in other countries. It, therefore, cannot be concluded that policies restricting exports implemented to stabilize domestic food supplies and prices actually contributed to stabilizing food prices. Djuric et al. (2015) observed that restrictions on wheat exports do not contribute to lower wheat prices. This assessment requires further examination since food prices could have risen higher had those countries not imposed restrictions.

### 2. Impact of export restrictions on global food security

According to the Food and Agriculture Organization (FAO), the prevalence of undernourishment (POU) declined from 12.3% in 2005 to 7.6% in 2017 but rose to 9.2% in 2022 (FAO et al. 2023). The International Food Policy Research Institute (IFPRI 2024) estimated that implementing policies restricting agricultural and food product exports would have affected 12% of the world's caloric intake in 2008, 8% in 2020, and 15% in 2022. These policies restricting agricultural and food product exports affect the availability of components of global food security. As a political factor, volatility in the prices of agricultural commodities and food also affects food stability, another factor of food security. Food price increases are more likely to have a more significant negative impact in developing countries than in developed countries, as well as in lower income groups than in relatively higher income groups, due to differences in income, Engel's coefficient, and the share of expenditure

Table 1. Imposing export restriction measures (export actual ban) in agriculture and food sector (2022)

Country	Products	Starting Date	End Date	Net food exporter/ importer for products	Prevalence of Undernourishment (2020/22) (%)	CPI (al	ng rate of (1 items) (6) 2022	of CPI	ing rate (food) (6) 2022	WTO Notification on export restrictions
Kazakhstan	Wheat, wheat flour, sunflower seeds, sunflower oil, sugar, potatoes	2021/8/24 ~ 2022/5/23	2022/2/23 ~ 2023/4/28	Net Exporter	< 2.5	8.0	14.4	10.8	19.2	×
Cameroon	Cereals, vegetable oils	2021/12/27	2023/12/31	Net Importer	6.4	2.3	6.2	4.3	12.0	×
Indonesia	Palm oil, palm kernel oil	2022/1/1 ~ 4/28	2022/5/22 ~ 6/7	Net Exporter	5.9	1.6	4.2	2.7	6.3	×
Argentina	Beef meat, soybean oil and soy flour	2022/1/1 ~ 3/13	2022/3/20 ~ 2024/12/31	Net Exporter	5.8	48.4	72.4	49.9	74.6	×
Turkey	Butter, olive oils, beef meat, sheep meat and others	2022/1/27 ~ 3/4	2022/9/30 ~ 2023/3/8	Net Exporter	< 2.5	19.6	72.3	24.3	85.7	×
Kyrgyzstan	Wheat, bovine meat	2022/1/31 ~ 3/25	2022/9/19 ~ 2023/4/30	Net Importer	4.8	11.9	13.9	18.0	15.7	0
Burkina Faso	Millet flour, corn and sorghum flour	2022/2/23	2024/12/31	Net Importer	16.2	3.8	14.3	6.8	25.2	×
Moldova	Wheat, maize, sugar	2022/3/1	2022/6/24	Net Exporter	< 2.5	5.1	28.7	7.1	29.9	0
Hungary	Wheat, rye, barley, oat, soybeans	2022/3/6	2022/5/15	Net Exporter	< 2.5	5.1	14.6	3.4	27.8	×
Ukraine	Wheat, oats, millet, sugar	2022/3/9	2022/5/10	Net Exporter	4.8	9.4	20.2	10.8	24.4	0
Egypt	Wheat, vegetable oil, maize, pasta, beans, others	2022/3/10 ~ 3/12	2022/9/14	Net Importer	7.2	5.2	13.9	4.6	21.0	×
Serbia	Wheat, maize, others	2022/3/10 ~ 4/20	2022/4/20 ~ 2024/12/31	Net Importer	< 2.5	4.1	12.0	4.5	16.6	×
Morocco	Tomato	2022/3/12	2022/4/30	Net Exporter	5.6	1.4	6.7	0.6	10.4	×
Algeria	Pasta, vegetable oils, others	2022/3/13	2024/12/31	Net Importer	< 2.5	7.2	9.3	10.1	12.7	×
Russia	Wheat, rye, barley, maize, rapeseed, sunflower seeds, sugar, others	2022/3/14 ~ 7/29	2022/6/30 ~ 2024/12/31	Net Exporter	< 2.5	6.7	11.8	9.6	-	×
Lebanon	Bread, sugar, processed fruits and vegetables, others	2022/3/18	2024/12/31	Net Importer	-	154.8	189.4	310.7	276.1	×
Kuwait	Grains, vegetable oils, chicken meal	2022/3/20 ~ 3/23	2024/12/31	Net Importer	< 2.5	3.4	4.1	9.5	6.9	×
Belarus	Rice, wholemeal flour, flour from rye, barley, pasta	2022/3/25	2022/6/15	Net Importer (Rice, Barley). Net exporter (Rye)	< 2.5	9.5	15.2	9.6	16.7	×
Ghana	Rice, maize, soybeans	2022/4/11	2022/10/20	Net Importer	4.9	10.0	31.3	10.3	28.8	×
Tunisia	Fruits, vegetables	2022/4/12	2024/12/31	Net Exporter	3.0	5.7	8.3	6.3	9.8	×
Pakistan	Sugar	2022/4/15	2022/12/31	Net Exporter	18.5	9.5	19.9	10.5	21.6	×
Kosovo	Wheat, corn, flour, vegetable oils, salt, others	2022/4/15	2023/12/31	-	-	3.4	11.7	-	-	×
Iran	Potatoes, tomatoes, onions, eggplants	2022/4/27	2022/12/31	Net Exporter	6.1	43.4	36.2	59.2	60.5	×
India	Wheat, broken rice, sugar, others	2022/5/13 ~ 9/8	2024/12/31	Net Exporter	16.6	4.9	5.9	3.7	6.9	×
Afghanistan	Wheat	2022/5/20	2024/12/31	Net Importer	30.1	5.1	-	-	-	×
Malaysia	Chicken meat, live chicken	2022/6/1	2022/8/31	Net Importer	2.7	2.5	3.4	1.8	5.4	×
Bangladesh	Rice	2022/6/29	2024/12/31	Net Importer	11.2	5.3	7.7	5.3	7.4	×
Georgia	Wheat, barley	2022/7/4	2023/7/1	Net Importer	2.9	9.6	11.9	10.8	16.8	×
China	Corn starch	2022/10/2	2024/12/31	Net Importer	< 2.5	0.9	2.0	-1.7	2.5	×
Bolivia	Soybeans, soybean meal, beef, sugar, others	2022/10/30	2022/11/21	Net Exporter	19.4	0.7	1.7	0.6	1.4	×

Sources: IFPRI (2024), FAO et al. (2023), OECD (2023) and Ha et al. (2023)

Notes: 1) The order of listing is based on the earliest starting date of the actual export ban.

<sup>2)</sup> The information on implementing export restriction countries is based on IFPRI (2024) as of May 1, 2024.

of household income on staple foods.

The export restrictions of large exporting countries have a negative impact on global food security in two ways. First, export restrictions have a direct effect on market supplies. Second, there is an indirect effect on the domestic market of the export restriction country, where declined prices due to export restriction measures reduce production and investment incentives of the domestic market (Götz et al. 2013). Therefore, lower domestic agricultural commodity prices can affect availability and stability because lower agricultural investment incentives may lead to instability in future agricultural production in the mid to long term.

# Policy recommendations for export restriction measures for agricultural commodities and food

Policies restricting agricultural commodities and food exports since 2020 can be broadly classified based on Table 1 into four categories (Table 2). Countries in Categories A and B require export restriction measures to secure domestic food availability and stability as components of food security because they have higher POUs. These countries may not have other effective policy options to secure domestic food security in severe conditions. Category C countries are net food exporters and have much lower POUs. They may require export restriction measures to decrease and stabilize domestic food prices, but these measures can have a negative effect on the undernourished population in the least developed countries. Among them, Russia, Kazakhstan, and Argentina are "large" countries to note. Therefore, export restriction measures in these countries cause hikes and volatilization of international agricultural commodities and food prices. They should apply other policy options to decrease and stabilize domestic food prices, such as improving market transparency. Moreover, Category D countries are net food importers and have a lower POU.

They should apply other policy options to decrease domestic food prices, such as enforcing domestic production and managing an effective stock-holding system for staple food.

Even if policies restricting exports of agricultural commodities and food contribute to ensuring domestic food security in the country they are imposed, they can threaten the food security of other countries. Moreover, export restrictions can psychologically destabilize international reference prices even in small volumes in small countries. It can have a negative impact on the stability of food security. Therefore, international society must address policies that restrict exports of agricultural commodities and food as a risk factor that affects global food security. We argue that not all export restriction measures should be regulated, and it is important to sort out how to restrict these measures, which depend on their POU. Conducting export restriction measures is required for countries in which their POU is over 2.5% for humanitarian reasons. Therefore, international society cannot restrict export restriction measures for Categories A and B countries. The society should regulate export restriction measures for countries in Categories C and D. However, it is difficult to regulate Category D countries because Article 12 of the World Trade Organization Agreement on Agriculture exempts net food-importing developing countries from additional obligations<sup>3</sup>.

Food security stems from several related factors and manifests in a diverse range of events. Since 2013, the FAO has introduced 31 food security indicators to assess food security in every country and region through individual evaluations of the four aspects of food security (Table 3). However, the current FAO indicators do not fully consider the risk to global food security posed by restrictions on agricultural commodities and food exports. Therefore, we advocate that it is imperative to assess the impact of export restriction measures on caloric intake by the importing country and introduce the

Table 2. Categories of export restriction

Category number	Content of Category	Countries		
A	Countries that are net importers of agricultural commodities, and have a domestic prevalence of undernourishment of 2.5% or higher	Egypt, Cameroon and others		
В	Countries that are net exporters of agricultural commodities, and have a domestic prevalence of undernourishment of 2.5% or higher	India, Indonesia and others		
С	Countries that are net exporters of agricultural commodities, and have a domestic prevalence of undernourishment of 2.5% or lower	Russia, Kazakhstan, Afghanistan and others		
D	Countries that are net importers of agricultural commodities, and have a domestic prevalence of undernourishment of 2.5% or lower	Algeria, Malaysia and others		

<sup>&</sup>lt;sup>3</sup> Refer to the Appendix.

Table 3. Food security indicators

Dimensions	Food security indicators				
	Average dietary energy supply adequacy				
	Average value of food production				
Availability	Share of dietary energy supply derived from cereals, roots and tubers				
	Average protein supply				
	Average supply of protein of animal origin				
	Percentage of paved roads over total roads				
	Road density				
	Rail lines density				
	Gross domestic product (in purchasing power parity)				
Access	Domestic food price index				
	Prevalence of undernourishment				
	Share of food expenditure of the poor				
	Depth of the food deficit				
	Prevalence of food inadequacy				
	Cereal import dependency ratio				
	Percent of arable land equipped for irrigation				
	Value of food imports over total merchandise exports				
Stability	Political stability and absence of violence/terrorism				
	Domestic food price volatility				
	Per capita food production variability				
	Per capita food supply variability				
	Access to improved water sources				
	Access to improved sanitation facilities				
	Percentage of children under 5 years of age affected by wasting				
	Percentage of children under 5 years of age who are stunted				
Utilization	Percentage of children under 5 years of age who are underweight				
Utilization	Percentage of adults who are underweight				
	Prevalence of anemia among pregnant women				
	Prevalence of anemia among children under 5 years of age				
	Prevalence of vitamin A deficiency in the population				
	Prevalence of iodine deficiency in the population				

Source: FAO (2015)

FAO Food Security Indicator, thereby positioning the measures as important risks in the availability and stability of food security<sup>4</sup>.

## **Conclusions**

In 2022, 30 exporting countries imposed export restriction measures in the agriculture and food sectors. Most policies restricting agricultural commodities and

food exports are implemented to ensure domestic food security. However, policies restricting exports cause food security risks of availability and stability through higher international reference prices and volatility, especially in least developed countries that depend on food imports and have higher POUs. Therefore, securing domestic food security in one country may conflict with domestic food security in other countries.

On the other hand, a decline in domestic agricultural

<sup>&</sup>lt;sup>4</sup> In this context, international society is required to strengthen the monitoring of policies restricting exports of agricultural commodities and food. The Agricultural Market Information System (AMIS) and IFPRI are working on strengthening monitoring by observing and publicizing policies restricting exports of agricultural commodities and food to ensure transparency in food markets and related policies.

commodity prices in the country imposing such restriction may cause risks of decreasing and destabilizing agricultural production by affecting agricultural investments and farm incomes in the mid to long term. Although these measures may focus on specific products in a particular country, they can cause a chain reaction that induces similar policies to affect a wider range of countries and products through their trade. Therefore, it is important to regulate countries imposing such policies at an early stage. However, we argue that not all export restriction measures should be regulated. We propose that international society should identify countries that should be restricted or allowed to conduct these measures based on the level of POU. The current FAO food security indicators do not fully cover the risks to global food security posed by policies restricting exports of agricultural and food products. Therefore, we advocate that new indicators should cover the impact of export restriction measures on caloric intake by the importing country as an important risk in the availability and stability of food security. It is also crucial to introduce similar indicators caused by export restriction measures of fertilizers as food security risks.

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# Appendix. Export restrictions in the agricultural and food sector and WTO rules

In relation to policies restricting exports and the World Trade Organization (WTO) rules, Article 11 of the General Agreement on Tariffs and Trade (GATT), "General Elimination of Quantitative Restrictions," states that no prohibitions or restriction other than duties, taxes or other charges shall be instituted or maintained. However, the member may take exceptional measures to prohibit and restrict exports in accordance with the provisions of the GATT11-2(a). Furthermore, Article 12 of the WTO GATT11-2(a) on Agriculture requires that "the Member instituting the export prohibition or restriction shall give due consideration to the effects of such prohibition or restriction on importing members' food security" and that "before any Member institutes an export prohibition or restriction, it shall give notice in writing, as far in advance as practicable, to the Committee on Agriculture comprising such information as the nature and the duration of such measure." However, the provisions of this Article shall not apply to any developing country member unless the measure is taken by a developing country member which is a net-food exporter of the specific foodstuff concerned.

Under these circumstances, the 12th WTO Ministerial Conference in 2022 decided that members shall not impose export prohibitions or restrictions on foodstuffs purchased for non-commercial humanitarian purposes by the World Food Programme.