



Research Article

Volume 28 Issue 5 - November 2024

DOI: 10.19080/ARTOAJ.2024.28.556430

Agri Res & Tech: Open Access J

Copyright © All rights are reserved by Adel M Ghanem

The Impact of the Russian-Ukrainian War on the Value of Wheat Imports for the Gulf Cooperation Council countries

Adel M Ghanem^{1*}, Khalid N Alrwis¹, Mohammad H Alqunaibet², Mohamad Alnafissa², Othman S Alnashwan², Abdul Aziz M Alduwais², Yosef A Alamri², Sattam F Almadrra² and Sharafeldin B Alaagib¹

¹Office of Food Security Studies and Research, Vice Rectorate for Postgraduate Studies and Scientific Research, King Saud University, Saudi Arabia

²Agricultural economics department, College of food and Agricultural Sciences, King Saud University, Saudi Arabia

Submission: November 04, 2024; Published: November 15, 2024

***Corresponding author:** Adel M Ghanem, Office of Food Security Studies and Research, Vice Rectorate for Postgraduate Studies and Scientific Research, King Saud University, Saudi Arabia

Abstract

This study aimed to measure the impact of the Russian-Ukrainian war on the value of wheat imports to the Gulf Cooperation Council, using the Herfindahl-Hirschman coefficient and the (t) test, estimating the demand functions for wheat imports, and predicting the quantity of imports. The study showed that the Arab Gulf countries imported wheat from the Russian Federation and Ukraine in varying proportions. The Kingdom of Saudi Arabia followed a policy of economic diversification in wheat import sources, followed by the Sultanate of Oman, Qatar and the United Arab Emirates. As for the States of Kuwait and the Kingdom of Bahrain, their wheat import policy was characterized by geographical concentration. There was also a significant difference between the average global wheat import price and its counterpart for Bahrain, Kuwait and Qatar. 10 % increase in wheat import prices for Bahrain, Oman and the United Arab Emirates leads to a reduction in the quantity of wheat imports by rates of 5.49%, 8.13% and 5.34%, respectively. To mitigate the negative effects of the Russian-Ukrainian war, the Gulf Arab countries need to raise food security by increasing the stock of strategic commodities, to ensure the flow of goods to the markets and stabilize their prices, in addition to expanding local production and increasing its contribution to meeting local consumer needs.

Keywords: The Russian-Ukrainian war; Wheat; Import prices; The import bill; The Gulf Cooperation Council

Introduction

The Russian-Ukrainian war began on February 24, 2022, causing several effects whose impact does not limit to the Russian Federation and Ukraine but extends to the global system, especially the countries that have interests and partnerships with them. Together, Russia and Ukraine dominate wheat production with 110.81 million tons representing 14.56% of the total global wheat production from 760.93 million tons in 2020. The total exports of Russia and Ukraine of wheat amounted to 55.32 million tons, representing 27.9% of the total amount of world exports of 198.53 million tons from wheat in 2020. At the level of the Gulf Cooperation Council, the Russian Federation is the main source of wheat imports for the State of Qatar (38.49%), the United Arab Emirates (39.18%), and the Sultanate of Oman (35.42%) during the period 2010-2020. The State of Qatar also depends on Ukrainian wheat (6.24%) during the period 2010-2020 [1].

Ghanem et al. [2] studied the impact of the Russian-Ukrainian war on consumer prices of food products. This study showed that a 10% increase in both the global food price index and the total population of the Kingdom of Saudi Arabia leads to an increase in the consumer price index for food products by 1.22% and 4.95% for each, respectively. The consumer price index for food products was expected to increase to 137.7 in 2022, with an increase of 12.2% from its counterpart of 122.78 in 2021. Also, Ghanem et al. [2] in second research addressed the repercussions of the Russian-Ukrainian war on the value of imports and the food trade balance of the Kingdom of Saudi Arabia. The study showed that increasing the global food price index by 10% led to an increase in the value of food imports by 6.98%, and thus an increase in the value of the deficit in the food trade balance by 7.87%. As for increasing the food production index by 10%, it led to a decrease

in the value of food imports by 1.88%. Also, increasing the value of food exports by 10% led to a decrease in the value of the deficit in the food trade balance by 5.24%. The increasing in the food price index to 145.8, the value of both food imports and the deficit in the food trade balance exceeds their counterparts in the current situation for the year 2021, by a rate of 37.1% and 44.5% for each, respectively. Ghanem et al. [3] also studied the impact of the Russian-Ukrainian war on food security in the Kingdom of Saudi Arabia. This study relied on published data and food security index measures, in addition to standard economic analysis. The study showed that increasing both the estimated food production index and real per capita income by 10% leads to an increase in the food security index by 2.72% and 6.55% for each, respectively. As for increasing the estimated consumer price index for food by 10%, it leads to a decrease in the food security index by 1.74%. Despite the repercussions of the Russian-Ukrainian war, the food security index will be good for the Kingdom of Saudi Arabia, as it is expected to increase from 72.4 in 2024 to 75.6 in 2030, due to the state adopting a policy of Saudi agricultural investment abroad and directing local agricultural investments towards vertical expansion, protected agriculture and good agricultural practices, in addition to achieving huge financial surpluses, which leads to increasing the state's ability to import from abroad.

Since the outbreak of the Russian-Ukrainian war, the Moscow and Saint Petersburg stock exchanges have suspended trading, and thus wheat and oil prices have risen. Wheat prices on the Forex market rose from 1206.3 dollars/ton on 4/3 2022 to 1342.3 dollars/ton on 8/3 2022 and then decreased to 1005.6 dollars/ton on 1/4 2022. The Food and Agriculture Organization reports that the index for cereal prices increased from 103.1 in 2020 to 170.1 in March 2022 [4]. There is no doubt that the increase in import costs has an impact on food security and the import bill of nations who are net food importers. The Arab Gulf states rely on imports to meet their needs for food security and consumption due to the lack of water resources in the region. The study addresses the following query in this regard: What effects does the war between Russia and Ukraine have on the cost of wheat imported by the members of the Gulf Cooperation Council?

There is no doubt that this study and other economic studies are of great importance, especially those related to measuring the impact of wars and international crises on supply chains and imports of strategic goods, most notably wheat. The importance of this study increases in light of the GCC countries' clear reliance on imports to meet consumer needs and achieve food security for wheat, in addition to the fact that some countries, including the Kingdom of Saudi Arabia, have reduced wheat cultivation in accordance with Resolution No. (335), due to the scarcity of water resources. This study is also important because it sheds light on

the repercussions of the Russian-Ukrainian war on prices and thus the increase in the value of the import bill.

Research Objectives

The following objectives were analyzed in order to assess how the Russian-Ukrainian War affected the value of wheat imports for the countries of the Gulf Cooperation Council:

- i. the relative importance of the Ukrainian and Russian Federations in regards of wheat exports and production.
- ii. The relative importance of wheat imports sources for the Gulf Cooperation Council countries.
- iii. Comparative economic analysis of wheat imports prices for the Gulf Cooperation Council countries.
- iv. estimation of the demand function for wheat imports by the countries of the Gulf Cooperation Council from 1990 to 2020.
- v. calculating the effect of the rise in wheat import costs on the value of imports for the gulf corporation Council countries.

Materials and Methods

This study used secondary data from the World Bank and the Food and Agriculture Organization (FAOSTAT) to achieve its objectives. Also, rely on econometric analysis represented by:

- i. The United Nations Organization for Trade and Development (UNCTAD) used the normalized Herfindahl Hirschman Index, and the Hirschman coefficient was given by the following equation [5,6]:

$$H = \frac{\sqrt{\sum_{i=1}^n \left(\frac{x_i}{X}\right)^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}}$$

Where: H represents the Herfindel-Hirschmann coefficient as an indicator of diversification in wheat import sources, N represents the number of countries, x_i represents the quantity of imports from a country, and X represents the total imports of wheat for the Gulf Cooperation Council countries. The value of the Herfindel-Hirschmann coefficient ranges from zero to one, i.e. $(0 \leq H \leq 1)$. If the value of the Herfindel-Hirschmann coefficient is zero, there is complete diversity in the import sources of wheat. If the value is equal to one, then the diversity is zero.

- ii. The (t) test was used to determine the significance of the difference between the average world import price for wheat during the period 2010–2020 and the average import price for wheat for the Gulf Cooperation Council countries. The value of (t)

was calculated through the following equation [7]:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sigma \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$\sigma^2 = \frac{(n_1 - 1)\sigma_1^2 + (n_2 - 1)\sigma_2^2}{n_1 + n_2 - 2}$$

iii. The proposed methodology for analyzing how the Russian-Ukrainian war affected the value of wheat imports into the Gulf Cooperation Council countries. The proposed model consists of the following equations:

$$Y_1 = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + e_1$$

$$Y_2 = Y_1 * X_1$$

The proposed model includes the following variables: (i) Endogenous Variables, and their number is two variables: the quantity of wheat imports in thousand tons (Y_1), the value of wheat imports in million dollars (Y_2), (ii) Exogenous Variables, which are four variables: Average price import in dollars/ton (X_1), domestic production of wheat in thousand tons (X_2), the total population in million people (X_3), GDP in billion dollars (X_4).

Results

First: Russian Federation and Ukraine's specific roles in the production and export of wheat

The information in Tables (1 & 2) and (Figure 1) makes it evident that the total wheat production of the Russian Federation and Ukraine throughout the period of 2010–2020 is significantly increased from 58.36 million tons, representing 9.11% of the total global wheat production of 640.8 million tons in 2010, to 110.81 million tons, represents 14.56% of the total world wheat production of 760.93 million tons in 2020. The total amount of wheat exports to the Russian Federation and Ukraine increased from 16.15 million tons, representing 11.08% of the total amount of world exports of 145.74 million tons in 2010, to 55.32 million tons, representing 27.87% of the total amount of world exports of 198.53 million tons in 2020. It is clear from the data in the Table (3) that the ratio of wheat exports to production in the Russian Federation increased from 28.5% in 2010 to 43.4% in 2020 and in Ukraine increased from 25.5% in 2010 to 72.5 % in 2020. At the global level, the ratio of the quantity of exports to wheat production increased from 22.7% in 2010 to 26.1% in 2020.

Second: The relative importance of wheat imports sources for the Gulf Cooperation Council countries

The information in Table 4 and Figure 2, which analyzes the range of wheat import sources for the Arab Gulf countries from 2010 to 2020, leads to the following findings:

i. The most important suppliers of wheat to Saudi Arabia were Germany, Poland, Lithuania, Canada, Australia, Latvia, and the United States of America. The total relative importance of these countries reached 87.16%, while the relative importance of the rest of the countries does not exceed 12.84%. The largest important exporters of wheat to the Kingdom of Bahrain were Australia, Canada, Lithuania, Argentina, and Germany, where the total relative importance of these countries reached 92.65%, while the relative importance of the rest of the countries does not exceed 7.35%.

ii. The State of Kuwait mostly imports wheat from Australia and Canada, with a combined relative importance of 98.96% for these two countries, while the relative importance of the rest of the countries does not exceed 1.04%. The State of Qatar imports wheat from several countries, the most important of which are the Russian Federation, Canada, Australia, Romania, Ukraine, Pakistan, and India. The total relative importance of these countries reached 91.65%, while the relative importance of the rest of the countries does not exceed 8.35%.

iii. The United Arab Emirates imported wheat from several countries, the most important of which are the Russian Federation, Canada, Australia, India, and Romania. The total relative importance of these countries reached 87.13%, while the relative importance of the rest of the countries does not exceed 12.87%. The Russian Federation, Australia, Canada, Germany, India, the United States of America, and Argentina are the main importers of wheat to the Sultanate of Oman. The total relative importance of these countries reached 90.11%, while the relative importance of the rest of the countries does not exceed 10.0%.

iv. Wheat import diversification factors for the Arab Gulf countries ranged between a minimum of 0.21 for the Kingdom of Saudi Arabia and a maximum of 0.85 for the State of Kuwait during the period 2010-2020. It is evident that the Kingdom of Saudi Arabia, the Sultanate of Oman, Qatar, and the United Arab Emirates have all used a strategy of economic diversification when purchasing sources of wheat. In the states of Kuwait and the Kingdom of Bahrain, their wheat import policy was characterized by geographical concentration.

v. The Gulf Arab countries imported wheat from the Russian Federation and Ukraine in varying proportions. The percentage of wheat imports from Ukraine ranged between a minimum of 0.02% for the Kingdom of Bahrain and Kuwait and a maximum of 6.34% for the State of Qatar. The Russian-Ukrainian war may affect the availability of wheat in those countries, in addition to all countries being impacted by the increase in wheat

import prices, as the Russian Federation is also the main source for importing wheat for Qatar, the United Arab Emirates, and the Sultanate of Oman.

Third: Comparative economic analysis of the cost of wheat imports for the Gulf Cooperation Council countries

It is clear from the information in (Tables 5 & 6) that the difference in wheat import prices for the Arab Gulf countries between 2010 and 2020 was that:

i. The average import price of wheat for the Arab Gulf countries ranged between a minimum of \$269.6/ton for the Kingdom of Saudi Arabia and a maximum of \$350.8/ton for the Kingdom of Bahrain. By comparing the wheat average import price to the Kingdom of Saudi Arabia of \$269.6/ton with the average world wheat import price of \$273.3/ton, it was discovered that the average cost of importing wheat into the Kingdom of Saudi Arabia is \$3.7/ton less than the equivalent price globally, i.e. decreased by 1.4% during 2010-2020 period. The difference between the average wheat import price for the rest of the Arab Gulf countries and its international counterpart ranged between a minimum of \$21.7/ton for the United Arab Emirates and a maximum of \$77.5/ton for the Kingdom of Bahrain.

ii. The average import price of wheat increased from its international counterpart in Bahrain, Kuwait, Oman, Qatar, and the United Arab Emirates at rates of 28.4%, 13.5%, 9.1%, 15.9%, and 7.8%, respectively. Between 2010 and 2020, the average price of wheat imported into the Kingdoms of Bahrain, Kuwait, Oman, Qatar, and the United Arab Emirates increased compared to the Kingdom of Saudi Arabia at rates of 30.1%, 15.1%, 10.6%, 17.5%, and 9.3%, respectively.

iii. By studying a significant difference between the average world import price of wheat and its counterpart in the Arab Gulf countries, the calculated value (t) found more than its tabular counterpart of 2.764 at the 1% probability level for each of the Kingdom of Bahrain and the State of Qatar. Also, the calculated value (t) is more than its tabular counterpart of 1.812 at the 5% probability level for the State of Kuwait, which confirms the significant difference between the average world import price of wheat and its counterpart for the Kingdom of Bahrain, Kuwait, and Qatar. Regarding the other countries (the Sultanate of Oman, the United Arab Emirates, and the Kingdom of Saudi Arabia), there was no variation between the average import price of wheat and its comparable on a global scale. As for a significant study of the difference between the average import price of wheat to the Kingdom of Saudi Arabia and its counterpart to the rest of the Arab Gulf countries, the difference between the average import price of wheat to the Kingdom of Saudi Arabia and its counterpart

to the Kingdom of Bahrain, Kuwait and Qatar was shown, while the difference between the average import price of wheat to the Kingdom was found to be insignificant. Saudi Arabia and its counterpart in the United Arab Emirates and the Sultanate of Oman.

Fourth: Functions of the demand for wheat imports for the Gulf Cooperation Council countries

Stepwise multiple regression analysis was used to estimate the functions of the demand for wheat imports for the Arab Gulf countries between 1990 and 2020 in linear, logarithmic, and semi-logarithmic forms [7], showing the preference for the estimated models shown in (Table 7), as it is clear from the following:

i. **The Kingdom of Bahrain:** The relative impact (elasticity) of wheat import price and GDP is estimated at -0.549*, and 0.726 for each, respectively. This means that an increase in the import price of wheat by 10% leads to a decrease in the quantity of wheat imports by 5.49%. As for the increase in GDP by 10%, it encourages an increase in wheat imports to the Kingdom of Bahrain by 7.26%. The Kingdom of Bahrain does not produce wheat, and therefore, to meet consumer needs and food security, wheat purchases continue even in light of high prices.

ii. **State of Kuwait:** It was found that an increase in GDP of 10% causes an increase in the quantity of wheat imports to the State of Kuwait of 6.28%, making GDP one of the most significant factors that affect wheat import.

iii. **Sultanate of Oman:** A 10% increase in wheat import prices results in an 8.13% decrease in wheat import volume. The amount of wheat imported into the Sultanate of Oman would increase by 7.71% with a 10% growth in GDP.

iv. **The State of Qatar:** With a relative impact (elasticity) estimated at 0.476*, GDP is one of the most important factors that affect wheat import. This leads to an increase in wheat imports to Qatar of 4.76% for every 10% growth in GDP.

v. **United Arab Emirates:** A 10% increase in wheat import prices results in a 5.34% decrease in wheat import volume. The amount of wheat imported into the United Arab Emirates would increase by 10.51% for a 10% growth in GDP.

vi. **Kingdom of Saudi Arabia:** Since the beginning of 2008, the Kingdom of Saudi Arabia has been importing wheat. Since the GDP's relative importance (elasticity) is estimated to be about 0.666, an increase in GDP by 10% results in an increase in the amount of wheat imported into the Kingdom of Saudi Arabia by 6.66%. This makes the GDP one of the most significant factors affecting wheat imports.

vii. It was found that the relative impact of the import price of wheat is not substantial on the amount of imports for Kuwait,

Qatar, and Saudi Arabia through the functions of the demand for wheat imports estimated for the Arab Gulf countries. This is a

result of the oil wealth incomes of these countries, which allow them to purchase wheat despite the high cost of imports (Table 8).

Table 1: Wheat production and its relative importance for the countries of Russia and Ukraine during the period 2010-2020.

Year	Production in million tons				Relative importance%		
	Russia	Ukraine	The sum of the two countries	The world	Russia	Ukraine	The sum of the two countries
2010	41.51	16.85	58.36	640.8	6.48	2.63	9.11
2011	56.24	22.32	78.56	696.9	8.07	3.2	11.27
2012	37.72	15.76	53.48	673.74	5.6	2.34	7.94
2013	52.09	22.28	74.37	710.17	7.33	3.14	10.47
2014	59.71	24.11	83.83	728.76	8.19	3.31	11.5
2015	61.79	26.53	88.32	741.85	8.33	3.58	11.91
2016	73.35	26.1	99.44	748.44	9.8	3.49	13.29
2017	86	26.21	112.21	772.29	11.14	3.39	14.53
2018	72.14	24.65	96.79	732.14	9.85	3.37	13.22
2019	74.45	28.37	102.82	764.98	9.73	3.71	13.44
2020	85.9	24.91	110.81	760.93	11.29	3.27	14.56
Average	63.72	23.46	87.18	724.63	8.71	3.22	11.93

Source: Food and Agriculture Organization (FAOSTAT), 2010-2020.

Table 2: The quantity of wheat exports and their relative importance to Russia and Ukraine during the period 2010-2020.

Year	Exports in million tons				Relative importance %		
	Russia	Ukraine	The sum of the two countries	The world	Russia	Ukraine	The sum of the two countries
2010	11.85	4.3	16.15	145.74	8.13	2.95	11.08
2011	15.19	4.1	19.28	148.35	10.24	2.76	13
2012	16.09	8.68	24.77	164.62	9.77	5.27	15.05
2013	13.8	7.76	21.56	162.8	8.47	4.77	13.24
2014	22.14	10.54	32.68	174.03	12.72	6.06	18.78
2015	21.23	13.45	34.69	170.87	12.43	7.87	20.3
2016	25.33	17.92	43.25	190.05	13.33	9.43	22.76
2017	33.03	17.31	50.34	196.6	16.8	8.81	25.6
2018	43.97	16.37	60.34	190.9	23.03	8.58	31.61
2019	31.87	13.9	45.77	180.17	17.69	7.72	25.41
2020	37.27	18.06	55.32	198.53	18.77	9.09	27.87
Average	24.7	12.04	36.74	174.79	13.76	6.66	20.43

Source: Food and Agriculture Organization (FAOSTAT), 2010-2020.

Table 3: The ratio of the quantity of exports to wheat production for the countries of the Russian Federation and Ukraine during the period 2010-2020.

Year	Russia	Ukraine	The sum of the two countries	The World
2010	28.5	25.5	27.7	22.7
2011	27	18.4	24.5	21.3
2012	42.7	55.1	46.3	24.4
2013	26.5	34.8	29	22.9
2014	37.1	43.7	39	23.9
2015	34.4	50.7	39.3	23
2016	34.5	68.7	43.5	25.4
2017	38.4	66	44.9	25.5
2018	61	66.4	62.3	26.1
2019	42.8	49	44.5	23.6
2020	43.4	72.5	49.9	26.1
Average	37.8	50.1	41	24.1

Source: The data in my (Tables1,2).

Table 4: The relative importance of wheat imports sources for the Gulf Cooperation Council countries during the period 2010-2020.

Country	Kingdom of Saudi Arabia	Bahrain	Kuwait	Qatar	United Arab Emirates	Oman
Germany	26.45	5.68	0.002	1.91	1.35	8.23
Poland	17.47	1.99	-	-	-	-
Lithuania	14.85	8.53	-	-	3.13	-
Canada	12.57	9.96	10.81	14.78	26.49	10.89
Australia	5.78	60.92	88.15	14.01	7.84	21.22
Latvia	5.04	-	-	-	0.21	-
United States of America	5	0.0009	0.001	0.001	2.64	4.44
France	2.41	0.03	0.0001	-	0.002	-
Brazil	2.38	0.0002	0.003	-	-	0.34
Ukraine	1.85	0.02	0.02	6.24	1.98	1.42
Czech	1.72	-	-	-	-	-
Argentina	1.15	7.56	-	1.68	0.5	3.88
Russia	0.93	0.85	0.01	38.49	39.18	35.42
Finland	0.56	-	-		-	-
Romania	0.53	2.41	0.75	8.2	5.98	1.11
Holland	0.44	0.002	0.001	-	-	-
Bulgaria	0.05	0.38	0.005	-	-	-
India	0.29	1.62	0.11	4.91	7.64	6.03
Pakistan	-	0.0001	-	5.02	3.03	1.49
The United Arab Emirates	0.01	0.04	0.14	0.43	-	2.11
Oman	-	0.0002	0.001	0.62	-	-
Tanzania	-	-	-	2.34	-	0.04
Iran	-	-	-	-	-	2.79
other countries	0.52	0.01	-	1.37	0.03	0.59
Diversification coefficient	0.21	0.52	0.85	0.26	0.31	0.25

Source: Compiled and calculated from the Food and Agriculture Organization (FAO) for the period 2010-2020.

Table 5: The amount of discrepancy between the average import prices of wheat for the Gulf Cooperation Council countries and the average world import price for wheat during the period 2010-2020.

Country	The average import price is dollars/ton	The difference between the country's import price and the international price, dollars/ton	The difference between the import price of the country and the import price of Saudi Arabia, dollars/ton	The index number compared to the world price	The index number compared the import price of Saudi Arabia
Bahrain	350.8	77.5	81.2	128.4	130.1
Kuwait	310.2	36.9	40.6	113.5	115.1
Oman	298.1	24.8	28.5	109.1	110.6
Qatar	316.8	43.5	47.2	115.9	117.5
The United Arab Emirates	294.7	21.4	25.1	107.8	109.3
Kingdom Saudi Arabia	269.6	-3.7	-	98.6	100
The world	273.3	-	-	100	-

Source: Compiled and calculated from the Food and Agriculture Organization (FAO) for the period 2010-2020.

Table 6: (t) test for the significance of the difference between the average import prices of wheat for the Gulf Cooperation Council countries and the average world import price for wheat during the period 2010-2020.

Country	The difference between the country's import price and the international price, dollars/ton	The difference between the import price of the country and the import price of Saudi Arabia, dollars/ton
Bahrain	3.05**	3.18**
Kuwait	2.06*	2.24*
Oman	1.09	1.24
Qatar	2.80**	3.00**
The United Arab Emirates	1.5	1.74
Kingdom Saudi Arabia	-0.22	-

** Significant at the 1% probability level, *Significant at the 5% probability level.

Source: The data provided in (Table 5).

Table 7: Estimated demand functions for wheat imports for the Arab Gulf countries during the period 1990-2020.

Country	Equation
Bahrain	$\hat{Y}_1 = 54.535 - 0.142X_1 + 2.602X_4$
	$(6.03)^{**} \ (-3.23)^{**} \ (6.16)^{**}$
	$R^2 = 0.59 \ F=19.86 \ D.W=1.42$
	$LM \ test=2.79 \ Arch \ test=1.66$
Kuwait	$\hat{Ln} Y_2 = 4.151 - 0.219LnX_1 + 0.628LnX_4$
	$(4.36)^{**} \ (-0.87)^{ns} \ (5.12)^{**}$
	$R^2 = 0.72 \ F=36.52 \ D.W=1.48$
	$LM \ test=2.08 \ Arch \ test=2.07$

Oman	$\hat{Ln Y_3} = 7.303 - 0.813LnX_1 + 0.771LnX_4$
	(7.21)** (-3.56)** (7.22)**
	$R^2 = 0.67 \ F=28.65 \ D.W=1.23$
	$LM \ test=2.37 \ Arch \ test=0.72$
Qatar	$\hat{Ln Y_4} = 3.540 - 0.0005X_1 + 0.006X_4$
	(13.56)** (-0.45) ^{ns} (4.51)**
	$R^2 = 0.57 \ F=18.36 \ D.W=2.27$
	$LM \ test=1.74 \ Arch \ test=1.16$
The United Arab Emirates	$\hat{Ln Y_5} = 3.972 - 0.534LnX_1 + 1.051LnX_4 + 0.823ar(1)$
	(2.17)* (-1.98)* (2.85)** (7.11)**
	$R^2 = 0.88 \ F=48.30 \ D.W=1.44$
	$LM \ test=0.001 \ Arch \ test=0.33$
Kingdom Saudi Arabia	$\hat{Ln Y_6} = 5.538 - 0.002X_1 + 0.001X_4$
	(4.16)* (-0.63) ^{ns} (2.76)*
	$R^2 = 0.44 \ F=3.95 \ D.W=1.58$
	$LM \ test=0.43 \ Arch \ test=0.32$

**Significant at the 1% probability level, *Significant at the 5% probability level.

Source: Calculated from data provided on the website of the Food and Agriculture Organization (FAO) and the World Bank.

Table 8: Efficiency criteria for wheat import demand functions for Arab Gulf countries during the period 1990-2020.

Country	Root Mean Squared Error	Mean Absolute Error	Mean Abs. Percent Error	Theil Inequality Coef.
Bahrain	0.64	0.38	15.33	0.08
Kuwait	0.27	0.21	3.92	0.02
Oman	0.31	0.24	4.39	0.03
Qatar	0.43	0.34	8.24	0.05
The United Arab Emirates	0.56	0.45	7.22	0.04
Kingdom Saudi Arabia	0.49	0.33	4.89	0.03

Source: Demand functions estimated in (Table 7).

Fifth: The value of wheat imported by the Gulf Cooperation Council countries as a result of rising import prices

It is necessary to predict the amount of wheat imports and then estimate the value of imports by multiplying the amount of

expected imports by the average import price of wheat before and after the spread of the Russian-Ukrainian war. This will enable researchers to study the effects of rising import prices on the value of wheat imports for the Gulf Cooperation Council countries. The quantity of wheat imports was predicted, using the price and income elasticities of demand and annual growth rates

in wheat import prices and GDP [8] in (Table 9), after ensuring the efficiency of the general trend equations estimated according to the criteria provided in (Table 10). The equations used to predict the quantity of wheat imports for the Arab Gulf countries could be expressed as follows:

$$\text{Saudi Arabia: } Y_t = 3109.5 [1 + (0.033 \times 0.666)]^n$$

$$\text{Qatar: } Y_t = 58.7 [1 + (0.138 \times 0.476)]^n$$

$$\text{Kuwait: } Y_t = 507.9 [1 + (0.082 \times 0.628)]^n$$

Bahrain:

$$Y_t = 81.4 [1 + (0.034 \times -0.549)]^n [1 + (0.084 \times 0.726)]^n$$

Oman:

$$Y_t = 653.1 [1 + (0.023 \times -0.813)]^n [1 + (0.084 \times 0.726)]^n$$

Emirates:

$$Y_t = 1400.7 [1 + (0.025 \times -0.534)]^n [1 + (0.083 \times 1.051)]^n$$

It is clear from the data in the (Table 11) that the total wheat imports of the Gulf Cooperation Council for the Arab States increased from 6.29 million tons in 2022, to 7.10 million tons in 2025, with an annual average estimated at about 6.69 million tons during the period 2022-2025. And Saudi Arabia ranks first in importing wheat, as the average quantity of imports expected for it represents about 50.18% of the average quantity of wheat imports for the Gulf Cooperation Council for the Arab States during the period 2022-2025, followed by the United Arab Emirates with 26.85%, then the Sultanate of Oman with 11.40 %, then Kuwait with 9.07%, then the Kingdom of Bahrain and Qatar with 1.4%, 1.1% each, respectively.

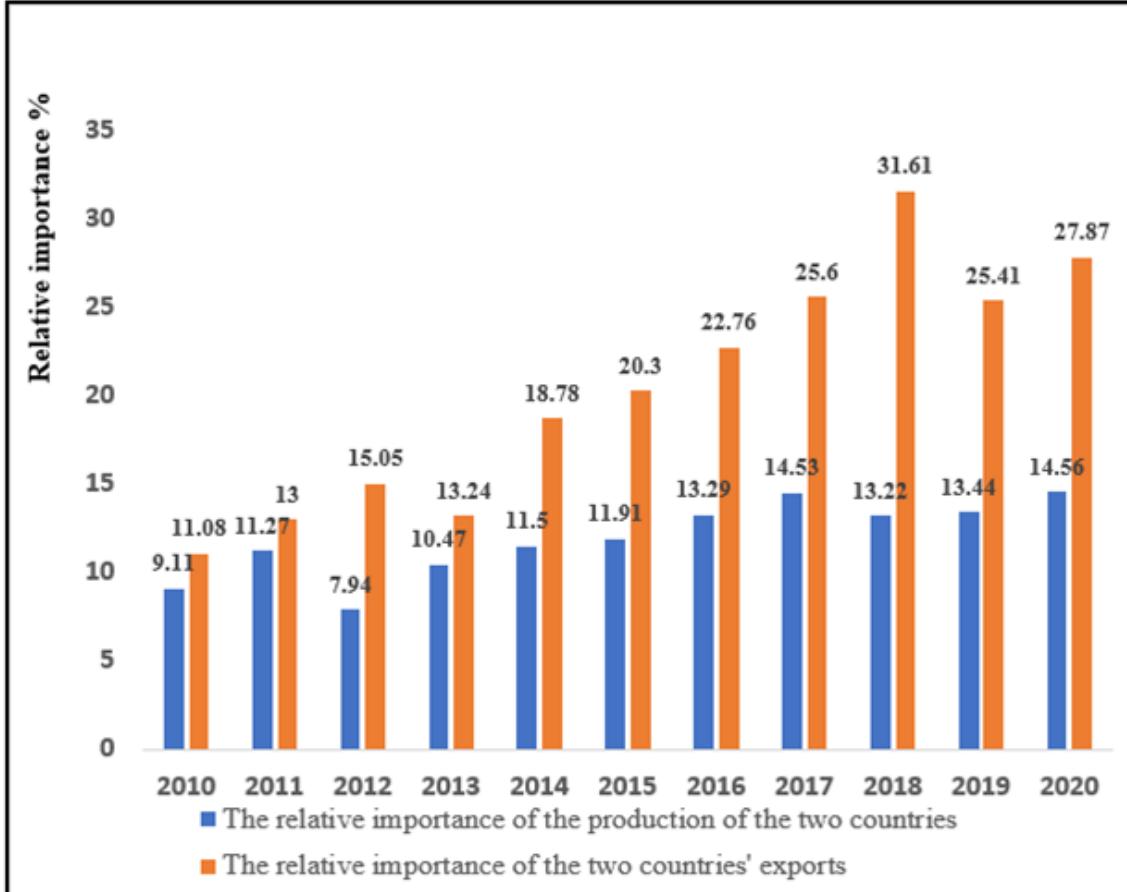


Figure 1: The relative importance of wheat production and exports to Russia and Ukraine during the period 2010-2020.

Source: The data in my tables (1, 2).

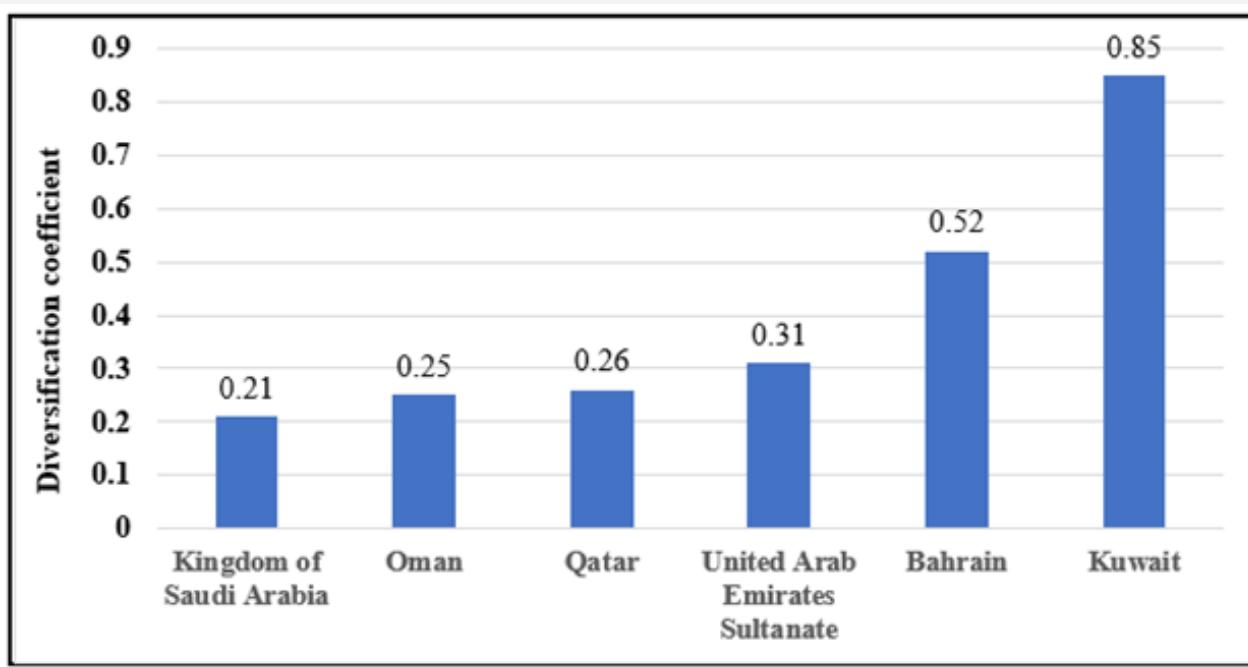


Figure 2: Diversification coefficient of wheat import sources for the Cooperation Council for the Arab States of the Gulf during the period 2010-2020.

Source: The data in Table (4).

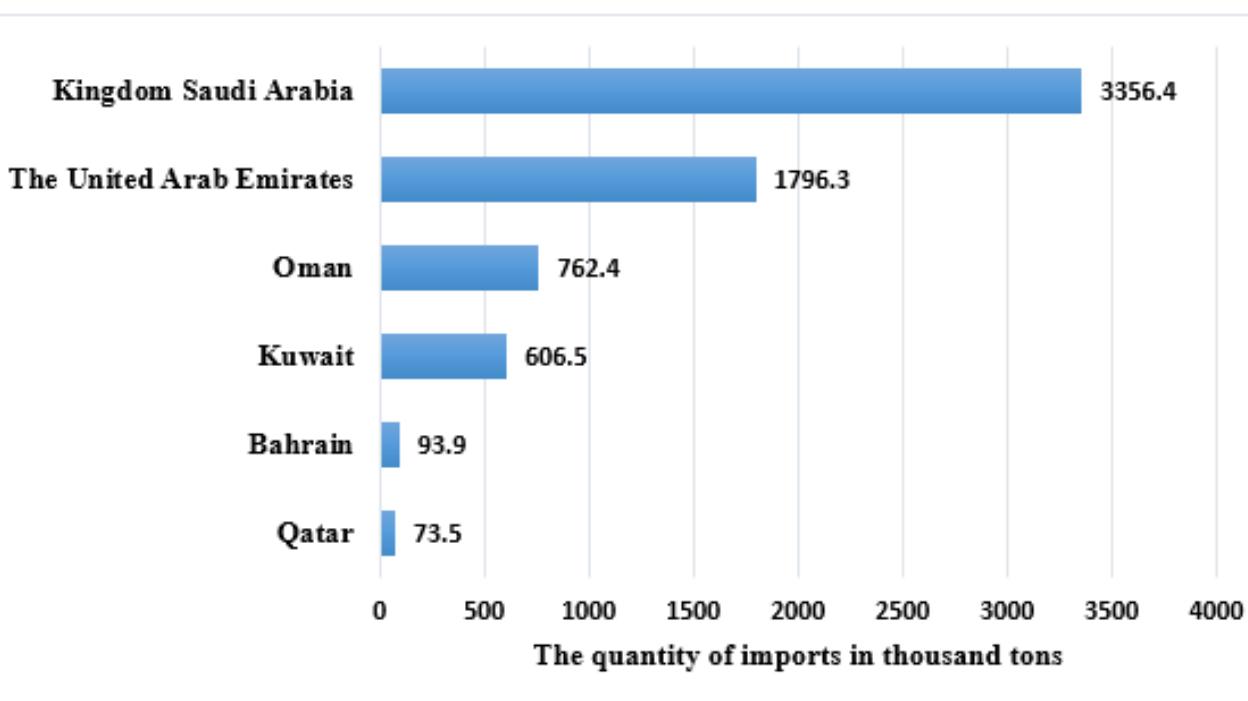


Figure 3: The average quantity of wheat imports for the Cooperation Council for the Arab States of the Gulf during the period 2022-2025.

Source: The data in Table (11).

Through contracts to purchase wheat from international markets, it was found that the Kingdom of Saudi Arabia imported a quantity of wheat amounting to 2959 thousand tons, with a value of \$884.95 million, with an average price estimated at about \$299.07 / ton in 2021. The Kingdom also imported a quantity of wheat that amounted to 2582 thousand tons, with a value of 994.35 million dollars, with an average price estimated at 385.11 dollars / ton in 2022. From the above it is clear that the average import price of wheat in 2022 is higher than its counterpart in 2021, at a rate of 28.8% [9].

The value of wheat imports was estimated for 2022 based on the average import price of wheat into the Kingdom of Saudi Arabia and the variations in wheat prices between it and the other countries of the Gulf Cooperation Council. The average import price of wheat for the Gulf Cooperation Council (GCC), starting in 2023, is not less than the average closing price on global stock exchanges of \$1063.2/ton due to the difficulty of speculating about the end of the Russian-Ukrainian war and the extent of the outbreak of other international wars. It is expected that the value of wheat imports for the Gulf Cooperation Council will increase from 6.96 billion dollars in 2023 to 7.55 billion dollars in 2025, with an annual average estimated at 6.08 billion dollars during the period 2022-2025 (Table 12).

Discussion

The global economic system has been subjected to successive economic crises, as after the Coronavirus crisis, the Russian-Ukrainian war broke out, causing several negative effects, the most important of which are the rise in energy prices (oil and natural gas) and the costs of producing strategic food and non-food commodities, which led to an increase in food prices and an increase in the import bill and the amount of the balance of payments deficit. The countries that have trade relations with Russia and Ukraine, especially the net food-importing countries,

including the Gulf Cooperation Council countries, were also affected because many countries that monopolize the production of food commodities have imposed restrictions on exports, which led to a rise in prices and the import bill and the search for other markets to import food goods.

Through the geographical distribution of wheat import sources for the Gulf Cooperation Council countries, it was found that the Russian Federation is the main source of wheat import for Qatar, the United Arab Emirates, and the Sultanate of Oman, and therefore the Russian-Ukrainian war may affect the availability of wheat in those countries, in addition to All countries were affected by the rise in import prices for wheat. As for Saudi Arabia, it may not be affected significantly by wheat supplies, due to its diversification of import sources, followed by the Sultanate of Oman, Qatar, and the United Arab Emirates. As for the states of Kuwait and the Kingdom of Bahrain, their wheat import policy was characterized by geographical concentration.

In light of the difficulty of speculations about the end of the Russian-Ukrainian war and the extent of the outbreak of other international wars, the average import price of wheat for the Gulf Cooperation Council countries, starting in 2023, is not less than the average closing price on global stock exchanges of 1063.2\$/ton. The value of wheat imports for the Gulf Cooperation Council countries would be expected to increase from 6.96 billion dollars in 2023 to 7.55 billion dollars in 2025, with an annual average estimated at 6.08 billion dollars from 2022-to 2025. In the event of the continuation of the Russian-Ukrainian war, which may lead to the outbreak of a third world war, the issue of food security becomes one of the most important problems that the net food-importing countries suffer from it. The most important of which is the Gulf Cooperation Council countries which suffer from a scarcity of water resources, which is an obstacle to expansion in local production and increase its contribution to meet local consumer needs.

Table 9: Equations of the general trend of the evolution of wheat import prices and the GDP of the Gulf Cooperation Council countries during the period 1990-2020.

Country	Variable	growth rate %	F	R ²	Equation
Bahrain	Import Price	3.4	25.9	0.47	$\hat{Ln Y} = 4.905 + 0.034T$ (40.18) ^{**} (5.09) ^{**}
	Gross Domestic Production	8.4	648.23	0.96	$\hat{Ln Y} = 1.299 + 0.084T$ (21.38) ^{**} (25.46) ^{**}

Kuwait	Gross Domestic Production	8.2	160.91	0.85	$\hat{Ln Y} = 2.794 + 0.082T$ (23.39) ^{**} (12.69) ^{**}
Oman	Import Price	2.3	14.79	0.34	$\hat{Ln Y} = 5.059 + 0.023T$ (44.75) ^{**} (3.85) ^{**}
	Gross Domestic Production	8.4	373.22	0.93	$\hat{Ln Y} = 2.149 + 0.084T$ (26.91) ^{**} (19.32) ^{**}
Qatar	Gross Domestic Production	13.8	347.96	0.92	$\hat{Ln Y} = 1.483 + 0.138T$ (10.88) ^{**} (18.65) ^{**}
The United Arab Emirates	Import Price	2.5	19.07	0.4	$\hat{Ln Y} = 4.935 + 0.025T$ (45.94) ^{**} (4.37) ^{**}
	Gross Domestic Production	8.3	494.45	0.94	$\hat{Ln Y} = 3.759 + 0.083T$ _s
Kingdom Saudi Arabia	Gross Domestic Production	3.3	11.28	0.51	$\hat{Ln Y} = 6.250 + 0.033T$ (78.52) ^{**} (3.36) ^{**}

**Significant at the 1% probability level, *Significant at the 5% probability level.

Source: Calculated from data provided on the website of the Food and Agriculture Organization (FAO) and the World Bank.

Table 10: Efficiency criteria of the general trend equations for the evolution of wheat import prices and the GDP of the Gulf Cooperation Council countries during the period 1990-2020.

Country	Variable	Root Mean Squared Error	Mean Absolute Error	Mean Abs. Percent Error	Theil Inequality Coef.
Bahrain	Import Price	0.321	0.262	4.769	0.029
	Gross Domestic Production	0.159	0.13	4.832	0.029
Kuwait	Gross Domestic Production	0.314	0.258	6.031	0.037
Oman	Import Price	0.297	0.214	3.841	0.027
	Gross Domestic Production	0.209	0.169	4.808	0.029
Qatar	Gross Domestic Production	0.358	0.311	8.712	0.045
The United Arab Emirates	Import Price	0.282	0.213	4.15	0.026
	Gross Domestic Production	0.181	0.146	2.747	0.017
Kingdom Saudi Arabia	Gross Domestic Production	0.124	0.104	1.621	0.009

Source: It was calculated from the equations in (Table 9).

Table 11: Forecasting the quantity of wheat imports for the Gulf Cooperation Council countries in thousand tons during the period 2022-2025.

Year	Bahrain	Kuwait	Oman	Qatar	The United Arab Emirates	Kingdom Saudi Arabia	Total
2022	88.2	561.6	713	66.7	1611.8	3247.7	6289
2023	91.9	590.5	745	71	1729	3319.1	6546.5
2024	95.7	620.9	778.4	75.7	1854.8	3392	6817.5
2025	99.6	652.9	813.3	80.7	1989.6	3466.6	7102.7
Average	93.9	606.5	762.4	73.5	1796.3	3356.4	6688.9
%	1.4	9.07	11.4	1.1	26.85	50.18	100

Source: It was calculated from the equations in my (Tables 7, 9).

Table 12: Forecasting the value of wheat imports for the Gulf Cooperation Council countries in million dollars during the period 2022-2025.

Year	Bahrain	Kuwait	Oman	Qatar	The United Arab Emirates	Kingdom Saudi Arabia	Total
2022	44.19	248.96	303.67	30.18	678.41	1250.72	2556.12
2023	97.71	627.82	792.08	75.49	1838.27	3528.87	6960.24
2024	101.75	660.14	827.59	80.48	1972.02	3606.37	7248.37
2025	105.89	694.16	864.7	85.8	2115.34	3685.69	7551.59
Average	87.39	557.77	697.01	67.99	1651.01	3017.91	6079.08
%	1.44	9.18	11.47	1.12	27.16	49.64	100

Source: The data in (Table 11) and the average closing price of the global stock exchanges.

Conclusion

The Russian Federation and Ukraine are among the most important wheat-producing and exporting countries in the world. Their production represents 14.56% of the total global wheat production of 760.93 million tons in 2020. The total wheat exports to Russia and Ukraine represent 27.87% of the total global wheat exports of 198.53 million tons in 2020. Given the significance of the Russian Federation and Ukraine in the production and export of wheat, the start of a war between them on February 24, 2022, has adverse effects that are reflected in the increase in import prices and the value of imports as well as the restriction of food supply chains, especially for net wheat importing countries like the Gulf Cooperation Council countries. Due to its implementation of a policy of economic diversification in the sources of importing wheat, the Kingdom of Saudi Arabia is considered as being the least affected by the problem of wheat supply in the Gulf states, followed by the Sultanate of Oman, Qatar, and the United Arab Emirates. As for the states of Kuwait and the Kingdom of Bahrain, their wheat import policy was characterized by geographical concentration.

In light of the elasticity of price and income demand and the annual growth rate of both import prices and GDP, the amount of wheat imports for the Gulf Cooperation Council countries is expected to increase from 6.29 million tons, with a value of 2.55

billion dollars in 2022, to 7.1 million tons, with a value of 7.55 billion dollars in 2025. The Arab Gulf states are known to be oil-producing countries that have benefited financially from the high price of oil, allowing them to purchase wheat despite the high cost of imports. In order to mitigate the negative effects of the Russian-Ukrainian war, it is necessary for the Arab Gulf states to raise the level of food security by increasing the volume of stocks of strategic goods to ensure the flow of goods to markets and the stability of their prices, in addition to expanding local production and increasing its contribution to meeting local consumer needs.

Acknowledgment

The authors extend their sincere appreciation to the Deanship of Scientific Research at King Saud University for supporting the work.

References

1. Food and Agriculture Organization (FAOSTAT), 2010-2020.
2. Ghanem AMK, Khalid NA, Sharafeldin BA, Nageeb MA, Al-Nashwan IO, et al. (2023) Effects of the Russian-Ukrainian war on the value of imports and the food trade balance for the Kingdom of Saudi Arabia, Arab Gulf Journal of Scientific Research.
3. Ghanem AMK, Saad Al-Nashwan O; Sahar AMK, Azali Ahamada S (2023) The impact Russian-Ukrainian war on consumer prices of food products in Saudi Arabia, International Journal of Food, Nutrition and Public Health (IJFNPH) 13(1-2): 67- 79.

4. Ghanem AM, Khalid NA, Othman SA, Al-Duwais AAM, Sharaf al-Din BA (2024) The impact of the Russian-Ukrainian war on the food security of the Kingdom of Saudi Arabia, *Journal of experimental biology and agricultural Sciences* 12(4): 606- 615.
5. Food and Agriculture Organization (2022) FAO Food Price Index, 6 May.
6. Hirschman A (1964) The Paternity of an Index, *American Economic Review* 54(4-6), pp. 761-762.
7. Lapteacru I (2012) Assessing Lending Market Concentration in Bulgaria: The Application of a new measure of Concentration. *The Journal of Comparative Economics* 9(1): 79-102.
8. William HG (2003) *Econometric Analysis*, Fifth edition, New York University, USA.
9. Almellah, Jalal Abdel-Fattah (2001) *The Economic Entrance to the Study of the Market, Analytical Tools for the Study of Supply, Demand and Prices*, Center for Translation, Authoring and Publishing, King Faisal University.
10. General Grain Corporation (2022) Wheat import platform.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/ARTOAJ.2024.28.556430](https://doi.org/10.19080/ARTOAJ.2024.28.556430)

**Your next submission with Juniper Publishers
will reach you the below assets**

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>