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Covid-19 and Food Security: Impact on Wheat

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ABSTRACT

The new coronavirus, emerged in Wuhan, China in December 2019, turned into a major global pandemic and has caused many deaths around the world. Covid-19 pandemic has adversely affected every aspect from economy, education to health system. During Covid-19 pandemic, access to foodstuffs has become even more important, and some countries have imposed restrictions on exports of basic food items for fear of food shortages. These restrictions and quotas are feared to disrupt the flows of trade for staple foods such as wheat, corn and rice, which has deepened the concerns for food security. This study was conducted to examine the effects of the Covid-19 pandemic on wheat price, production and trade and to review the policies of wheat exporter countries. According to the results of the study, Covid-19 did not cause fear in wheat markets, and no shortages of wheat are expected in the short term. Although countries have reduced the measures they have taken as of May, uncertainties regarding food safety still persist for the coming years. World economies have shrunk significantly as a result of the drastic measures they have taken against covid-19, which could worsen the situation for low income households.

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Introduction

Coronavirus pandemic is transforming economies, education, health system and transportation around the world. And there is a growing concern for food safety not only in underdeveloped but also in developed countries, as well. The provision of safe and affordable food is more important than ever in recent history. This is partly due to the still unknown effects of coronavirus, how long it will last and how it will affect the production, delivery and price of foods. Despite the recent good news on vaccine development, there is still not a definite treatment procedure for coronavirus, and even when the vaccine is ready for use, it will take a little while longer before its widespread public application and to see its results.

In human nutrition, three products e.g. wheat, corn and rice have utmost importance with regard to food safety and sustainable alimentation of large populations. Among these three, wheat has always been the most critical commodity as it is also the main ingredient of bread, which is the fundamental food around the world. With an ever-increasing global population, the world consumes more and more bread each year. Due to its importance, wheat prices and availability are closely monitored and regulated by all governments. Throughout the history, its high price and unavailability have sparked public unrest and even revolutions. Even the recent revolts and revolutions in North African Arab countries like Tunisia and Egypt were directly caused by the lack of bread.

Although Covid-19 has been declared pandemic on March 11, a number of studies have already been made on account of the importance of the matter. Rizou et al. (2020) concluded that the transmission of COVID-19 through foods and food supply chain is negligible. A similar finding has been reported by Pressman et al. (2020) and the summary report of Extraordinary Scientific Roundtable of IUFoST-CIFST (Shahidi, 2020). Béné (2020) researched the possible impact of COVID-19 on the local food system resilience of low- and middle-income countries. He ascertained that the main impact of the pandemic could derive from the lockdown and mobility restrictions, and subsequent loss of income and purchasing power. Shahidi (2020) criticized trade restrictions imposed by some countries for fear of food shortages as worst possible response to safeguard food security and this kind of measures could trigger food price spikes and speculations in global food markets. Laborde et al. (2020) claimed that agricultural and food markets have started facing disruptions due to labor shortages and shifts in food demand, and this process is affecting availability, access, utilization and stability in food markets. UN World Food Program (WPF) published 2020 Global Report on Food

Crises in late April. Accordingly, it is estimated that around 135 million people face acute levels of hunger in 55 countries, mostly from central South America, Africa, Middle East and Asia. Another 185 million people experience stressed food security and are at risk of facing acute hunger. The ten countries with the worst food crises are reported, respectively, as Yemen, the Democratic Republic of the Congo, Afghanistan, Venezuela, Ethiopia, South Sudan, the Syrian Arab Republic, Sudan, Nigeria (northern regions), and Haiti. In the post publication analysis, WPF expressed its concern that the situation could worsen as the global and national economies weaken due to COVID-19 pandemic.

This paper aims to investigate the impacts of Covid-19 pandemic on the price, production and trade of wheat, which is the main dietary ingredient of a large population.

Methodology

All the data about coronavirus statistics were taken from Word Health Organization (WHO) and John Hopkins Coronavirus Research center. In order to assess the policy reactions of governments, two indices produced by Oxford Covid-19 Government Response Tracker (OxCGRT) were used, which are Government Response Index (GRI) and Stringency Legacy Index (SLI) (Hale et al. 2021). US Wheat Futures Prices were obtained from investing.com. The historical data of wheat production, harvest area, trade quantity, detailed trade matrix and cereal import dependency index were gathered from the statistics database of Food and Agriculture Organization of the United Nations (FAO).

In the initial part of the study, the volatility and percent changes of US Wheat Futures prices were calculated, and a correlation analysis was performed to reveal the relations between Covid-19, GRI, SLI and US Wheat Futures. The policies of the countries were reviewed. Python Pandas Data Analysis Toolkit was used for analysis and visualization purposes.

Findings

The coronavirus challenges the whole world with unprecedented threats to life; therefore, countries have started adopting a variety of measures depending on their healthcare and education systems along with social, political and monetary conditions. Oxford Coronavirus Research Center monitors the responses of governments against the pandemic and produces daily indices for this purpose. This paper utilizes GRI and SLI of OxCGRT to investigate the relations with US Wheat Futures Price, diagnosis of new and total cases as well as daily and total deaths for the globe and US. The reason why US Wheat Futures is chosen for the analysis is that US has fully functional free markets where the flow of information is accepted unrestricted. It is also an important producer, exporter and importer of wheat. As is known, US is the biggest economy and the events in US economy directly reflect upon the economies of other countries, and the majority of the world closely follows how the US markets respond to events before taking their positions.

Figure 1 shows the Correlation Matrix of the analysis performed using US Wheat Futures, global and US coronavirus statistics, GRI and SLI indices of OxCGRT. The most significant result in this figure is that the volatility in US Wheat Futures prices is not correlated nor affected by any other parameters included in the analysis. So, futures market expects that coronavirus will not have direct impact on wheat prices. There is a noteworthy positive correlation in the Figure 1 between GRI, SLI and daily deaths in US, which indicates that US government adopts more stringent measures only when the number of daily deaths increases.

The results of the correlation matrix are logical in that wheat plantation is mostly made between September and December in northern hemisphere and it is harvested between May and August. So, the planting of wheat was completed before the onset of coronavirus, which started in January in China and announced as pandemic on March 11 by WHO. There has been no problem in wheat harvest either, as it fell in a period when most countries relieved the strict measures they took during March and April, which enabled the mobility of seasonal workers in agriculture.

The World Bank and UN have reported that global agricultural markets have remained stable as they are more resilient compared to overall trade, and the production of three important staples (wheat, maize, rice) is near their all-time highs. Indeed, the production quantity of wheat increased from around 640 million tones to over 730 million tones between 2010 and 2018, while the harvest area slightly decreased from 215 million ha to around 214 million ha (FAO, 2020; WB, 2020). However, some important changes occurred in harvest area, yield and production of wheat during this period. Table 1 summarizes the statistics of top 10 countries with highest production, export and import quantity of wheat in 2018 as well as with the highest increase in production quantity from 2010 to 2018. Accordingly, the most populous countries, China and India are the biggest producers of wheat. The developing countries with unfavorable climate, e.g. Indonesia, Egypt, Algeria are top importer countries. Russia, Ukraine and Kazakhstan have steadily increased their production and become major player in global wheat market as they took advantage of their unused land resources and yield gaps (Schierhorn et al., 2014).

The trade statistics of FAO in Table 1 show that top 5 exporter countries account for more than 65% of global wheat export, and top 5 importer countries account for around 23% of global wheat import. This indicates that wheat import is more dispersed among countries, while wheat export is centered around some top countries, which further boosts the risk of food security. With the uncertainty and increasing fear of food shortages, Romania, the second biggest wheat exporter in EU, became the first country to ban grain exports on April 10 and lifted the restriction 1 week later on April 16, which displays the fear and uncertainty at that time. Furthermore, Russia, Ukraine and Kazakhstan imposed restriction and quotas on the export of grains and lifted bans as of July, as the harvest of wheat has been higher than early expectations.

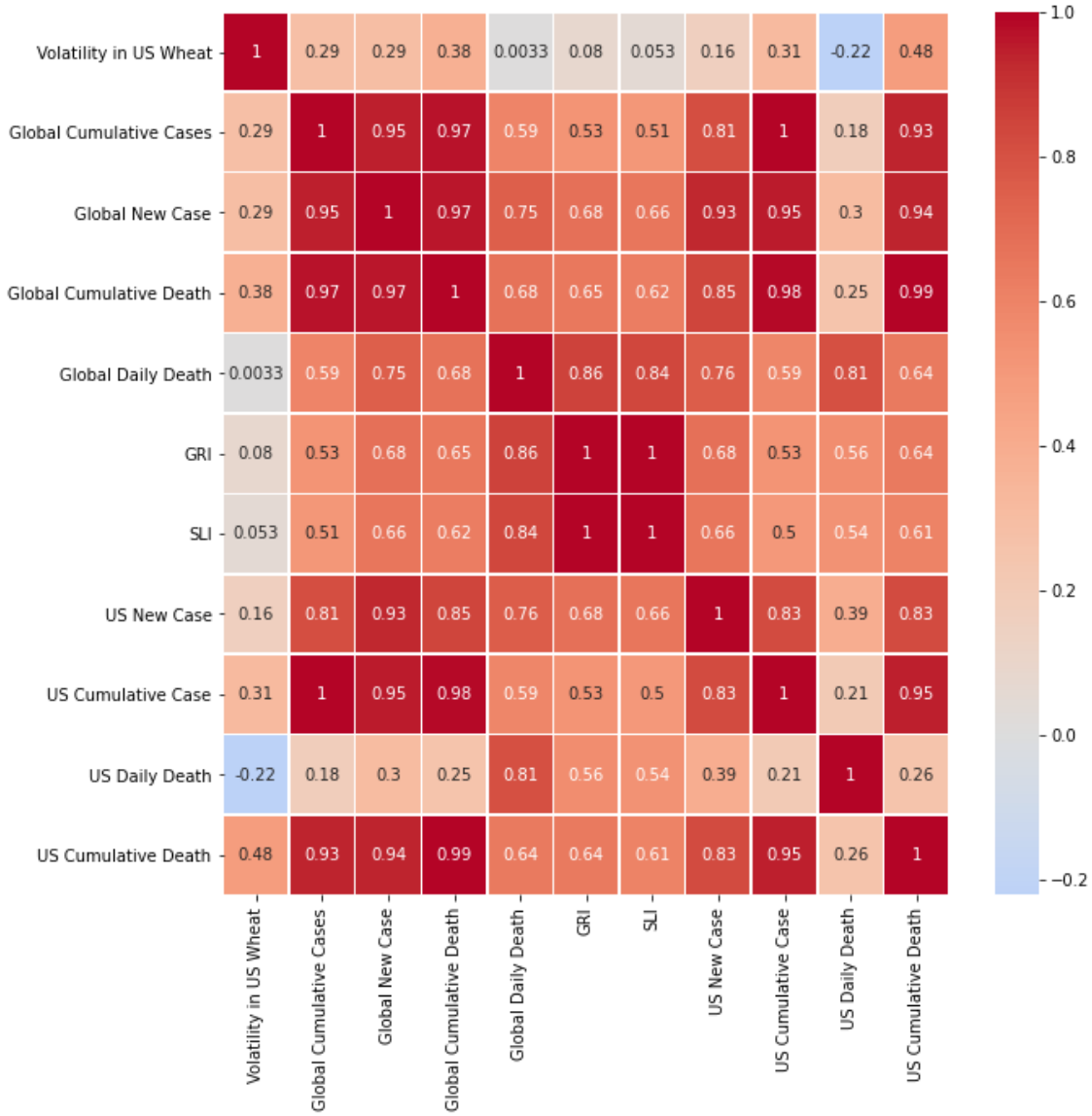


Figure 1. Correlation Matrix

Table 1. Top 10 countries in wheat production, export and import (1000 tones)

Producers	Production	Exporters	Export	Importers	Import	Highest Increase	Quantity
China	131.440	Russia	43.965	Indonesia	10.096	Russia	30.628
India	99.700	Canada	22.874	Egypt	9.330	India	18.896
Russia	72.136	US	22.499	Algeria	8.422	China	16.259
US	51.286	France	18.940	Italy	7.453	Argentina	9.501
France	35.798	Ukraine	16.373	Brazil	6.817	Canada	8.469
Canada	31.769	Australia	12.352	Philippines	6.690	Ukraine	7.801
Pakistan	25.076	Argentina	11.724	Spain	6.028	Romania	4.331
Ukraine	24.652	Kazakhstan	6.198	Turkey	5.781	Kazakhstan	4.305
Australia	20.941	Romania	5.880	Japan	5.652	Morocco	2.444
Germany	20.263	Germany	5.228	Netherlands	5.566	Iran	2.357

Source: FAO, 2020

Table 2 gives the major buyers of wheat from top 5 exporter countries, most of which are either underdeveloped or developing countries with limited economic resources, which poses the key challenge in food safety.

Figure 2 below depicts the food price inflation of some of the importer countries given above. And accordingly, inflation is slightly above 10% except for Sudan (30%) and Algeria (-1%), and the trend is relatively straight for the first 5 months of 2020 (FAO, 2020). This indicates that covid-19 or imposed bans on grains have not triggered the inflation in these countries due to stockpiles of grains hoarded last season.

Table 3 gives the cereal import dependency ratio for the selected wheat importer countries. This ratio is calculated as 3-year average and presented by the statistics division of FAO. What it tells us is how much of the available domestic food supply of cereals has been imported and

how much comes from the country's own production. Its positive values indicate that the country is a net importer of cereals. And the maximum possible value is 999. The greater the indicator, the higher the dependence. In this regard, especially Yemen, Algeria, Morocco, Tunisia, Egypt and Sudan are highly dependent on cereal import and any disrupt in the food supply chain would have direct adverse effect over their large populations.

Many resources and news portals cite the Covid-19 as the culprit behind the export bans because the countries fear of food shortages due to possible disruption in food supply chain. However, the real reason seems to be climate change at least for some countries. Europe has experienced the warmest winter in 2019-2020, followed by a dry and warmer spring (WMO, 2020). World Meteorological Organization (WMO) also reported record high temperatures in the North of Artic Circle, which was confirmed by Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) (WMO, 2020).

Table 2. Detailed trade matrix for top 5 wheat exporter countries

1st Russia	2nd Canada	3rd USA	4th France	5th Ukraine
Egypt	US	Japan	Algeria	Indonesia
Turkey	Indonesia	Mexico	Belgium	Philippines
Vietnam	China	Philippines	Netherlands	Egypt
Sudan	Japan	Korea	Italy	Morocco
Nigeria	Peru	China	Spain	Tunisia
Bangladesh	Colombia	Nigeria	Morocco	Korea
Indonesia	Mexico	Iraq	Portugal	Bangladesh
Yemen	Morocco	Indonesia	S.Arabia	Spain
Latvia	Nigeria	Thailand	Germany	Libya
Philippines	Algeria	Guatemala	Cote d'Ivoire	Thailand

Source:FAO, 2020

Table 3. Cereal import dependency (%) (3-year average)

	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017
Algeria	722	708	727	755	761
Bangladesh	103	81	9	83	106
Egypt	421	416	433	448	446
Indonesia	154	134	124	115	107
Nigeria	192	20	206	183	161
Philippines	178	173	169	186	204
Sudan	183	186	341	338	377
Turkey	4	52	53	29	1
Vietnam	-126	-103	-57	7	61
Tunisia	421	465	38	599	542
Morocco	597	587	637	661	711
Yemen	953	949	920	948	956

Source: FAO, 2020.

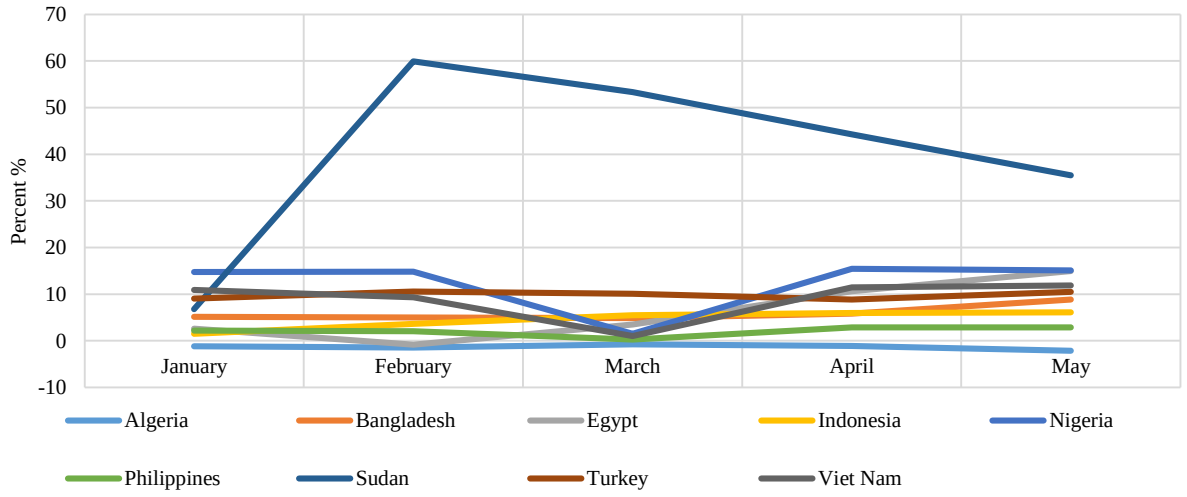


Figure 2. Food Price Inflation

For the last part of this section, a special attention should be given to oil prices and currency values. As the governments have strengthened measures against coronavirus, oil prices have collapsed to their lowest level in the recent two decades (Investing, 2020). This has been mainly due to diminishing demand because many countries closed their borders and canceled flights and other public transportations. Even after the governments have relieved the measures as of June, people still abstain from using public transportation. At this moment, no recovery in oil demand is expected for the next few years. This is actually beneficial to agricultural producers as the oil accounts for the major cost of input and transport of products along with pesticides and fertilizers. Therefore, the lower oil price could reduce the production cost of wheat.

Summary and Conclusions

The analysis results indicate that COVID-19 has not caused fear in US Wheat Futures market, and the statistics show no shortage of wheat at least for this season. Countries relieved the strict measures as of May and seasonal workers in agriculture took their part in the harvest, though there have been major concerns about their health safety and its possible implications. However, there is still uncertainty and fear among countries for the future. Therefore, some wheat importer countries like Egypt and Turkey rush to hoard their wheat supplies. Especially, the quotas and export bans imposed by Russia, Ukraine, Kazakhstan and Romania have fueled this fear. The wheat importer countries from Russia and Ukraine might have to pay higher prices to import from other export markets like US and Canada because of higher transportation cost, rising demand and prices in exporter countries as well as rising value of dollar against their national currencies.

Food security is an intricate problem and involves dynamic processes. The large populations dependence on wheat is the major issue, and it is not an easy task neither to transform eating habits of millions nor to secure wheat as a reliable and sustainable food source as its production is vulnerable to weather events. Another major problem is that global wheat export is concentrated within a limited number of countries. And, any unfavorable condition in these countries directly cause the fluctuation in the price and adequacy of wheat, which then affect the large number of importer countries. The history is full of this story, but the most recent one is the global food crisis that started in 2007/2008 season due to severe droughts in Russia and Ukraine. The inadequacy and increasing price of wheat and bread sparked the revolutions in Middle East, called Arab Spring, and created political unrest that still persists. Climate change is still the worst enemy that cannot be healed with a single vaccination program. Its adverse effects in Siberian and arctic regions are alarming. The recent heatwaves, arctic fires and rapidly decreasing sea ice coverage indicate that climate change has much worse effects than expected. It has become much more probable than ever that unfavorable weather conditions could substantially disrupt wheat production in the region.

World economies suffered greatly in the second quarter of 2020 because of the shutdown and curfews. The OECD countries shrank by 10% on average, which has not been witnessed for decades. The economic burden is much higher on more vulnerable section of the communities. The loss of employment and decreasing income will further deteriorate the food crisis around the world and put more people at risk of attaining adequate nutrition. The worsening condition of the developed countries pose another danger to people facing acute hunger around the world, as it will become harder and harder to obtain humanitarian aids from reduced national budgets. However, it is still early to calculate the exact cost of COVID-19. And further studies should be carried out with incoming data, also the situation in low-income groups of communities should be monitored closely. Similar studies can be performed for rice, maize and alternative products, as well.

Conflict of Interest

The authors declared that they have no conflict of interest.

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