

Double shocks: Russia-Ukraine conflict and COVID-19 impacts on the rice value chain, trade and fertilizer use in Africa



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Introduction

- In 2020, the world saw the emergence of one of the most damaging pandemics in recent times which has been associated with food and nutrition insecurity. When things were somewhat improving two years later, the Russia-Ukraine conflict showed its face in February 2022 with further implications on food and nutrition security. These double shocks pose serious constraints on various staple value chains including rice which is heavily consumed in many parts of Africa.
- We examine how the rice value chain was fairing under the COVID-19 pandemic and the Russia-Ukraine conflict. We look at various aspects such as prices, production, yields, consumption, and trade.
- Previous studies have examined the impact of the COVID-19 and Russia-Ukraine conflict on food and nutrition security (Arndt et al., 2023; Tabe-Ojong et al., 2023; Mottaleb et al., 2022), but there is limited research on the impact of both crisis and fertilizer use, particularly on the rice value chain.
- Research question:** What are impacts of the COVID-19 pandemic and the Russia-Ukraine conflict on the rice value chain and fertilizer use in Africa?

Methodology

- Study area:** Africa (Fig 1.)
- We rely on different datasets from the World Bank, FAO, and USDA examining three different periods:
- Pre-COVID (2018–2020),
 - During COVID (2020–2022),
 - and post-COVID which reflects the Russia-Ukraine conflict (2022–2024).

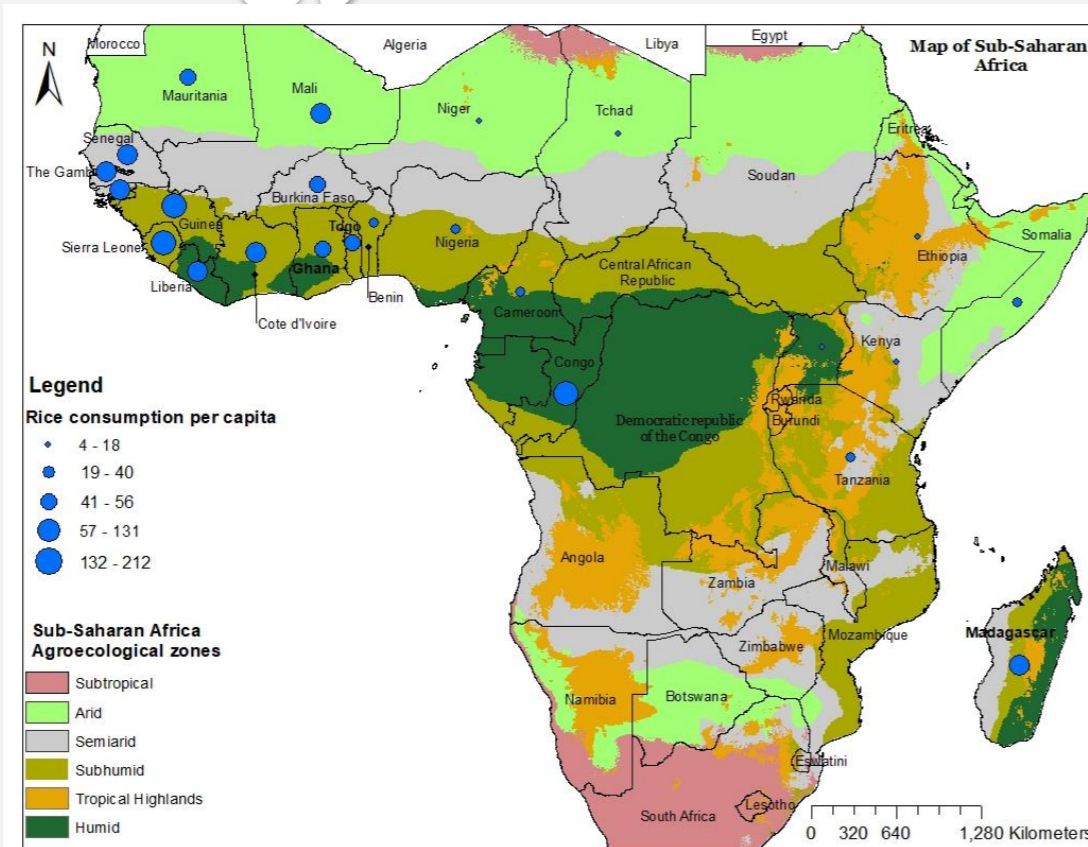


Fig 1. Study area and rice consumption

- Data analysis:** Two econometrics models

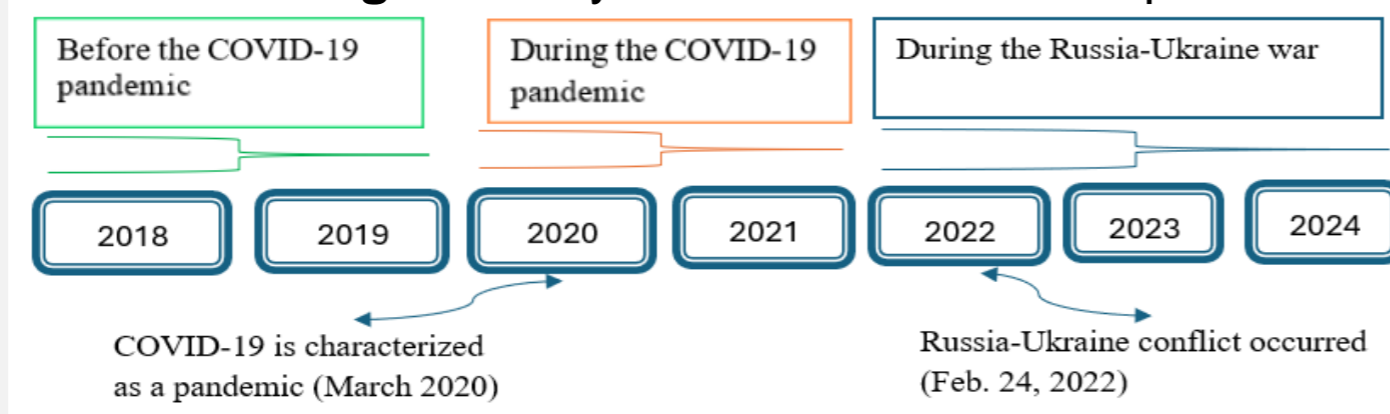


Fig 2. Timeline of the COVID-19 pandemic and the Russia-Ukraine war

- Fixed effects regression model**

$$Y_{ct} = \alpha + \beta S_{ct} + \theta + u_c + v_{ct}$$

Where Y_{ct} refers to the outcomes of interest such as fertilizer and cereal prices.

- Conditional (recursive) mixed-process estimator** with multilevel random effects to assess the determinants of rice consumption.

Results

We document some interesting findings:

- Both COVID-19 and the Russian-Ukraine war are negatively associated with rice production and yields. The COVID-19 pandemic has had a profound impact on the rice production systems in Sub-Saharan Africa (SSA).
- Two years after the COVID-19 pandemic, the rice production system in SSA has been impacted negatively by the pandemic, which was exacerbated by the ongoing Russia-Ukraine armed conflict (Fig 3, 4 and Table 1, 2). Both shocks are positively correlated with an increase in fertilizer prices (urea and DAP) and an increase in cereal prices and global food prices (Fig 4).
- Results from the use of the **conditional (recursive) mixed-process estimator** show that the rise of the domestic prices of rice in Africa influence negatively rice consumption in SSA (Table 2).

Results

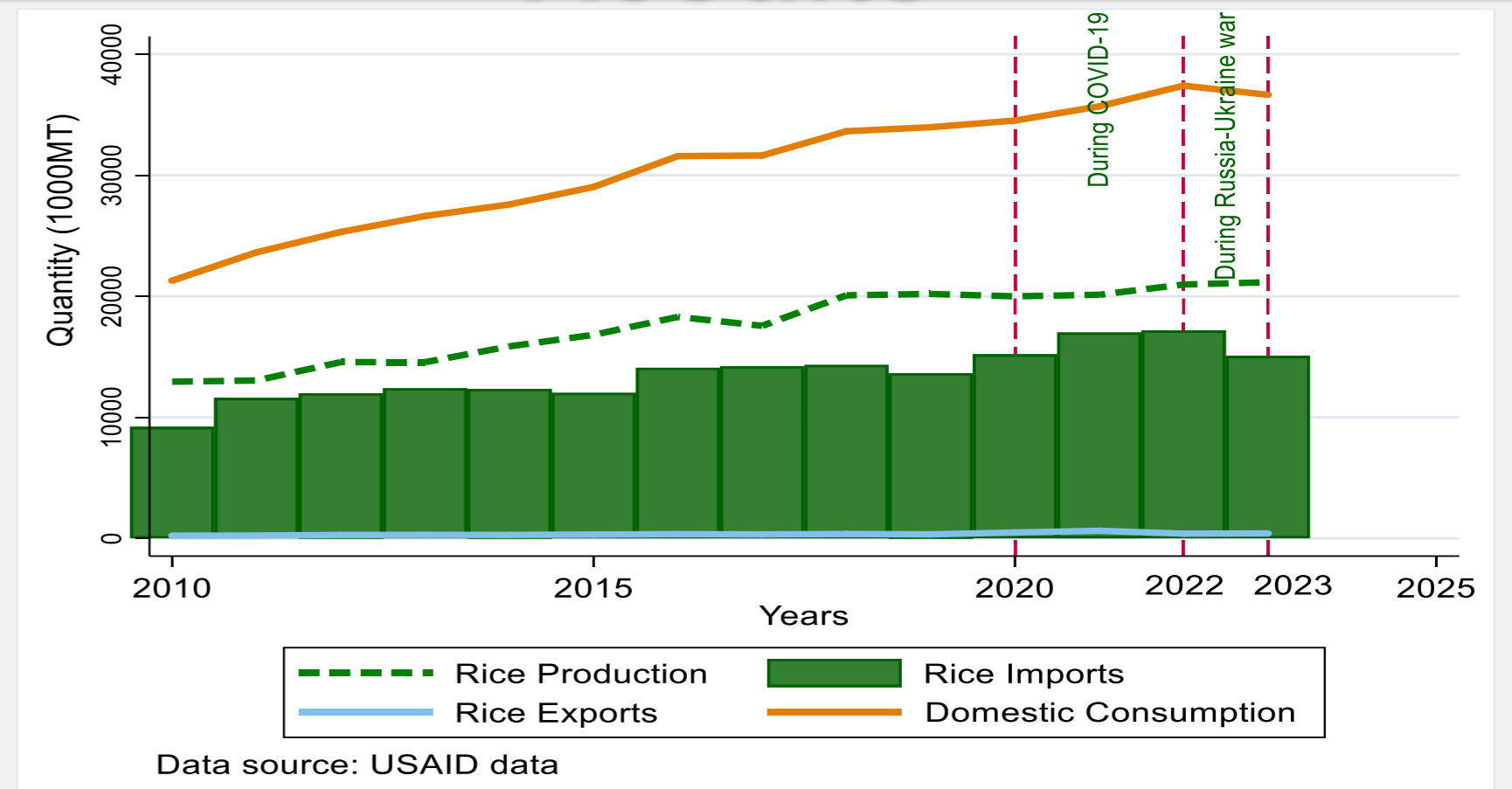


Fig 3. Rice production, exports, imports, and domestic consumption in Sub-Saharan Africa

- The Russian-Ukraine war seems to have a more pronounced association with all these outcomes than the COVID-19 pandemic

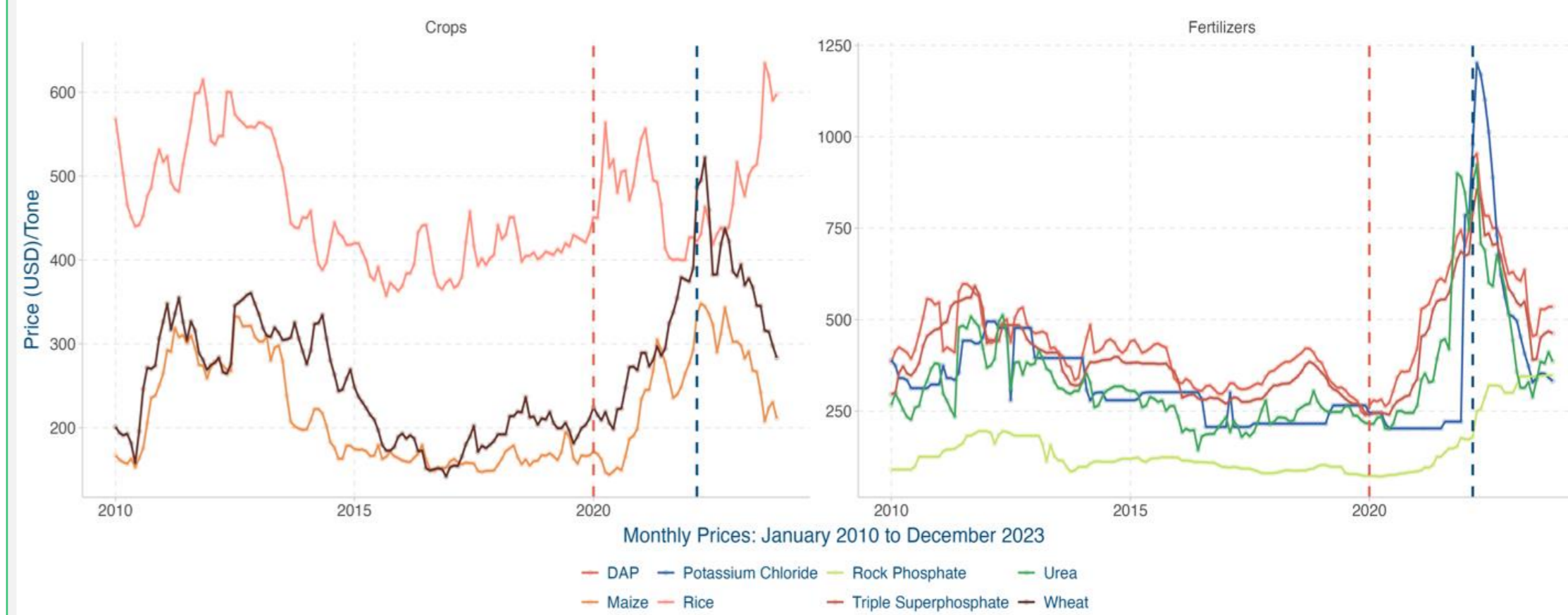


Fig 4. Monthly price trends of crops and fertilizers from 2010 to 2024

- The empirical results show that during the COVID-19 pandemic, the price of urea and DAP have increased significantly by \$US 232 and \$US 240, respectively.
- We found evidence that during crises, rice, wheat, and maize prices have increased by \$US 39, \$US 108, and \$US 92, respectively (Table 1).

	Rice price	Wheat price	Maize price
COVID-19	39.08*** (2.03)	107.82*** (4.33)	91.82*** (5.01)
Russia-Ukraine war	76.52*** (8.41)	179.43*** (6.85)	117.73*** (4.66)
Constant	400.85*** (131.70)	197.61 (286.50)	209.43 (321.58)
Additional controls	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Number of countries	24	24	24
Number of observations	96	96	96

Table 1. COVID-19 and rice, maize, and wheat prices using the fixed-effect regression model

Variables	In (Rice consumption (kg/capita/ yearly))
Domestic price of rice (US\$/ton)	-0.15*** (0.05)
Rice importation (ton)	0.00*** (0.00)
Wheat importation (ton)	-0.00** (0.00)
In (Rice Production)	0.28*** (0.02)
In (Maize Production)	0.01 (0.02)
In (Millet Production)	-0.08*** (0.02)
Constant	20.60*** (4.55)
No. of observations	144.00
Wald chi2(51)	5999.53
Prob > chi2	0.00
Log pseudolikelihood	-690.43

Table 2. Determinants of rice consumption during crises

Conclusion and policy implications

- The COVID-19 pandemic and the Russia-Ukraine conflict have significantly impacted global food and nutrition security, particularly in SSA where rice is a staple food. These crises have created a storm of challenges. The Russian-Ukraine war seems to have a more pronounced association with the increase in cereal prices and fertilizer which are important for agricultural productivity.
- Policymakers in Africa must prioritize investments in building resilience in agrifood systems to mitigate the impact of future crises and encourage the development of regional fertilizer manufacturing plants to reduce reliance on imports.

References

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