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Bringing Rigour and Evidence to Economic Policy Making in Africa

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By

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Abstract

The Russia and Ukraine crisis escalated into a war in February 2022, with devastating economic consequences. However, the impact of the Russia-Ukraine War (RUW) on gender dynamics remains largely unexplored, particularly at the microeconomic, household, and individual levels. This study considers Russian Ukraine war as an exogenous shock with gender and food security effects at the household level. Data was collected from a random sample of 2,030 respondents through phone interviews conducted in April and May 2024. In this paper, RUW is considered akin to a foreign policy and effects on food security and on gender are determined using a 2-Stage Least Squares (2SLS). The dependent variable, Food Insecurity Experience Index (FIEI), was computed using principal component analysis. The results show that food security conditions at household level is driven by wages received, domestic and exogenous trade policy perceptions in addition to the education levels of the respondents. Domestic policy led to worsening of food security position in general. On further disaggregation, the results reveal that while the domestic policies worked to the advantage of male-headed households' food security, both domestic and exogenous (RUW) worsened women's food security position. This study recommends social safety nets deliberately targeted towards women, especially in women-headed households, building the resilience of women in business and in waged employment, enhancing the financial position of women during crisis through informal financial institutions such as the Village Savings and Loans Associations (VSLAs), and capacity building to buttress the skills of women in business and income generating startups.

Key words- Russia Ukraine War (RUW), food security, gender

1. Introduction

The global economy has faced successive crises in less than a decade. Barely recovering from the Covid-19 pandemic, the Russia-Ukraine War (RUW) dealt a devastating blow to growth, eroding recovery gains. The RUW impacted the global economy through financial sanctions, commodities price increases (fuel, fertilizer and food price increases) and supply-chain disruptions (ILO 2022, OECD, 2022, Ndong et al, 2024), with negative effects on the global trade patterns creating economic uncertainty and market distortions across the world (Ayaz et al., 2024; Arndt et al., 2023; Olatunji, and Ojakorotu., 2023). Between June 2021 and Aprill 2022, the price of crude oil rose 44% (34% in real terms), natural gas by 88%, and fertilizer prices increased by 101% (Arndt, et al ,2022). This was accompanied by increases in global prices of wheat, palm oil, rice, crude oil, natural gas and fertilizers but subsided after April 2022. Furthermore, between February and July 2022, global grain and oilseed trade from Ukraine was 78.2% lower than expected (Ahn et al., 2023) with diversion of trade in favor of the mainly North American and European countries.

The effects of the RUW led to appreciation of the US dollar, the primary trading currency, due to change in trade that favored countries in North America and Europe, putting a downward pressure on currencies in developing countries. Similarly, Chortane and Pandey (2022) observed using event-study methodology that currencies of advanced economies appreciated the most among those affected by the war. When exchange rates depreciate, it presents a double burden to households and consumers since it compounds price increases for the poorest, women (UNCTAD, 2022). Overall, the crisis dimmed global economic growth to below pre-war estimates to grow at 2.2% in 2023 and projected a moderate sub-par recovery of 2.7% in 2024 (OECD 2022). The effect of the RUW was felt through fuel, food and fertilizer price shocks.

The effects of the RUW varied across African countries depending on their trade, production and consumption structures, government interventions, and other local factors (Abay et al., 2023; Raga et al 2024). The effects were almost zero impact in Southern and East African countries and almost 6% in North African Countries (Raga et al. 2024). A 10% shock in oil, food and fertilizer prices emanating from RUW was simulated to reduce Africa's GDP by 0.1%, 0.1% and 0.04% respectively (Cororaton, 2023; M'bouke et al., 2023). The reduced supply from Russia Federation and Ukraine led to fertilizer shortages and price hikes, with fertilizer prices doubling between 2020 and 2022 in many sub-Saharan countries prompting many of the respective governments to adopt subsidies as a short-term measure to address the supply shortage (Njoroge et al., 2023). The impact of the rise in fertilizer prices culminated in reduced agriculture productivity and subsequent decline in food supply. The decline in the food supply led to an increase in domestic prices consequently denying consumers adequate food access.

Kenya's trade with Ukraine and Russia trade is modest and estimated to be just 3% of the total imports into the country. Kenya's exports to Ukraine in 2020 were valued at US$9.18 million, representing only 0.15% of the total Kenya exports valued at US$6.03 billion. Kenya's imports from Ukraine in 2020 were valued at US$70.24 million, representing 0.46% of Kenya's total imports valued at US$15.42 billion. Furthermore, Kenya exported products worth US$75.26 million in 2020 to Russia, representing 1.25% of Kenya's total exports. Regarding imports from Russia, Kenya imported various commodities worth US$

350.09 million from Russia, representing 2.32% of Kenya's total imports[1]. The impact of RUW was transmitted into Kenya through trade in fuel, wheat and fertilizer commodities with GDP contracting by 0.8% and agri-food systems by 1% (Arndt et al., 2023). Despite their small contributions to trade, wheat and flour are critical inputs for both the manufacturing and agriculture sectors. The disruption of these value chains resulted in increases in energy, wheat and fertilizer costs which are key in the manufacturing and agricultural sector (UNDP 2022).

Being the core driver of the economy contributing 21% to the GDP, agriculture is intricately linked to women through wage employment, manufacturing, food security, and nutrition. The agricultural sector in Kenya is predominantly small-scale and women constitute a good proportion of small-scale farm households. Evidence shows that small-scale farmers experienced declining productivity because of unaffordable inputs prices since the onset of the RUW (UN-Women, 2022). Most women depend on the agricultural sector in the rural areas while women in urban areas are employed in the manufacturing sector that deeply relies on agricultural inputs for value addition. Any domestic and exogenous effect on agriculture reverberates through the manufacturing sector with gendered effects. The rise in import prices occasioned by the RUW led to a decline in activity in agri-food commodities and service provision with consequent effects of decline in gross domestic product and household consumption (Ndong et al 2024) and concomitantly affecting women in different sectors and subsectors that rely on agriculture.

The effects of RUW on gender or how they affected women and children in varying demographic characteristics including income, education, location (urban and rural), and how domestic and international policies can mediate the negative impact of RUW on outcomes allied to women have been less examined (Olatunji and Ojakorotu, 2023). The objectives of this paper are two-fold. First, to provide a descriptive analysis of the main effects of the RUW on Kenyan households. Second, to empirically examine the association between household characteristics, domestic and exogenous trade effect (RUW) and food insecurity.

The paper is structured as follows: in Section 2, a review of literature is conducted to highlight the effects of the RUW on Gross-Domestic Product (GDP), household poverty, food security, and gender. In Section 3 we highlight the analytical approach, data as well as the descriptive and quantitative analysis model. The results and discussions are presented in Section 4 while conclusion and recommendations in Section 5.

[1] [1] https://kippra.or.ke/what-does-the-ukraine-russia-war-mean-for-kenya/

2. Literature Review

In the African economies, the effects of RUW varied depending on interventions made by governments and non-tariff barriers like high costs of transportation (Martin and Minot, 2023a). The effects of the RUW on Gross Domestic Product (GDP), trade, exchange rates, inflation, poverty, and household food security were characteristically moderate in most of the African countries. The real GDP fell by less than 1% in many African countries but was almost negligible in countries which export crude oil, fertilizers, and natural gas like Egypt, Ghana, and Nigeria (Arndt, et al., 2022). The level of contraction was a result of deterioration in terms of trade due high prices of imports outweighing export prices, or due to high fertilizer or fuel prices.

Countries whose GDP contracted by more than 1% include Rwanda (2.5%), Malawi (1.4%) and Tanzania (1.3%) while Kenya, Senegal, Mali, Niger, Nigeria, Ethiopia, Ghana, DRC had less than 1% contractions of their GDP. In Kenya, real GDP contracted by 0.8% while employment declined by 2.6% driven largely by effects on the agriculture sector due to increases in fertilizer prices that stifled production (Breisinger et al 2022). In Ghana and Ethiopia, GDP contracted by 0.5% and 1% respectively while employment contracted by 0.5% in Ghana and 1.8 in Ethiopia driven by negative terms-of-trade on goods exported and imported (Diao et al. 2022). Contraction in GDP was highest in Rwanda (2.5%) driven by the negative effects of higher import prices that outweighed the effect of export prices. Employment also declined by 3.1% as decline in agricultural production led to job losses in Rwanda. Contractions in GDP was lowest in Egypt at 0.7% and agri-food employment by 0.9% with the negative effect coming from fertilizer price shocks (Abay, et al., 2022).

At the household level, research has investigated the effects of the Russia-Ukraine War (RUW) on poverty and food security, considering rural-urban and income-level differences. The drivers of poverty differ between the rural and urban areas and along the income continuum. The effects of RUW on poverty were largely driven by fuel price shock in urban areas while fertilizer price shocks drove poverty in rural areas (Breisinger et al 2022). The poverty rates as examined by (Martin and Minot, 2023a) increased from 40.9% to 42.5% in rural areas between January 2022 and July 2022 while in urban areas from 13.3% to 13.9% over the same period. However, the proportionate increase in poverty rate increased faster in urban (6%) than in rural areas (4%) driven by the increase in global prices of staples such as maize, wheat and sorghum.

The effects of RUW on household food security was induced through price shocks which decline of real income and food consumption expenditures as households adjusted to cheaper food items (Arndt, et al, 2022). Countries with food consumption baskets consisting of imported or manufactured products such as wheat and palm products experienced relative high impacts of the food price shocks depending on their level of income (Breisinger et al 2022). In several African countries, national poverty (less than USD 1.90) increased by more than 1%. These include Egypt (1.8%), Ethiopia (3.2%). Kenya (2.6%), Mali (3.3%), Malawi (2.4%), Rwanda (3.8%), Senegal (2.6%), and Tanzania (2.1%). However, poverty increased by less than 1% in Ghana, Niger, Nigeria, Uganda, and Zambia (Arndt, et al, 2022).

The Russia-Ukraine War (RUW) had far-reaching consequences on nutrition and diets, particularly due to rising wheat prices, affecting both rural and urban areas. The dual impact of increasing food prices and declining disposable incomes resulting from the RUW led to deteriorating diets. According to Arndt et al. (2022), Egypt experienced the most significant decline (13%), while Mali and Uganda saw the least (2%).

The consequences of food price inflation have varying impacts based on gender (UNAIDS, 2012), particularly in relation to a woman's economic role, whether as an employer, producer, consumer, importer, exporter, or caregiver. Gender effects are exacerbated amid unequal intra-household resource allocations which are driven by discriminatory gender norms, particularly during times of pronounced food insecurity (Harris-Fry et al., 2017). Studies such as Chitiga et al. (2022) and Mabugu et al. (2023) analyzed the gendered economic impact of the COVID-19 pandemic and reported disproportionate negative effects of COVID-19 on women. The trade distortions caused by the RUW created a consecutive crisis soon after the COVID-19 pandemic and affected women, particularly in developing countries.

A few studies have examined the impacts of the RUW on women in developing countries, Papadavid (2023) analyzed the transmission channels of the RUW on African women and identified their vulnerabilities related to women's intrahousehold bargaining power, agency in small-scale farming, and access to education, employment opportunities and financial resources. Evidence reveals that the poor and marginalized as well as those who were experiencing pre-existing discriminatory norms and practices experienced disproportionate impact of the RUW (UN-Women 2022, Papadavid., 2023).

In Kenya, the Russia Ukraine war disrupted logistics and consequently affected availability of imported wheat from Ukraine and fertilizer from Russia (Mwatu, 2023). As a result of the war, there was a reduction in the production of wheat, a disruption in the harvest and distribution of the grain, a disruption in the production and distribution of fertilizer, and an increase in the price of wheat. Like any other sub-Sahara African country, Kenya is predisposed to food insecurity due to reliance on food imports (M'boueke et al., 2023; KNBS., 2023). As such, any increase in consumer prices affect the poor disproportionately, compounding the economic hardship caused by COVID-19 pandemic in 2020 and 2021 (Deng et al., 2022; Glauber and Laborde, 2022).

The effects of RUW were transmitted to women in different pathways including through reduced purchasing power and credit access, as exchange rates and inflation increased, reduced trade and job opportunities and muted resilience response due to discriminatory norms as disruptions in agriculture ensued (Papadavid, 2023). The effects varied depending on the aspect affected. For instance, in Tanzania, time spend on economic activities did not show any signs of increasing but women participation in non-farm activities increased as a measure to mitigate the negative effects of the economic shocks due to RUW (UN Women 2022). Women experienced income declines over the crisis period especially those in non-farm businesses such as food vending due to rise in commodity prices and closure of women run businesses since March 2022 leading to reduced meal quantities as a copying mechanism which could be detrimental to the nutrition at household level (Ibid).

Of the outcomes possible on women due to RUW included negative coping mechanisms such as reduced quantity of meals by women headed households and migration of men leaving their families in search of employment (Olatunji and Ojakorotu, V, 2023). Moreover, there is possibility that the crisis led to increase in income inequality for women in comparison to men (Ayaz et al., 2024). International and national policies related to labour market participation, livelihoods and political representation are taunted to be part solution to the outcomes emanating from the RUW (Papadavid., 2023).

3. Analytical Approach and Data

This paper is premised on the logic flow that high fuel prices pass through into the production and manufacturing process and result in high producer and per unit manufacturing costs for agricultural products. The rise in prices is further passed on to consumer prices which diminish the demand for the agricultural oriented products. With Kenya's agricultural sector contributing 21% of the Gross Domestic Product (GDP)[2] and directly and indirectly employing over 40% of the population of which 70% are in the rural areas, a decline in demand for the sector's products is associated with reduced employment and wages.

Women make up for 80% of Kenya's agricultural labour force and depend on agriculture as their main source of income and wages and are likely to suffer most from exogenous shocks that have effects on agricultural sector. Exogenous shocks, such as the Russia-Ukraine War, can lead to a decline in demand for agricultural products, resulting in reduced incomes and wages, disproportionately affecting women Persistent negative social norms and disparities in access to agricultural productive resources, information, credit and market between men and women serve to exacerbate the effect of occurring exogenous shocks.

> High Fertilizer, Fuel, and wheat import prices→high production costs→high producer prices→Reduced demand for agricultural products→Reduced agricultural production activities→Reduced employment and wages in agriculture→Food insecurity and increased wage dispersion

With this flow of thought, we hypothesize that domestic or international policies could have been used to mitigate on the effect of the RUW on outcomes that affect women especially household food security. As such, we examine the effect of domestic and international policies within the outcomes of food security and wage dispersion.

To explore the food security, the study developed a food insecurity experience index through principal component analysis approach. The index was generated from a combination of the following variables captured during seven days preceding the survey:

1. they were unable to eat the usual amount
2. they were unable to buy the usual amount because of shortages
3. they were unable to buy the usual amount because of price increases
4. they were unable to buy the usual amount because of decreased income,
5. they reduced meals/portions
6. they have to change the meal composition
7. they have one of the previous dimensions

The index represents household food security situation which improves as the index tends to 1 and worsens as it tends to 0. A min-max rescaling method was used to ensure that the food insecurity experience index lies between 0 (food insecurity experience) and 1 (food security experience) to make it easier for regression interpretation.

Although running the policy options against the food insecurity score indicates whether the score has changed because of the domestic policy or the RUW, we hypothesize that the status of food security is influence by policies through wages or incomes. As such, the effect of domestic or international policies

[2] Central Bank of Kenya (CBK). Agriculture Sector Survey of January 2023

is mediated through to household food security through wages especially because a good proportion of women are depended on agriculture as their main source of livelihood.

To explore the impact of the impact of the Russia Ukraine War (RUW) and the domestic policies applied so far, the following system of equation was defined.

$$FIES = \alpha_o + \beta_1 X_1 + \beta_2 Dom_{policy} + \beta_3 RUW + \beta_3 lnWage_{i,2024} + \varepsilon_1 \quad (1)$$

$$lnWage_{i,2024} = \alpha_o + \beta_1 X_1 + \beta_2 Dom_{policy} + \beta_3 RUW + \beta_3 lnWage_{i,2022} + \varepsilon_2 \quad (2)$$

The proposition in this system of equations is that the wage received by households in 2024 (wage 2024) in Equation 1 may also be determined by the domestic Dom and exogenous policies RUW among other domestic characteristics as well as the pre-crisis wage in 2022. Omitting the wages paid in 2022 would create a misspecification error while incorporating wages in 2024 without accounting for the underlying determinants leads to endogeneity problem. To control for the dynamism between wage received in 2024 and wage received in 2022 and the resultant endogenous bias, the system of equations is thus estimated through a 2SLS estimator with Equation 2 identified by the pre-crisis wage (wage 2022).

The dependent variable (*FIES*) is an index generated through principal component analysis approach. To explore the effects of the domestic and exogenous policies on disaggregated groups, the FIES index was further disaggregated based on (1). Males in male-headed households (MMH), (2) Females in female-headed households (FFH), (3). Males in female headed households (MFH) – males residing in families headed by females, and (4). Females in Male Headed households (FMH) – females residing in families headed by males and all the headship disaggregation used as a dependent variable.

The explanatory variables consist of the individual and household characteristics X_1, which include:

- Gender (a dummy variable taking the value of 1 if the individual is a female and zero otherwise), Age, Education, Household size, number of female members, number of members between 15 and 65 years of age, number of children below 6 years of age,
- Sex and household headship decomposition- Females in female headed households (FFH), males in male headed households (MMH), Female in male headed households (FMH) and Male in female headed households (MFH), gender of the respondent, wage 2024
- To better capture the perception of policies in Kenya, two dummy variables are included: Dom takes the value of 1 if the respondent identified it as the main cause of the observed changes, otherwise zero while RUW denotes Russia-Ukraine War and takes 1 if the respondent identified it as the main cause of the observed changes, otherwise zero.

The data used in this analysis was collected from a random sample of 2,030 respondents between April and May 2024 using a structured data collection tool administered using through phone interviews. Respondents were asked to recall some of the information related to the Russia-Ukraine War in February 2022. This was applied to wages for example with respondents recalling their wage level in February 2022, just before the start of the RUW in April 2022 allowing an opportunity to compare before and after the start of the war.

4. Results and Discussions

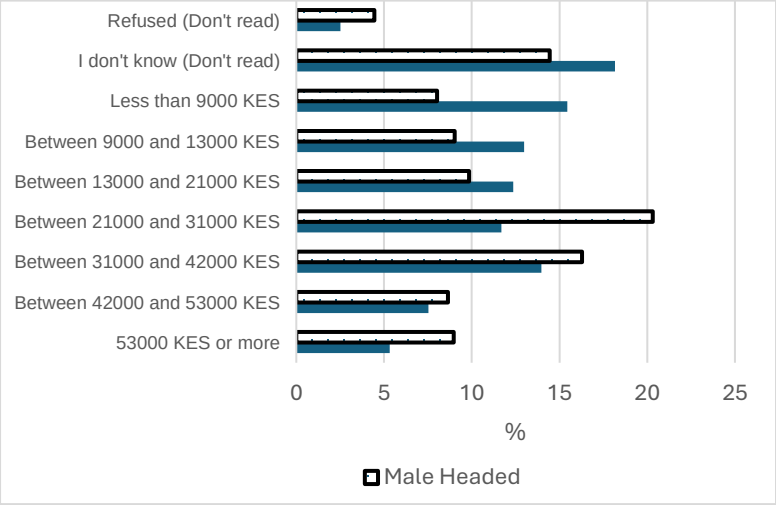
Descriptive statistics

The survey collected responses from 2,030 individuals, comprising 42% females and 58% males. In terms of geographical distribution, 33% of respondents resided in rural areas, while 67% were from urban areas. Notably, males dominated the sample in both rural and urban areas. A breakdown of the urban sample reveals a composition of 43% females and 57% males (n=1,360). In contrast, the rural sample consisted of 41% females and 59% males (n=670). In terms of marriage, 72% (n=2,030) of the respondents reported never to have been married, 21% (n=2,030) married and 6% (n=2,030) were widowed or divorced. Majority of the respondents - 74% (n=1,171) and 71% (n=859) of the male and female respondents respectively had never married. 20% (n=859) and 21% (n=1,171) of female and male respectively reported being married. Widows and widowers accounted for 9% (n=859) and 5%(n=1,171) respectively.

The sex of the household head was reconstructed from the direct responses of the respondents and the relationship of the respondent to the head of household. The sex of the respondents who did not report sex of the head of household and relationship to the head were considered as the household heads and their sex adopted to fill the missing sex information on the sex of the head of household. This culminated to 68% (n=2,030) male headed and 32%(n=2,030) female headed households. The average age of the respondents was 29 years (29 in rural and 28 in urban). The average size of households (number of members living under the same roof and cooking together) by the time of the survey was 3 members (3 in rural and 2 in urban).

Income changes between February 2022 and April 2024

Figure 1: Income categories in Feb 2022 (Before RUW)



Only 7% (n=2,030) of the respondents earned more than KES 53,000 with 6% earning between KES 42,000 and 53,000. The monthly income of 36% (n=2,030) earned ranged between KES 13,000 and KES 42,000. Male and female headed households varied in the level of income accessed. Male headed

households dominated the high-income categories between KES 21,000 while female headed were dominant in the lower income ranges from KES 9,000 to KES 21,000 (Figure 1).

A small proportion (14% (n=2,030)) reported that their jobs had changed compared to the month of Feb 2022 preceding the survey. A slightly higher proportion of female respondents (15%(n=642)) reported job change that 13% (n=1,388) of male respondents. On the same note, a slightly higher proportion (14% (n=1,360)) of urban respondents reported changes in jobs compared to respondents in rural (13% (n=670)).

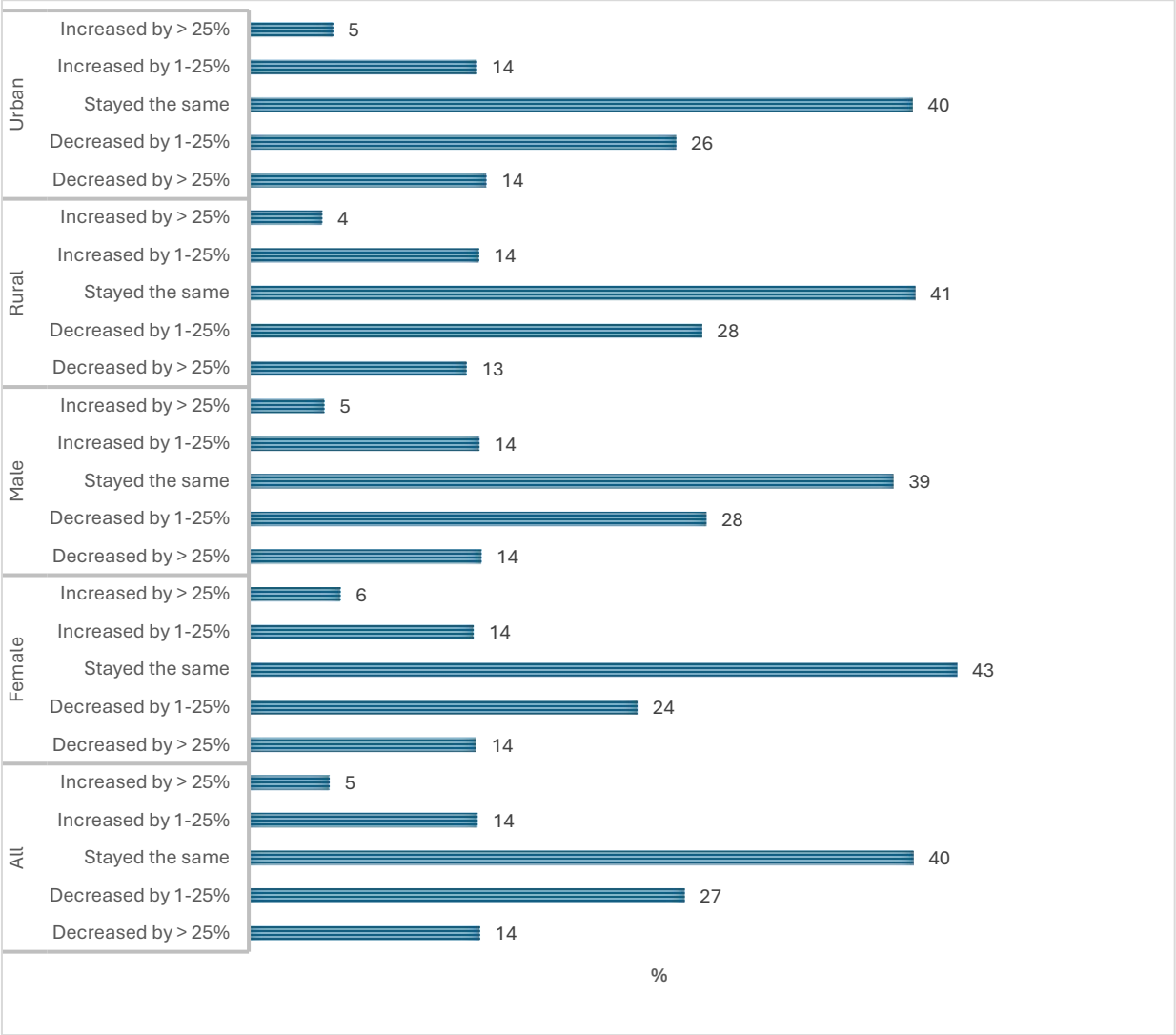
Figure 2 shows that although 35% of the respondents reported no changes in incomes between 2022 and 2024, changes in jobs were associated with an increase and decrease of incomes of between 1 to 25% of the income in Feb 2022 for 14% of the respondents. Moreover, the proportion of respondents who experienced decrease in income of more than 25% were more than twice those that experienced an increase of the same proportion (> 25%).

Employment and livelihoods

Increasing unemployment and constricting wage work private sector employment are among the shifts that were witnessed over the period between February 2022 and Aprill 2024. About 14% (n=2,030) indicated that their jobs had changed since February 2022. In 2022, Most 33% (n=2,030) of the respondents reached in the survey were on wage employment with 28%(n=2,030) being full time students. 12%(n=2,030) of the respondents were unemployed and searching for employment figure 3).

The changes in income between February 2022 and April 2024 were reflected as shifts in the structure of employment. There were notable shifts on the employment structure between February 2022 and April 2024. The proportion of respondents in the private sector wage employment or NGOs, contracted from 33% in Feb 2022 to 17% in April 2024 (figure 4), a confirmation that employment in the private sector was contracting while at the same time, unemployment increased with the proportion increasing from 12% to 30% between February 2022 and April 2024. A small margin of increase was noted in the government sector where the proportion of people engaged in waged work in government increased from 6% to 14%.

Figure 2: Income change in April 2024 compared to February 2022



The number of hours worked in a week preceding this survey showed that women worked on average 13 hours while men worked 14 hours, one hour more than women. On average respondents residing in rural areas worked for 11 hours while those residing in urban areas worked 14 hours, or 3 hours more. Women in rural areas worked for 11 hours, 3 hours less than their urban counterparts who worked on average for 14 hours. A similar trend was observed among men, with those in rural areas working an average of 12 hours per week, compared to 16 hours per week for those in urban areas, a difference of 4 hours

Figure 3: Main jobs in February 2022- before the conflict

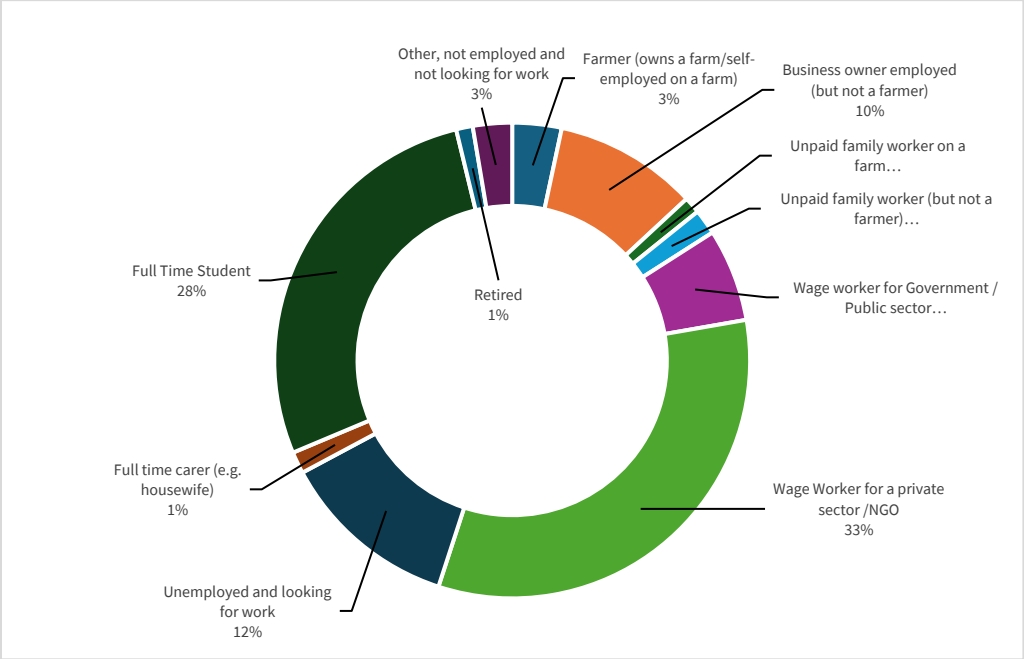
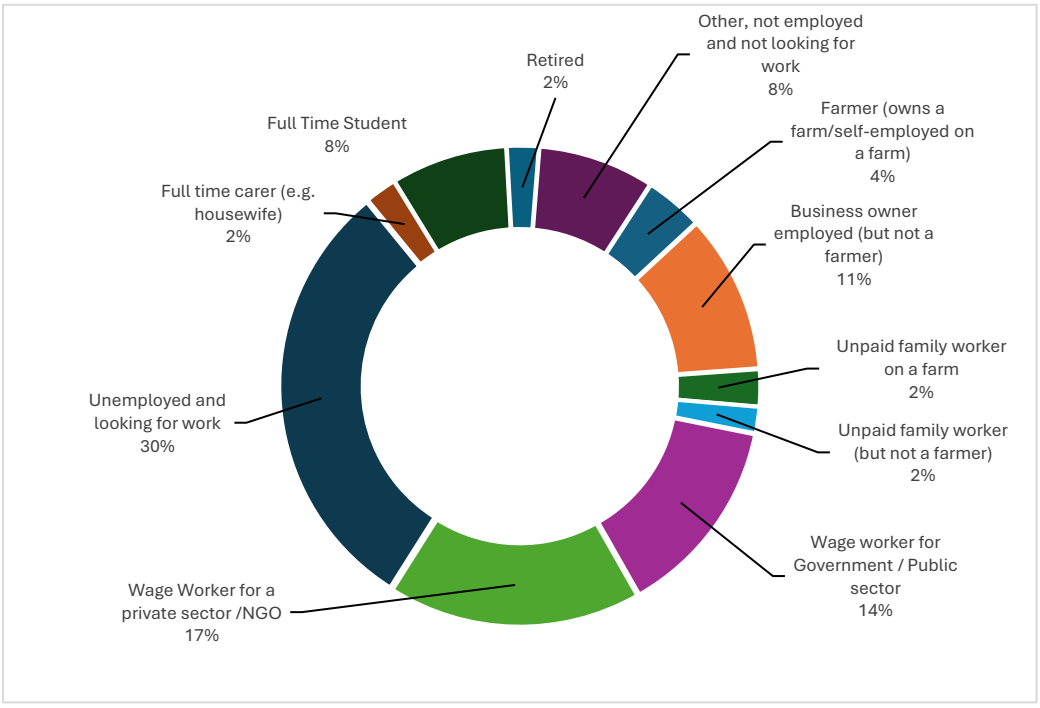


Figure 4 Main jobs in February 2024- After the conflict



Women are structurally disadvantaged when it comes to work environment. An examination of the sectors in which women and men worked reveal differences that have a bearing to the income generated and benefits that are accrued from employment. In February 2022, the sectors that anchored jobs of most of the male headed households were the construction (10% n=561), retail (13% n=561) and the wholesale 13% (n=561) and education 10% (n=561).

Table 1: Characteristics of Employment for men and women -February 2022

		Female Headed HH	Male Headed HH
		Percent	Percent
Occupation February 2022	Manager/professional	19	21
	Technicians/associate professionals	27	29
	Clerks/service workers	41	34
	"Blue collar, skilled agricultural, production and transport"	13	16
	Total	100	100
Stability of your employment status - February 2022	Regular (permanent or temporary)	41	45
	Irregular (causal, seasonal, or intermittent)	59	55
	Total	100	100
Social Insurance - February 2022	Yes	48	55
	No	52	45
	Total	100	100
Worked in an Establishment- February 2022	Yes	63	72
	No	37	28
	Total	100	100

Women headed households worked in sectors including retail (16% n=232), 11% (n=232) in manufacturing and 9% (n=252) in wholesale. While men dominate in the construction sector, women are more in the retail sector. In terms of occupation, more women (41%, n=232) worked as clerks or social workers than men (34%, n=561). There are also differenced in that fewer women also worked in jobs with social insurance, are unstable and not in an establishment when compared to men.

In February 2022 when the RUW started, women were structurally disadvantaged in workplace. Fewer women than men access jobs with social insurance (48% women compared to 55% men), work more in clerical or social jobs (41% women vs 34% men) and in jobs which are less stable (41% female vs 45% male) (Table 1). This trend may not have changed since April 2024.

Time spent on household Chores

In Kenya, literature posits that on average women spend approximately 5 hours per day on unpaid work, while men spend only about 1 hour (KNBS., 2023). A consideration of time spent on household chores in this case revealed that the time spent on chores increased for 25% (n=2,030) of the respondents with 21% (n=2,030) reporting a decrease while 31%(n=2,030) reported no change in time spend in household chores. A higher proportion of men 27%(n=1,388) compared to 22%(n=642) of women reported that their time spend on household chores had increased. On the same note, 22%(n=1,388) and 17% (n=642) of men and women reported that their time they spend on household chores decreased. Slightly higher proportions of men reported an increase in the time spend on household chores than women in both

urban and rural areas. 72% (n=254) and 81%(n=679) of female and male headed families respectively associate the changes in the time spend on household chores between Feb 2022 and April 2024 to economic reasons.

Changes in monthly wages between 2022 and 2024

Women's economic empowerment is limited because relatively big gender gaps between men and women create higher salary for men than women with men on average earning 10% more than women. The wage gaps depend on sectors, occupation and skills and is estimated to range from approximately 14% (in trade) to 38% (in education) (UN Women, 2023).

In general, the personal average net monthly wage declined from KES 37,455 in February to KES 35,351 in April 2024. However, the effects of the crisis were mixed if demographic decomposition was considered. Female headed households (FH) in urban areas experienced the highest decline with personal net monthly wage declining by 25% from KES 41,192 to KES 30,961. On the contrary, personal net monthly wage for rural Female Headed (FH) increased by 6%. On the other hand, the personal average monthly wage increased from KES 32,032 females in male headed households (FMH) to KES 35,947 and for males in female headed households (MFH) from KES 24,744 in February 2022 to KES 39,340 in April 2024 (Table 2).

Table 2: Personal net monthly wage

		2022		2024		
		N	mean	N	mean	% change 2022 & 2024)
All	Female Headed HH	178	38,731	177	31,697	-18%
	Females in Male Headed HH (FMH)	94	32,031	96	35,947	12%
	Male headed HH MH	355	38,579	348	36,931	-4%
	Males in Female Headed HH (MFH)	9	24,744	10	39,340	59%
Urban	Female Headed HH	132	41,192	126	30,961	-25%
	Females in Male Headed HH	58	31,644	61	33,466	6%
	Male headed HH	256	39,575	251	37,447	-5%
	Males in Female Headed HH	5	19,300	7	26,500	37%
Rural	Female Headed HH	46	31,667	51	33,516	6%
	Females in Male Headed HH	36	32,655	35	40,271	23%
	Male headed HH	99	36,001	97	35,597	-1%
	Males in Female Headed HH	4	31,550	3	69,300	120%

Wage disparity

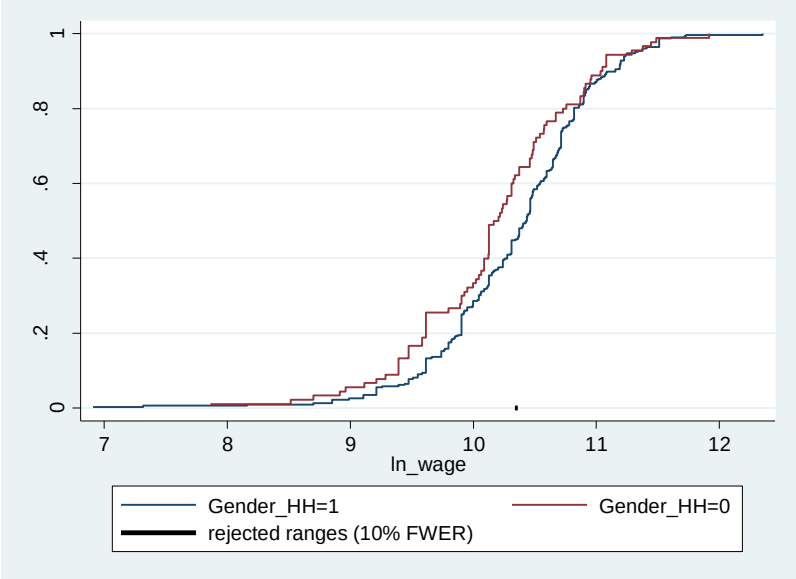
A distributional examination on temporal and special scale using the Gini coefficient (0 and reflecting perfect equality and perfect inequality, respectively) on wages shows that that inequality has declined between 2022 and 2024 despite the continuation of RUW. However, in both years, the inequality is high for female headed households compared to male headed households in both years (Table 3).

Table 3: Gini and Adjusted Gini Coefficients Male and female headed respondents (2022 &2024)

	2022		2024	
	Gini	Adjusted Gini	Gini	Adjusted Gini
Male Headed	0.369	0.357	0.324	0.315
Female Headed	0.481	0.477	0.354	0.332

A comparison of wage distribution in 2024 using a stochastic dominance between male and female respondents rejected equality of the cumulative density function (cdf) at 10% ($p<0.1$) implying that female headed households depict more inequality compared to male headed households (figure 5).

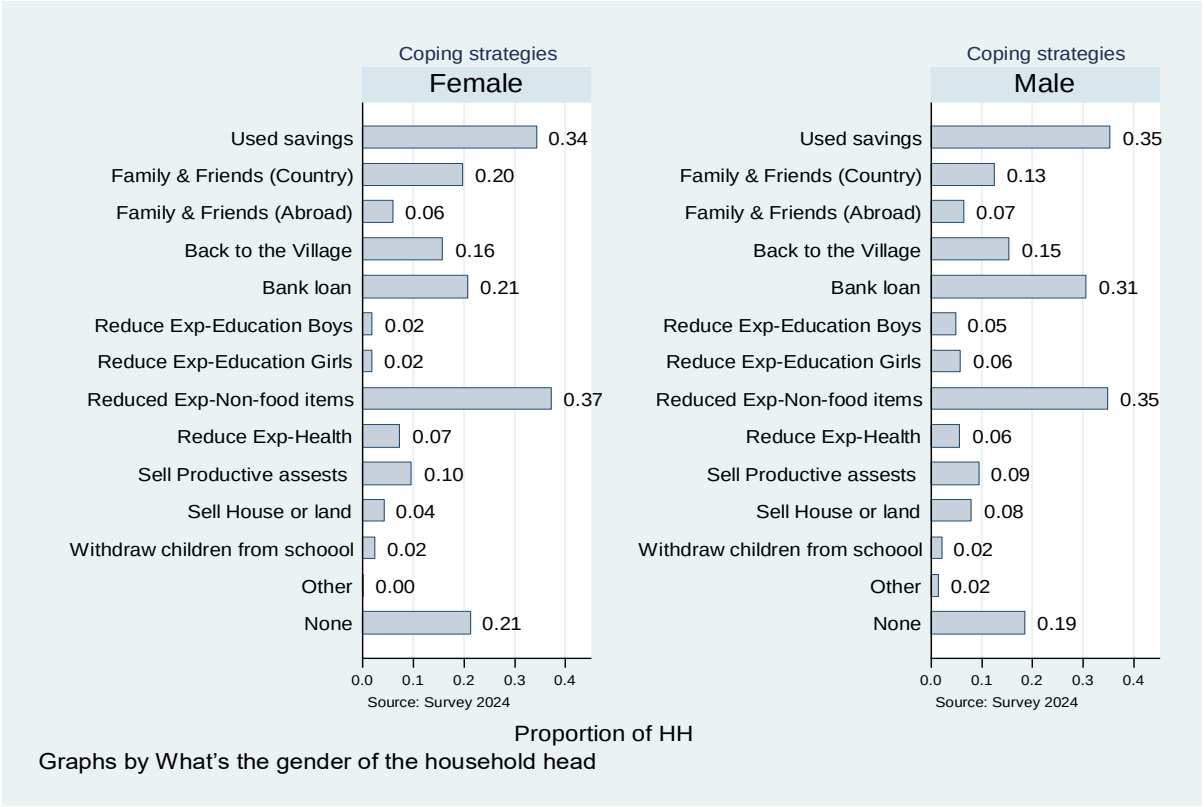
Figure 5: Wage distribution between male and female respondents in 2024



Coping Strategies over the RUW crisis

Kenya's government response to the RUW crisis was at macrolevel and mainly focused on curbing resultant inflationary pressures. At the microlevel, there were no major interventions and majority (>90% (n=2,030) indicated not to have received any form of transfers in cash or subsidies. Over the crisis period, coping mechanisms applied by households were almost similar. Most of the households used their savings and/or reduced expenditures on non-food items in both male and female headed households. This signaled a response towards an increase in food prices triggered by general inflation perhaps from exchange rate depreciation. Proportionally, more female-headed households reduced expenditures on non-food items compared to those headed by men, although the difference was marginal. Compared to men, the effect of reduced expenditures on non-food was higher on women since fewer (21%) female headed households could access bank loans compared to 31% male headed households (figure 6). The reduction in non-food expenditure may imply a decline in household investments in education and health as well as in income generating activities and this could result in an increase in rates of poverty and food insecurity. Reduced savings places households in precarious resilience positions in the event of future occurrence of shocks such as climate or new market shocks.

Figure 6: Coping mechanisms after start of RUW war in February 2024



Food Insecurity Experiences and their determinants

High food prices over the crisis period were the reason behind food insecurity experiences. 45% of the respondents indicated that they consumed less food due to high prices. Compared to male households, 41% of female households consumed less food due to high prices, 29% due to reduced income and 27% reduced food portion and changed meal composition (figure 7).

A slightly higher proportion (42%) of female headed households residing in urban areas were affected by the high prices compared to rural areas (40%) (figure 8). Although the difference is marginal, it reflects the differences in the level of market dependence. Urban households are more depended on the market for their food requirements compared to rural households who can have part of their consumption basket met through own farm-production.

Figure 7: Food security related experiences after start of RUW war in February 2024

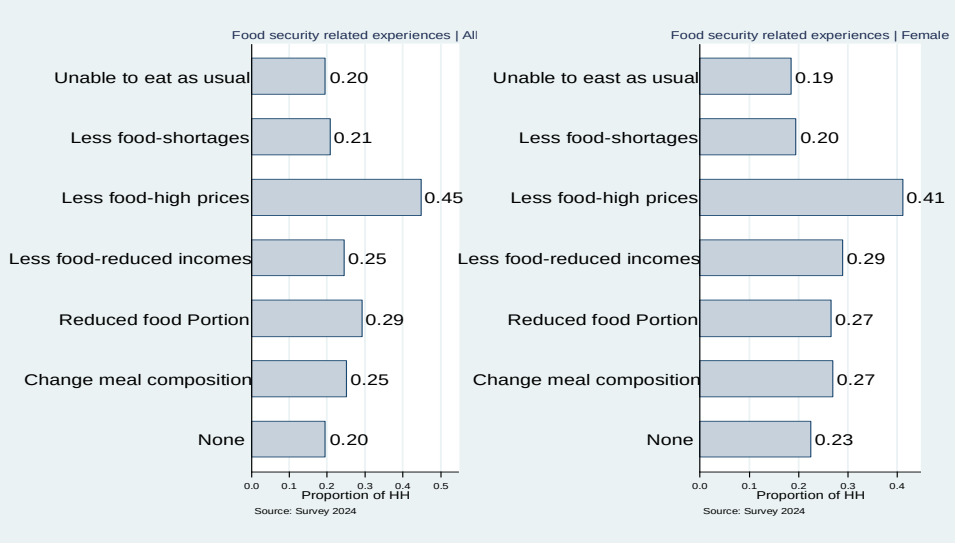


Figure *8*: Food security related experiences after start of RUW war in February 2024 for women, by urban and rural areas

We further examined food security by asking respondents about their concerns regarding access to sufficient food. Specifically, we inquired about worries related to not having enough to eat, being unable to afford meat, rice, and vegetables, having a limited diet, skipping meals, eating less than desired, running out of food, and experiencing hunger without eating. A considerable proportion of households were either occasionally, rarely or never worried about any of the above aspects of food security. Only about 14% (n=2,030) reported to have always worried of having not enough food to eat (Table 4). A similar trend that less than 30% either always or often worried about their food security was reflected in both male and female headed households.

Econometric Results

The results of the estimation of Equations (1) and (2) are presented in Table 5. The determinants of the food insecurity experience index were estimated using 2-Stage Least Squares (2-SLS) to control for possible endogeneity in wages. To assess some form of sensitivity, Equation (1) was also estimated through OLS and Tobit because of left and right censoring of the min-max scaled index.

The analysis revealed a positive and significant relationship ($p>0.1$) between the number of female members in a household and its food security status. Specifically, the results indicate that having more women in the household can improve its food security situation. This finding aligns with the notion that women tend to be more aware of and attentive to household food security concerns than men.

Table 4: Food Insecurity experiences by sex of the head of household

		Always	Often	Occasionally	Rarely	Never
All	Concerned about not having enough food to eat	14.4	16.0	25.1	26.5	18.0
	Unable to eat a source of meat, rice and vegetables	6.4	16.6	27.6	30.3	19.2
	Ate only a few kinds of foods	7.9	18.3	28.0	27.7	18.0
	Had to skip a meal	3.9	11.9	20.7	35.6	27.8
	Ate less than you thought you should	6.5	16.3	23.3	32.7	21.3
	Household run out of food	3.5	11.8	21.0	35.3	28.4
	Hungry but did not eat	3.4	14.5	22.0	33.9	26.2
Female	Concerned about not having enough food to eat	13.1	17.8	22.6	28.7	17.9
	Unable to eat a source of meat, rice and vegetables	7.0	16.8	24.6	30.7	20.9
	Ate only a few kinds of foods	7.9	15.3	26.0	29.9	20.9
	Had to skip a meal	4.4	12.9	18.2	34.1	30.4
	Ate less than you thought you should	6.1	13.9	21.5	32.9	25.7
	Household run out of food	4.5	12.9	17.9	32.7	31.9
	Hungry but did not eat	3.1	15.9	17.9	35.1	28.0
Male	Concerned about not having enough food to eat	15.1	15.1	26.2	25.5	18.1
	Unable to eat a source of meat, rice and vegetables	6.1	16.4	29.0	30.0	18.4
	Ate only a few kinds of foods	7.9	19.7	29.0	26.7	16.7
	Had to skip a meal	3.8	11.5	21.9	36.2	26.7
	Ate less than you thought you should	6.7	17.4	24.1	32.6	19.3
	Household run out of food	3.0	11.3	22.5	36.5	26.7
	Hungry but did not eat	3.5	13.9	23.9	33.4	25.4

The fact that households with a higher number of females have better food security conditions relate to the findings by Hoddinott and Haddad (1995), Ragasa et al. (2019), Kassie et al. (2020), and Kihiu (2021). Hodinott and Haddad (1995) and Ragasa et al. (2019) observed that in comparison to men women spend higher on food within households. According to Kassie et al. (2020), women play an essential role in selection, acquisition, preparation, and allocation of food. Kihiu et al. (2021) find that women's empowerment has a positive and significant effect on households' food consumption scores, whereas the male's empowerment effect is weaker and much lower.

The amount of wage received in 2024, a proxy of income, was positive and significant ($p<0.05$). When income increases, households expand their consumption frontier to accommodate food consumption items on the increasing order of luxury continuum. Moreover, the food security conditions are positively affected by the level of education in reference to no-education of (less- than primary) level of education. All levels of education have a positive influence on the food security, pointing to the fact that higher educated households have better food security status compared to non-educated respondents. Education is viewed as an enabler in accessing employment opportunities that guarantee income and thus streamline consumption at individual and even at household level.

In the OLS and the Tobit, the inclusion of a sex and household headship disaggregated variable (1-Males in male headed households (MMH), 2- Female in female headed households (FFH), 3 - Male in female headed households (MFH) and 4- Female in Male Headed households- (FMH)) did not reveal any significant effect on the food security experience. Moreover, the OLS and Tobit models did not reflect any significant results of both the domestic and exogenous policies.

As aforementioned, domestic and/or international policies or shocks affect food security through the level of income or price of food commodities. In this case, we turn to the 2SLS to examine whether the effect of domestic and international polices were mediated through the wage into the household food security status. Results show that once the endogeneity was controlled for through 2SLS, the food security conditions experienced was determined by domestic policy ($p<0.1$) in addition to number of female members of a household ($p<0.1$), the amount of wage received in 2024 ($p<0.01$) and the level of education of the respondent. This conforms to the argument by Papadavid (2023) that domestic policies could be used to mediate the negative effects of RUW on outcomes such as food insecurity.

Table 5: Determinants of Food Insecurity Experience Index

Dep. Var Food Insecurity Experience Index	OLS	Tobit	2 SLS
Ln Household size (#)	-.02 (.041)	-.022; (.044)	-0.02 (0.623)
Ln # of female members	.039* (.023)	.041* ;(.024)	0.039* (0.09)
Ln_# of members _15_65	-.018 (.034)	-.021; (.036)	-0.019 (0.584)
Ln_wage2024	.003** (.002)	.003** (.002)	0.007***(0.003)
Ln_# Children _<6 years of age	.005; (.019)	.003; (.02)	0(0.991)
Education of the respondent-			
Less than Primary			0
Primary/ Preparatory	.242* (.125)	.244* (.131)	0.259 **(0.039)
Secondary	.312** (.121)	.319** (.127)	0.327*** (0.007)
Technical Institutes	.298** (.121)	.306** (.127)	0.309** (0.011)
University	.293** (.121)	.3** (.127)	0.304** (0.012)
Above university	.295** (.137)	.306** (.144)	0.304** (0.027)
Individual Sex and HH Headship decomposition			
Male in male headed Households (MMH)			0
Males in Female Headed Households (MFH)	.016 (.031)	.018 (.033)	0.02 (0.526)
Females in Male Headed Households (FMH)	.003 (.016)	.005 (.017)	0.003 (0.872)
Female in female Headed Households (FFH)	-.008 (.02)	-.009 (.021)	-0.008 (0.699)
Economic Policy			
Domestic Policy	-.016; (.019)	-.016 (.02)	-0.038* (0.076)
RUW	-.021; (.026)	-.023 (.027)	-0.042 (0.126)
Other	.053; (.07)	.059 (.074)	0.036 (0.611)
None			0
_cons	.349*** (.124)	.352*** (.13)	0.331*** (0.008)
sigma:_cons		.217*** (.005)	
Observations	1091	1091	
Pseudo R^2	.z	-.767	
Standard errors are in parentheses			
*** p<.01, ** p<.05, * p<.1			

The data allowed for disaggregation of sub-samples of the data along the sex of the respondent and household headship, that is, (1). Males in male headed households (MMH), (2). Female in female headed households (FFH), (3). Male in female headed households (MFH) and, (4). Female in Male Headed households (FMH). Table 6 presents the results of the disaggregated analysis. Domestic policies reduced the status of household food security (increased food insecurity) for the female respondents.

The study found positive and significant (p<0.05) effects of domestic policy on food security status for Males in Female Headed (MFH) and negative and significant (p<0.05) for Females in Male Headed (FMH) households. This implies that domestic policies such including transfers that influence wages permeated into households benefiting men than women. These results confirm that women were adversely affected by policies that affected incomes and or wages.

The study also found that the RUW or the exogenous policies had negative and significant effects (p<0.05) on the household food security for Females in female Headed Households (FFH). The effects of the exogenous shocks on wages led to lower wages in 2024. Notably, the effect of RUW was negative and significant on women food security conditions implying that RUW had negative effects on the food security outcomes of women-headed households unlike in male-headed households where the effect of both domestic and RUW were insignificant. The fact that women-headed household food insecurity experience aligns with the previous study by Geda and Musyoka (2023).

Table 6: Determinants of Food Insecurity Experience Index (sex disaggregated)-2 SLS

Dep. Var Food Insecurity Experience Index		Female	Male	MMH	MFH	FMH	FFH
Ln Household size (#)		-0.044	0.079**	0.140***	-0.061***	-0.061*	0.017
Ln # of female members		0.324***	-0.292***	-0.314***	0.023*	0.118***	0.206***
Ln_# of members _15_65		-0.300***	0.276***	0.274***	0.002	-0.018	-0.281***
Ln_wage2024		0.007*	-0.001	0.002	-0.003*	0.006	0.002
Ln_# Children _<6 years of age		-0.092***	0.086***	0.112***	-0.027**	0.003	-0.095***
Education of the respondent-							
Less than Primary							
Primary/ Preparatory		0.309	-0.053	-0.038	-0.014	0.118	0.191
Secondary		0.178	0.162	0.151	0.011	0.111	0.067
Technical Institutes		0.25	0.069	0.061	0.009	0.153	0.097
University		0.207	0.108	0.112	-0.004	0.138	0.069
Above university		0.277	0.032	0.037	-0.005	0.168	0.109
Policy							
Domestic Policy		**-0.082****	**0.045**	**0.014**	**0.031****	**-0.060****	**-0.021**
RUW		**-0.013**	**-0.03**	**-0.04**	**0.01**	**0.051**	**-0.065****
Other		-0.065	0.098	0.103	-0.005	-0.021	-0.044
None		(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
_cons		0.305	-0.118	-0.336	0.219**	0.124	0.181
	N	1091	1091	1091	1091	1091	1091
	r2_1	0.134	0.124	0.134	0.0355	0.0395	0.137
	F_1	13.2	11.7	12.8	3.31	3.86	13.1
	chi2_1						
	ll						
	p_1	0.00	0.00	0.00	0.00	0.00	0.00

5. Conclusion and Recommendations

This paper explores the effects of Russia-Ukraine War (RUW) on disaggregated segments of the community. The study treats the RUW as an exogenous economic shock, akin to an exogenous economic policy and examines its effects on food security and wage which are sex and household head disaggregated segments of the community. The survey used data from a random sample of 2,030 respondents interviewed between April and May 2024. The paper considered respondents in the survey as the unit of analysis where necessary and categorizes the respondents into four household headships: (1). Males in male headed households (MMH), (2). Females in female headed households (FFH), (3). Male in female headed households (MFH), and (4). Female in Male Headed households (FMH).

The effects of the domestic policies and RUW are not revealed until the effect of wages, that varied over time are taken into consideration in a recursive model. A 2SLS regression is used to estimate the determinants of food security in the advent of the RUW crisis considering the different segments of the population. The sensitivity of the parameters is tested using OLS and tobit models.

The study found that households increasingly depleted their savings to meet household food consumption and in addition reduced expenditures on non-food items which signaled a decline in investments in education, health and income generating activities. Fewer women compared to men could access loans as a mitigation measure to the crisis. Such depletion in investments affected investments in income-generating activities and in the face of increasing unemployment and those affected may find it hard or take a long time to recover from the negative effects of the shocks. Proportionally, more female headed households also reduced expenditures on non-food items compared to men, although the difference is marginal.

Household income declined between 2022 and 2024. The decreased in income was experienced by more than twice those who experienced increase in income with men spending more time in household chores than women in both urban and rural areas.

Although the monthly wage declined, the decline was realized in urban areas where more women are on wage employment and dependency on markets for food is high making them prone to exogenous shocks that affect prices and wage income. The decline in monthly wage was more pronounced in females than in males. With the decline in wages the RUW may may have resulted in widening the wage gap between men and women in the period between 2022 and 2024. In 2024, women compared to men, were more unequal based on the wages received.

Unlike women, men benefited from the domestic policies applied to mitigate the RUW. The study finds positive and significant ($p<0.05$) effects of domestic policy on food security status for Males in Female Headed (MFH). Women did not benefit from any of the domestic or exogenous policies. Their food security position worsened in the presence of the domestic and RUW. Women suffered from both domestic and international shocks emanating from the RUW. Domestic policies (including cash transfers targeted to the poor households and input subsidies such as fertilizers to agricultural producers) implemented to mitigate the effects of RUW and the shock from RUW worked to worsen the food security status of women in the community and particularly households headed by women.

The study recommends social safety nets deliberately targeted towards women and especially women headed households who suffered most from the RUW even in presence both the domestic and RUW policies; building the resilience of women in business and in waged employment; enhancing the financial position of women during crisis; building formal and informal financial institutions such as the

Village Savings and Loans Associations (VSLAs) and capacity building to buttress the skills of women in business and income generating startups that can spur the income generation for women.

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Appendices

Linear regression

Food Insecurity Experience Index	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Ln Household size	-.018	.041	-0.42	.671	-.099	.064	
Ln Number of female members	.038	.023	1.69	.09	-.006	.083	*
Ln_# of members _15_65	-.017	.034	-0.51	.609	-.084	.049	
Ln_wage2024	.005	.002	2.97	.003	.002	.008	***
Ln_Children _<6 years of age	.003	.019	0.17	.861	-.034	.041	
Less than Primary	0	.	.	.	.	.	
Primary/ Preparatory	.229	.124	1.84	.066	-.015	.474	*
Secondary	.301	.121	2.49	.013	.064	.538	**
Technical Institutes	.288	.121	2.38	.017	.051	.525	**
University	.282	.121	2.34	.02	.045	.518	**
Above university	.289	.137	2.11	.035	.02	.557	**
Male headed Households	0	.	.	.	.	.	
Males in Female Headed Households	.018	.031	0.58	.565	-.044	.08	
Females in Male Headed Households	.003	.016	0.19	.85	-.029	.035	
Female Headed Households	-.007	.02	-0.36	.716	-.046	.031	
Domestic Policy	-.025	.019	-1.33	.183	-.063	.012	
RUW	-.038	.027	-1.40	.163	-.09	.015	
Other	.04	.07	0.57	.568	-.098	.178	
None	0	.	.	.	.	.	
_cons	.354	.123	2.87	.004	.112	.596	***

Mean dependent var	0.641	SD dependent var	0.208
R-squared	0.023	Number of obs	1091
F-test	1.565	Prob > F	0.071
Akaike crit. (AIC)	-324.411	Bayesian crit. (BIC)	-239.498

*** p<.01, ** p<.05, * p<.1

Tobit regression

Food Insecurity Experience Index	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Ln Household size	-.019	.044	-0.44	.658	-.105	.066	
Ln Number of female members	.04	.024	1.69	.091	-.006	.087	*
Ln_# of members _15_65	-.02	.036	-0.57	.568	-.091	.05	
Ln_wage2024	.005	.002	2.92	.004	.002	.008	***
Ln_Children _<6 years of age	.002	.02	0.09	.927	-.037	.041	
Less than Primary	0	.	.	.	.	.	
Primary/ Preparatory	.231	.13	1.77	.077	-.025	.487	*
Secondary	.307	.127	2.43	.015	.059	.556	**
Technical Institutes	.295	.127	2.33	.02	.047	.544	**
University	.288	.126	2.28	.023	.04	.536	**
Above university	.3	.144	2.09	.037	.018	.581	**
Male headed Households	0	.	.	.	.	.	
Males in Female Headed Households	.021	.033	0.62	.534	-.044	.086	
Females in Male Headed Households	.005	.017	0.29	.775	-.029	.038	
Female Headed Households	-.008	.021	-0.39	.699	-.049	.033	
Domestic Policy	-.026	.02	-1.28	.202	-.065	.014	
RUW	-.04	.028	-1.43	.153	-.096	.015	
Other	.045	.074	0.61	.545	-.101	.191	
None	0	.	.	.	.	.	
_cons	.357	.129	2.76	.006	.103	.611	***
Sigma	.217	.005			.207	.226	

Mean dependent var	0.641	SD dependent var	0.208
Pseudo r-squared	-0.937	Number of obs	1091
Chi-square	24.294	Prob > chi2	0.083
Akaike crit. (AIC)	-14.218	Bayesian crit. (BIC)	75.690

*** p<.01, ** p<.05, * p<.1

Regression results

scaled_FIES ln_~2024	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Ln Household size	-.02	.042	-0.49	.623	-.102	.061	
Ln Number of female members	.039	.023	1.70	.09	-.006	.083	*
Ln_# of members _15_65	-.019	.034	-0.55	.584	-.086	.048	
Ln_wage2024	.007	.002	2.95	.003	.002	.012	***
Ln_Children _<6 years of age	0	.019	-0.01	.991	-.038	.038	
Less than Primary	0	.	.	.	.	.	
Primary/ Preparatory	.259	.125	2.06	.039	.013	.505	**
Secondary	.327	.122	2.69	.007	.088	.565	***
Technical Institutes	.309	.122	2.54	.011	.071	.547	**
University	.304	.121	2.51	.012	.066	.542	**
Above university	.304	.137	2.21	.027	.034	.574	**
Male headed Households	0	.	.	.	.	.	
Males in Female Headed Households	.02	.032	0.63	.526	-.042	.082	
Females in Male Headed Households	.003	.016	0.16	.872	-.029	.034	
Female Headed Households	-.008	.02	-0.39	.699	-.046	.031	
Domestic Policy	-.038	.022	-1.78	.076	-.081	.004	*
RUW	-.042	.028	-1.53	.126	-.097	.012	
Other	.036	.071	0.51	.611	-.103	.175	
None	0	.	.	.	.	.	
_cons	.331	.124	2.66	.008	.087	.575	***
Ln_wage2024							
Ln Household size	.401	.65	0.62	.537	-.873	1.675	
Ln Number of female members	-.028	.357	-0.08	.938	-.727	.672	
Ln_# of members _15_65	.186	.534	0.35	.728	-.861	1.232	
Ln_wage2022	.661	.025	26.48	0	.612	.71	***
Ln_Children _<6 years of age	.496	.299	1.66	.097	-.09	1.082	*
Less than Primary	0	.	.	.	.	.	
Primary/ Preparatory	-4.16	1.955	-2.13	.033	-7.995	-.326	**
Secondary	-3.637	1.896	-1.92	.055	-7.355	.081	*
Technical Institutes	-3	1.897	-1.58	.114	-6.721	.72	
University	-3.154	1.895	-1.66	.096	-6.871	.563	*
Above university	-2.138	2.148	-1.00	.32	-6.351	2.074	
Male headed Households	0	.	.	.	.	.	
Males in Female Headed Households	-.277	.494	-0.56	.575	-1.246	.691	
Females in Male Headed Households	.062	.254	0.24	.807	-.436	.56	
Female Headed Households	.069	.308	0.23	.822	-.535	.674	
Domestic Policy	1.82	.301	6.05	0	1.229	2.41	***
RUW	.679	.422	1.61	.108	-.149	1.506	
Other	.582	1.103	0.53	.598	-1.582	2.746	
None	0	.	.	.	.	.	
_cons	3.171	1.937	1.64	.102	-.628	6.969	
Mean dependent var	3.481	SD dependent var				4.886	

*** p<.01, ** p<.05, * p<.1

Mission

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