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# Gender-specific effects of Russia-Ukraine conflict – Evidence from South Africa

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## Abstract

The Russia-Ukraine war has caused trade distortions, increasing international energy, fertiliser, and food prices. In emerging and developing countries, rising consumer prices have disproportionately hit the poor population. In South Africa, where women's poverty and inequality are extremely high, women are hit harder than men. In this study, we apply a gendered static single-country CGE model and a behavioural microsimulation model to simulate the macroeconomic impacts of the war-caused trade distortions and analyse the gendered impact on the South African economy. The results show that the global price shock decreased labour demand and real GDP by 0.48 percent and 0.26 per cent. Men's per capita food spending fell by 0.78 per cent, while women's fell by 0.99 per cent. Women accounted for 58 percent of jobs lost due to the labour market effect. Women are also more affected than men in terms of the depth and severity of food poverty. The impacts are stronger for rural and black African populations, indicating that policy measures need to consider the gendered differences to counteract the socioeconomic impacts of the Russia-Ukraine war.

**Keywords:** war, trade, women, poverty, inequality, food security

## JEL-code:

C68 Computable General Equilibrium Models

I32 Measurement and Analysis of Poverty

F16 Trade and Labor Market Interactions

J16 Economics of Gender

N40 General, International, or Comparative

## **1 Introduction**

Starting from February 2022, economic uncertainty and market distortions resulting from the Russia-Ukraine war (RUW) have increased international prices for energy, fertilisers and food (Arndt et al., 2023; Ayaz et al., 2023). In many emerging and developing countries, rising consumer prices have disproportionately hit the poor population, compounding the economic hardship caused by Covid19 pandemic in 2020 and 2021 (Bentley et al., 2022; Deng et al., 2022; Glauber and Laborde, 2022). These consecutive crises have particularly affected women, who constitute a major share of the vulnerable and poor segment of the population (World Bank, 2021). The negative impact of RUW trade shock on women's welfare can have important implications at the individual, household and country levels, particularly in countries where women face high poverty and inequality. In South Africa for instance, poverty levels among female-headed households were already 20 percentage points (pp) higher than male-headed households before the onset of the Covid19 pandemic (Sulla and Zikhali, 2018), while individual women faced a 4 to 6 percentage points higher poverty headcount rate than men (Stats SA, 2018). Likewise, female-headed households, particularly those living in rural areas, have lower access to adequate food than their male counterparts. Unemployment is higher for women than men in all age categories (Stats SA, 2019). Women are more likely to work in a narrower range of sectors and in vulnerable sectors where they occupy lower-paid jobs and more elementary tasks, e.g., domestic workers (Espí et al., 2019; Gradín, 2018; Mosomi, 2019). During the COVID-19 pandemic, domestic chores disadvantaged women in the labour market. Gender inequalities were exacerbated as South African women bore the brunt of the crisis (Casale and Posel, 2021).

Global trade shocks affect African women in their economic triple role as workers, business owners and consumers (Korinek et al., 2021). The overall uncertainty is mainly caused by increased energy prices and inflation that depreciate local currencies and decrease foreign capital inflows. In South Africa, higher costs and reduced investments negatively affected production and employment in all industrial and service sectors (UNDP, 2022). Female workers are at a greater risk of losing employment given the more vulnerable nature of their jobs. Most South African female workers are involved in trade, logistics, transport and food supply services (Competition Commission South Africa, 2023), and are hit by increased costs of transportation and agricultural commodities. The increased prices of energy, transportation, agricultural inputs and food commodities threaten the food affordability of South African households (Matebeni, 2022; Tshitiza, 2022). The higher price of diesel increases the cost of

road transport, which is important for domestic food transportation, particularly in rural areas. This higher cost is ultimately transmitted to farmers and consumers (Matebeni, 2022). Poor and vulnerable households suffer the most from the increase in prices of wheat (Lin et al., 2023), vegetable oil (Phaleng, 2022) and chicken meat (Lubinga, 2022). Poor households spend the largest share of income on food (UNDP, 2022). Compared to richer households, the poorest households (i.e. the two bottom income quintiles) lose more (Lubinga, 2022). Facing gender wage gaps and lower salaries, women lose more purchasing power than men, and are therefore at greater risk of poverty and food insecurity.

Since the 2000s, the gendered impacts of trade on women have gained increasing interest. Early studies describe different aspects of trade impacts on women's empowerment (e.g., (Çağatay, 2001; Darity, 1995; Elson, 1999; Elson et al., 2007; Kabeer, 2001; Seguino, 2000; van Staveren, 2007)). More recent studies analyse specific aspects of gendered impacts of trade and trade reforms (Juhn et al., 2014; Shepherd and Stone, 2017; Vhumbunu, 2022), gender inequalities in labour markets (Connolly, 2022), and decision-making processes (Deschênes et al., 2020). Since the worldwide recession of the late 2000s, the impacts of global crises and trade shocks have elicited more interest (Botreau and Cohen, 2020; Horn, 2010; Quisumbing et al., 2021). For instance, studies such as (Chitiga et al. (2022) and Mabugu et al. (2023) analysed the gendered economic impact of the COVID-19 pandemic. The trade distortions caused by the RUW have created a consecutive crisis soon after the COVID-19 pandemic and affected women, particularly in developing countries. To date, only a few studies have examined the impacts of the RUW on women in developing countries. Most of them are qualitative studies. For example, (Papadavid, 2023) analyses the transmission channels of the RUW on African women and identifies their vulnerabilities related to "women's intrahousehold bargaining power; agency in small-scale farming; and access to education, employment opportunities and financial resources." (Papadavid, 2023):16. In this study, we combine a gendered computable general equilibrium (CGE) model with behavioural microeconomic analysis to examine RUW's price- and labour market-effects on South African women. We assess RUW's impact on South African women's employment, food and non-food poverty, and inequality. Concretely, (i) we use a gendered CGE model to simulate the transmission channels and quantify the macroeconomic impacts (e.g. skilled and unskilled labor, food spending) of RUW on women; By (ii) linking a behavioural micro-econometric model based on data from the fifth wave of the National Income Dynamics Study (NIDS) to the CGE model, we analyse the changes in food- and non-food poverty and income distribution of the female-headed

households, and (iii) analyse the impact on poverty and inequality among population subgroups disaggregated by gender, race and region.

## **2. Methodology and Data**

### **2.1 The CGE model and macro data**

To simulate the macroeconomic impacts of the RUW-caused trade distortions, we apply a gendered static single-country CGE model. CGE models are appropriate tools to evaluate the impacts of external shocks' impacts on the local economy and different economic agents, such as world price increases. Studies such as (Arndt et al., 2023; Hosoe, 2023; Mahlstein et al., 2022; Rose et al., 2023; Schropp and Tsigas, 2023) employ CGE models to analyse the macroeconomic impacts of RUW. Studies such as (Chitiga et al., 2022; Mabugu et al., 2023)) use gendered CGE models to analyse the impact of global economic shocks on women. In this context, we calibrate the static single-country standard model PEP 1-1 (Decaluwé et al., 2013) to South Africa's Social Accounting Matrix (SAM) for the year 2017 (van Seventer and Davis, 2019). We modify the SAM and the PEP 1-1 standard model to represent the gender dimension in the South African economy. We disaggregate the labour market by gender using the labour market shares obtained from the microeconomic panel data of the National Income Dynamics Study (NIDS) survey. To operationalise the model, we apply income elasticities from (Burger et al., 2017) and trade elasticities from (Ntombela et al., 2018). The gendered model considers ten activities and 24 commodities. The production function is a four-level nested function. At the top level, a Leontief function combines intermediate consumption and value added to produce output. At the second level, a Constant Elasticity of Substitution (CES) function combines composite labour and capital. Labour is mobile across sectors, while capital is sector-specific. At the third level, composite labour is a CES function for skilled and unskilled labour. At the bottom level, each labour type is disaggregated by gender.

To reflect the rigidity of gender roles, we follow (Fontana and Wood, 2000) and limit the substitution between female and male workers in the model by using a low value of 0.5 for the elasticity of substitution. Each activity demands capital, labour and intermediate commodities to produce output in different proportions. For instance, the manufacturing sector mainly uses intermediate commodities to produce 70 percent of its production. The agricultural sector intensively uses labour, accounting for 41.2 percent of its wage bill. Some sectors differ in their demand for male and female labour. For example, the construction sector is highly male-intensive while the service sector (i.e., community, social and personal services) is female labour intensive with major demand for unskilled female labour.

The model distinguishes between four institutions: households, firms, government, and the rest of the world. Households are disaggregated by income deciles. They receive their income from labour, capital and transfers from other institutions. The structure of households' income widely differs among different deciles. The poorest households, at the bottom of the distribution, mainly receive transfers from the government (69 percent of their income) and unskilled labour income: 14.1 percent from male unskilled labour and 10.8 percent from female unskilled labour. The richest households in the two top deciles receive income mainly from male skilled (35 per cent) and female labour (23 per cent) income and dividends from firms. Thus, if the industries most affected by the increase in world prices employ and lay off many skilled workers, then the richer households will suffer relatively more than the poorer households. Indeed, the richest households receive more than 50 percent of the total skilled wages in South Africa.

Households also differ in the share of consumption taxes, transfers to other institutions, spending and saving. The household consumption behaviour is modelled as a Linear Expenditure System (LES), subject to the household's budget constraint. The poorest households spend more than 99 percent on consumption and the highest share on food, e.g., more than 10 percent of their consumption budget on cereals (maize, wheat) and less than 1 percent on petroleum products. In contrast, the richest households spend only 55 percent on consumption, with less than 2 percent of the consumption spent on cereals and more than 5 percent on petroleum products.

Firms receive income from capital and transfers from other institutions. They pay corporate tax and dividends to other institutions and save the remainder. The government collects direct taxes from households and firms, accounting for 35 percent of its total income. It collects indirect taxes (on production, consumption and import duties) and receives transfers from other institutions (e.g., dividends and social contributions). Import taxes (e.g., levies on manufactured and transport commodities) account for less than 3 percent of the total government income. The government spends its income on non-tradable services (education, health, public administration) and pays transfers to firms and households (e.g., social aid, pensions, grants). Government savings is the difference between the government's income and what it consumes.

To link South Africa and the rest of the world, we assume the imperfect substitutability of commodities given their origin, i.e., the *Armington Assumption* (Armington, 1969). South African producers decide to supply the local market or to export. To increase their world market

share, they need to be more competitive in international markets. This is represented by a finite demand elasticity for exports. South Africa mainly imports manufactured commodities, transport services and petroleum products, and mainly exports mining and manufactured commodities. In terms of closure rules, the government's spending is exogenous. The saving by the rest of the world is likewise exogenously given. Finally, applying the small country assumption, South African markets adjust to the given world prices. We define the nominal exchange rate as numeraire.

Following (Blanchflower and Oswald, 1995)'s approach, we model unemployment with a negative slope between unemployment rates and wage rates. Similar to the results of (Blanchflower and Oswald, 1995), (Kingdon and Knight, 2007, 2004) found that in South Africa, a 10 percent increase in the unemployment rate leads to a 1 percent decrease in wages. We take female unemployment rates to be systematically higher than men at any age and skill level (Stats SA, 2019).

The resulting customised static single-country model for South Africa simulates the macroeconomic impacts for the gendered labour market and households from ten different income groups. The households are aggregated over different socioeconomic indicators. Following a top-down approach, we complement the CGE model by linking a micro-econometric model to better represent the heterogeneity among South African households and compute various indicators of poverty, inequality and food adequacy. Combining a CGE model with a micro econometric model can help acquire a more complete picture of the impact of a global price shock on the economy and the households. We link the macro and the micro models by transmitting the macroeconomic information of changes in global commodity markets and labour markets obtained from the CGE model to the micro-econometric model. First, we estimate the impact of a commodity price change from the CGE model on family poverty and income distribution by gender, region, and race. Second, we determine changes in the labour market and unemployment due to global price hikes on poverty and income distribution.

## **2.2 The micro model**

In the micro model, we simulate two channels transmitting the global commodity price shocks on households' poverty and income distribution: the price channel and the labour market channel. The micro-econometric estimations are based on the fifth wave of South Africa's nationally representative National Income Dynamics Study (NIDS) (SALDRU, 2017). The NIDS data provide information on the labour market, wages, household income and

employment, and food and non-food consumption patterns. Furthermore, the list of commodities (food and non-food) consumed at the household level (micro model) is comparable to that of the CGE model.

### **2.2.1 Indicators and weighting**

#### **Poverty measures**

Based on food and total expenditure, we compute the Foster Greer and Thorbecke (FGT) metrics (Foster et al., 2010) to estimate the status and changes in food and non-food poverty. The FGT poverty index is a commonly used tool for evaluating poverty, particularly food poverty. In addition to the headcount ratio (P0), it allows us to quantify the depth (P1) and severity (P2) of food poverty<sup>1</sup>. Estimating food poverty using food spending per capita allows us to identify those who may not have enough resources to afford a nutritionally adequate diet, an important component of food poverty assessment. Estimates of non-food poverty (lower and upper bounds) are generated based on total expenditure (food and non-food). We use the poverty lines provided by South Africa's Department of Statistics for 2017. The food poverty threshold for 2017 is 531 South African Rand (ZAR), while the lower and upper bounds for overall poverty are 758 and 1183 Rand (Stats SA, 2021). We assess overall poverty based on total expenditure per capita rather than food expenditure. Individuals with per capita total expenditures of less than 758 Rands fall below the lower poverty bound and must choose between purchasing food and important non-food items. Households with total spending above 758 but below 1,138 Rands fall below the upper poverty line and cannot afford the minimum desired lifestyle by most South Africans. Likewise, individuals with food expenditure of less than 531 Rands, the amount of money required to purchase the minimum required daily energy intake, are regarded as food poor.

#### **Weighting and inequality index**

An "equivalence scale" accounts for changes in household composition, particularly variations in the number of adults and children. The equivalent scale adjusts the consumption level based on the size and composition of the household. For instance, it is considered that larger households often require more money to maintain the same level of living as smaller ones. The square root scale produces poverty estimates based on the before-housing-cost (BHC) income metrics (MSD, 2019; Stats NZ, 2019). It is assumed that as a household grows, its members

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<sup>1</sup> The poverty and inequality measures are generated using the Stata DASP package (Araar and Duclos, 2007).



can share some resources (e.g., housing and utilities) and hence do not require as much additional income or expenditure per new adult or child. The square root scale allocates decreasing weights to the increasing number of household members. When assessing poverty using an equivalence scale, a household's total income or consumption expenditure is weighted by the household size. Comparing this weighted income or consumption expenditure to the poverty line helps determine if the household is poor or not poor. Furthermore, we compute the Gini index and percentiles ratio for various social and income groups to evaluate the change in income distribution.

### **Price transmission channel**

The extent to which a global price shock affects households in the local market relies on their consumption basket and the corresponding change in price after the shock. Households close to the poverty line can fall below the poverty line if real consumption (or income) decreases and can move above the poverty line if real consumption (or income) increases. To simulate the impact of a price shock on poverty and income inequality across various social and income groups, we estimate the extent of price change ( $PCH_i$ ) for each household ' $i$ '. We compute  $PCH_i$  based on the consumption share ( $r_{k,i}$ ) of the commodity ' $k$ ' out of total household expenditure (obtained from the micro model), and the price change ( $P_k$ ) (obtained from the CGE model). The  $PCH_i$  estimation for each household can be described as follows<sup>2</sup>:

$$PCH_i = \prod_{k=1}^K \left( \frac{P_k^1}{P_k^0} \right)^{r_{k,i}} \quad (1)$$

$P_k^0$  denotes the commodity ' $k$ ' price before the shock, and  $P_k^1$  represents the corresponding price after the shock. We use the extent of each household's price change ( $PCH_i$ ) to simulate the impact of price shock on the poverty and income distribution of various social and income groups.

### **Labour market channel**

We use propensity score matching (PSM) to model the impact of an international price shock via the labour market channel. The labour market is divided into four groups: skilled male, skilled female, unskilled male, and unskilled female. We compute the propensity scores for the

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See, for example, see (Ayaz et al., 2023) for a study that employs a similar estimation strategy.

abovementioned groups to be employed or unemployed. Those currently employed and with the lowest propensity scores are more likely to be laid off when employment decreases. In the NIDS data set, we identify individual workers in the four groups who were initially employed but were most likely to lose their jobs. We simulate the number of laid-off workers in each category to match the simulated increased unemployment.

Using the 'queuing technique', we simulate the situation in which initially employed workers with the lowest propensity score (i.e. the one most likely to lose their job) are laid off first. The process will continue until the unemployment level matches the simulated unemployment increase. Because the economic shocks affect both the formal and informal sectors, we assume that unemployed individuals do not find work in the informal sector. Consequently, all laid-off workers lose their labour income. Synchronously, with the decreased income, we reduce spending on food and total household expenditure by the corresponding marginal propensity to consume. Thus, we adjust per capita food consumption and total spending according to the income situation to assess changes in food and non-food poverty metrics.

### 2.2.2 Data Description and Poverty Profile

The NIDS 2017 data set includes information on 39,400 individuals from 10,800 households, with women accounting for 51 percent of the population. The average per capita food expenditure is 773 Rand, ranging from 807 for men to 748 Rand for women. Similarly, men's total expenditure (food and non-food) per capita of 3,966 Rand is higher than 3,582 Rand for women. According to the NIDS data set, 40.5 percent of the population (22.9 million individuals) is food insecure; the amount of money required to purchase the minimum required daily energy intake is equal to 531 Rand of food expenditure in the case of South Africa. Approximately 42 percent of South African women (12.2 million) are food-poor compared to 38.3 percent of men (10.6 million). Women are more likely to be food insecure than men, both as children (under 18) and as adults, while children (boys and girls) are more food insecure than adults. Table 1 presents the food poverty rates by gender, region, age and race. Tables A1 and A2 in Appendix A provide more details on poverty numbers.

**Table 1:** Food poverty by gender, region, and race.

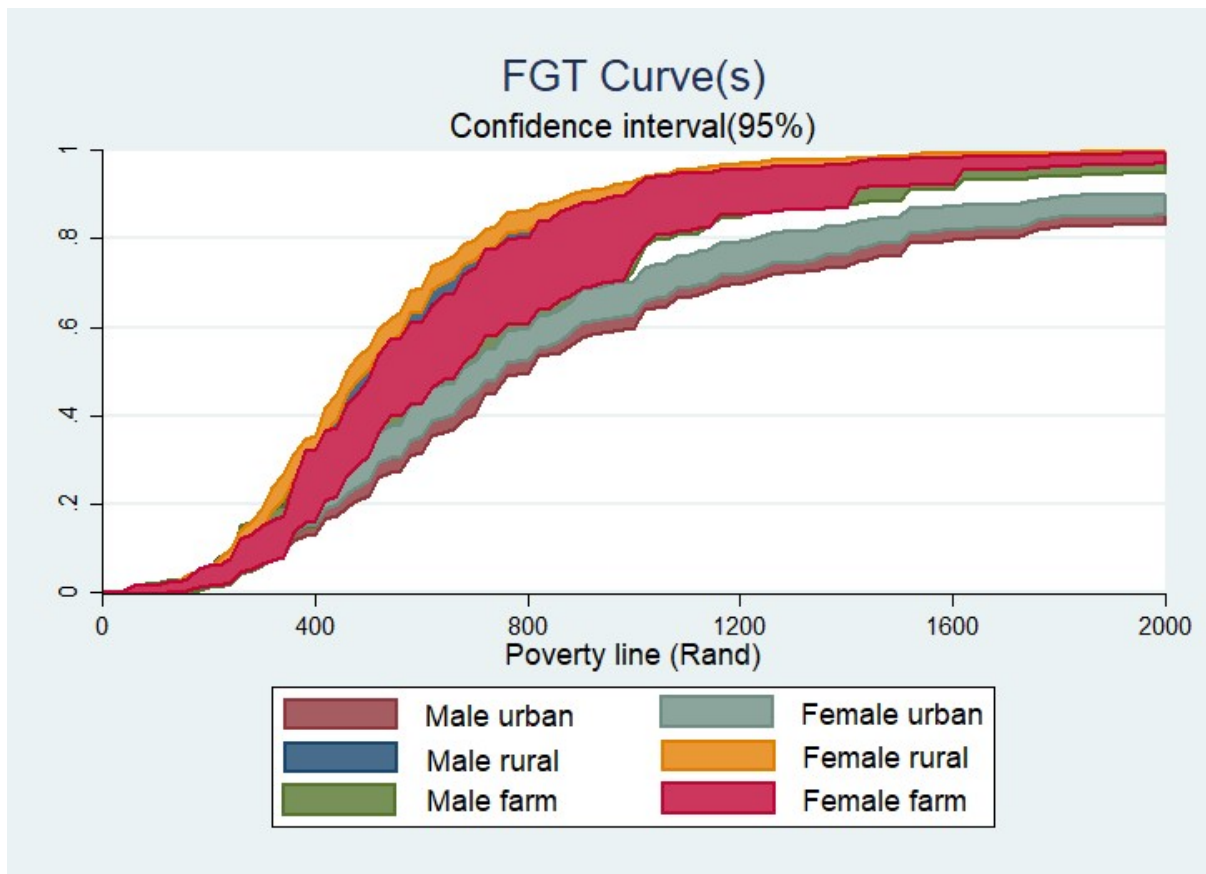
Food poverty		Non-food poverty	
Male	Female	Male	Female

Group	P0	P1	P2	P0	P1	P2	lower bound	upper bound	lower bound	upper bound
<b>Gender</b>	38.3	12	6	42	14	6	9	21.9	10.6	24.9
<b>Region</b>										
Rural	55.2	18	8	58	19	9	18.5	41.2	20.2	44.3
Urban	29.8	9.3	4	33	11	5	4.1	12.1	4.9	13.5
Farm	45.1	13	6	48	14	6	13.5	30	16.1	35.1
<b>Age</b>										
Children	45.9	15	7	47	15	7	13	29	13.7	30.3
Adults	34.2	11	5	40	13	6	6.7	18	9	22.2
<b>Race</b>										
Black African	43.2	14	6	48	15	7	10.3	25.1	12.4	28.9
Coloured	31.8	11.1	5.5	31.3	10.4	5	6.1	16.6	5	15
Asian	9.6	4.6	3.2	4.8	1.7	1	0	0	0	0.2
White	1.7	0.3	0.1	2	0.4	0.1	0.6	0.6	0.2	0.2

*Source: Authors' estimates using NIDS 2017.*

The majority of South Africa's population lives in urban areas, with the rural population accounting for 32 percent of the population. Only 4 percent are involved in farming. The higher food poverty rates and higher upper and lower thresholds for non-food poverty indicate that rural households have a lower standard of living than urban households. Rural areas have the highest food poverty rate (55.7 per cent), followed by farm households (46.4 per cent). The urban population's standard of living is substantially better than that of rural and farm households. Figure 1 shows that the poverty headcount rate (P0) is significantly higher in rural areas at all poverty levels. The female poverty headcount is about three percentage points (pp) higher than the male rate. Poverty is particularly high among females in farm households.

**Figure 1:** Food poverty incidence curves by region and gender.



*Source: Authors' estimates using NIDS 2017.*

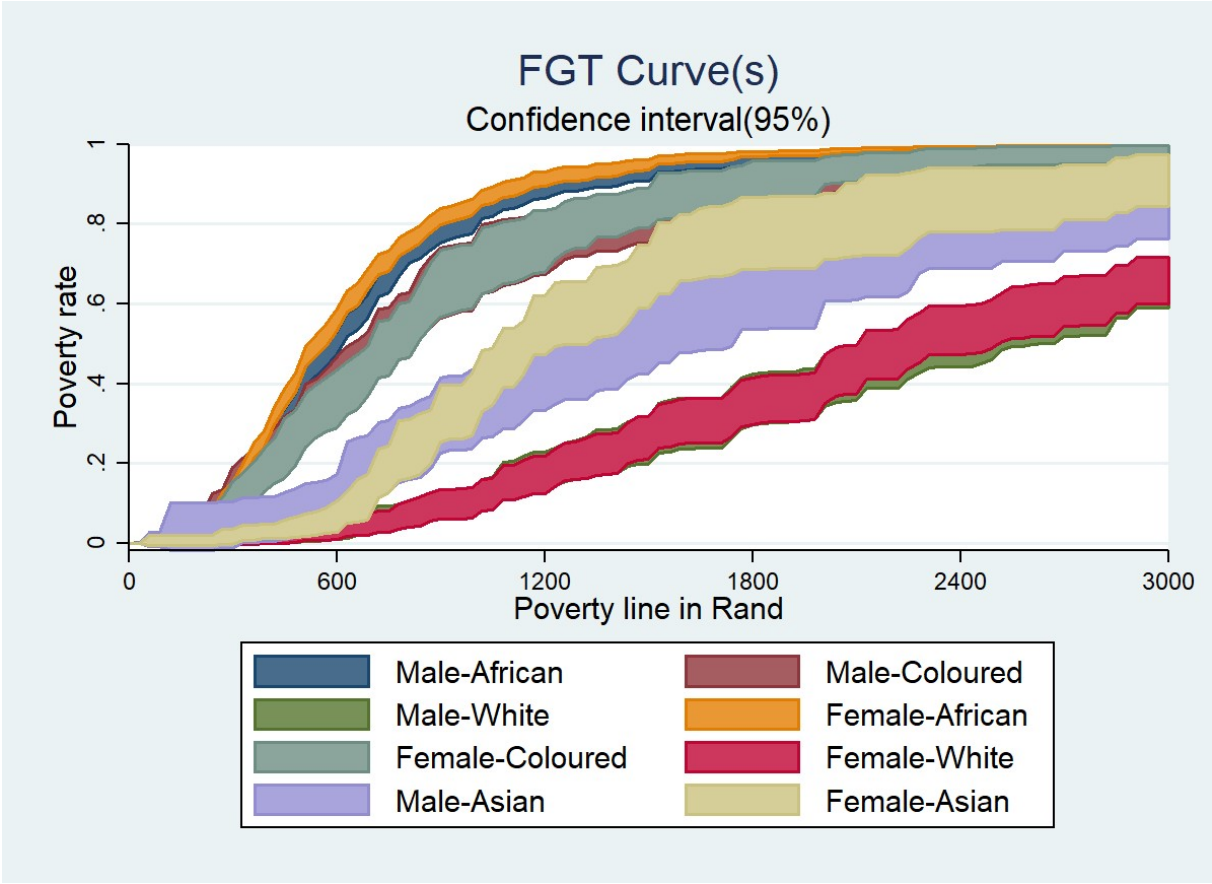
South Africa has a long history of racial segregation and apartheid, with important consequences on the economic and social well-being of various ethnic groups. The country's population can be classified into four racial groups: Black African, Coloured, Indian/Asian, and White. Around 80 percent of South Africans are Black African, 8.8 percent are Coloured, 2.5 percent are Indian/Asian, and 8 percent are White. Black Africans have historically endured institutional prejudice and economic disadvantage. They have a far higher food poverty rate (45.8 per cent) compared to the Coloured (31.5 per cent), Indian/Asian (7.2 per cent) and the White population (1.8 per cent). The difference between the male and female poverty rate is the greatest among the Black African population (43 percent for females, 48 percent for males). Surprisingly, poverty (both food and non-food) is somewhat higher among Coloured and Indian/Asian males than among females<sup>3</sup>.

The disparity in poverty by racial groups is more pronounced than that by regions. The disparity in food poverty headcount between Black Africans, Whites, and Indians/Asians is

<sup>3</sup> These statistics need to be read with caution: Indian/Asians account for only 1.7 percent of the sample size (754 individuals out of 45,273 surveyed individuals). Splitting the sample by gender renders the data non-representative.

approximately 44 percent and 38.6 per cent, respectively, compared to 14.3 percent between Black Africans and the Coloured. This disparity persists at all levels, peaking at the poverty threshold of 1,000 Rand. Even though poverty is highest among Black African women, the disparities within Coloured, Asian and White women are more visible than that of White and Indian/Asian (Figure 2).

**Figure 2:** Food poverty incidence curves by race and gender.



Source: Authors' estimates using NIDS 2017.

Besides food poverty, we assess overall poverty based on total expenditure per capita rather than food expenditure. We utilise the poverty bounds defined by the South African Department of Statistics. Individuals with per capita total expenditures of less than 758 Rands fall below the lower poverty bound and must choose between purchasing food and important non-food items. Households with total spending above 758 but below 1,138 Rands fall below the upper poverty line and cannot afford the minimum desired lifestyle by most South Africans. According to estimates, the overall poverty headcount is 9.8 percent on the lower poverty bound and as high as 23.5 percent on the upper poverty bound. Based on the lower and upper poverty bounds, female poverty rates are 12.4 and 28 per cent, which are substantially higher than that of males, i.e., 10.3 and 25.1 per cent.

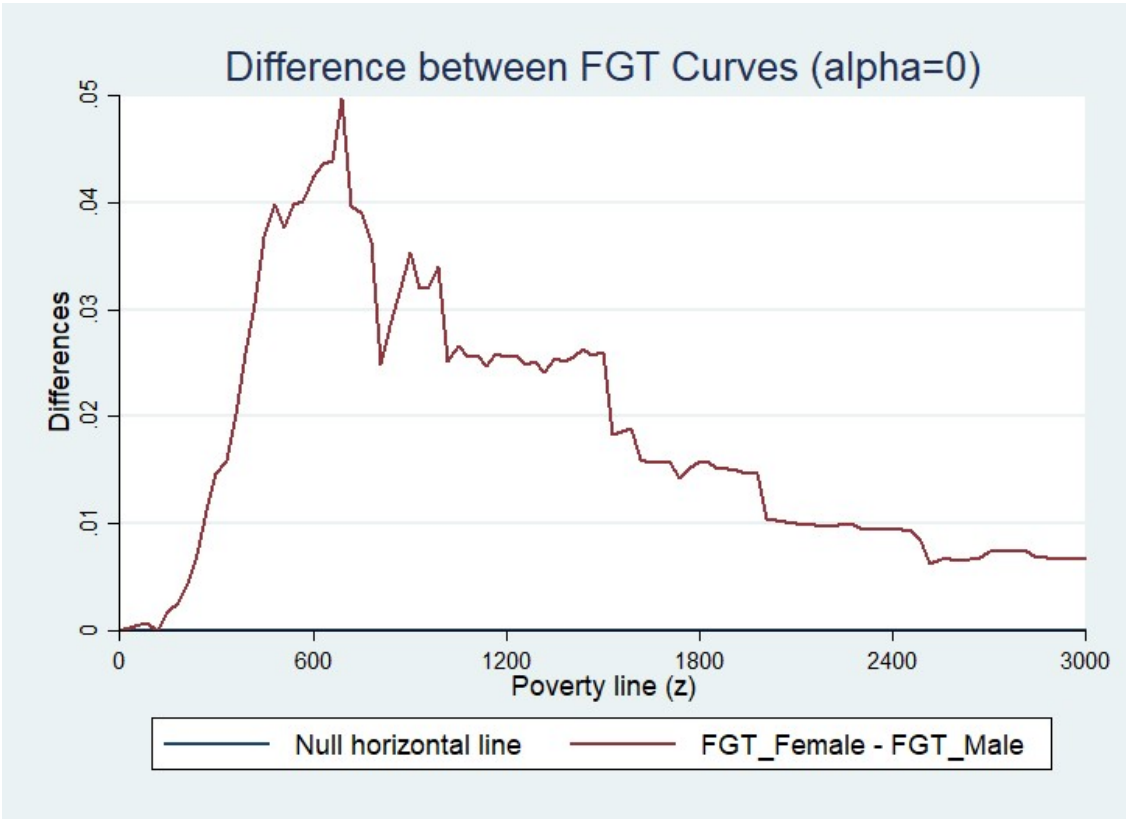
Again, females in rural areas are more likely to be poor than all other segments of society, with lower and upper-bounds non-food poverty levels of 20.2 percent and 44.3 per cent, respectively. In rural areas, the women's poverty rate is 1.7 and 3.1 pp higher than men's based on lower and upper poverty bounds, respectively. This gap is smaller for the urban population (0.8 to 1.4 pp)

and greater for the farming households (2.5 to 5.1 pp). More importantly, because approximately 24 percent of the population lives in poverty, a sizable percentage of the population is vulnerable to any profound economic shock. Moreover, Black Africans and Coloured groups are less secure (around 11 and 6 per cent) than the white and Indian/Asian population which has a poverty rate of below 1 per cent. However, the population of Black Africans (particularly women in rural areas) which represent the majority of the population, are the most vulnerable group of the society in terms of both food and non-food poverty.

### **2.2.3 Gendered food poverty**

According to the poverty statistics mentioned above, females are more vulnerable than males in every class of society except for the Coloured group. Figure 3 shows that female food poverty is always higher than men's. This poverty gap between males and females reaches a maximum of 5 pp around the poverty threshold of 650 Rands. Socioeconomic and cultural factors play an important part in understanding the difference between genders in poverty. South African women are more occupied with caregiving and housekeeping duties. Thus, they are more likely to be economically inactive than men. According to NIDS 2017, 47 percent of women are economically inactive compared to 32 percent of men. Even among those who are economically active, only 38 percent of women work compared to 56 percent of men. Furthermore, female employees earn 4.4 percent less per month (10,595 Rands) than male employees (11,060 Rands). Consequently, women have a lower average monthly per capita income (7,032 Rands) than men (7,758 Rands). Men have higher food spending and lower poverty rates at all levels of poverty than women. According to the NIDS 2017 data, men in all ten deciles have higher food spending per capita than women in the corresponding deciles (Figure A1, Appendix A).

**Figure 3:** Estimated difference between male and female food poverty



Note: The y-axis represents the percentage points difference in Female—male poverty rates, and the x-axis shows the various poverty lines in ZAR.

Source: Authors’ estimates using NIDS 2017.

**3 Results and discussion**

**3.1 Macro and sectoral results**

Using the CGE model, we simulate the increase in world prices for crude oil (+ 41%), fertiliser (+ 27%), maize (+20%), and vegetable oil (+7%). These price increases were observed between March 2023 and March 2022 (World Bank, 2023).

The increase in world prices impacts South Africa's via consumption and exports. Increased import prices drive higher prices for industries and households demanding the products for intermediate consumption (e.g., petrol, fertiliser) or final consumption (e.g., vegetable oil, maize). Increased export prices stimulate the domestic production and export of the corresponding products. Table 2 presents the macroeconomic impacts caused by the price increase. The large increase in import prices and South Africa’s dependency on crude oil and fertiliser imports dramatically affects the South African economy, translating into a decrease in



GDP by 0.26 percent (Table 2). First, given the economy's dependency on imported oil, there is an increase in production costs for different activities. The increase in production costs will be even more significant as the sector depends on oil—for instance, prices for intermediate commodities increase by 2 percent in the transport sector. Consequently, firms reduce their production and lay off workers. This reduction of workers leads to a decrease in their wage rate. At the same time, households face an increase in the consumer price index, leading to a drop in their real consumption.

**Table 2:** Macroeconomic impact (in per cent)

Economic indicators	Percentage Change
Total labour demand	-0.48
Real Gross Domestic Product (GDP)	-0.26
Consumer Price Index (CPI)	1.32
Total investment	0.78

Source: Results from the CGE model.

Almost all sectors in South Africa are negatively impacted by the increased import prices of oil. For example, the transport sector, which relies heavily on petrol, faces a decline in its production by 0.7 per cent. When reducing their production, sectors lay off workers and reduce their intermediate consumption from other sectors, reinforcing the negative impact of rising world prices. The increase in fertiliser and fuel prices raises the production costs for the agricultural sector. Nevertheless, agricultural production expands because of increased export prices for agricultural commodities. Consequently, agriculture hires more workers to supply the increased export demand. Moreover, the sector spends 26 percent of its intermediate consumption on manufactured goods and thus stimulates the demand for manufacturing industries.

The net effect of reduced labour demand from the contracting sectors and increased labour demand from the expanding sectors is negative, with a drop of 0.48 percent of total hired labour. The demand for unskilled workers decreases by 0.6 per cent, relatively more than the demand for skilled workers, with a drop of 0.5 per cent. The gender impact differs by skills. For unskilled labour, the demand for male labour force decreases relatively more than for female labour. Contraction of the male labour-intensive transport and construction sectors drives the decrease in demand for unskilled male labour. For skilled labour, however, the demand for female labour is reduced more than that of their male counterparts.

Households' nominal income increases because of the increase in nominal wages and government transfers. The nominal income of the poorest households increases more than that of the richer households. They receive increased indexed transfers from the government, contributing to more than 60 percent of their income. However, given the sharp increase in consumer prices, households real consumption decreases for all the different categories of households. Interestingly, the richest households reduce consumption more relative to the poorer households. Unlike poor households, which receive a high share of income from transfers, richer households receive more income from labour and capital, which are negatively impacted (transfer effect). Furthermore, richer households have a different structure of spending than poor households, with a higher share of petroleum products.

**Table 3:** Households real consumption (%)

Income deciles	Real consumption
hhd0	-0.23
hhd1	-0.29
hhd2	-0.35
hhd3	-0.43
hhd4	-0.52
hhd5	-0.64
hhd6	-0.78
hhd7	-0.85
hhd8	-0.93
hhd9	-0.94

Source: Results from the CGE model.

## 3.2 Micro results

### 3.2.1 Effects of price shocks on poverty

Table 4 shows the food- and overall-poverty effects (lower and upper bounds) of the global price shock. The results suggest that the aggregate (price and labour market) impact of the shock increases food poverty by 0.9 percentage points, implying that approximately 0.5 million persons fall newly below the food poverty line. The impact on poverty headcount (P0) is similar across genders, with men and women experiencing 0.9 and 0.8 pp increase. Nonetheless, the impact on food poverty's depth (P1) and severity (P2) is greater for women than men. Food poverty depth (P1) and severity (P2) increased for men by 0.8 and 0.7 pp and for women by 1.0 and 0.9 pp (Table 4). Furthermore, there is a 1.0 and 0.8 pp increase in the lower and upper poverty bounds, respectively, which corresponds to pushing an additional 0.565 and 0.452

million persons below the lower and upper poverty bounds. Based on the lower poverty bound, the impact on women is 0.3 pp higher than that on men (1.0 pp for women, 0.7 pp for men). Nonetheless, the impact on the higher poverty bound basis is the same for both genders, i.e., an increase of 0.8 pp.

Moreover, the rural population (both men and women) is the most affected with a 1.9 pp increase in food poverty. Though the change for both genders is the same (1.9 pp), women are affected in greater numbers (0.18 million) than men (0.15 million). Furthermore, the increase in depth and severity of poverty is slightly higher for women (2.5 and 2.4 pp) than for men (2.3 and 2.1 pp). Likewise, in rural-farm areas, women see a larger relative increase in poverty headcount, depth, and severity than men.

**Table 4:** Percentage point change in poverty rate due to the shock's aggregate impact.

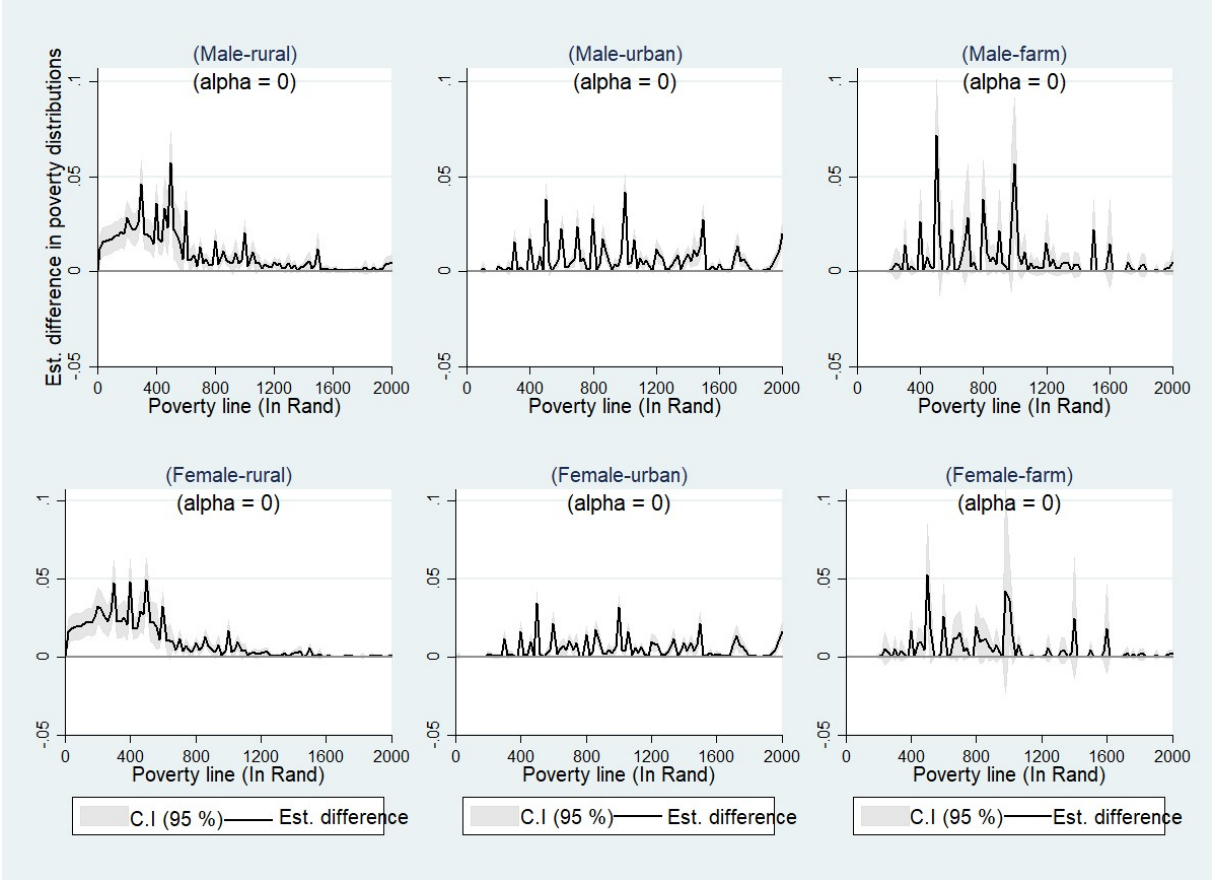
Groups	Food poverty						Lower and upper-bound poverty			
	Male			Female			Male		Female	
	P0	P1	P2	P0	P1	P2	lower bound	upper bound	lower bound	upper bound
<b>Gender</b>	0.9	0.8	0.7	0.8	1	0.9	0.7	0.8	1	0.8
<b>Region</b>										
Rural	1.9	2.3	2.1	1.9	2.5	2.4	2.2	1.7	2.7	1.9
Urban	0.4	0.2	0.1	0.3	0.2	0.2	0	0.3	0.1	0.2
Farm	0.4	0.3	0.2	0.6	0.4	0.2	0.6	0.7	0.8	0.8
<b>Age</b>										
Children	1.6	1.1	1	0.8	1.2	1	1.2	0.9	1.2	1
Adults	0.5	0.7	0.6	0.8	0.9	0.6	0.5	0.7	1	0.7
<b>Race</b>										
Black										
African	1.1	1	0.9	1	1.2	1.1	0.9	0.80	1.3	0.90
Coloured	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.30
Asian	0	0.1	0.1	0.1	0.1	0	0	0.6	0	0.4
White	0	0.1	0	0	0.1	0	0	0.00	0	0.00

*Source: Authors' estimates using NIDS 2017.*

Figure 4 substantiates these findings in terms of food poverty headcount, demonstrating that rural females and males are the most affected by the shock. The impact is the greatest (about 2 pp) between the 300-to-500 Rand per capita food expenditure poverty line, diminishing beyond 800 Rand.

The impact on urban and farm regions is minimal. Females in all three regions (rural, urban, and farm) are much poorer, both on the lower and upper bound than males. Furthermore, based on the lower poverty bound, the increase in rural poverty (2.7 pp) is significantly greater than that of farm (0.8 pp) and urban poverty (0.1 pp). This suggests that rural areas are more affected than urban and farm areas. Women are affected more by the depth and severity of poverty and the upper and lower poverty bounds. Nonetheless, in rural areas, the impact is similar for both genders.

**Figure 4:** Impact on food poverty by gender and region.

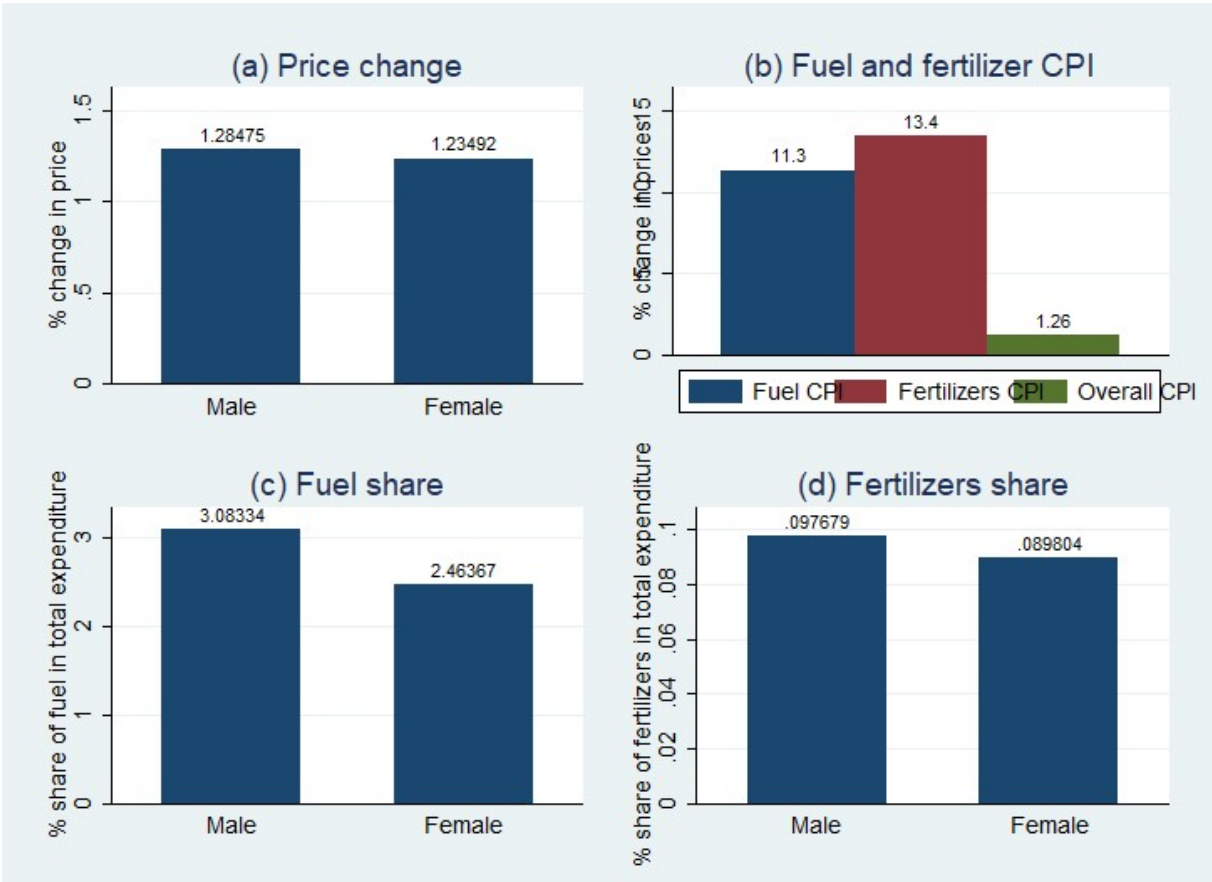


Note: the y-axis represents the estimated difference in poverty distribution (in percentage points) before and after the shock, while the x-axis shows the various poverty lines in Rands.

Source: Authors' estimates using NIDS 2017.

The local price increase is marginally higher for men (1.285 per cent) than for women (1.235 per cent) (Figure 5-a). This owes, in part, to a double-digit increase in the price of gasoline and fertilisers in the local market (by 11.3 and 13.4 per cent) compared to an overall price increase of 1.26 per cent (Figure 5-b). Compared to women, men are more involved in farming, transportation, and other related tasks that require more fuel and fertilisers. Consequently, they have a higher share of gasoline and fertilisers in their consumption basket (3.1 and 0.1 per cent) than women (2.46 and 0.09 per cent) (Figures 5-c and -d).

**Figure 5:** Relative change in price and share of fuel and fertilisers by gender.



Source: Authors' estimates using NIDS 2017.

The labour market shock affects women disproportionately more than men. The negative effect of the labour market reduces per capita food spending by 0.78 percent for men and 0.99 percent for women. About 0.41 million women (58 percent of the overall affected population) lost their jobs due to the labour market shock compared to 0.28 million men (42 per cent). Thus, women are disproportionately affected than men as a result of labour market shock. In South Africa, 12.2 million females are food-poor compared to 10.6 million males. Females have lower per capita food and total expenditure than men across all ten income deciles (Figure A1, appendix A). The food expenditure of females in the first decile (210 Rands) is particularly low compared to that of males (221 Rands). As discussed above, the impact on the labour market is the greatest among the women in the first decile, with an average effect of -2.7 percent change in employment as a percent of the total active labour force, compared to -1.7 percent for men. The global price shock disproportionately affects the rural population because price and labour market changes affect the rural population more than the farm and urban population (Figure 4 and Table 4). The simulated increase in international prices raises local prices in rural areas by 1.32 percent compared to 1.29 and 1.22 per cent in urban and farming areas. Furthermore, the

negative effect of the labour market reduces real average food spending in rural areas by 2.67 percent but does not decrease average food spending in farming and urban areas.

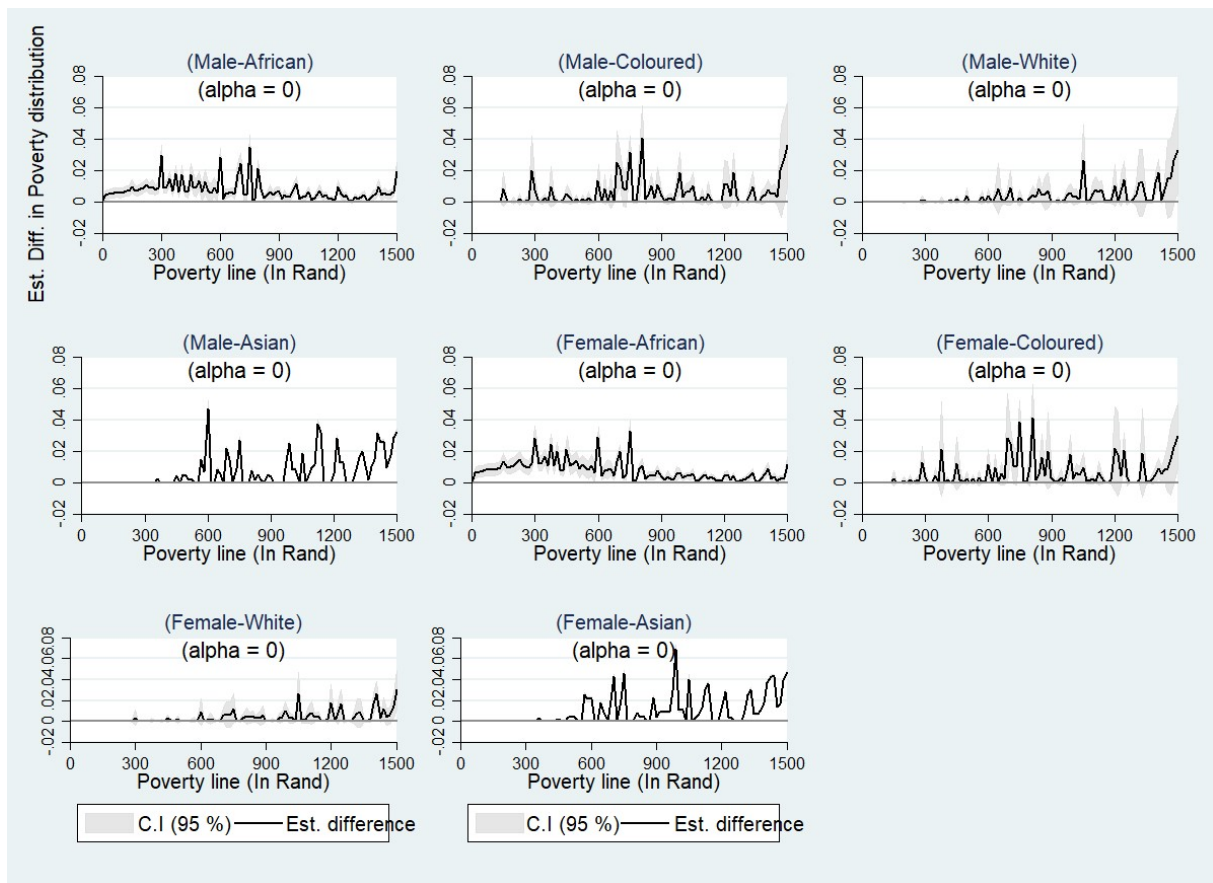
Poverty in South Africa is highly concentrated among Black Africans, accounting for 94 percent (20.9 million) of the country's population living below the food poverty line. Table 1 shows that 43.2 percent of Black African males and 48.3 percent of Black African females are poor. Compared to 45.8 percent of Black Africans who live below the poverty line, 31.5, 7.2 and 1.8 percent of the Coloured, Indian/Asian and White population live below the poverty line, respectively (Table 4). The density distribution of food spending per capita by race and gender reveals that a large proportion of the Black African and Coloured population lives on less than 530- and 700-rand per capita food expenditure. Asian/Indian and White populations spend substantially greater amounts, i.e., over 1,000 and 2,000 Rands per capita. On average, Black African and Coloured spend significantly less on food (approx. 700 and 964 Rand per capita) than Asian/Indian and White (approx. 1,590 and 2,923 Rands). Average per capita food spending tends to be lower for females than for males across all three racial groups.<sup>4</sup>

The impact on poverty is the highest for Black Africans (more than 1 pp) while marginal for the Coloured, Asians and the White population (0.2 pp or less) (Figure 6). The impact is the greatest around the income group between 300 and 500 Rands per capita. The impact on Black African men and women is similar in terms of food poverty headcount, but the impact is more severe for women in terms of food poverty depth and severity and the lower and upper poverty bounds (Table 4). Likewise, children, as a vulnerable population, are more affected by the shock (with an increase of 1.2 pp) than adults (an increase of 0.7 pp).

**Figure 6:** Impact on food poverty by gender and race.

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<sup>4</sup> The average per capita food expenditure for females is around 8 percent less than that of males (748 and 807 Rands). Female Black Africans, Coloured, Asian/Indian, and White spend 618, 829, 1,476 and 2,661 Rands per capita on food, which is substantially lower than that of per capita food spending by males, i.e., 643, 891, 1,553 and 2,941 Rands, respectively. For more details, see Figure A2, Appendix-A.



Note: the y-axis represents the estimated difference in poverty distribution (in percentage points) before and after the shock, while the x-axis shows the various poverty lines in Rands.

Source: Authors' estimates using NIDS 2017.

### 3.2.2 Effects on income inequality

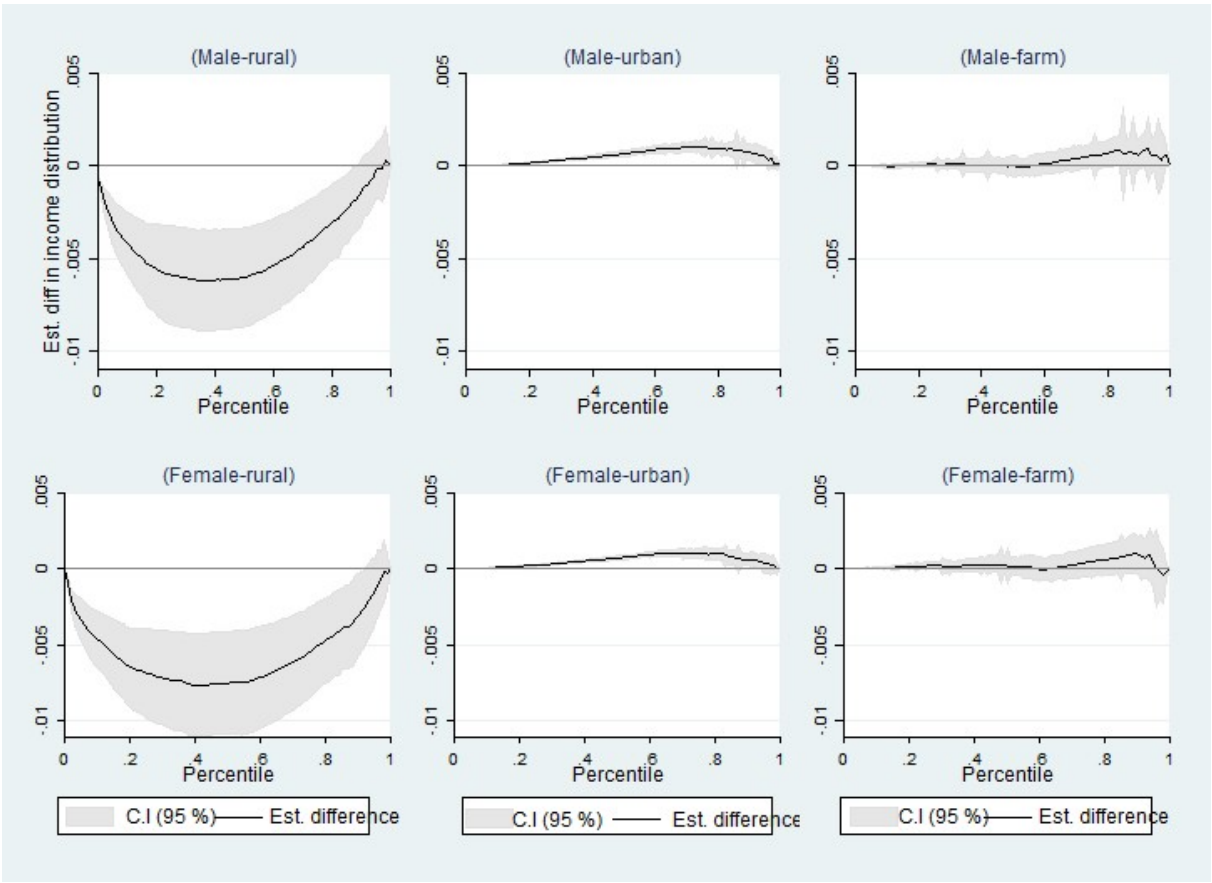
South Africa has one of the highest levels of income inequality in the world, with a Gini of 0.6045 (0.6066 among men, 0.6011 among women). While the RUW price shock exacerbated income inequality across both genders, the increase is significantly greater for females (increase in Gini by 0.0016 points) than for males (0.000664 points). The estimated difference in Gini values before and after the RUW shock is significant at the 1 percent level for women and the 10 percent level for men.<sup>5</sup> This suggests that females are more affected by the shock than males, particularly those who fall in the lower income deciles.

Figure 7 shows the impact on the income distribution by location. Although the real income of all sections of society declined due to the price shock, the relative change in income distribution for various income classes exhibits a different picture. The fall in the income share is the greatest among the income groups between the 20th and 50th percentiles of the rural population. Rural women experience a greater decline in income than men. In urban areas, in contrast, the

<sup>5</sup> For more details, see Table A3 in Appendix A.

income share of individuals in the upper half (50th-100th percentiles) of the income distribution increased marginally, both for men and women. Similarly, the income share of individuals in the upper deciles (70<sup>th</sup>-100<sup>th</sup> percentiles) of farm households increased, both for men and women. We find that income inequality increased more noticeably for rural women (increase in Gini by 0.011 points) than for rural men (increase in Gini by 0.009 points) but decreased marginally for urban men and women (decrease in Gini by 0.001). Nonetheless, the estimated change in inequality for farm households is statistically insignificant.<sup>6</sup> The decrease in urban income inequality owes, in part, to the lower share in fuel expenditure and the smaller rise in CPI for the lower income (1 – 5) deciles compared to that of higher (6-10) deciles.<sup>7</sup>

**Figure 7:** Estimated difference by income percentile before and after the shock.



Source: Authors’ estimates using NIDS 2017.

**4 Conclusion and policy recommendations**

<sup>6</sup> see Table A3 in Appendix A for details.  
<sup>7</sup> For more details, see Figure A3 in Appendix A.



The latest war between Russia and Ukraine began in February 2022 when Russian forces invaded parts of the Ukrainian territory. Given that both countries are important suppliers of several commodities (e.g., crude oil, cereals, vegetable oil, fertilisers), the conflict directly impacted consumers worldwide through supply shortages and price hikes. Vulnerable populations of the importing countries more acutely felt the impact. This is particularly the case in countries such as South Africa, where inequalities are high (Income Gini: 0.6045) and poverty is concentrated in specific population segments. 40.5 percent of South Africa's population (about 22.88 million) lives below the food poverty line, 94 percent of which are Black African. Poverty rates are higher among women, especially those living in rural areas and those from Black African ethnic groups.

In this study, we use the macro CGE model and micro econometric simulation to evaluate the impacts of the Russia-Ukraine war (RUW) on South African women by measuring changes in their levels of food poverty, lower and upper-bounds poverty, and income distribution. On the micro side, we derive labour market segregation using nationally representative microeconomic panel data from the National Income Dynamics Study 2017. We use the FGT metric to estimate food and non-food poverty estimates (lower and upper bounds poverty) based on the adult equivalent square root scale method.

Our key findings are as follows:

First, local prices increased by 1.32 percent following the global price shock, while labour demand and Real GDP decreased by 0.48 percent and 0.26 per cent, respectively. Men's per capita food spending fell by 0.78 per cent, and women's by 0.99 per cent. Women accounted for 58 percent of jobs lost due to the labour market effect.

Second, approximately 0.508 million persons (0.9 percentage points) fell below the food poverty line following the shock. While the impact in terms of poverty headcount (P0) is similar across genders, the increase in the depth (P1) and severity (P2) of food poverty is greater among women (1.0 and 0.9 percentage points) than among men (0.8 and 0.7 percentage points).

Third, based on the lower poverty bound, the impact on women (1 percentage point) is higher than that on men (0.7 percentage point). The impact is similar across genders on the upper bound. More rural women were affected (183.8 thousand) than rural men (158.8 thousand). The increase in the depth and severity of poverty is significantly greater for women (2.5 and 2.4 percentage points) than for men (2.3 and 2.1 percentage points).

Fourth, the increase in poverty is the strongest among Black Africans (over 1 percentage point) and negligible among the Coloured (0.2 percentage point) and the White (0.1 percentage point). The poverty impact is more pronounced among women, both in terms of the depth and severity of food poverty as well as the lower and upper poverty bounds.

Finally, while the shock exacerbated income inequality for both genders, the increase in income inequality among women (Gini diff = 0.0016) is significantly higher than for men (Gini diff = 0.000664). Inequality among rural women increased more than it did for rural men, while the change in inequality in urban areas was similar across genders.

These findings highlight the need to protect women, particularly those among the Black Africans and those living in rural areas, to better fight the price and labour market shocks arising from a major international conflict such as the Russia-Ukraine war. For this purpose, the social protection programme can be made more responsive and better targeted to assist the segments of the population more at risk of falling into poverty and food insecurity due to rising prices and a deteriorating labour market.

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## Appendix A

List of additional tables

**Table A1:** Food poverty numbers before and after the shock (in thousands)

Group	Pop Share	Pop in numbers	Initial Pov.No	Poverty changes due to transmission channel		
				Price	Income	Combine
<b>Gender</b>						
1: Male	48.94	27652.4	10590.9	165.9	110.6	248.9
2: Female	51.06	28850.3	12232.5	115.4	115.4	230.8
<b>Region</b>						
1: Male rural	14.8	8362.4	4616.0	66.9	92.0	158.9
2: Male urban	32.05	18109.1	5396.5	72.4	0.0	72.4
3: Male farm	2.08	1175.3	530.0	4.7	0.0	4.7
4: Female rural	17.13	9678.9	5613.8	67.8	125.8	183.9
5: Female urban	32.21	18199.5	6078.6	54.6	0.0	54.6
6: Female farm	1.72	971.8	461.6	5.8	0.0	5.8
<b>Age</b>						
1: Male children	17.33	9791.9	4494.5	97.9	58.8	156.7
2: Female Children	17.22	9729.8	4592.4	29.2	48.6	77.8
3: Male adults	31.61	17860.5	6108.3	35.7	35.7	89.3
4: Female adults	33.85	19126.1	7650.5	76.5	76.5	153.0
<b>Race</b>						
1: Male-African	39.56	22,352.4	9,656.2	156.5	89.4	245.9
2: Male-Coloured	4.25	2,401.3	763.6	4.8	0.0	4.8
3: Male-Asian	1.26	711.9	68.3	0.0	0.0	0.0
4: Male-White	3.84	2,164.1	36.7	0.0	0.0	0.0
5: Female-African	41.31	23,341.2	11,273.8	116.7	116.7	233.4
6: Female-Coloured	4.52	2,553.9	799.3	7.7	0.0	7.7
7: Female-Asian	1.21	683.6	32.8	0.7	0.0	0.7
8: Female-White	4.05	2,288.3	45.7	0.0	0.0	0.0
Population	100	56,496.9	22,881.23	282.5	226.0	508.5

*Source: Authors estimates from using NIDS 2017*

**Table A2:** Lower and upper poverty bounds numbers before and after the shock (in thousands)

Group	Pop Share	Pop in numbers	lower bound poverty				upper bound poverty			
			Initial Pov.No	Poverty changes due to transmission channel			Initial Pov.No	Poverty changes due to transmission channel		
				Price	Income	Combine		Price	Income	Combine
<b>Gender</b>										
Male	48.94	27652.4	2488.7	83.0	110.6	193.6	6055.9	165.9	55.3	221.2
Female	51.06	28850.3	3058.1	115.4	173.1	288.5	7183.7	144.3	86.6	230.8
<b>Region</b>										
Male rural	14.8	8362.4	1547.0	75.3	117.1	184.0	3445.3	100.3	33.4	142.2
Male urban	32.05	18109.1	742.5	0.0	0.0	0.0	2191.2	54.3	0.0	54.3
Male farm	2.08	1175.3	158.7	7.1	0.0	7.1	352.6	8.2	0.0	8.2
Female rural	17.13	9678.9	1955.1	87.1	183.9	261.3	4287.8	106.5	77.4	183.9
Female urban	32.21	18199.5	891.8	18.2	0.0	18.2	2456.9	36.4	0.0	36.4
Female farm	1.72	971.8	156.5	7.8	0.0	7.8	341.1	7.8	0.0	7.8
<b>Age</b>										
Male children	17.33	9791.9	1272.9	58.8	58.8	117.5	2839.7	68.5	19.6	88.1
Female children	17.22	9729.8	1333.0	38.9	77.8	116.8	2948.1	68.1	29.2	97.3
Male adults	31.61	17860.5	1196.7	35.7	71.4	89.3	3214.9	107.2	17.9	125.0
Female adults	33.85	19126.1	1721.4	76.5	114.8	191.3	4246.0	76.5	38.3	133.9
<b>Race</b>										
Male-African	39.56	22,352.4	2302.3	89.4	111.8	201.2	5610.5	156.5	22.4	178.8
Male-Coloured	4.25	2,401.3	146.5	2.4	0.0	2.4	401.0	2.4	0.0	2.4
Male-Asian	1.26	711.9	0.0	0.0	0.0	0.0	0.7	4.3	0.0	4.3
Male-White	3.84	2,164.1	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0
Female-African	41.31	23,341.2	2894.3	116.7	186.7	303.4	6745.6	140.0	70.0	210.1
Female-Coloured	4.52	2,553.9	125.1	5.1	0.0	5.1	383.1	7.7	0.0	7.7
Female-Asian	1.21	683.6	0.7	0.0	0.0	0.0	1.4	2.7	0.0	2.7
Female-White	4.05	2,288.3	4.6	0.0	0.0	0.0	4.6	0.0	0.0	0.0
Population	100	56,496.9	5536.7	226.0	339.0	565.0	13276.8	339.0	113.0	452.0

Source: Authors estimates from using NIDS 2017

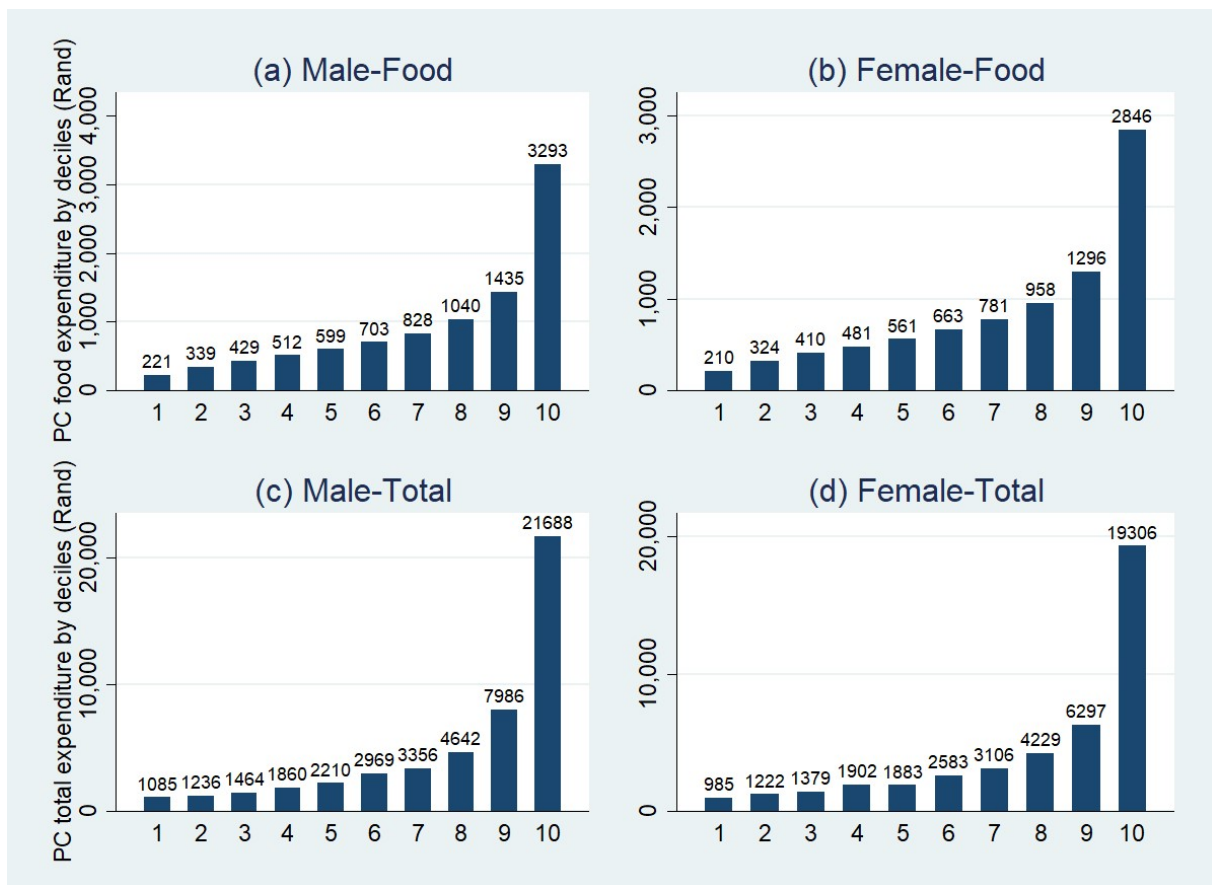
**Table A3:** Estimated difference in Gini values before and after the shock by gender.

	Male				Female			
	Before	After	Difference	P-value	Before	After	Difference	P-value
<b>Gender</b>	0.6065	0.6072	0.00066	0.090	0.6011	0.6027	0.00156	0.009
<b>Region</b>								
Rural	0.484	0.493	0.009	0.000	0.476	0.487	0.011	0.000
Urban	0.599	0.5987	-0.0011	0.000	0.594	0.593	-0.001	0.000
Farm	0.485	0.485	-0.0004	0.199	0.477	0.477	-0.000	0.365

Source: Authors' estimates using NIDS 2017.

## List of additional figures

Figure A1: Per capita food expenditure deciles by gender.

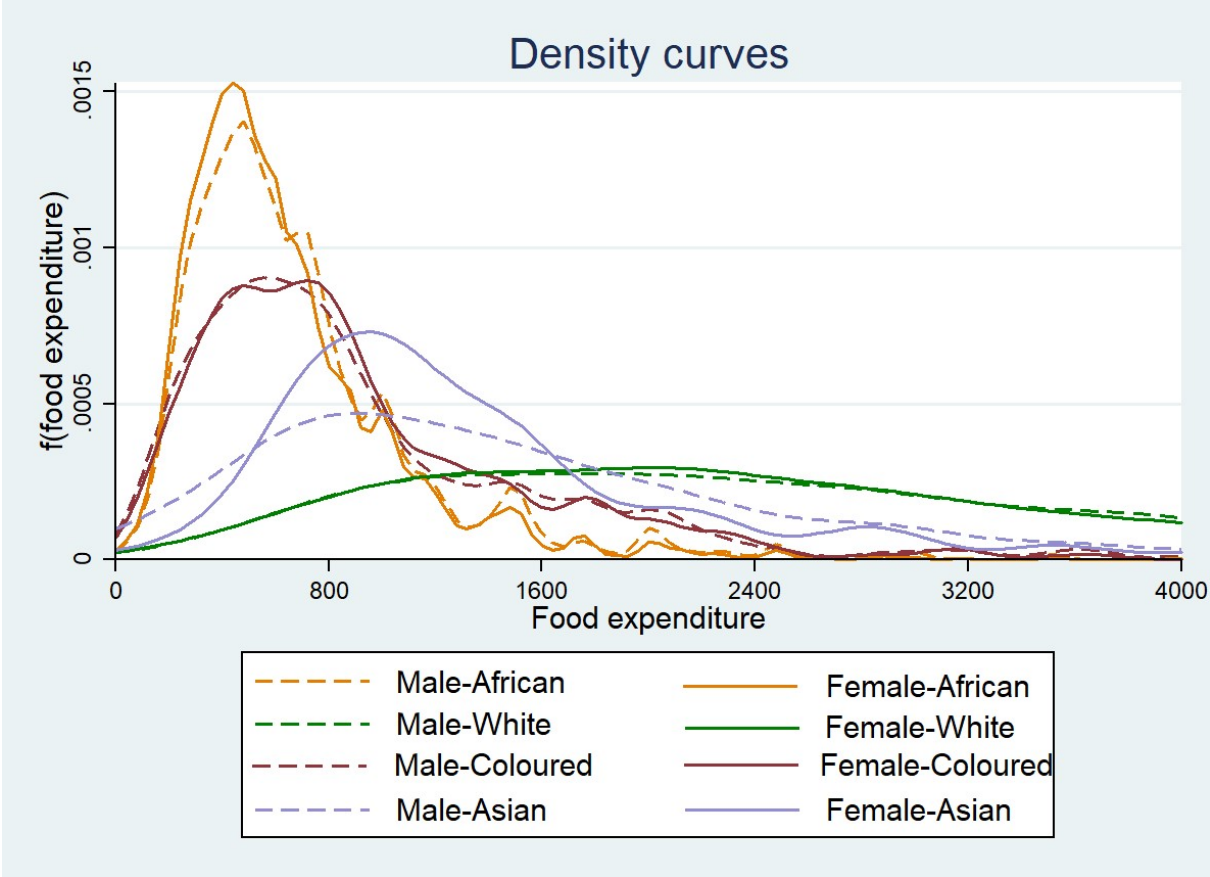


Note: The y-axis shows the per capita food and total expenditure in Rands, while the x-axis shows the deciles by food expenditure.

Source: Authors' estimates using NIDS 2017.

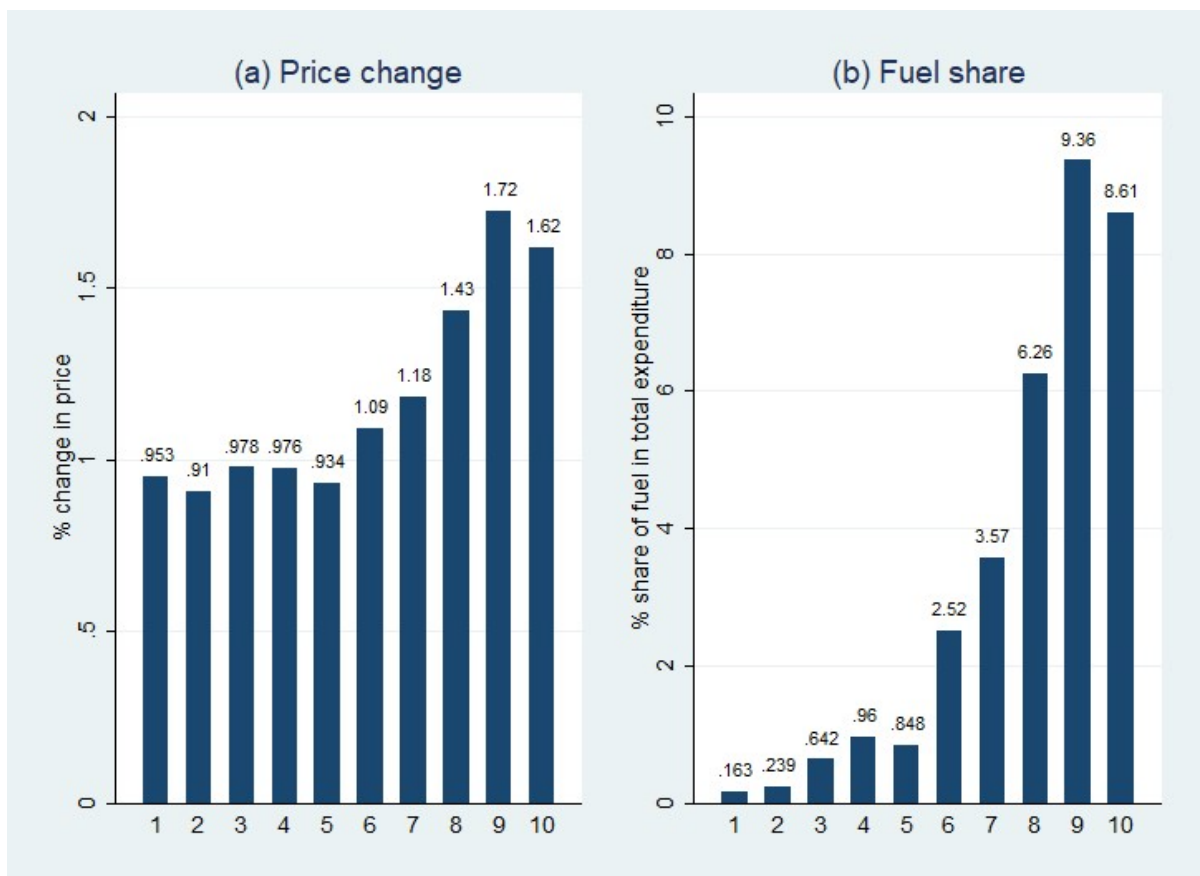


Figure A2: Density plot of per capita food expenditure by race and gender.



Source: Authors' estimates using NIDS 2017.

Figure A3: Relative change in price and share of fuel in urban regions by expenditure deciles.



Note: The y-axis shows the percentage change in prices and share of fuel in total expenditure, while the x-axis shows the deciles by total expenditure.

Source: Authors' estimates using NIDS 2017.