Energy for Sustainable Development 71 (2022) 54–63

Contents lists available at ScienceDirect

Energy for Sustainable Development

The winners, losers and shapers of fluctuating fuel prices in Sierra Leone

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ARTICLE INFO

Article history:
Received 5 January 2022
Revised 2 September 2022
Accepted 3 September 2022
Available online xxxx

Keywords:
Fuel price
Adaptive capacity
Avoidance
Resistance
Sierra Leone

ABSTRACT

This paper demonstrates the impacts of fluctuating fuel prices on a diversity of local livelihoods by exploring the local factors influencing increasing fuel, transport, and agricultural produce prices and how different individuals – along gender, age, marital status, employment, and rural-urban lines – experience and respond to the fluctuating price of fuel and food products in different ways in Sierra Leone. The findings are based on ethnographic data from Makeni city in Bombali District, north Sierra Leone, collected between August 2020 and February 2021. Within this time the price of fuel at filling stations in the country rose from the equivalent of $0.50 (Old Le7000) to $0.61 (Old Le8500). The study finds while some individuals, such as Jebou (illegal fuel) sellers and pushcart drivers benefit from rising fuel prices; others, such as okada (commercial motorbike) riders, farmers, market traders and women responsible for feeding their families are negatively affected by the fluctuating price of fuel both economically and socially. Beyond this, the findings show how individuals respond to and shape the effects of increased fuel, transport, and agricultural produce prices. In so doing, the findings contribute to academic debates by (i) exploring the relationship between fuel and food prices at the local level, rather than at the global level; and (ii) highlighting the nuanced ways Sierra Leoneans experience and respond to unstable fuel costs. In contrast to the dominant narrative that presents Africans as a homogenous group of victims of fluctuating global oil prices, the findings demonstrate the heterogeneity of individual responses.

Introduction

Sierra Leone has been experiencing rapidly increasing fuel prices and with-it soaring costs of living over the last few years. This has been further exacerbated in the last few months, at least in part, by the global inflation crisis, seen in cost of living increasing by more than 40 % (Barrie, 2022; Thomas, 2022). Food like all commodities in Sierra Leone is transported by and large within the country by road, thus the price of food commodities is directly related to the price of fuel. Economists have given much attention to the relationship between global oil prices and the cost of food (see for example Arndt et al., 2008; Baker, 2008; Chaudhry & Chaudhry, 2008; Fowowe, 2016) and how carbon emissions and related policies affect this (see Shapiro et al., 2012; Springmann et al., 2017). However, less is known about how local factors influence fluctuating fuel, transport, and food prices and how different people experience and respond to this.

The 2008 fuel crisis acted as a catalyst for scholars to explore the relationship between international fuel and food prices (see for example Arndt et al., 2008; Baker, 2008; Jones & Sanyang, 2008; Fowowe, 2016). However, since then there has been a notable decline in scholarly interest in the food-fuel nexus. Given that both fuel and food prices continue to fluctuate, there is an urgent need for further research into the relationship between transportation and the cost of food, particularly in Sub-Saharan Africa where increasing living costs have a profoundly negative effect on people's quality of living (Jones & Sanyang, 2008). High food prices in Sub-Saharan Africa have resulted in people eating cheaper and less nutritious food, eating smaller portions and less (Jones & Sanyang, 2008). This has caused increased levels of malnutrition and disease, increased poverty and threats to peace, stability and social cohesion in the region (Jones & Sanyang, 2008). While there is a clear need to control the price of food to reduce these problems, there is much debate over the main cause(s) of increasing food prices and a lack of understanding of local individual experiences and responses to this.

This paper moves beyond the study of how the global price of oil affects the price of food products to examine the impact of fluctuating fuel prices on local livelihoods by exploring the local factors influencing fluctuating fuel, transport, and agricultural produce prices; and how individuals experience and respond to fluctuating prices of fuel and food products in different ways. For example, motorised transport drivers, such as *okada* (motorbike) riders and *okada*-cart drivers are found to negatively experience increasing fuel prices, whereas non-motorised transport owners are found to benefit from rising fuel prices. Jebou (illegal fuel) sellers are also found to benefit from increasing fuel prices. Women market traders and food buyers more broadly are also found

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https://doi.org/10.1016/j.esd.2022.09.004
0973-0826/

to negatively experience rising fuel prices and the rise in cost of food that this causes. However, women are also found to draw on a variety of adaptive strategies to cope with the increased cost of food and the threat this poses to their livelihoods and ability to feed their families. Other women are found to avoid some of the negative effects of rising fuel and food prices. For example, women selling produce that does spoil when buying decreases. In contrast to adapting and avoiding, *okada* riders are found to, at times, actively resist increasing fuel costs. These findings offer an alternative to the dominant narrative within the literature of a homogenous African people, and African women and children in particular, being extremely vulnerable to rising fuel and food prices (see for example Baker, 2008; Jones & Sanyang, 2008; Headey & Fan, 2010), by demonstrating the diverse ways in which individuals experience, adapt, avoid and resist rising fuel and food prices and the effects of this.

Literature review

International commodity prices influencing domestic food prices

International commodity prices, namely fuel and food, drive the local price of food in many Sub-Saharan African countries, including Sierra Leone (Arndt et al., 2008; Danladi, 2020). International fuel prices influence the price of transporting imported food products, domestic fuel prices and thus the domestic food market (Sieber, 1999; Arndt et al., 2008). One key example of the global price of oil influencing the cost of transport, the price of food and living expenses is the 2008 fuel crisis. From 2005 to 2008 the international price of staple foods such as wheat and rice surged upwards. In some places the price of rice tripled between January and April 2008 (Wodon & Zaman, 2010). One major cause of the spike in global food prices was the increasing cost of oil at the time (it should be noted that other causes of the increase in the cost of staple foods include greater demand for biofuels and trade decisions- such as export restrictions) (Chaudhry & Chaudhry, 2008; Headey & Fan, 2010). The high price of food and fuel costs in 2008 is argued to have increased the number of extremely poor people in the world by 100 million (Baker, 2008). The 2008 fuel crisis received much attention, including how low-income countries in Latin America and Africa were particularly vulnerable to its negative effects (see for example Fowowe, 2016).

The effect of high food prices on developing countries depends on a number of additional influencing factors (Danladi, 2020). For example, commodity producing nations are likely to benefit, while major commodity importing developing countries, such as Sierra Leone are likely to be negatively affected. Sierra Leone's economy is heavily international commodity dependent (Danladi, 2020). Fuel and rice – the country's staple food – constitute more than 60 % of Sierra Leone's imports. Rising commodity prices has a particularly negative effect on countries such as Sierra Leone where much of the population's limited income is spent on food (Danladi, 2020). In addition to this, in poor countries where the majority of people depend on food production for their livelihoods, including Sierra Leone, individuals are thought to have limited adaptive capacity to respond and are therefore particularly vulnerable to rapid changes in relative prices (Headey & Fan, 2010).

Local means of transportation influence food prices

In contrast to the understanding that the global price of oil is the major driver of the cost of food in Sub-Saharan Africa, Fowowe (2016) argues that there is not a strong correlation between the global price of oil and agricultural commodity prices. For example, in South Africa, agricultural commodity prices were found to be neutral to global oil prices (Fowowe, 2016). In Sierra Leone also, the slump in the global price of oil (starting in June 2014) had little effect on domestic food prices, seen in the cost of food and consumer prices remaining high and continuing to rise (Danladi, 2020).

Rather than global oil prices, Sieber (1999) demonstrates how poor local means of transporting agricultural produce is a major factor that pushes the cost of transport and food prices up in Sub-Saharan Africa. Poor infrastructure and a lack of efficiently functioning, appropriate transport vehicles make transporting produce difficult and expensive (Sieber, 1999; Wedin et al., 2013). These issues are particularly pertinent in rural parts of Sub-Saharan Africa, where there is a lack of motorised transport and therefore a lack of competition, meaning prices of transportation remain high (Sieber, 1999). In Ghana for example, high internal transport costs have caused an increase in food costs in the country (Jones & Sanyang, 2008). The cost of transport is one of the major factors influencing people's choice of mode of transporting agricultural produce (Sieber, 1999).

Poor modes of transporting agricultural produce in Sub-Saharan African countries when coupled with high global oil prices driving local fuel prices is sure to push the price of agriculture produce up in Sub-Saharan Africa (cf. Arndt et al., 2008). This combination of poor transportation and high fuel prices is a particular issue in Sub-Saharan Africa for two main reasons. First, a large proportion of the population live below the poverty line and are therefore particularly vulnerable to high food prices caused by these factors. Second, 60 % of the population are smallholder farmers with limited capacity to finance high costs of transporting their produce to local markets (Arndt et al., 2008; Goedde et al., 2019).

A number of strategies to improve food security in Sub-Saharan Africa are outlined in the literature, such as improving road networks along with a number of other rural development strategies (Jones & Sanyang, 2008). Improving transport networks are argued to be particularly beneficial to women who take the greater responsibility for selling food in local markets and providing food for their families and spend a large proportion of their time travelling to do this (Agénor & Agénor, 2009; Effendy, 2011). For example, women in Africa spend a large proportion of their time walking to the market to sell and buy food, walking to fetch water and walking to gather firewood needed to cook and feed their families (Agénor & Agénor, 2009). Sieber (1999) and Njobe (2015) highlight that the conventional approach to improving agricultural transport has focused on constructing and improving physical infrastructure - namely roads for motorised transport between farm and market. However, they argue that improving physical infrastructure alone does not respond to all the needs of small-scale farmers in developing countries in terms of small roads, short distances and soft infrastructure challenges – such as policies and social norms – that influence ways in which agricultural produce can be transported and food security is achieved (Sieber, 1999; Njobe, 2015).

People's experiences and response(s) to increasing food and fuel prices

While mitigation strategies particularly along the lines of improving infrastructure in Sub-Saharan Africa have been recommended (Jones & Sanyang, 2008), what is largely missing from the literature is the pre-existing ways in which individuals in Sub-Saharan Africa respond to fluctuating prices of both transporting agricultural produce and buying agriculture commodities in the market. What is largely described within the literature is African people's vulnerability and lack of adaptive capacity to increasing transport and food costs (see for example, Headey & Fan, 2010; Wodon & Zaman, 2010). Within this body of literature, certain scholars, call attention to the particular vulnerabilities of women and girls (see for example Baker, 2008; Jones & Sanyang, 2008; Headey & Fan, 2010; Wodon & Zaman, 2010). For example, in times of food shortage, women are found to forego meals for the sake of their children and boys' feeding is found to be prioritised over that of girls (Baker, 2008). Pregnant and lactating women and children under 24 months are also highlighted to be most vulnerable to malnutrition during food crises (Wodon & Zaman, 2010). There also exists within the literature a debate over whether the 'urban poor' as a homogenised group are more vulnerable to increasing food prices due to being net consumers (Arndt et al., 2008; Danladi, 2020), or whether the homogenous

'rural poor' are more vulnerable due to them being not only consumers but also reliant on transporting their surplus agriculture to market to earn their living (Arndt et al., 2008; Zaman, 2008).

More broadly there is a lack of understanding of how different individuals - namely along gender, age, and profession lines – access, use, and experience changes in energy, such as the price of fuel, in different ways (Greene & Schiffer, 2021). This paper contributes to this gap by showing how different men and women in Sierra Leone are advantaged and disadvantaged by increasing fuel prices and food costs and the diversity of individual responses to this along gender, age, employment and rural-urban lines.

While the general narrative seems to be that African people are vulnerable and lacking in capacity to respond to increasing prices of food and fuel, scholars have explored people's reactions to these shortages particularly when they have resulted in or coincide with violent conflict (see Baker, 2008; Shepler, 2011; Berazneva & Lee, 2013). For example, Baker (2008) documents how, in response to the 2008 food and fuel crisis there were widespread reports of food-related protests in various African countries, including Burkina Faso and Cameroon. Baker (2008) describes riots breaking out in Burkina Faso in response to increasing prices of food, clothes and fuel resulting in government buildings being destroyed and people being injured. In Cameroon taxi drivers are described to have begun rioting over fuel prices which later escalated into a protest over food prices (Baker, 2008). Shepler (2011) also describes how Sierra Leoneans adapted to food shortages during the civil war in the country by eating different food, such as mixing rice with bulgur (known as 'combat') when rice was in short supply. Scholars from various disciplines, ranging from anthropology to economics have been interested in the relationship between food and violent conflict, both in terms of how a lack of access to food enhances the likelihood of conflict and conflict reduces people's access to food (Shepler, 2011). Flynne (2005) argues that nothing ignites unrest in Africa faster that rising prices of staple foods. By viewing reactions and adaptations to food shortages through a lens of conflict, there is a tendency to ignore people's experiences of food shortages outside of conflict contexts within the literature. This paper contributes to this gap by showing how people, experience, perceive and react to fluctuating food prices in a non-conflict context.

This paper explores the local causes of increases in fuel and food prices, how different people experience rising fuel and food costs and individual's reactions to this in Sierra Leone. In this paper people's reactions to rising fuel and food prices are analysed using adaptive capacity and resistance theories. The findings of which show how an individual's access to economic and physical resources – such as different foods – and knowledge influences their ability to adapt, avoid and resist rising fuel and food prices.

Methodology and framework

Ethnographic case study

The findings are based on ethnographic data collected in Makeni city and nearby rural communities in Bombali District, north Sierra Leone to understand how rising fuel, transport and food commodity prices affect local livelihoods. Qualitative data was collected using a combination of participant observation and semi-structured interviews that were conducted over seven months, from August 2020 to February 2021. It is worth noting that within this time the price of fuel at filling stations in the country rose from the equivalent of $0.50 (Old Le7000) to $0.61 (Old Le8500). This ethnographic case study was done in part to understand the modes and economics of transporting agricultural products with the idea of electrifying light vehicles in Sierra Leone as part of a larger solar power project being implemented in the country.

Makeni is located in Bombali District in the Northern Province of Sierra Leone. In 2015 the District of Bambali had a population of 606,544 people. Makeni is the fifth largest city in the country and the largest in the Northern Province with a population of approximately 127,324, according to the 2015 census (Statistics Sierra Leone, 2017a). Makeni city is the economic centre of the north (Statistics Sierra Leone, 2017a). The predominant economic activities in Makeni and its rural surroundings are farming, trading and *okada* (commercial motorbike) riding (Statistics Sierra Leone, 2019; own observations, 2020). Out of a total of 105,902 households in Bombali District, 67,229 households have at least one household member engaging in a form of agricultural activity (Statistics Sierra Leone, 2017b). While there were no published records for market traders or commercial bike riders at the time of the study, the Makeni Trader's Union estimated that there are around 5000 adults involved in market and street trading in Makeni and the Sierra Leone Road Authority (SLRA) and the Bike Riders Union estimated there to be more than 2000 *okada* riders active in Bombali District. Makeni and its surrounding villages are therefore an ideal case study for exploring the effects of fluctuating fuel, transport, and food prices on local livelihoods.

Using an ethnographic case study allowed an in-depth study of how the price of fuel, transport and food commodity prices change over time and the cause and effects of this in the local context. The study was designed to capture different individual's experiences of this over time, rather than be representative of the population (and/or populations of the different stakeholder groups) in numerical terms. An ethnographic case study was also deemed appropriate due to a lack of available records on population sizes of the different groups that the study sought to represent, making numerically representative sample sizes impossible to calculate.

Participants and sampling techniques

Semi-structured interviews were conducted with 40 individuals who are particularly affected by rising fuel prices – market traders, commercial transport drivers, fuel sellers, and women responsible for cooking for their families (see Appendix I). While there is no fixed rule on the number of interviews required for qualitative research, 20 is typically considered the minimum (Schreier, 2018). A combination of theoretical, quota and convenience sampling techniques were used to select interview participants. In theoretical sampling it is not the sheer number, typicality or representativeness of people that matters, but the quality of information the person has (Crang & Crook, 2007). In the case of this study, market traders, commercial transport drivers, fuel sellers and women responsible for feeding their families were selected to participate because of their experiences of rising fuel prices. The number of interviewees in each stakeholder group was determined by quotas - to represent different demographics within these groups (explained below) - and respondent's willingness and availability to take part in the study. Using these sampling techniques enabled a sample that represents specific categories of people who are affected by rising fuel prices enabling claims to be made about their different experiences of and responses to rising fuel, transport and food commodity prices. It is recognised that there is a limited generalisability of findings from an ethnographic case study such as this because it speaks to a unique group of people at a given time, but common themes can be used to understand the phenomenon more broadly (Fife, 2005; Crang & Crook, 2007; Swanborn, 2010; Gerring, 2017).

Market traders

10 market traders were targeted to represent 10 popular food commodities that are sold in the market in Makeni and grown/produced in Bombali District. These food commodities are chilli pepper, local rice, groundnuts (peanuts), cassava leaves, fresh beans, dried black eye beans, eggs, aubergines, ginger and fruit (pineapple and watermelon). These market traders were identified and selected from an initial scoping study in which 30 traders – representing both people that trade inside the main market in Makeni city and those that trade (hawk) on the streets – were interviewed about what they sell and how it is transported.

Commercial transport

4 commercial transport drivers were targeted to represent three popular modes of transporting agricultural produce from farm to market within the district. These modes were *okadas* (commercial motorbikes), an *okada*-cart and a pushcart. One *okada* rider was residing in Makeni city and the other was resident of a rural community within Bombali at the time of the study. The two *okada* riders were selected with the aim of capturing the difference of commercial bike riding in an urban locality compared to a rural one.

Fuel sellers

8 fuel sellers were targeted to capture the experiences of fuel sellers selling in different locations. This included one working at a legal fuel (filling) station in Makeni city, one *Jebou* (illegal fuel) seller trading in Makeni and six other *Jebou* sellers located at extending distances from Makeni. Each of these *Jebou* sellers were at least 1 mile further from Makeni than the last to capture how distance from town influences the price of fuel. The Jebou sellers are 2 miles, 3 miles, 4 miles, 6.5 miles, 9 miles and 10.5 miles away from Makeni respectively. There are 13 legal filling stations in Makeni city. It is impossible to know how many *Jebou* (illegal fuel) sellers there are in Makeni and its surrounding villages because of the illicit and ad hoc nature of *Jebou* selling. A quota sampling technique to capture fuel sellers' different experiences of increasing fuel prices along geographic lines was therefore used.

Women responsible for cooking for their families

18 women who are responsible for cooking for their families and who buy food from the market in Makeni were also targeted. There are approximately 151,606 women aged between 15 and 49 years in Bombali District according to the 2015 Housing Census (Statistics Sierra Leone, 2017a). We can assume that a large proportion of these women are responsible for cooking for their families. This is because married women are responsible for cooking for their families and over 90 % of women are married by the age of 18 years in Sierra Leone. The mean age of a woman marrying in Bombali District is 17.5 years (Statistics Sierra Leone, 2017c). As women get older (past the age of 49), it is common for younger women to take over the cooking responsibility. Women between the age of 18 and 49 were therefore targeted to represent those who take the greatest responsibility for cooking.

The 18 targeted women include 3 young women (18–29 years), 3 middle-aged women (30–39 years) and 3 old women (40 years and above) living in a rural community (close to Makeni city) and 9 women representing these same age categories who were residing in Makeni city. Additionally, within each of these age brackets in both the rural and the urban locations, a woman who is the head of her household was selected (6 female head of households in total). Speaking with women who represent different demographics - namely age, rural-urban lines, and marital status - enabled a comparison of how different women respond to fluctuating fuel, transport, and food commodity prices.

Women were differentiated by age, rural-urban lines and marital status because all rural women described themselves as being involved in one type of agricultural activity, whether part time or full time, making differentiating along employment lines inappropriate. Women residing in Makeni were involved in different employment activities including teaching, trading, and agriculture, however employment type was not found to influence how these women responded to rising fuel and food prices in this study.

Data collection tools

Interviews

Semi-structured interviews were held with the 10 market traders every month for four months (a total of 40 instances of interviews from August 2020 to November 2020) to gain an understanding of what produce they were selling over this time period, how the price of produce changes and what the influencing factors and effects of these changes are. Semi-structured interviews were also held with the 4 commercial transport drivers over four consecutive months (a total of 16 instances of interviews from August 2020 to November 2020) to understand how what they transported changed by month. These interviews also explored how the cost of transportation changed and what the causes of this were. Interviews were held with the 8 fuel sellers to understand how much they sell fuel for and what influences the price of the fuel they sell. Semi-structured interviews were also held with 18 women who are responsible for feeding their families. These interviews were held to capture these women's experiences of fluctuating transport and food prices and how they cope with this.

Interviews were conducted in either Krio (the *lingua France* of Sierra Leone) or Temne (the most widely spoken indigenous language in Makeni). The interview data was collected and translated by a research assistant that worked on the project throughout.

Observations

Over the seven-month study period (August 2020–Februrary 2021) participant observation was conducted in Makeni city and surrounding rural communities by the author, who is a permanent resident of Makeni. Observations were made on how increasing fuel prices were affecting transport and food commodity prices in these different places and how different people were experiencing and responding to this. This data was used to corroborate the data from the interviews.

Ethical considerations

The University of Makeni's ethical guidelines were followed throughout the research. Before each research method was conducted with each potential participant, consent and ethics were discussed. This research was conducted during the COVID-19 pandemic and all Sierra Leone's COVID-19 measures including social distancing and face mask wearing were adhered to during the research. We also kept our contact with participants to a minimum by keeping our sample size small, to minimize potentially spreading the virus.

Framework for analysis

The interview and observation data were analysed using a thematic coding approach. Adaptive capacity and resistance theories informed the analysis of how people respond to rising fuel, transport, and food prices. The analysis enabled an evaluation of which individuals' lives and livelihoods are benefiting, which are being hindered and how individuals are influencing the effects of rising fuel prices. In so doing, the findings show who the winners, losers, and shapers are of rising fuel prices and the effects of this at the local level.

Examining how and why people are responding in different ways enables a better understanding of how people cope with socioeconomic shock, such as rising fuel prices, in the Sub-Saharan African context. Adaptive capacity is a concept that describes an individual's or group's ability to respond to an environmental or socioeconomic change (Jones, 2020). There is a need to alter one's behaviour when the change that has occurred prevents a certain action from taking place as it did before. An inability to act as before is often caused by a change in access to a physical or non-physical resource. Ability to adapt is largely dependent on an individual's or group's access to resources that are needed for them to alter their behaviour in line with the change that has taken place (Jones, 2020). In this article, adaptive capacity is used to analyse how people alter their behaviour in response to increasing fuel prices and the change in access to resources this causes – for example the increase in price of food commodities that makes them unaffordable. The findings of this study show that people's capability to adapt to increasing fuel, transport and food prices is determined by their access to financial capital and knowledge.

While adaptive capacity is used to understand how some people have changed their behaviour in line with rising fuel, transport and food costs, the concept of active resistance is used to analyse the behaviour of those that seek to alter the socioeconomic change and/or its effects, in this case reversing the hike of the price of fuel (cf. Scott, 1985; Jones, 2020, 2022). For example, *okada* riders have been found to actively resist an increase in fuel price by protesting to reduce the cost (see for example Butty, 2016; Mumbere, 2018).

The main findings that emerged from the data from this study are the various causes of increasing fuel prices; the ways in which different people are advantaged and disadvantaged by the increasing cost of fuel; and how different people respond by adapting, avoiding and resisting high fuel costs and the effects of this.

Findings

Fuel prices in Sierra Leone

The cost of and availability of fuel is erratic in Sierra Leone. This has led to the search for alternative and more sustainable energy options in the country, such as biomass-based energy (Wedin et al., 2013). One example of this is Addax biofuel company in Makeni (Wedin et al., 2013). However, although there are alternative renewable energy sources available in Sierra Leone, to date the vast majority of motor vehicles run on petrol or diesel.

International oil price

The price of fuel at legal filling stations is directly related to international oil prices (cf. Arndt et al., 2008). In contrast, the availability of fuel and the price of fuel at *Jebou* (illegal) filling stations are influenced by a number of factors such as delays in shipments of oil into the country, the distribution of fuel within the country and political manipulations. For example, Makeni experienced a fuel shortage from Monday 1st February to Wednesday 3rd February 2021. Fuel sellers explained at the time that this shortage was due to delays in the shipment of oil. Following this, on 4th February 2021 the Petroleum Regulatory Agency, Ministry of Finance, Ministry of Trade and Industry and the Oil Marketing Companies (OMCs) announced that after reviewing the pump prices of petroleum products compared to global oil prices and the US dollar exchange rate, they were increasing the pump prices from the equivalent of $0.50 (Old Le7000) to $0.61 (Old Le8500) for petrol, diesel, kerosene and fuel oil from February 2021 onwards. This led to suspicions locally, that the filing stations were rationing fuel prior to the scheduled price increase on 4th February in order to financially benefit from the rise in fuel prices.

Distance of Jebou (illegal fuel) seller from town

While the price of fuel at (legal) filling stations is uniform at a given time, *Jebou* (illegal fuel) sellers sell fuel at different prices depending on two key factors. The first factor is the distance from the main town – the further the seller is from the town and legal filling stations, the higher the cost of fuel. The cost of transport and therefore living in remote places is higher than in urban areas due to the high price of fuel and this affecting the general price of living, as is the case elsewhere. For example, the price of a commodity sold in a village in Bombali, that originate from outside of that village, can be anywhere from 10 % to 300 % higher than when bought in Makeni. The majority of rural residents are served by Jebou sellers due to legal filling stations only being located in urban areas and along some main highways.

Fuel shortages influence Jebou (illegal fuel) price

The second factor increasing the cost of fuel being sold by *Jebou* sellers is when there is a fuel shortage (crisis) in the country. During fuel shortages, filling stations do not supply fuel and as a result of this the entire population (whether rural or urban) becomes dependent on *Jebou* sellers. Some fuel shortages are caused by international oil shortages or delays. Some shortages are created by legal filling stations selling their fuel to *Jebou* sellers for profit, thus reducing the amount they have to sell and increasing their profit. While other shortages are believed to be a political tactic. The latter type of (politically manipulated) fuel shortage, is believed to happen when the government wants to gain control by putting the cost of living up, stalling livelihoods, and generally causing chaos to their political advantage. This was explained by an *okada* rider in Makeni:

> *"The government creates fuel shortages. At times they stop the supply coming here to us in Makeni and then life becomes difficult."*
> [(28/10/2020)]

A full exploration of the causes and politics of fuel shortages is beyond the scope of this paper (for more information see for example Butty, 2016; Mumbere, 2018; Concord Times, 2021; Kanu, 2021). However, the frequency of fuel shortages in Makeni (approximately two per year) and the town being a stronghold of the opposition party (at the time of research) – the All-Peoples Congress (APC) should be taken as part of the context in which people perceive and react to rising fuel prices. The ways in which people perceive and therefore react to fuel and food shortages at the local level offers an important micro illustration of how people's perceptions influence their reactions to fluctuations in fuel and food prices that is largely left out of macro studies about global fuel and food prices.

The 'winners' and 'losers' of fluctuating fuel prices

The different ways individuals are advantaged (win) and disadvantaged (lose) by fluctuating fuel prices is related to the relationship between the cost of fuel, transport and agricultural produce and the way (s) in which people are involved in this. The findings of this study show how an increase in the cost of fuel benefits *Jebou* (illegal fuel) sellers and pushcart drivers, but disadvantages *okada* and *okada*-cart riders, farmers, traders and those responsible for feeding their families (see Fig. 1).

Jebou sellers financially benefit from fuel shortages

Jebou sellers are financially advantaged by fuel shortages. According to legal fuel sellers, during fuel shortages, legal sellers either receive a smaller amount of fuel, none or are choosing not to sell. As a result of this, legal selling commonly ceases during these periods. In contrast, *Jebou* sellers continue to have a supply of fuel and are then able to sell at a highly inflated price due to the demand. During a fuel shortage in Makeni, some *Jebou* sellers reported selling at a 300 % higher price

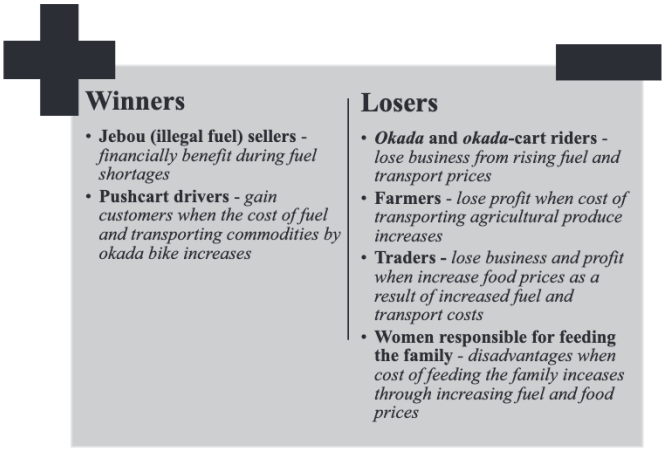

Fig. 1. Winners and losers of rising fuel prices in Bombali District.

than during 'normal' times. A *Jebou* seller in Madoko village, approximately 10.5 miles from Makeni, explained that during 'normal' times when a litre of fuel was being sold in Makeni for the equivalent of $0.50 (Old Le7000) he was selling a litre of fuel for $0.72 (Old Le10,000). When there is a fuel shortage, he explained he can sell fuel for up to $2.51 (Old Le 35,000) for a litre.

Pushcart drivers are winners when fuel and transport prices spike

When fuel and transport costs increase, there is a tendency for farmers to employ pushcart (non-fuel vehicle) drivers to transport their produce to market. Pushcart drivers explained that they benefit from rising fuel prices and fuel shortages as they get more business during these times, due to their costs not being driven by fuel prices. This was explained by a pushcart driver in Makeni:

> "*It* [*an increase in fuel price*] *has a positive influence on my business because, the people see us as the last option for transporting their produce to the market when they can afford to take motorbikes. When they cannot afford to take a motorbike, they ask us*"
>
> [(28/10/2020)]

Pushcart drivers, who are predominantly older men that steer and lift the cart at the front and older women that push the carts from behind, therefore benefit from high fuel prices and fuel shortages.

Okada riders lose business from increasing fuel costs

The study found that *okada* (commercial motorbike) riders and *okada*-cart drivers experience increasing fuel prices in negative ways and to varying extents. Unsurprisingly, when the price of fuel goes up, commercial transport drivers sometimes increase the price of transporting people and commodities. The result of this, is they often have less customers as not everybody can afford to pay the increased transport costs. This is particularly true for *okada* riders in more remote locations, where the price of fuel is higher (see above for detail).

Farmers and traders lose from increasing transport costs

Rising fuel prices also has detrimental effects on farmers who have to pay more to transport their produce to market if transport costs have gone up. This can result in farmers taking less produce to sell at the market and/or women and children transporting produce on foot by 'head-loading' to the market. The latter of which has been proven to have negative effects on women's and children's health and wellbeing (Porter et al., 2013).

The price of fuel affects market traders, the majority of whom are women. When the price of fuel and transporting produce to the market increases, market traders are forced to increase the price of the produce they sell. As a result of this many people are not able to buy as much food as they did before, due to a lack of financial capital. This means that market traders earn less during these times and are at risk of making a loss. This was explained by a trader in Makeni market:

> "*The increase in fuel and agricultural commodities causes a lot of losses in the business, but we just have to keep the business going.*"
>
> [(27/10/2020)]

Women responsible for feeding the family disadvantages by increased food prices.

When the price of produce in the market goes up, market-buyers -the majority of whom are women- who are responsible for feeding their families find it more difficult to fulfil this role. If a woman cannot cook as she wishes and the quality or quantity of the food she is able to provide for her family decreases, a woman may feel like she is not performing well as a woman/mother/wife and this may lower her status and sense of wellbeing. Cooking good food gives many women status and pride in Sierra Leone (Jones, 2020). This was explained by a woman who cooks for her family in Makeni:

> "*When I cannot cook my family their favourite meal, I do feel bad. I feel I am letting them down and again, when my children say they are hungry I feel bad as a mother.*"
>
> [(03/11/2020)]

The findings show that women with the least amount of disposable income are most negatively affected because they cannot afford the increase in food at the market. The six women who are the heads of their households that were interviewed explained that increasing transport and food costs was particularly difficult for them because they have less money than others who have someone else bringing in more money. This is demonstrated in the following quote from an older female head of household living in a rural area:

> "*Since my husband died, it has been difficult for me. Before now, we were both earning, so we had more money to buy food. Now it is just me as my children have moved to Freetown, so I struggle to have enough money for food.*"
>
> [(04/02/21)]

Female headed households are documented to be poorer than male-headed households (Chant, 2004). The concept of the feminisation of poverty has frequently been used to explain the increased likelihood of living in poverty and the difficulties of escaping poverty being exacerbated if residing in a female headed household (Chant, 1999, 2004). However, it should be noted here that this study did not find any notable difference between women who are head of their households and those that are not in terms of food purchasing power and how much money these different women spend on feeding their families. A full analysis of single women's and women from male-headed households' food-spending habits and the reasons for this are beyond the scope of this study. However rudimentary observations suggest that some of the reasons that single women and women from male-headed households reported spending the same on food might be that: income and food spending estimations are not accurate- particularly when records are not kept; certain male-headed households are as poor if not poorer than female headed households; relatives and friends are particularly concerned by women's wellbeing and therefore give food and/or money to women that head their households; women are more concerned with feeding their families than men and are therefore willing to spend more of their money to ensure they are able to feed their family members.

Adapting to rising agricultural prices

While this paper finds that local fuel prices influence the cost of agriculture produce being sold in Makeni market, it should also be noted that seasonality and religious celebrations – both Christian and Muslim – influence the price of agricultural produce being sold in the market. For example, when there is an abundance of a particular crop, the price is driven down by the supply being greater than demand and their being limited local preservative storage facilities, forcing farmers and market traders to sell their produce straight after it has been harvested (cf. Wedin et al., 2013). In contrast, around the time of religious celebrations, the price of certain foods increases in the market due to high demand. Both seasonality and celebrations are considered predictable influencing factors because traders and buyers know when the growing seasons for different produce are and when religious celebrations occur and can therefore prepare for the change in food prices that these factors cause. In contrast, fuel prices are considered unpredictable because people do not know when changes in the cost of fuel and/or fuel shortages will occur and are therefore less able to prepare for this.

Buying less food (urban adaptation strategy)

Both market traders and buyers mitigate the effects of rising fuel and food prices in numerous and to varying extents, largely related to their access to financial capital and knowledge. For example, some women who are responsible for feeding their families adapt to the increase in cost of agricultural produce in the market by buying less food and/or cooking less expensive meals (cf. Shepler, 2011). This is demonstrated in the following quotes from women in Makeni:

> "*Sometimes when the price of food increases, we simply can't afford to buy the same food. When this happens, I cook a cheaper sauce and without meat. Using only fish* [*instead of beef*] *makes it cheaper.*"
> [(03/02/21)]

> "*When the price of food goes up, I buy less cups of rice for the family to eat, they don't like it but that is the way it is.*"
> [(03/02/21)]

A 'typical' expectation for a meal in Sierra Leone is rice with either sauce ('*placas*') or soup that often contain fish and/or meat -when people can afford it. Popular sauces are often leaf based, for example cassava leaves or potato leaves and a popular soup is groundnut soup which is made from ground peanuts. Women living in urban areas that are unable to afford the increase in food prices were found to adapt by buying and cooking less cups of rice for their family or different, cheaper sauces.

Cooking alternative foods (rural adaptation strategy)

In contrast to women living in urban areas, women in rural areas were found to look for cheaper alternatives to rice, such as cassava or wild yams, when the price of food goes up. This demonstrates a difference in adaptive capacity along rural-urban lines due to women in rural areas having access to other cheap starch foods that urban women sometimes lack. This is demonstrated in the following quote from a rural woman:

> "*When the price of fuel and food goes up, I cannot afford to buy rice for all the family, so I sometimes cook cassava or yams that I can get from the farms near the village. I do try to buy one cup of rice for the young children and the elderly pa, but the rest of us manage without.*"
> [(04/02/21)]

The evidence shows women's ability to adapt is therefore restricted by their lack of financial capital but enhanced by their knowledge of how to prepare less costly meals and access to alternative foods. This is in line with Shepler's (2011) argument that flexibility in using different ingredients and knowledge about food preparation helps Sierra Leone feed itself when food is scarce as was the case during the country's civil war and in the post-war period. Changing foodways through women's adaptive capacity may therefore be a way to reduce the likelihood of food related conflict (cf. Shepler, 2011).

The findings also demonstrate a difference in the way in which urban women respond compared to women living in rural communities (cf. Jones, 2022). Women in rural communities are able to avoid the increasing price of rice by replacing it with other starch food they can find in the farms close to their rural locations. In comparison women in urban areas talked of eating less rice and cooking cheaper sauces. This demonstrates a difference between rural and urban women and perhaps highlights an advantage of subsistence farming and living in rural communities. This corresponds with Danladi's (2020) argument that farm households that produce food for their consumption are insulated from price fluctuations compared to the urban poor who are more exposed to international and national markets and fluxes in these.

Market traders preserve certain foods

Some market traders who sell produce that can be preserved also adapt to increasing prices in fuel, food and people buying less food in the market (as explained above) by preserving leftover produce in various ways. By preserving their produce, they are able to reduce food waste and profit loss. This was explained by traders in Makeni market:

> "*If people are not buying my fresh groundnuts and the groundnuts will not last, I do grind them into paste to preserve them. Groundnuts last longer as paste, and people will always buy that to make soup or placas* [*sauce*]."
> [(Groundnut seller in Makeni market, 28/08/2020)]

> "*If I do not sell all the fresh pepper, I dry it and then sell it as dried pepper.*"
> [(Market trader selling chilli pepper in Makeni market, 27/09/2020)]

Market trader's adaptive capacity is therefore enabled by their knowledge of preserving different food items in different ways. Sometimes these adaptations result in a loss in profit, for example dried chilli pepper is sold for less than fresh chilli pepper, however other adaptations such as selling groundnut paste enables a trader to maintain their profit. This is because the price of selling groundnut paste after it is ground is relative to the price of the same quantity of fresh groundnuts. Through this adaptative capacity, these women are able to make their livelihoods resistant to hikes in the price of fuel and food.

Avoiding the effects of rising fuel and food prices

While some women were found to adapt to the increase in the price of fuel and food and the effects of this, other women were found to avoid certain effects, such as food produce spoiling and the loss of profits caused by this. Certain traders sell produce that does not go off or has a longer shelf life than fresh produce and thus avoid wasting produce that would spoil if not sold quickly. This is demonstrated in the following quotes:

> "*I sell local rice and although when the price of fuel goes up and I put the price of the rice up, I sell less, it doesn't go off quickly. Not like other foods. So that is better.*"
> [(Local rice seller in Makeni market, 27/08/2020)]

> "*I sell dried beans and people do buy these less when the price of them goes up. We have to put the prices up when fuel goes up. The only benefit is that they do not spoil like other produce that other women are selling. I feel for those that are selling fresh produce from the farms because they lose a lot when people do not buy.*"
> [(Dried bean seller, Makeni market, 27/08/2020)]

These quotes demonstrate that while all market sellers are negatively affected by increasing fuel prices in terms of a reduction in sales, some women can avoid some of the negative effects of this - such as produce being spoilt, and profit being lost completely. There are a number of factors that are likely to influence women's choice regarding what to sell, in terms of perishable versus less perishable or non-perishable goods. These influencing factors include the seasonality of produce; supply and physical access to produce; existing-customer demand for certain produce; available capital to buy produce; and cost-benefit analysis – for example certain perishable goods such as tomatoes are more expensive to buy but can be sold for a greater profit than less-perishable goods such as dried pepper.

Actively resisting rising fuel prices and shortages

While market women and other women responsible for cooking for their families are found to adapt to and avoid rising fuel and food prices, *okada* riders are found to actively resist increasing fuel prices. It is worth noting that market women have also been found to protest threats to their business in the past (see Politico Online, 2014). Although neither *okada* riders nor market women in Makeni protested the increase in fuel prices in February 2021, there is a history of public transport bike riders protesting this. This is due to increasing fuel prices negatively affecting their business, either by forcing them to put up their prices and thus reducing customers or charging the same price, thus reducing their profits. This is demonstrated in the following quotes from *okada* riders:

> "*Sometimes we put our prices up when fuel goes up, but people don't like it, so sometimes we have to ride for less which reduces our profits. It is because of this that we protest.*"
>
> [(28/10/2020)]

> "*Often we know the price of fuel is about to go up. This is because filling stations start to reduce how much they are selling, you can see it, you see the bikes queuing for fuel. So, we know that the cost is about to go up and we know what this will do to our business, to our families, many of us have responsibilities. So, when we know the price of fuel is going up, we want to protect our livelihoods and our children, so we protest to tell the government what they are doing is wrong. They should not put the price of fuel up because then everything goes up. Life in Sierra Leone is getting more and more expensive every day. It is really not easy.*"
>
> [(28/10/2020)]

These quotes are corroborated by newspaper articles published at the time of the various protests (see for example Butty, 2016; Mumbere, 2018).

Non-authorized protests are strongly discouraged in Sierra Leone and frequently suppressed by the government (see for example HRCSL, 2012; Human Rights Watch, 2014; Jones, 2020). However, they remain a popular mode of response to rising fuel prices with *okada* riders. In July 2018, *okada* riders resisted the rise in fuel prices being initiated at the time by protesting in Freetown. In response to the protests the ruling SLPP government dispersed the protestors and arrested the person suspected to have orchestrated the protest in Freetown (Garda World, 2018). Despite protests in Sierra Leone often being violently suppressed by state police and military, protesting remains a popular mode of response by male youths, including *okada* riders, when livelihoods and means of finding money are being threatened.

The findings of this study offer a micro illustration of how people perceive and therefore experience and react to changes in fuel and food prices. This contributes to the relevant literature that tends to examine issues pertaining to fuel and food prices at the macro level and leave this important aspect out. In addition, in contrast to the dominant narrative in the existing literature that African people are a homogenous group vulnerable to rising fuel and food costs (see for example Headey & Fan, 2010), the findings demonstrate how different people have reacted to fluctuating fuel and food prices in different ways in Sierra Leone. The findings also suggest that these reactions are at least in part gendered, as women are found to avoid and adapt to rising food prices, while some young men – namely *okada* riders are found to actively resist. This contributes to debates on the gendered nature of energy access and how this affects livelihoods and individual and community wellbeing.

Conclusion

To conclude, this study shows that fluctuating fuel prices have distinct effects on different livelihoods. For example, Jebou (illegal fuel) sellers are advantaged by rising fuel costs as they are able to sell fuel at higher rates and increase their profits. Pushcart drivers' livelihoods also benefit from increased fuel prices, as farmers are more likely to use them to transport produce during these times. In contrast, *okada* (commercial bike) riders', farmers' and market traders' livelihoods are found to be disadvantages by rising fuel prices as it increases the price of transporting food commodities which reduces their business and profits.

The findings show that the government and fuel sellers (both legal and illegal) are believed to be major influencers of fluctuating fuel prices and availability of fuel in Sierra Leone. Respondents believed that the government manipulates fuel prices and controls access to fuel at certain times for political advantage. The study also shows that the price of fuel and transport are major factors influencing the price of agricultural commodities grown and sold in Sierra Leone.

In contrast to the government and fuel sellers influencing the price and availability of fuel, the findings of this study show that the shapers of the effects of fluctuating fuel and agricultural commodity prices are individuals that adapt to, avoid and resist price rises and the effects. For example, women in urban areas adapt to increasing food prices by buying less in the market and changing their cooking habits. In contrast, women in rural areas look for cheaper, alternatives to rice that they can source from the farms directly for their families to eat when the price of food in the market goes up. Some market sellers are also shown to find ways to preserve produce in order to reduce their financial losses, while others are able to avoid these such losses by selling dried food that do not spoil quickly. Individuals were also found to actively resist increasing fuel prices and fuel shortages, for example *okada* riders protesting over fuel shortages in the country. It is worth noting here that since the completion of this study, fuel prices, transport and food commodity prices have continued to rise. In response to this on Monday 4th July 2022 commercial transport drivers nationwide -including *okada* riders - went on strike and women market traders in Freetown took to the streets to peacefully protest the soaring cost of living.

The findings of this study contribute empirical data on the diversity of individual Sierra Leonean's access to, use of and experiences of changes in energy. The data thus contributes to literature on the relationship between energy and livelihoods by highlighting different people's relationships with energy, changes in access to energy and responses to this along gender, age, profession, and urban-rural lines. The findings also contribute to literature concerned with access to energy in Sub-Saharan Africa specifically, by demonstrating not only the heterogeneity of people's experiences of fluctuating fuel prices in Sierra Leone but also individual's agency in responding to this, thus challenging discourse that presents African people, and women in particular, as a homogenous group of vulnerable victims of rising fuel and food prices. In addition, by showing how people's perceptions influence people's reactions to fluctuations in fuel and food prices, the findings offer a micro illustration of how perceptions of the cost of fuel and food influence people's behaviour. This contributes to the literature concerned with fuel and food prices, that largely takes the form of macro studies and ignores the aspect of individual perceptions and reactions.

In response to the findings of this study, two recommendations are made. The first recommendation is that the government should develop better policies to limit rapid fluctuations in fuel prices in order to better protect livelihoods that are directly affected by fuel prices. The second recommendation is to invest in electric commercial vehicles in Sierra Leone that would not be affected by fuel prices. These vehicles could be used to transport agricultural produce and would drive agricultural commodity prices down, thus protecting farmers and market buyers from the effects of fluctuating fuel prices.

One of the limitations of this study is that the scope was restricted to one district in Sierra Leone. It is therefore recommended that the study be expanded to include more districts within Sierra Leone and other countries to gain a broader understanding of the effects of rising fuel prices on livelihoods both within Sierra Leone and elsewhere. This study was also limited to a short timeframe, since this study was concluded fuel prices have continued to fluctuate and people have continued to respond – most notably by striking and protesting. It is therefore recommended that further research be conducted into the relationship between energy access and active resistance, particularly in terms of who is involved, what triggers the response, what modes they take and why.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Jess Jones reports financial support was provided by 3B Impact. Jess Jones reports a relationship with 3B Impact that includes: consulting or advisory.

Acknowledgements

I would like to thank Ankit Kumar and Caitlin Ryan for their feedback on drafts of this article.

Appendix I. Characteristics of participants

Participant	Main source of personal income	Age	Gender	Level of education	Household size	Number of children dependents	Household head
Market trader selling chilli pepper	Trading	36	Female	Basic	5	3	No
Market trader –selling local rice	Trading	45	Female	None	5	4	Yes
Market trader selling groundnuts	Trading	40	Female	Basic	18	14	No
Market trader selling cassava leaves	Trading	21	Female	Basic	6	4	No
Market trader selling fresh beans	Trading	41	Female	Non	17	8	No
Market trader selling dried (black eye) beans	Trading	30	Female	Basic	8	5	No
Market trader selling eggs	Trading	25	Female	Basic	6	2	No
Market trader selling aubergines	Trading	33	Female	Basic	14	9	No
Market trader selling ginger	Trading	29	Female	Basic	8	6	No
Market trader selling pineapple and watermelon	Trading	32	Female	Basic	11	7	No
Urban okada rider	Commercial transport	45	Male	Basic	6	4	Yes
Rural urban okada	Commercial transport	23	Male	Senior secondary school	7	1	No
Okada-cart rider	Commercial transport	35	Male	Senior secondary school	4	2	Yes
Pushcart driver	Commercial transport/farming	44	Male	None	12	8	Yes
Legal fuel seller in Makeni	Fuel selling	33	Male	Senior secondary school	5	3	Yes
Jebou (illegal fuel) seller in Makeni	Fuel selling	29	Male	Senior secondary school	3	3	Yes
Jebou (illegal fuel) seller – 2 miles away from Makeni	Fuel selling	40	Male	Basic	6	4	Yes
Jebou (illegal fuel) seller – 3 miles away from Makeni	Fuel selling	35	Male	Basic	8	6	Yes
Jebou (illegal fuel) seller – 4 miles away from Makeni	Fuel selling	45	Male	None	12	9	Yes
Jebou (illegal fuel) seller – 6.5 miles away from Makeni	Fuel selling	34	Male	Basic	7	4	Yes
Jebou (illegal fuel) seller – 9 miles away from Makeni	Fuel selling	27	Male	Senior secondary school	10	2	No
Jebou (illegal fuel) seller – 10.5 miles away from Makeni	Fuel selling	30	Male	Basic	5	3	Yes
Young rural woman responsible for cooking	Farming	19	Female	Senior secondary school	3	1	No
Young rural woman responsible for cooking	Farming	24	Female	Senior secondary school	4	2	No
Young rural woman responsible for cooking	Farming/trading	27	Female	Basic	4	2	Yes
Middle age rural woman responsible for cooking	Farming/trading	33	Female	Basic	4	3	Yes
Middle age rural woman responsible for cooking	Farming/trading	32	Female	Basic	6	4	No
Middle age rural woman responsible for cooking	Farming/trading	39	Female	None	8	5	No
Old rural woman responsible for cooking	Farming	43	Female	Basic	8	6	No
Old rural woman responsible for cooking	Farming/trading	45	Female	None	8	6	No
Old rural woman responsible for cooking	Farming	49	Female	None	4	2	Yes
Young urban woman responsible for cooking	Trading/student	20	Female	Senior secondary school	3	1	No
Young urban woman responsible for cooking	Trading	24	Female	Undergraduate	3	2	Yes
Young urban woman responsible for cooking	Trading/student	29	Female	Undergraduate	3	1	No
Middle age urban woman responsible for cooking	Agriculture/trading	30	Female	Basic	4	3	Yes
Middle age urban woman responsible for cooking	Trading	36	Female	Basic	7	5	No
Middle age urban woman responsible for cooking	Teacher	38	Female	Undergraduate	6	4	No
Old urban woman responsible for cooking	Trading	48	Female	Basic	3	4	Yes
Old urban woman responsible for cooking	Trading	47	Female	Basic	4	6	No
Old urban woman responsible for cooking	Lecturer	46	Female	Postgraduate	4	6	No

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