Petroleum product subsidies in Ghana: Do the rich benefit more than the poor?

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Abstract

This study investigates the direct welfare impact of fuel price increases using Ghana living standards survey data. The study argues that the effect of any increase in fuel prices falls on the rich more than the poor, and that therefore, introducing subsidies to mitigate the impact will benefit the rich more than the poor. The findings suggest that fuel price subsidies are regressive with the rich benefiting three times more than the poor. The study recommends a policy that ensures direct cash transfer to cushion the poor against hikes in fuel prices or social intervention programs that directly impact the poor.

Key words: Fossil fuel subsidy, Budget share, Petroleum products pricing, Price deregulation

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1. Introduction

A survey of existing literature indicates that there are numerous studies that have examined the economic, social, and environmental impact of fossil fuel subsidy (FFS) reforms. Owing to the impact of FFS, many countries have undertaken subsidy reforms to alleviate the effects of FFS on the economy. Several studies including Solarin (2020), Vandeninden et al., 2022 and Shehabi 2020, have highlighted the impact of FFS reforms in terms of trade, greenhouse gases (GHG) and household income. For example, it has been established that reducing any fossil fuel subsidy reduces fossil fuel consumption and lowers carbon dioxide and greenhouse gas (GHG) emissions (Chepeliev and Mensbrugghe, 2020; Burniaux et al., 2009). Additionally, removing FFS allows revenue to be spent on social priority areas such as health and education because it reduces pressure on governments' budgets (Hadian et al., 2020).

Though the removal of FFS has been identified to positively impact the economy and environment (Chepeliev and Mensbrugghe, 2020; Adekunle and Oseni, 2021; Burniaux et al., 2009), there are concerns that higher fossil fuel prices are regressive with a higher effect on poor households. For instance, Coady et al., (2006) estimated both the direct and indirect effects of FFS in Bolivia, Ghana, Jordan, Mali, and Sri Lanka. Their findings suggest that there is a direct effect of hikes in fossil fuel prices on aggregate income and this ranges from 0.2 percent to 0.9 percent, with the effect being distributionally neutral. However, in countries such as Ghana, Jordan, and Sri Lanka, the impact of the fossil fuel hikes was regressive with a higher effect on the lower-income group than the higher-income group. Similarly, Solarin (2022) established that an increase in FFS leads to more income and health poverty. This finding was confirmed by Vandeninden et al., (2022) who analyzed the effects of energy subsidies reforms and found that subsidies were not pro-poor.

Theoretically, the removal of FFS results in higher fuel prices and reduces the consumption of petroleum products and consequently limits GHG emissions (Adekunle and Oseni 2021). However, in poorer countries, the removal of FFS on cooking fuel such as Liquefied Petroleum Gas (LPG) could have debilitating effects because it could lead to reliance on biomass for cooking and heating thereby putting pressure on the forests. Whatever the case, (Saunders and Schneider, 2000) subsidy reforms would result in economic loss (Solarin 2022), therefore some measures would have to be instituted to compensate the losers while efforts are put in place by governments to redirect the income saved from subsidies to transfers or social programmes that directly affect the poor (International Energy Agency, 1999).

In Ghana, before the deregulation of the downstream petroleum sector, retail prices of petroleum products were fixed by the government. Retail prices were consistently lower than the market prices due to subsidies on the products, resulting in a high fiscal cost for the government. To ensure the gradual removal of petroleum products subsidies, the National Petroleum Authority (NPA) was established in 2005 to, among other things, implement the deregulation policy for the downstream petroleum sector.
However, subsidies on petroleum products were continued until July 2015 when subsidies on petroleum products such as gasoil, gasoline and LPG were completely removed. The removal of subsidies occurred at a time when international oil prices were as low as $20/barrel.

Critics of petroleum product subsidies argue that real income losses may be substantial, as higher fuel prices may not only imply higher prices for petroleum products consumed directly by households but also higher prices of other goods which use petroleum products as intermediate goods in the production process (Nwachukwu et at, 2011).
Others believe that petroleum product subsidies compete for limited resources that could otherwise be used to provide other essential services, widen the scope for rent-seeking and commercial malpractices (Sharma, 2013), discourage both supply and demand side efficiency improvement, and promote non-economic consumption of petroleum products (Sarkar and Singh, 2010). Thus, government could use the subsidies to fund well-targeted pro-poor programmes that would directly benefit the vulnerable in society.

Following the foregoing arguments, this paper addresses three fundamental questions:

1. Are the poor the real beneficiaries of the price subsidies in Ghana?
2. What is the magnitude of the distribution of the impact on the various income groups in Ghana?
3. Is the impact of fuel price subsidy regressive or progressive in Ghana?

Addressing the above questions is crucial because, in Ghana, any time fuel prices are adjusted upwards, there are agitations for government to cushion the poor by either reducing taxes on petroleum products or by absorbing the price differential by introducing subsidies. Studies on the removal of FFS on households in Ghana have not adequately addressed the issue of the impact of FFS. One study that comes close is the one conducted by Coady et al. (2006), which investigated the social and fiscal costs of fuel subsidies. They evaluated the magnitude and distribution of fuel subsidies and how they impact poor households in Bolivia, Ghana, Jordan, Mali, and Sri Lanka. They carried out budget share analysis using household fuel expenditure obtained from a household expenditure survey of the aforementioned countries. The study established that the direct effect of an increase in fuel prices ranges from 0.9 percent for Mali to 2 percent for Jordan.

However, the direct effect is either distributionally neutral (Bolivia and Mali) or regressive (Ghana, Jordan and Sri Lanka).

This study differs from previous studies because it uses more recent data on a household survey (Ghana Living Standards Survey rounds six and seven (GLSSVI & VII)) to carry out the before- and after-analysis of subsidy removal. Secondly, the study carries out micro analysis to determine the impact of FFS removal on households in urban and rural areas as well as the regional level.

The remainder of this paper is organised as follows: Section 2 presents a review of relevant strands of studies on the subject matter; Section 3 provides the methodology and data employed; Section 4 includes the presentation and discussion of results, and Section 5 concludes the study with the provision of policy recommendations.

2. Literature Review

2.1 Pricing of petroleum products in Ghana

The pricing of petroleum products in Ghana is guided by three main policy objectives, namely: (i) full cost recovery of investment based on import parity benchmarking; (ii) revenue generation by the imposition of taxes and levies on the petroleum products; and (iii) uniform prices nationwide. The pricing at full cost is meant to assist the players in the industry to recoup their cost of investment. There are two pricing windows and prices are reviewed every two weeks (first and sixteenth of every month). Pump prices are computed based on the free-on-board (FOB) prices, supplier's premium, taxes, levies, and margins. The FOB is the price of petroleum products on the international market and the supplier's premium is expected to cater for all costs associated with importing the petroleum products into the country, such as jetty fees, port charges, demurrage costs, in-plant losses, financing costs, etc. The margins include unified petroleum price fund margin, primary distribution margin, petroleum products marking scheme margin, LPG compensation and distribution margin, marketer's margin, dealer's margin, etc.

Ghana started the implementation of petroleum price deregulation in July 2015. Prior to the price deregulation, prices of petroleum products were set by the National Petroleum Authority (NPA). The introduction of price deregulation shifted the responsibility of price setting to the Bulk Import Distribution and Export Companies (BIDECs) and Oil Marketing Companies (OMCs). The BIDECs are responsible for setting up ex-refinery prices and the OMCs are responsible for setting up ex-pump prices. Following the review of the price deregulation guidelines, the NPA now sets a price floor for OMCs.

2.2 Impact of fossil fuel subsidy reforms

Empirical studies on FFS reforms tend to focus on three key issues such as environmental, economic, and social effects.

2.2.1 Environmental and economic impact of FFS reforms

Research has identified positive effects of FFS removal on the environment and economic growth. For example, a study carried out by Chepeliev and Mensbrugghe (2020) highlighted the impact of subsidy reform on the environment. The authors established that removing FFS could help countries meet their Nationally Determined Contribution (NDC) target and lead to a global emission target of between 1.8 to 3.2% in 2030. The findings were confirmed in a study conducted by Solarin (2020) who used the Generalized Method of Moments (GMM) to investigate the impact of FFS on environmental degradation and found that increasing FFS led to an increase in ecological footprint. Likewise, using non-linear autoregressive lag, Adekunle and Oseni (2021) examined the effects of fuel subsidy on carbon intensity in Nigeria. They found that the relationship between FFS removal and carbon emissions in Nigeria was inversely related in the short and long run.

Earlier, Burniaux et al. (2009) examined the impact of the gradual removal of unilateral and multilateral energy subsidies of OECD and non-OECD countries using price-gap data from the IEA. They found that multilateral energy subsidy removal resulted in an increase in GDP and real income of non-OECD countries such as India, China and Brazil, but declined in some countries, including Russia, the oil-producing countries, and the non-EU Eastern European countries. Regarding the impact of fossil subsidy removal on the environment, they found a reduction in world CO_2 emissions by 3.9 percent in 2020 and 13 percent in 2050. However, GHG emissions were reduced by 3.1 percent in 2020 and are expected to reduce by 10.2 percent in 2050.

Saunders and Schneider (2000) investigated the effect of FFS on OECD and non-OECD countries for the period 1995 to 2010. They found that the removal of FFS resulted in an increase in GDP by 0.45 percent for non-OECD countries in 2010 and 0.1 percent for OECD countries. Additionally, they established that in countries where fossil fuel prices increased, GHG emissions fell, but they were offset by the rise in emissions in other countries.

2.2.2 Social effects of fossil fuel subsidy reform

Regarding the social effects of FFS reforms, studies have looked at the social effect of removal of FFS with a particular emphasis on the incidence of FFS removal on rich and poor households (Vandeninden et al., 2022; Solarin, 2022; Rao, 2012; Vecchi and Andriamihaja, 2007; Kpodar, 2006; Kebede, 2006; Saboohi, 2001).

To understand the impact of energy subsidy reforms on households, Vandeninden et al., (2022) carried out a price-gap analysis and established that energy subsidies were not pro-poor, and that they had a near zero impact on poverty. Therefore, they recommended a compensation scheme instead of energy subsidies. Similarly, Solarin, (2022) investigated the role of subsidies on income in 30 developing countries using GMM techniques. The author found that an increase in FFS leads to more income-and-health-related poverty.

Earlier, other empirical studies had made similar findings. A study conducted on subsidy reforms in Iran found that an increase in energy prices increased rural household cost of living by 33.7% compared to 28.7% of urban households. Similarly, Vecchi and Andriamihaja (2007) investigated the impact of the increase in petroleum prices on living standards in Madagascar and established that the incidence of price increase was higher for low-income households (2.1%) than high-income households (1.5%). They concluded that the subsidies benefited the rich more than the poor.

These findings were confirmed by a similar study conducted in Mali by Kpodar (2006). He established that increasing prices of gasoil and gasoline affected the rich households; however, increasing prices of kerosene affected the poor households Saboohi (2001). Rao (2012) confirmed the findings of the study carried out in Mali when he conducted similar work in India and concluded that subsidies on kerosene were regressive since they did not provide any financial benefit to the poor. He recommended that subsidies should be replaced with government cash transfers. In contrast, Kebede (2006) established that subsidies on kerosene prices did not significantly change the overall cost of living of households.

3. Methodology

3.1 Model Specification

The study specified "petroleum products price subsidy" as the difference between the full pass-through price of each product and the actual price sold to the consumer. The petroleum products price subsidy was specified as,

$$P_S = F_P - A_P \quad (1)$$

where P_S is price subsidy Coady et al., (2006), F_P is full pass-through price and A_P is actual pump price. Full passthrough price is the price without subsidy and the actual pump price is the subsidized price offered to consumers.

The welfare impact of a petroleum products subsidy on households could be direct or indirect. The direct impact on households is due to higher prices for fuels consumed for cooking and transportation. The indirect impact is through higher prices for other goods consumed by the households as a result of higher fuel costs.

This study focused on the direct welfare impact of petroleum products subsidies because of insufficient data to estimate the indirect welfare impact of petroleum products subsidies. The direct effect is considered a short-run estimate of welfare impact because it assumes zero elasticity of substitution. Thus, households are assumed not to immediately substitute for fuel when there is a fuel price increase.

Household budget share is specified as:

$$\frac{H_{FE}}{H_{TE}} \quad (2)$$

Direct effect of fuel price increase is specified as:

$$D_E = \frac{H_{FE}}{H_{TE}} \times Percentage\ increase\ in\ fuel\ price \quad (3)$$

where D_E is direct effect of fuel price increase, H_{FE} is the household's expenditure on petroleum products and public transport, H_{TE} is the household's total expenditure.

The magnitude of the impact of fuel price increases depends on the share of cooking and private transport costs in the total household consumption, as well as on the fuel intensity of other goods and services. The distribution of the impacts across different income groups also depends on the relative importance of these factors across income groups. For instance, if the consumption baskets of higher-income groups are relatively more fuel intensive than of lower-income groups, then the impact on the former will be greater than on the latter.

3.2 Data

The study used Ghana Living Standards Survey rounds six and seven (GLSSVI & VII) data from the Ghana Statistical Service (GSS). The GLSS data is a nationwide household survey designed to generate information on the living conditions of households in the country. The GLSSVI survey was conducted from 18th October 2012 to 17th October 2013 and that of GLSSVII was conducted from 3rd October 2016 to 3rd October 2017 (GSS 2019). The survey captured information on the demographic characteristics of households, education, health, employment, migration, tourism, housing conditions, household agriculture, household expenditures, etc.

This study used data on the expenditure of households in the country to estimate the welfare impact of the fuel price increase and the benefits of fuel subsidies. Data on total household expenditure (excluding rent) and household expenditure on LPG, kerosene, petrol/diesel and transport were used to estimate the budget share of the petroleum products. The mean household expenditure for each quintile is shown in Table 1. Data on fuel price subsidies for 2014 were computed from the data on actual consumer prices and full pass-through prices of petroleum products obtained from the NPA. This period was selected because of the availability of data.

3.3 Estimation Technique

The study computed a unit subsidy by comparing the full pass-through price and the actual consumer price. The total fuel subsidy for each product was estimated by multiplying the unit subsidy and the annual consumption of each product.

The budget share was estimated for petroleum products such as LPG, kerosene, transportation fuel (petrol/diesel) and public transport (cost of fares) for both rural and urban households. The budget shares were multiplied by the percentage price increase to estimate the impact of the fuel price increase. The estimation of the magnitude of the impact across the different groups was carried out by grouping the households into

various consumption quintiles[1] and estimated the direct welfare impact of fuel price increase on the various quintile groups. To analyze the impact of fuel price increases on the welfare of households, we carried out the various scenarios using actual fuel price adjustments.

Table 1: Mean annual household expenditure

Quintile group	Mean annual household expenditure (GHS) GLSS VI	Mean annual household expenditure (GHS) GLSS VII
First (bottom 20%)	3,924	4,114
Second	5,833	7,538
Third	7,444	9,849
Fourth	9,238	11,837
Fifth (top 20%)	14,665	17,813

Source: Authors own computation using GLSS VI &VII data

4. Discussion of Results 4.1 Results based on GLSS VI data

This section presents the result and discussion of the budget share of household fuel consumption as well as the impact of fuel price increases and the direct benefit of petroleum products subsidies using GLSSVI data.

4.1.1 Budget shares of household fuel consumption at the national level

Table 2 presents the results of household budget shares on LPG, transportation fuel (diesel/petrol), kerosene and public transport (fares). The results indicate that the households spent 0.2% of their total expenditure on LPG for cooking and 1.7% on transportation fuel (diesel/petrol) per year. Regarding kerosene, households spent 0.1% on the product per year. Additionally, households spent 3.3% of their annual expenditure on public transport.

[1] Divided the total households into five according to ascending consumption level

Table 2: Household's budget share of petroleum products and public transport

Products	Budget Share
LPG	0.002
Transport (diesel/petrol)	0.017
Kerosene	0.001
Public transport	0.033

Source: Authors own computation using GLSS VI

4.1.2 Direct impact of fuel prices increase by consumption quintile

The results of the analysis of the distribution of the impact of fuel price increases across different income groups are presented in Table 3. The impact of fuel price increases on the various income groups depends on the relative importance of the petroleum products across income groups.

Table 3: Budget share across different income groups

Product	Bottom 20%	Second	Third	Fourth	Top 20%
LPG	0.0001	0.0007	0.0011	0.0027	0.0035
Transport fuel (petrol/diesel)	0.0090	0.0091	0.0091	0.0109	0.0278
Kerosene	0.0012	0.0014	0.0013	0.0010	0.0006
Public transport	0.0168	0.0254	0.0318	0.0350	0.0383
National Total	**0.0272**	**0.0366**	**0.0433**	**0.0496**	**0.0701**

Source: Authors own computation using GLSS VI

The results revealed that households in the lower-income group allocated a smaller consumption budget to LPG, petrol/diesel and public transport. The higher-income group allocated a higher consumption budget to LPG, petrol/diesel and public transport. While the lower-income group allocated 0.01% of their income to LPG, the higher-income group allocated 0.35% of their income to LPG. Concerning transportation fuel, the lower-income group allocated 0.9% of their income to diesel/petrol while the higher-income group allocated 2.8% of their income to diesel/petrol. Similarly, the percentage of income

spent by the higher-income group is almost twice that of the lower-income group. The lower-income group was found to spend higher (0.12%) on kerosene than the higher-income group (0.06%).

The above results indicate that the impact of the increase in fuel prices was progressive across the different income groups except for kerosene which was regressive (see Table 4). For instance, the impact of a 10% rise in fuel prices is 2.5 times higher on the top 20% income group than the bottom income group.

This is expected because the budget share of the households in the higher-income group is higher than that of those in the lower-income group. Also, it is expected that those in the lower-income group will spend more on kerosene compared to those in the higher-income group. These findings are contrary to the findings by Coady et al. (2006) and Vecchi and Andriamihaja (2007) who established that the impact of fuel price increases was higher on the poor than the rich.

Table 4: Direct impact of fuel price increase across different income groups

Product	Bottom 20%	Second	Third	Fourth	Top 20%
LPG	0.0001	0.0008	0.0012	0.0029	0.0038
Transport fuel (petrol/diesel)	0.0099	0.0100	0.0100	0.0120	0.0305
Kerosene	0.0014	0.0015	0.0014	0.0011	0.0006
Public transport	0.0185	0.0279	0.0350	0.0385	0.0421
National Total	**0.0299**	**0.0402**	**0.0476**	**0.0546**	**0.0771**

Source: Authors own computation using GLSS VI

4.1.3 Distribution of subsidy benefits by consumption quintile

Table 5 presents the results of the share of the total benefits from subsidized fuel prices of each income group. The estimation of the total subsidy benefits was carried out using the actual price subsidy of the petroleum products for 2014. In 2014, the total price subsidies on LPG, petrol/diesel (combined), kerosene were GHS0.90, GHS4.42 and GHS2.99 respectively.

Table 5: Distribution of subsidy benefits by consumption quintile (%)

Product	Bottom 20%	Second	Third	Fourth	Top 20%
LPG	0.9	6.9	11.1	26.5	34.4
Transport fuel (petrol/diesel)	439.1	443.7	440.8	532.1	1,349.8
Kerosene	40.9	45.9	43.3	31.7	18.2
National Total	**480.9**	**496.4**	**495.2**	**590.3**	**1,402.4**
National (Average)	**160.3**	**165.5**	**165.1**	**196.8**	**467.5**

Authors own computation using GLSS VI

The results reveal that, on average, the top income group received about three times more than the bottom income group. Likewise, the top income group received about three times more of the subsidies than the bottom 40% of the income group. The situation is even worse at the individual product level. For instance, almost all subsidies on LPG went to the top-income group with the lowest income group receiving just 1%. The top income group received more than thirty (30) times the subsidies received by the lower income group. Similarly, the top income group received about three times the subsidies on petrol/diesel compared to the lower-income group. However, regarding kerosene, the bottom income group received more subsidies than the top income group.

The above findings lend support to the assertion that there is a spillover of fuel subsidies to the rich. Thus, the rich benefit more than the poor when there are fuel subsidies. The analysis indicates that there is substantial leakage of subsidy benefits to the higher-income group which defeats the rationale for petroleum products subsidies.

These findings support the findings of studies conducted by Vandeninden et al., (2022), Solarin, (2022), Vecchi and Andriamihaja (2007) and Rao (2012). For example, Vandeninden et al., (2022) undertook a price-gap analysis and established that energy subsidies were not pro-poor and that they had a near-zero impact on poverty. Vecchi and Andriamihaja and (2007) found that, in Madagascar, the increase in prices of petroleum products was higher for the poor than the rich and concluded that subsidies benefited the rich more than the poor.

4.1.4 Budget share of rural and urban households

Table 6 presents the budget share of rural and urban households on LPG, Kerosene, transportation fuel (diesel/petrol) and public transport. The results reveal that the budget share of rural households on all the products is lower than that of households in the urban areas except for kerosene. The higher budget share on kerosene recorded in the rural areas is because the households in rural areas consume more kerosene than those in urban areas.

Table 6: Budget share of households in the rural and urban areas

Location	LPG	Transport (diesel/petrol)	Kerosene	Public transport	Total	Average
Rural	0.0007	0.0144	0.0013	0.0270	**0.0434**	**0.0108**
Urban	0.0036	0.0196	0.0006	0.0380	**0.0618**	**0.0154**

Source: Authors own computation using GLSS VI

The budget shares of rural households on LPG, kerosene, petrol/diesel and transport were 0.0007, 0.0013, 0.0144 and 0.0270 respectively, meaning that households in rural areas allocated 0.07% of their total consumption budget to LPG, 0.13% to kerosene, 1.44% of petrol/diesel and 2.70% of public transport.

On the other hand, the budget shares of households in urban areas on LPG, petrol/diesel and public transport were higher than those of households in rural areas, but not for kerosene. For example, households in urban areas allocated 0.4% of their consumption budget to LPG compared to 0.07% of the households in rural areas. Similarly, households in urban areas allocated 1.96% more of their consumption budget to petrol/diesel than households in rural areas. Regarding public transport, urban households allocated 3.8% of their consumption budget to public transport.

Overall, households in rural areas in Ghana spent less consumption budget (1.1%) on petroleum products and public transport compared to their urban counterparts. This suggests that the impact of fuel price increases is higher among the urban dwellers than the rural dwellers because the rural household's consumption basket is less fuel intensive.

4.2 Results based on GLSS VII

This section discusses the results of the budget share analysis of household fuel consumption as well as the impact of fuel price increases and the direct benefit of petroleum products subsidies.

4.2.1 Budget shares of household fuel consumption at the National Level

Table 7 exhibits the results of the household budget shares on LPG, transportation fuel (diesel/petrol), kerosene and public transport at the national level. The results show that households spent 0.4% of their total consumption budget on LPG for cooking and 1.7% on transportation fuel (diesel/petrol) per year. On the other hand, households spent 0.02% of their consumption budget on kerosene per year. Households spent 4.8% of their annual consumption budget on public transport.

Table 7: Household's budget shares on petroleum products/public transport (GLSSVII)

Products	**Budget Shares**
LPG	0.0035
Transport (diesel/petrol)	0.0169
Kerosene	0.0002
Public transport	0.0480

Source: Authors own computation using GLSS VII

The results, based on GLSSVII, indicate that the household consumption budget was higher for all the petroleum products and public transport compared to GLSSVI data. This could be attributed to an increase in fuel prices because of the implementation of the price deregulation policy introduced in July 2015.

Further analysis of the budget shares based on rural and urban households reveals that households in rural areas allocated less consumption budget to LPG compared to households in urban areas (see Table 8). Additionally, households in rural areas spent less of their consumption budget on transportation fuel (diesel/petrol) and public transport, compared to urban areas. The only product the households in rural areas spent more than their counterparts in urban areas was kerosene.

Table 8: Budget share of rural and urban households (GLSSVII)

Products	Rural	Urban
LPG	0.0015	0.0050
Transport (diesel/petrol)	0.0145	0.0187
Kerosene	0.0002	0.0001
Public transport	0.0389	0.0549
National Total **0.0551** **0.0787**	**National Average**	**0.0138** **0.0197**

Source: Authors own computation using GLSS VII

4.2.2 Direct impact of fuel prices increase by consumption quintile

The results of the incidence of the impact of fuel prices increase across different income groups are presented in Table 9. The results reveal that the households in the lower-income group allocated a smaller consumption budget to LPG, petrol/diesel and public transport. The higher-income group allocated a higher consumption budget to LPG, petrol/diesel and public transport. While the lower income group (bottom 20%) allocated 0.01% of their income to LPG, the higher-income group allocated 0.55% of their income to LPG. Concerning transportation fuel, the lower-income group allocated 0.1% of their income to diesel/petrol while the higher-income group allocated 2.8% of their income to diesel/petrol. Similarly, the percentage of income spent by the higher-income group on public transport is almost twice that of the lower-income group. The lower-income group was found to spend more (0.02%) on kerosene than the higher-income group (0.01%).

Table 9: Budget shares of various households' consumption quintile (GLSSVII)

Products	Bottom 20%	Second	Third	Fourth	Top 20%
LPG	0.00007	0.0008	0.0022	0.0039	0.0055
Transport fuel (petrol/diesel)	0.0113	0.0100	0.0083	0.0092	0.0277
Kerosene	0.0002	0.0002	0.0002	0.0002	0.0001
Public transport	0.0258	0.0312	0.0388	0.0502	0.0607
National Total	**0.03739**	**0.0422**	**0.0495**	**0.0635**	**0.0939**
National Average	**0.00935**	**0.01055**	**0.01237**	**0.01587**	**0.02348**

Source: Authors own computation using GLSS VII

Further analysis was carried out to ascertain the impact of the increase in prices of petrol, diesel and LPG due to the imposition of an energy recovery levy, and a sanitation and pollution levy. The government imposed an energy sector recovery levy of GH₵ 0.20p on petrol and diesel and GH₵ 0.18p on LPG. Also, a sanitation and pollution levy of GH₵ 0.10p was imposed on petrol and diesel. This translated into an increase of about 10% for petrol, diesel and LPG. The results of the impact of recent fuel price increases on the household consumption budget are presented in Table 10. The results reveal that the impact is marginal on the various consumption quintiles of households which consume LPG. However, the impact is higher for the higher-income group than the lower-income group since the higher-income group allocated a higher consumption budget to petroleum products.

Table 10: Impact of fuel price increases on household consumption quintile based on GLSSVII (% of total consumption)

Product	Bottom 20%	Second	Third	Fourth	Top 20%
LPG	0.01	0.09	0.24	0.43	0.60
Transport fuel (petrol/diesel)	1.24	1.09	0.91	1.01	3.05
National Total	**1.25**	**1.18**	**1.15**	**1.44**	**3.65**

Source: Authors own computation using GLSS VII

4.2.3 Regional household budget share

Table 11: Regional Households Budget Shares (based on GLSSVI data)

Region	LPG	Transport (diesel/petrol)	Kerosene	Public Transport
Western	0.0029	0.0151	0.0003	0.0350
Central	0.0031	0.0098	0.0019	0.0346
Greater Accra	0.0041	0.0224	0.0010	0.0548
Volta	0.0018	0.0151	0.0026	0.0310
Eastern	0.0020	0.0066	0.0013	0.0359
Ashanti	0.0028	0.0155	0.0002	0.0342
Brong Ahafo	0.0011	0.0154	0.0001	0.0290
Northern	0.0003	0.0292	0.0011	0.0171
Upper East	0.0008	0.0169	0.0008	0.0118
Upper West	0.0008	0.0291	0.0002	0.0105

Source: Authors own computation using GLSS VI

Tables 11 and 12 show the results of the regional household budget shares based on GLSSVI & VII data. The results based on GLSSVI indicated that households in the Greater Accra region had the highest budget shares on LPG followed by Central and Western regions. This could be attributed to the fact that in the Greater Accra region, most households use LPG as cooking fuel, and, therefore, their budget share on LPG tends to be higher. Even though the consumption of LPG in Central and Western regions in 2013 was low compared to the Ashanti region, the budget shares of households in the former regions were higher. This is because the total household consumption budgets of Western

(GHS16 million) and Central (GHS12 million) were small, thus resulting in higher budget shares. Regarding transport fuels, households in the Northern region had the highest budget shares (0.0292), followed by Upper West (0.0291) and Greater Accra (0.0224) respectively. This could be attributed to the fact that the total consumption budgets of households in the Northern and Upper West regions were low, thus resulting in higher budget shares. Households in the Greater Accra region had the highest budget shares (0.0548) on public transport, followed by Eastern (0.0359) and Western (0.0350) respectively.

Table 12: Regional Households Budget Shares (based on GLSSVII data)

Region	LPG	Transport (diesel/petrol)	Kerosene	Public transport
Western	0.0035	0.0051	0.0001	0.0383
Central	0.0035	0.0030	0.0002	0.0451
Greater Accra	0.0062	0.0257	0.0001	0.0825
Volta	0.0044	0.0113	0.0010	0.0470
Eastern	0.0031	0.0048	0.0002	0.0429
Ashanti	0.0038	0.0168	0.0000	0.0555
Brong Ahafo	0.0020	0.0161	0.0000	0.0366
Northern	0.0007	0.0371	0.0000	0.0239
Upper East	0.0019	0.0142	0.0000	0.0166
Upper West	0.0012	0.0404	0.0000	0.0342

Source: Authors own computation using GLSS VII

The results reveal that an increase in the price of LPG tends to affect households in Greater Accra more than households in the other regions. Similarly, an increase in the price of diesel/petrol affects households in the Northern and Upper West regions more than the other regions. However, increasing prices of kerosene affect households in the Volta and Central regions more than any other region. Households in the three Northern regions are the least affected whenever there is an increase in LPG prices because the households in these regions spent less consumption budget on LPG. Households in the Central and Eastern regions spent less consumption budget on petrol and diesel compared to the other regions. Regarding public transport, households in the Upper East and Upper West spent less consumption budget on public transport than any other region.

The results based on GLSSVII indicate that the three Northern regions had the lowest budget shares on LPG. However, they had the highest budget shares on petrol and diesel compared to most of the regions. The lowest budget share on LPG is due to the fact that the three Northern regions have lower LPG consumption. Additionally, because the three regions have lower total consumption budgets, their budget shares for petrol and diesel tend to be higher than other regions. Unlike the GLSSVI results, the budget share on LPG is higher for Greater Accra followed by Volta and Ashanti regions respectively. The results obtained from GLSSVI data and GLSSVII data in terms of the trend of household budget shares on petroleum products and public transport were not different.

The comparison of regional total budget shares on petroleum products and public transport for both GLSSVI and GLSSVII is presented in Figure 1. All the regions recorded higher budget shares in 2017 except the Western region. The increased budget shares of households in 2017 could be attributed to the fuel price increase due to the implementation of price deregulation.

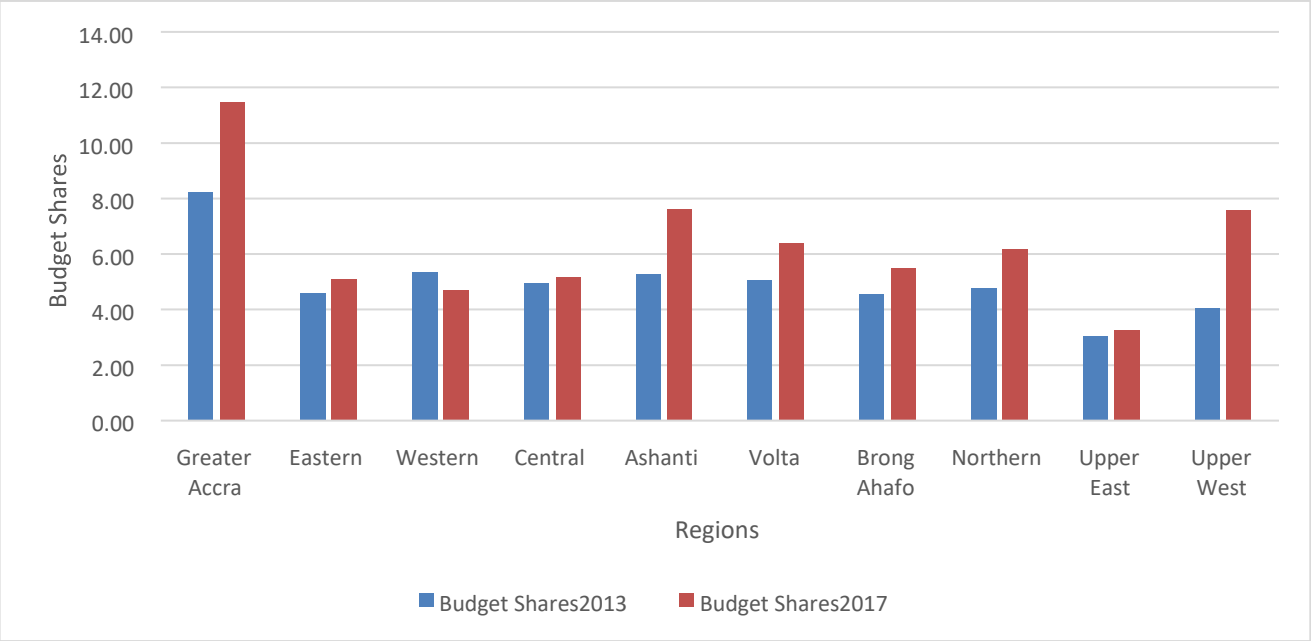

Figure 1: Comparison of total regional budget shares on petroleum products and public transport, 2013 and 2017 (Source: Authors own computation using GLSS VII)

5. Conclusion and Recommendation

5.1 Conclusion

This paper investigates the direct impact of petroleum price increases on the welfare of consumers and the benefits of petroleum products subsidies using the information on household expenditure data obtained from Ghana Living Standards Survey rounds six and seven (GLSSVI & VII).

The study established that households in rural areas are less affected whenever there is an increase in the price of petroleum products because they allocate a smaller amount of their consumption budget to petroleum products per year. For instance, on average, households in rural areas allocated 1.1% of their total consumption budget to petroleum products. This increases to 1.4% in the case of GLSSVII data. However, households in urban areas are more affected whenever the prices of petroleum products go up. This is because households in urban areas allocated higher consumption budgets to petroleum products. Households in urban areas allocated 1.5% of their consumption budgets to petroleum products. This increases to 2% in the case of GLSSVII data.

Further analysis based on the various consumption quintiles (income groups) revealed that the lower-income group allocated a small fraction of their income to petroleum products such as LPG and diesel/petrol. The results indicated that the impact of fuel price increases was progressive across the different income groups, except for kerosene. This is because the budget share of the households in the higher-income group on fuel products is higher than those in the lower-income group.

Regarding the distribution of subsidy benefits by consumption quintile, the study found that the top income group received about three times more of the subsidies than the bottom-income group suggesting that FFS is regressive. This indicates that identifying cost-effective social intervention programs to protect the poor would be more appropriate than subsidizing petroleum products. These findings justify the complete removal of subsidies on prices of petroleum products since there is a substantial spillover of benefits of petroleum product subsidies to the rich.

In Sub-Saharan Africa (SSA), subsidies on petroleum products are estimated at US$16.1 billion (Black et al., 2023). Diesel, petrol and LPG constitute about 55%, 27% and 2.5% respectively. Based on the findings of this study, it is likely that the subsidies on these products do not get to the intended beneficiaries. Thus, the findings of this study provide evidence that petroleum product subsidies benefit the rich more than the poor, therefore

countries in which petroleum products are subsidized to benefit the poor may have to reexamine this policy and come up with a more targeted policy which is pro-poor.

The main limitation of this study is the adoption of a static model for analysis. The study assumes that there is zero elasticity of substitution and that households do not change their consumption basket when fuel prices increase. However, households may decide to use alternative fuels such as biomass should the prices of LPG increase. This means that the welfare impact of the adjustment in prices would be minimal. Additionally, the removal of FFS may have both direct and indirect effects on households. This study only looked at the direct effects. Therefore, future research should consider both the direct and indirect effects of petroleum product subsidies removal using a dynamic model.

5.2 Recommendation

The study recommends that targeted policies which will directly cushion the poor instead of subsidizing the price of petroleum products should be implemented since subsidies on petroleum products, especially petrol and diesel are regressive. Thus, the government could provide a direct cash transfer to cushion the poor through the Livelihood Empower Against Poverty (LEAP) program to absorb the impact associated with fuel price increases to avoid leakage of subsidies to the rich. This could be done by using part of the funds realized from the price stabilization and recovery levy (PSRL) as well as funds that could have been used to subsidize the product to support the poor through the LEAP programme.

Additionally, poor households could be cushioned by introducing mass transportation to lessen the cost of transportation. The provision of mass transport will help ameliorate the effect of fuel price increases on the poor.

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