Fuel Price Hike and Vulnerability of Households in Nigeria: Empirical Evidence from Ibadan Metropolis

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ABSTRACT World oil prices have risen to substantial levels recently. The world demand-driven oil price shock has influenced the way developing countries pursue policies aimed at improving the standard of living of the people. This paper examines the effect of fuel price hike on the Nigerian households. A structured questionnaire was administered to 123 households in the Ibadan metropolis, Oyo State, Nigeria using a multi-staged random sampling technique. Descriptive statistics and the Tobit regression model were employed as analytical tools. Results of data analysis show that households with higher income employed fewer but better coping strategies and are less vulnerable to fuel price hikes, while households with lower income employed more but less effective coping strategies and are more vulnerable. Using the absolute poverty line of N54, 401.16 defined by National Bureau of Statistics as a benchmark, the per capita expenditure approach was used for assessing the poverty level of respondents. From the result, it was revealed that about seventy percent of respondents spent less than N54, 401.16 indicating about three-quarters of Nigerians are poor, living on less than USD2 a day. Findings also show that any increase in fuel prices beyond its current price will further increase the vulnerability of the already poor households. It is, therefore, suggested that governments should cushion the effect of incessant fuel price fluctuations and reduce households' vulnerability by introducing income redistribution policies in favor of the vulnerable group. Also, a provision of safety nets and other welfare-enhancing programs will help in boosting the living conditions of the vulnerable group.

INTRODUCTION

The hike in fuel prices has been a common phenomenon in Nigeria. The most recent of the price hike was the shocker on 1st January, 2012 when the pump price was increased to N141 from N65 representing a 116.92 percent increase; although the price was later reduced to N97 due to the protest embarked upon by the Nigeria Labor Congress (NLC), Trade Union Congress (TUC) and other organized labor bodies in Nigeria. As a result of this increase, inflation rate rose from 10.3 percent in December 2011 to 12.6 percent the following month (January, 2012). The six-day protest that arose as a result of the recent increase brought the nation's economic activities to a standstill with Nigeria losing an estimated USD1.3 billion, which is about N207.1bn (NBS 2012; Aye et al 2014). National Bureau of Statistics (NBS) reveals that the biggest losses were recorded in the wholesale and retail sector which recorded forty-two percent of the economic loss to the tune of N86.984bn; this was followed by the oil and gas sector which is the largest source of government revenue accounting for N28.710bn and fourteen percent of

economic losses. The agricultural sector suffered a loss estimated at N17.87bn (NBS 2012).

Agriculture contributes about forty-five percent of the GDP of Nigeria (NBS homepage March 2012) and employs close to ninety-five percent of the rural population. Poverty in Nigeria remains significant despite high economic growth with Nigeria having one of the world's highest economic growth rates (averaging 7.4 percent over the last decade). The economy of Nigeria has been growing as revealed by the GDP growth but it has failed to translate to meaningful improvement in the standard of living of an average Nigerian. An increase in pump price, especially that of petrol, will have an astronomical impact on the cost of transportation, cost of implements to use on farms and a higher cost of living which their streams of income cannot adequately cater for. In a study conducted by Fofana et al. (2007), it was shown that the adverse impact of higher oil prices is much more diversified depending on the share of oil cost in national income and the energy efficiency and substitution possibilities of the industries in the economy. It was predicted that oil price increases would have negative effects on the economy

as a whole and the welfare of highly vulnerable households (Blanchard 2003; IMF 2013).

To be vulnerable is to be without adequate protection—open to physical or emotional harm, extremely susceptible—easily persuadable or liable to give in to temptation, physically or psychologically weak—unable to resist illness, debility, or failure (Encarta Dictionaries 2009). Poverty level in most cases is defined in terms of household consumption levels relative to a pre-selected poverty line. According to Okunmadewa (2003) and Trung (2015), vulnerability is the likelihood of a shock causing a significant welfare loss. He was of the opinion that vulnerability depends on exposure to risks (uncertain events that can lead to welfare losses) and on risk management actions taken to respond to risks, while IPCC (2001) defines vulnerability as, the degree to which a system is susceptible, or unable to cope with adverse effects of climate change, including climate variability and extremes.

The picture painted above is worsened by incessant increases in the pump price of fuel because our economy is so much dependent on oil.

Statement of the Problem

Nigeria is one of the countries where the price of its domestic oil has been on the increase since 1970. Incessant increase in the prices of crude oil has led to multiple negative effects on the economy. Whatever happens in the oil sector influences all other sectors of the economy and by implication it affects the macroeconomic policies of the country. The rural people are more susceptible to this effect because there is infrastructure inadequacy, low level of access to productive assets, and most importantly inadequate access to formal education, which limits them only to income from their produce, as they in most cases do not have access to well-paying jobs.

Adegeye and Dittoh (1985) are of the opinion that any nation neglecting the development and empowerment of the rural communities should not expect meaningful development. In other words, unless the rural areas are well developed, hardly would any meaningful development occur in a country (World Bank 2012). Rising fuel prices is now perceived to be altering household financial and consumption patterns. Less fuel consumption and fewer car trips with reductions in discretionary spending such as

'going out' and entertainment appear to be the main behavioral responses. Public, policy and political concern reflects further anxieties about the implications of indirect inflationary impacts from rising fuel costs on households as increased business production and transport costs are translated into the prices for goods and services.

Emanating from the foregoing, this study therefore, examines the effect of fuel price hike on the vulnerability level of households in Ibadan, Oyo State, Nigeria.

As depicted in Table 1, Nigeria has the least minimum wage and the second highest pump price of petrol, the country therefore seems to neglect the wellbeing of the population. The MDG goals include, eradication of extreme poverty and hunger, achievement of universal primary education, promoting gender equality and women empowerment, reduction in child mortality, improvement in maternal health, combating HIV/AIDS, Malaria and other diseases, ensuring environment sustainability and finally more and better aid, fairer trade and debt relief for developing nations. The achievement of these goals will be based on improved standard of living of rural dwellers, which account for about seventy-five percent of Nigeria's population. Rural infrastructure in Nigeria has long been neglected. Investments in health, education and water supply have been focused largely on the cities. As a result, the rural population has extremely limited access to services such as

Table 1: Comparison of oil prices producing countries

S No.	OPEC members	Fuel Price /liter (in Naira)	Per capita income (US Dollars)	Minimum wage (in Naira)
1	Venezuela	3.61	12,700	95,639
2	Kuwait	34.54	48,900	161,461
3	Saudi-Arabia	25.12	24,200	99,237
4	Iran	102.05	10,600	86,585
5	Qatar	34.54	179,000	101,250
6	Algeria	63.55	7,300	55,957
7	Libya	26.69	14,000	23,813
8	Iraq	59.66	3,800	25,813
9	Nigeria(97-100)		2,500	18,000
10	UAE	78.18	49,600	152,127

Source: Table culled from http://lindaikeji.blogspot.com (2012) and http://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html (2012)

schools and health centers, and about half of the population lack access to safe drinking water. Neglect of rural infrastructure affects the profitability of agricultural production. The lack of rural roads impedes the marketing of agricultural commodities, prevents farmers from selling their produce at reasonable prices, and leads to spoilage. Limited accessibility cuts small-scale farmers off from sources of inputs, mechanized equipment and new technology and thus keeps yield low. This study therefore examines vulnerability of households in Nigeria to fuel price hike.

Measures of Vulnerability

Shocks and hazards are exogenous aspects of vulnerability of a household while coping strategies constitute the endogenous aspect of vulnerability that a household adopts. Its distinction from poverty lies in the fact that not all vulnerable households with or without children are necessarily poor. Indeed, protracted shocks and less coping capacity will lead to some level of poverty (Lok-Dessallien 1998). Studies in poverty show that the concept is static compared to vulnerability. Vulnerability is more of an exposure to shocks or hazards than exposure to poverty (Ravallion 1996; Cunningham and Maloney 2000).

Measuring vulnerability empirically is complicated by the intricacy of the concept and the absence of unified indices (Pritchett et al. 2000; Azam and Imai 2012). Kanbur and Squire (1999) stated there are no clear-cut measurements of vulnerability. Scaramozzino (2006) identified outcome and utility-based approaches to vulnerability. The former attempts to quantify vulnerability in line with expected poverty, and the latter focuses on measuring vulnerability as the outcome in the difference between the utility that a household extracts from consuming a certain bundle with certainty and the expected utility of consumption. In order to estimate household vulnerability to fuel price hike, it is important to identify pertinent indicators of shocks or hazards and coping strategy index (CSI).

RESEARCH METHODOLOGY

Area of Study

The study area is Ibadan, Oyo State, Nigeria. Ibadan (Yoruba: *Ìbàdàn* or fully Ìlú ̣ Ìbá-Ììdàn, the city at the junction of the savannah and the forest) is the capital city of Oyo State and the third largest metropolitan area in Nigeria, after Lagos and Kano, with a population of 1,338,659 according to the 2006 census. Ibadan is also the largest metropolitan geographical area. At the time of Nigerian independence, Ibadan was the largest and most populous city in the country and the third in Africa after Cairo and Johannesburg. Ibadan is located in southwestern Nigeria, 128 km inland northeast of Lagos and 530 km southwest of Abuja, the federal capital, and is a prominent transit point between the coastal region and the areas to the north. Ibadan had been the center of administration of the old Western Region since the days of the British colonial rule, and parts of the city's ancient protective walls stand to this day. The principal inhabitants of the city are the Yoruba's.

Sources of Data and Sampling Method

For the purpose of this study, primary data from field survey and secondary data from the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS) and Nigerian Institute for Social and Economic Research (NISER) was used. Questionnaires were designed and used to obtain responses from the 130 respondents. Two Local Government Areas (LGAs)—Akinyele and Ido LGAs were covered in the survey using a multi-staged random sampling technique. The first stage involved a random selection of Akinyele and Ido Local Government from 11 LGAs in Ibadan metropolis. The second stage was the selection of the four villages in each of the LGAs. The third stage was a random selection of respondents based on probability proportionate to size. Out of the 130 respondents sampled for the purpose of this study, only 123 provided useful information and these were used for analysis.

Methods of Data Analysis

Descriptive statistics was employed to analyze, describe and summarize respondents' socioeconomic characteristics.

Tobit regression model was used in ascertaining the determinants of households' vulnerability to fuel price hike.

The vulnerability level of each household was calculated by generating an index ($V_{price\ hike}$) as follows:

$V_{(price\ hike)}$ = $\underline{Coping\ strategy\ employed\ by\ respondents}$
*Total number of strategies available and ac
cessible in the study area*

The predicted probability Gujarati (1995) of vulnerability to fuel price hike is estimated as:

$$P(V) = \frac{1}{1+e^{-zi}}$$

Where e is the base of the natural logarithm and Z_i is the value of the unobserved continuous variable for the ith case, which the model assumes is linearly related to independent variables expressed as

$Z_i = \beta_0 + \beta_1 X_{i1} + \ldots + \beta_n X_{in}$. Since Z is unobservable, it is not possible to employ a linear regression model, and the predictors to the probability that a household is vulnerable to fuel price hike should be substituted for Z:

$$P(V) = \frac{1}{1+e^{-\beta 0 + \varepsilon\beta xd}}$$

The Tobit model for vulnerability of household to price hike of fuel estimated as:

$Y = \beta 0 + \beta i\ Xi + ei$

Where Y ($0 \leq Y \leq 1$) is a dependent variable, which can be explained as;

$Y = 1$, if households are highly vulnerable, and $Y = 0$ if households are not vulnerable.

Tobit model does not limit probabilities for each value of dependent variables between 0 and 1 and this makes it more robust to the Logit model.

The parameters were estimated by the method of maximum likelihood.

The independent variables include the following:

X_1 = Gender of respondents (Male = 0, females = 1)
X_2 = Age of respondents (Actual age in years)
X_3 = Years of formal education of respondent
X_4 = Marital status (married = 1, otherwise = 0)
X_5 = Household size (Actual number)
X_6 = Primary occupation (farming = 1 otherwise = 0)
X_7 = number of cars respondents own
X_8 = Ownership of generating set (yes = 1 otherwise = 0)
X_9 = litres of petrol used per day (actual litres)
β_1 = stands for estimated parameters explaining the participatory variables respectively.

Compensating variation is the income or monetary transfer that is needed to restore the household to the initial position before the (price) shock occurred, expressed as a percentage of the initial level of total consumption expenditure.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Several characteristics of respondents such as age, marital status, litres of fuel consumed per day, and expenditure level of respondents were considered in the analysis. The results of analysis are thus discussed as follows.

Age Distribution of Respondents

The result shown in Table 2 shows that about eighty-seven percent of the respondents are within ages of 18 and 50 years and are considered to be in their economically active years. The mean age of respondents sampled is within ages 23 and 50 years. This means that an average respondent is within their economically active years. The minimum age of respondents is 19 years while the maximum age is 65 years. The two age limits were in consonance with the Nigeria workforce age of between 18 and 65 years. The coefficient of variation is 0.358 (35.8 percent) suggesting that there is a slight variation in the ages of respondents. The sampled area has various ages of people that make it a multi-social environment.

Table 2: Distribution of respondents by age

Age	Frequency	Percentage
≤30 years	60	48.8
31-40 years	31	25.2
41-50 years	16	13.0
51-60 years	9	7.3
≥60 years	7	5.7
Total	123	100

Gender Distribution of Respondents

The result from Table 3 shows that majority of the respondent were males accounting for 64.2 percent while the remaining 35.8 percent were females. This is in line with the pattern of

Table 3: Distribution of respondents by gender

Sex	Frequency	Percentage
Male	79	64.2
Female	44	35.8
Total	123	100

households in southwest, Nigeria where most households are headed by the male gender.

Education Status of Respondents

The results from Table 4 show that almost half of the respondents representing 44.7 percent have access to tertiary education followed by 35.8 percent of respondents who have secondary school leaving certificate. Only 2.4 percent do not have access to any form of formal education.

Table 4: Distribution of respondents by educational level

Education level	Frequency	Percentage
No education	3	2.4
Primary	21	17.1
Secondary	44	35.8
Tertiary	55	44.7
Total	123	100

Marital Status of Respondents

Table 5 shows the result on marital status of household heads. 50.4 percent of the respondents are married and this has implications for the household size and quantity of fuel consumed. Further results, however, show that 44.7 percent of the respondents are single while others are divorced or widowed.

Table 5: Distribution of respondents by marital

Marital status	Frequency	Percentage
Single	55	44.7
Married	62	50.4
Widowed	5	4.1
Divorced	1	0.8
Total	123	100

Household Size of Respondents

The result in Table 6 shows that about 20.3 percent of the respondents have above 6 household members while households with less than 5 household members account for the remaining 79.7 percent. The average household size is 5. The modal household size is also 5 and this make up for fifty percent of sampled households. The minimum household size recorded is 1 and the highest number of members of a household is 12.

Table 6: Distribution of respondents by household size

Household size	Frequency	Percentage
1-3	36	29.3
4-6	62	50.4
7-9	20	16.3
10-12	5	4.0
Total	123	100

Occupation of Respondents

As shown in Table 7, the most common occupation of the respondents is civil servants, working as employees in the private sector and trading, representing 26.8 percent, 24.4 percent and 18.7 percent respectively. This result reveals that the majority of respondents are gainfully employed. A low but not too unexpected 7.3 percent are into farming which further confirms that the study area is metropolitan in nature.

Table 7: Primary occupation of respondents

Primary occupation	Frequency	Percentage
Farming	9	7.3
Trading	23	18.7
Artisans	10	8.1
Civil servant	33	26.8
Private salaried jobs	30	24.4
Others	18	14.6
Total	123	100

Determinants of Households' Vulnerability to Fuel Price Hike

Expenditures of Respondents on Food Before and After the Hike

Food is a very crucial need in the life of a man and the standard and the quality of a person's life can be determined by the quality of food taken by such an individual. The expenditure of respondents on food before the hike (Table 8) reflects that thirteen percent spent N5000 or less on food per month while only 2.2 percent spent more than N30000. Comparing that with the expenditure on food after the hike (Table 9) reveals that only 2.2 percent spend less than N5000 and 7.4 percent spend more than N30000 on food monthly. The nominal increase cannot be said to be an indication of better food consumption in terms of quality and quantity but

this is due to the increase in prices of commodities especially food prices.

Table 8: Expenditure of respondents on food before the hike

Amount in Naira	Frequency	Percentage
≤ 5,000	16	13.0
5,001 – 10,000	23	18.7
10,001 – 15,000	41	33.3
15,001 – 20,000	18	14.7
20,001- 25,000	12	9.7
25,001- 30,000	10	8.2
≥ 30,001	3	2.4
Total	123	100

Table 9: Expenditure pattern of respondents on food after the hike

Amount in Naira	Frequency	Percentage
≤ 5,000	3	2.4
5,001- 10,000	22	17.9
10,001- 15,000	38	30.9
15,001- 20,000	25	20.3
20,001 – 25,000	12	9.8
25,001 – 30,000	14	11.4
≥ 30, 000	9	7.3
Total	123	100

Expenditure of Respondents on Non-food Items

Expenses on clothing and footwear, rent, health care (medical services), clothing, electricity bill, education and recharge cards falls under non-food expenditure. An expenditure of less than N5000 a month would reflect a very low standard of living owing to the average amount charged for house rent, electricity bills and education expenses in the study area. Going by the result in Tables 10 and 11, it is clear that expenditure on non-food is higher especially after the

Table 10: Expenditure of respondents on non-food before hike

Amount in Naira	Frequency	Percentage
≤ 5,000	17	13.8
5,001- 10,000	43	35.0
10,001- 15,000	13	10.5
15,001- 20,000	11	9.0
20,001 – 25,000	9	7.3
25,001 – 30,000	12	9.8
≥ 30, 000	20	14.6
Total	123	100

fuel price hike since the impact led to increase in the price of other commodities.

Table 11: Expenditure of respondents on non-food after hike

Amount in Naira	Frequency	Percentage
≤ 5,000	19	15.4
5,001- 10,000	24	19.6
10,001- 15,000	24	19.6
15,001- 20,000	7	5.7
20,001 – 25,000	11	8.9
25,001 – 30,000	7	5.7
≥ 30, 000	31	25.2
Total	123	100

Coping Measures Employed by Households

This is the *ex-ante* provision (Table 12) that enables the affected party to address the impact of the hike in prices of fuel. The highest ranked coping measures employed by households interviewed were trekking. Households tend to trek more not as a result of yielding to advise offered by medical practitioners that exercises are good for the body but because they are looking for ways to cut down cost and still maintain their happiness. Use of alternate energy source ranked second, the commonest alternate energy sources used by respondents were firewood and charcoal, which are obtained from trees in the forest. The forest is very good at reducing the direct impact of sun on man and animals, it covers the soil from excessive evaporation and releases oxygen needed by man into the atmosphere. If we continue to cut down trees, we are contributing hugely to global warming and temperature

Table 12: Coping mechanisms employed by respondents

Coping measure	Frequency	Percentage	Rank
	74	60.2	1
Alternative energy source	49	39.8	2
Reduction in food consume	49	39.8	2
Income from family and friends	42	34.1	4
Borrowing	38	30.9	5
Reduction in purchase of recharge cards	38	30.9	5
Take up another job	35	28.5	7
Skip meals	35	28.5	7

rise around the world. Other coping measures respondents take to include, increasing prices of commodities they produce, some travel less, working extra time and others have also resorted to praying.

Vulnerability Index of Respondents

Vulnerability of households to price hike is calculated as,

V (price hike)= Coping strategy employed by respondents
Total number of strategies available and accessible

Only 4 of the respondents (Table 13 and Fig. 1) representing 3.3 percent of the population were not vulnerable at all while 96.7 percent have a vulnerability index ranging from 0.13 to 1.

Poverty Level of Respondents

Absolute poverty line in Nigeria is N54401.16. This is the value estimated by the National Bureau of Statistics using the Harmonized Living Standard Survey (NLSS) of 2010. Here, this method considers both food expenditure and non-food expenditure using the per capita expendi-

Table 13: Vulnerability of respondents to fuel price hike

Vulnerability index	Frequency	Percentage
0.00	4	3.3
0.13	20	16.3
0.25	39	31.7
0.38	22	17.9
0.50	13	10.6
0.63	20	16.3
0.75	3	2.4
0.88	1	0.8
1.00	1	0.8
Total	123	100

ture approach. For the purpose of this study, the absolute poverty line of N54401.16 was adopted and used as the benchmark. From the estimation done, it was revealed that about seventy percent of respondents spent less than N60000 hence the high level of poverty is further aggravated by the fuel price hike.

The likelihood ratio chi-square of 40.54 (df=14) with a p-value of 0.0002 tells us that our model as a whole, fits significantly better than an empty model (that is, a model with no predictors). The Tobit regression result for the vulnerability to fuel price hike is in Table 14. The coefficient of determination R^2 is 0.5687 meaning that about fifty-six point eight seven percent of the
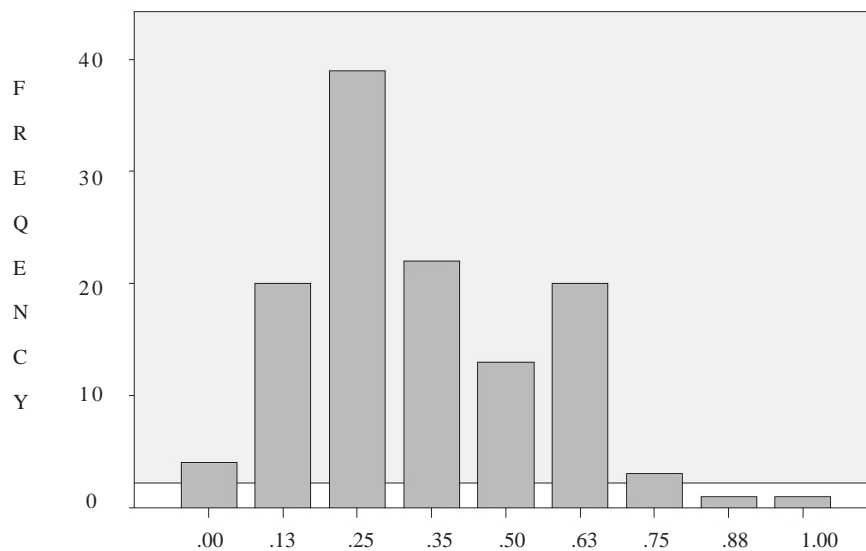
Fig. 1. Vulnerability of respondents to fuel price hike

variations in the dependent variable are explained by the independent variables. Number of cars respondents own, ownership of generating set and household size are significant at ninety-five percent confidence level.

Table 14: Result of Tobit regression model on determinants of household vulnerability

Variable	Coefficient	Standard error
Gender of respondents	.0252 (0.34)	.0736
Age of respondents	-.0022 (-0.96)	.0022
Years of formal education of respondent	-.0184 (1.79)	.0022
Marital status	.4502 (-3.76)	.0993
Household size	.0055* (-0.37)	.0147
Primary occupation	.00298 (0.06)	.0476
Number of cars respondents own	-.1887* (-3.71)	.0508
Ownership of generating set	.3091* (-2.95)	.1049
Litres of petrol used per day	-.0021 (-0.96)	.0524
No. of observations = 123		

Values in parentheses are the t-values
*Coefficient are significant at five percent
Log likelihood = -15.3723,
Prob > chi^2 = .0002,
Pseudo R^2 = 0.5687

Age of respondents, years of formal education, number of cars respondents own and liters of petrol used per day are negatively related to the dependent variable meaning that a one unit increase in each of the independent variables stated leads to the coefficient of the independent variable stated.

CONCLUSION

The study concludes that fuel price hike has a negative consequence on the vulnerability level of households in the study area. Therefore, should fuel prices increase substantially beyond current high levels, many households in the rural as well as the urban areas of Nigeria may experience high levels of financial stress. As energy prices rise, fuel poverty can only be reduced by an intensified focus on energy efficiency and energy bills of those in fuel poverty, especially low-income, vulnerable households. Fuel-poor households should be given incentives in the form of subsidies to lessen the burden of the fuel price hike. There are subgroups of the poor who are unable to take advantage of income earning opportunities or who may be adversely affected by policies. The groups include the unemployed, the physically challenged, the elderly and women overburdened with reproduction and childcare. These sets of people should be highly considered before policies are formulated and eventually implemented.

POLICY RECOMMENDATIONS

Based on the findings of this study, it is recommended that:
1. The government should try to minimize the impact of a fuel price hike on the poor by assisting respondents with social security such as cash transfer schemes and other forms of safety nets.
2. Although the supply of oil is finite, governments can take a number of measures to enhance supplies and address the issue of the refineries not working at full capacity. Nigeria needs to prepare for abrupt disruptions in oil supplies, by building strategic reserves, for example, or making plans for rationing.
3. Fuel marketers should also be barred from hoarding or creating artificial scarcity because of its negative impact on the economy and welfare of citizens.

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