EARLY IMPACTS OF FUEL SUBSIDY REMOVAL ON MENTAL HEALTH STATUS OF PRIMARY HEALTHCARE WORKERS AND COMMUNITY MEMBERS IN NIGERIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: **The abrupt removal of fuel subsidy in Nigeria led to exponential increase in fuel prices. The resultant economic pressure may have effects on the mental health status of Nigerians.**

The objective is to understand this impact, we assessed changes in mental health status among primary healthcare workers and community members after fuel subsidy removal.

Materials & Methods: **We carried out cross-sectional study in six Local Government Areas (LGA) across three Nigerian states and surveyed healthcare workers and community members.**

We analysed respondents' socio-demographic characteristics and their perceptions of fuel subsidies and mental health risks using summary statistics. Additionally, we evaluated depression and anxiety severity among respondents before and after the subsidy removal using the PHQ-9 and GAD-7 scales, reporting findings by state and percentage increases in the subsidy removal's impact on healthcare workers and community members.

Results: **We found a rise in depression and anxiety, particularly among younger adults. HCWs in Jigawa state faced the most severe increase, with depression rates nearly tripling. Similarly, community members across various demographics saw a significant rise in depression and anxiety after the policy change. According to state, Jigawa state bore the brunt, with depression and anxiety rising by over 200% while market women experienced the highest increase within occupational groups.**

Conclusion: **This study shows that younger adults, single individuals, residents of disadvantaged areas, and market women were mostly affected. The widespread mental health crisis necessitates broad interventions targeting these groups.**

Keywords: Fuel subsidy, Mental health, Depression, Anxiety, Nigeria.

INTRODUCTION

Fuel subsidy is a policy implemented by the government to lower the cost of petroleum products for the citizens and guarantee a steady supply.[1,2] The debate over fuel subsidies has increased all over the world because of their effect on citizens' welfare, and role in bolstering a nation's economy. Fuel subsidy costs have seen a notable rise in the last few years in many countries, hitting record-high numbers.[3] According to the International Monetary Fund (IMF), global fuel subsidies estimates surpassed $7 trillion in 2022, primarily due to the instability of energy markets and geopolitical complexities stemming from the Ukraine crisis.[4,5] While the intent behind fuel subsidies is to benefit low-income households,they can also distort markets, encourage smuggling, and hinder investment in renewable energy, leading to volatile pricing dynamics in the international oil market, which have strained governments' finances.[6,7]

Despite Nigeria's status as a leading exporter of crude oil in Africa[8], its ability to fully leverage its petroleum resources is hindered by high fuel subsidies, as it relies heavily on imported petroleum due to operational deficiencies and inadequate maintenance of local refineries.[8-10] Consequently, President Bola Ahmed Tinubu, in his inaugural speech on May 29, 2023, announced the complete removal of the fuel subsidy.[11] The rationale behind this decision was the government's inability to meet up with the financial implications of the fuel subsidies due to growing external debts and diminishing internal revenue.

However, due to the absence of a well-structured implementation plan, the directive to remove fuel subsidies has led to rising fuel prices, adversely affecting individuals, businesses, and critical sectors like healthcare and agriculture. This economic hardship is likely to exacerbate mental health problems in Nigeria, a country that already severely neglects this issue.[12] In 2019, the age-standardized suicide mortality rate per 100,000 population was 6.87, and government spending on mental health accounted for only 4.1% of the total health budget.[13] This lack of investment is particularly concerning given the established link between economic hardship and mental health issues. Moreover, essential mental health services for conditions like psychosis, bipolar disorder, and depression are not covered by the national health insurance scheme, further limiting access to care during this time of increased need.[13]

Previous studies on fuel subsidy impacts in Nigeria have identified various potential negative outcomes, including increased transportation costs, higher prices for essential goods.[14] Currency devaluation, inflation[15], rising poverty, and increased crime rates.[16] Furthermore, the removal of fuel subsidies can create barriers to healthcare access for Nigerians, as increased cost of care and services renders them unaffordable.[17] International studies also suggest a link between subsidy removal and worsened mental health.[18,19] However, the existing literature on Nigeria's fuel subsidy removal focuses primarily on economic consequences, neglecting the potential mental health impact on the population.

Therefore, this research aims to assess how the removal of fuel subsidies may affect the mental health of two crucial stakeholder groups: Nigerian healthcare professionals and local residents.

MATERIALS AND METHODS

Study design

We carried out a cross-sectional study involving community members and healthcare workers in three states in Nigeria: Jigawa, Oyo, and Lagos States from August 15, 2023, to November 30, 2023. The choice of the states were due to ongoing project in those states[20] and also the wide gap between average economic status of households, with the South West zone having a much higher percentage of households in the highest wealth quintile (48%) than the North West zones (9%)[21], and availability of local resources for data collection.

Study settings

In the northwest geopolitical zone, Jigawa State is characterized by a predominantly Hausa and Fulani ethnic groups, with Islam being the predominant religion. In contrast, the south western geopolitical zone is home to Oyo and Lagos States, both primarily inhabited by the Yoruba ethnic group. Within these states, there exists a relatively balanced distribution of Christianity and Islam as the prevailing religions. Lagos State has the highest population among the three states, with over 12 million people, while Oyo and Jigawa States have populations of 7.5 million and 6.7 million, respectively.[22]

In Jigawa state, we selected Kiyawa (rural) and Dutse (urban), and Hadeja (urban) Local Government Area (LGA); in Lagos state, we selected Ikorodu LGA (peri-urban), while in Oyo state, we selected Lagelu (peri-urban) and Ibadan southwest LGA (urban). Kiyawa LGA in Jigawa has a population estimated to be 230,000, while Dutse LGA is estimated to have a population of 202,448 inhabitants mainly comprising the Hausa and Fulani tribes. Dutse LGA is predominantly Islamic, with the Hausa and Fufulde languages being extensively spoken. Meanwhile, Hadeja LGA, with a population of approximately 105,628, consists of eleven political wards and is inhabited by primarily Hausa, Fulani, and Kanuri communities, engaged in various occupations such as crop farming, animal rearing, trading, fishing, and civil service. Lagelu LGA consists of over 1076 towns and villages, divided into 14 political wards before Local Council Development Areas were created. The main occupation of the people in Lagelu Local Government area is farming including large production of palm oil and black soap[23,24] .Ikorodu, located in Lagos State, is the largest local government area in the state with an estimated population of over 1 million and a growth rate of 5.3% annually.[20,25-27] These selected LGAs provide a diverse geographical, cultural and socioeconomic representation of Nigeria.

Study population

We collected data from healthcare workers providing clinical and non-clinical services to patients in the Primary Healthcare Centers (PHCs), as well as from community members residing in the study area.

Sample size

The sample size calculation was based on the formula $n = Z\alpha^2 * p * (1 - p) / d^2$. For this calculation, p represents the probability of the population having a positive mental health which was taken as 50%. To achieve a sample size that is representative of the population, a level of precision of 4% is employed, resulting in a larger sample size.

z (the standard score corresponding to 95% confidence interval) = 1.96

d (proportion of sampling error between the sample and the population) ≤5%
Sample size, n = 600.25 ≈ 600

Adjusting for anticipated minimum non-response of 10%, the final sample size, N = 666.9 ≈ 667 participants for each state, making it 2001 in total

Sampling technique

The sampling approach is similar to what was used in a previous study conducted in these settings.[28] Here, we conveniently selected 6 LGAs across the 3 states, we then accessed the government database to obtain a comprehensive list of primary healthcare facilities in the selected LGAs. From this list, we conveniently chose 32 facility clusters across the 6 LGAs: A cluster in this study referred to a PHC and its catchment areas. We selected 12 clusters in Jigawa state, 12 clusters in Oyo state, and 8 clusters in Lagos state. Healthcare workers and Community members were included based on availability and consent. Only community members who were 18 years of age or older and had the ability to communicate in either English or the predominant native languages (Hausa, Fulani, and Yoruba) spoken in the selected states were interviewed. This approach allowed us to include a wide range of participants.

Data collection

We recruited and trained individuals with at least secondary education and fluency in both English and the local dialects spoken in the study area. These data collectors had a comprehensive 3-day training program followed by a 2-week pretest in randomly selected facility clusters within target LGAs. Using Kobo Toolbox on Android tablets, data collectors visited each selected cluster 1-3 times weekly. To minimize duplicate interviews, data collectors were assigned to specific LGAs and facility clusters. Bi-monthly team meetings addressed emerging issues and facilitated periodic data cleaning and verification.

Data Management and Analysis

Using Stata 17, we conducted an analysis of the sociodemographic characteristics of respondents using summary statistics. Subsequently, we presented their perceptions of the fuel subsidy, its impact, and potential mental health risks through appropriate graphical illustrations and charts. To evaluate the mental health status of community members and healthcare workers (HCWs) before the fuel subsidy removal in 2023, we used nine indicators to measure mental health problems, such as recurrent prolonged sadness and recurrent confused thinking. We calculated the mental health risk score for each respondent by summing up the number of "yes" answers for each indicator, with a maximum possible score of 9. Additionally, we reported the number and percentage of respondents who reported each indicator, along with the mean, standard deviation (SD), and p-value of the mental health risk scores, both by group and in total.

Furthermore, we assessed the respondents' mental health status using the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scales, which have been widely used and validated in Nigeria.[29-31] Additionally, we measured the severity of depression and anxiety among respondents from three states (Jigawa, Lagos, and Oyo) before and after the fuel subsidy removal in 2023 using the PHQ-9 and GAD-7 scales. The PHQ-9 scores for depression were categorized into five levels: none, mild, moderate, moderately severe, and severe, while GAD-7 scores for anxiety were categorized into four levels: none, mild, moderate, and severe. We reported the number and percentage of respondents who reported each level of depression and anxiety severity, as well as the chi-square p-values of the differences between the before and after groups, stratified by state. Additionally, we reported the percentage increase in the impact of fuel subsidy removal for healthcare workers and community members before and after the fuel subsidy.

Ethical Considerations

Our investigation adhered to the ethical principles outlined in the Helsinki Declaration and the Nigerian National Code of Health Research Ethics. We obtained formal approval from relevant authorities, including the Jigawa State Government (ref: MOH/SEC/IS/7011/V/I), Lagos State Government (ref: LREC/06/10/2418), and Oyo State Ministry of Health (ref: AD/13/470/479). Prior to participation, all participants provided verbal consent and were offered the opportunity to review an informed consent form. We emphasized that participation was entirely voluntary and that the collected information would solely be used for research purposes.

RESULTS

Socio-demographic characteristics of respondents

A total of 2030 respondents were approached, 301 did not give consent and another 143 participants had several missing responses. We analyzed the data from 1506 (74.2%) respondents out of the 2030 approached, of whom 179 (11.9%) were healthcare workers (HCWs) and 1327 (88.1%) were community members. The educational levels varied between the groups: more than half (63.4%) of the community members had at least a secondary education, while most (89.9%) of the HCWs had a tertiary education or higher. The majority of the respondents practiced

Table 1: Respondents' characteristics (N= 1,506)

Respondent variables		Community members		Health Care Workers	
		N	(%)	N	(%)
Total		1,327	(88.1)	179	(11.9)
Age	Less than 30 years	502	(37.8)	60	(33.5)
	30-49 years	695	(52.4)	94	(52.5)
	50 years and above	130	(9.8)	25	(14.0)
Highest Level of Education	No formal education	309	(23.3)	1	(0.6)
	Primary	176	(13.3)	2	(1.1)
	Secondary	526	(39.6)	15	(8.4)
	Tertiary/further	316	(23.8)	161	(89.9)
Religion	Christianity	410	(30.9)	74	(41.3)
	Islam	910	(68.6)	105	(58.7)
	Others	7	(0.5)	0	(0.0)
Gender*	Female	611	(46.1)	121	(68.4)
	Male	714	(53.9)	56	(31.6)
Marital status	Never married	331	(24.9)	56	(31.3)
	Ever married	996	(75.1)	123	(68.7)
No of wives for men**	No wife	154	(25.0)	20	(38.5)
	1 wife	304	(49.4)	24	(46.1)
	2 and above	157	(25.6)	8	(15.4)
No of children alive***	None	206	(17.5)	45	(27.4)
	1-2 children	341	(29.0)	43	(26.2)
	3-4 children	309	(26.3)	58	(35.4)
	5 and above	319	(27.2)	18	(11.0)
Have other dependents	No	208	(15.7)	22	(12.3)
	Yes	1,119	(84.3)	157	(87.7)
	Jigawa	730	(55.0)	88	(49.2)
State	Lagos	216	(16.3)	49	(27.4)
	Oyo	381	(28.7)	42	(23.4)
Occupation	Market women/business owners	313	(23.6)		
	Artisans and farmers	261	(19.7)		
	Transporters and motorcycle riders	184	(13.9)		
	Petrol attendants and POS operators	176	(13.3)		
	Housewives/not working	117	(8.8%)		
	Teachers and professionals	54	(4.1%)		
Patient group	No	1,170	(88.5)	-	-
	Yes	157	(11.5)	-	-

** Missing gender (n=4)*
*** Missing number of wives (n=103)*
**** Missing number of children alive (n=167)*
***** Missing occupation (222)*

Islam (68.6% of community members and 58.7% of healthcare workers). Gender distribution also differed between the groups: there were more males among community members (53.9%) and more females among HCWs (68.4%). Most of the respondents were married, with75.1% of community members and 68.7% of HCWs being married. Additionally, a high percentage of respondents had at least one dependent child (84.3% of community members and 87.7% of HCWs). The community members had diverse occupations, including market women/business owners (23.6%), artisans and farmers (19.7%), transporters and motorcycle riders (13.9%), petrol attendants and POS operator (13.3%), teachers and professionals (4.1%), and housewives/not working (8.8%).

Mental health risk of respondent after the fuel subsidy removal

As shown in Table 2, HCWs had a higher prevalence of most mental health problems compared to community members, except for recurrent confused thinking and recurrent difficulty with sleep. The mean mental health risk score was also significantly higher for HCWs (mean=2.2, SD=1.3) than for community members (mean=1.7, SD=1.1), indicating a higher

overall risk of mental health problems among HCWs (Table 2 & Fig 1).

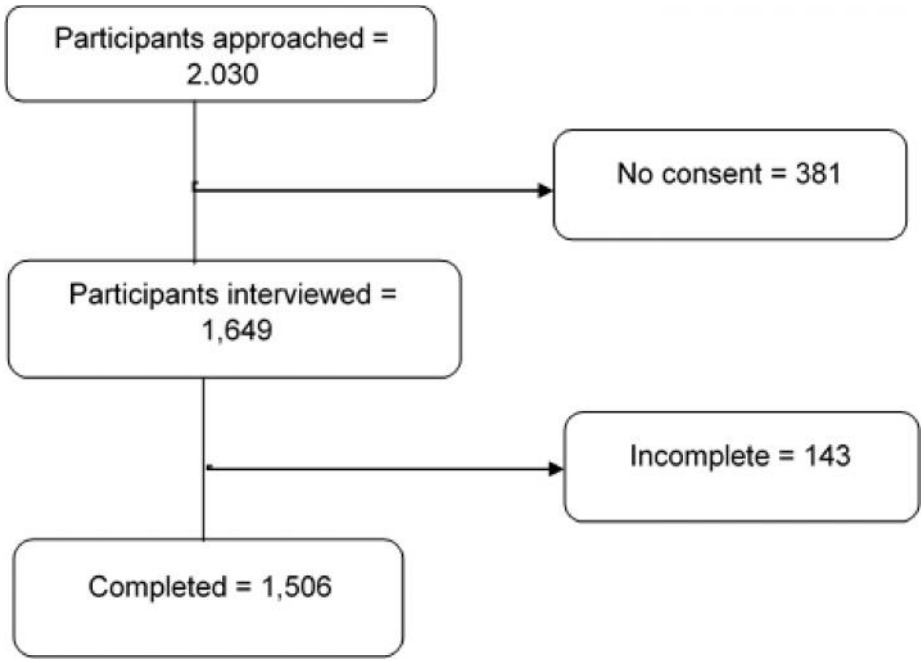
Depression and anxiety severity of respondents before and after the fuel subsidy removal

with the percentage of participants with no depression decreasing from 51.7% before fuel subsidy removal to 43.4% after fuel subsidy removal.

Table 2: Mental health risk of community members and healthcare workers (N= 1,506)

Variables – Mental health		Community members (n=1,370)		Healthcare workers (n=182)		Total (N= 1,506)	
		n	(%)	n	(%)	N	(%)
Mental state before fuel subsidy (year 2023)							
Recurrent prolong sadness	Yes	118	(8.9)	32	(17.9)	150	(10.0)
Recurrent confused thinking	Yes	93	(7.0)	14	(7.8)	107	(7.1)
Recurrent fears/worry	Yes	305	(23.0)	47	(26.3)	352	(23.4)
Recurrent feeling of guilt	Yes	38	(2.9)	9	(5.0)	47	(3.1)
Recurrent feeling of low energy	Yes	148	(11.2)	40	(22.4)	188	(12.5)
Recurrent withdrawal from friend	Yes	52	(3.9)	16	(8.9)	68	(4.5)
Recurrent suicidal thoughts	Yes	12	(0.9)	3	(1.7)	15	(1.0)
Recurrent suicidal attempts	Yes	6	(0.5)	0	(0.0)	6	(0.4)
Recurrent difficulty with sleep	Yes	106	(8.0)	15	(8.4)	121	(8.0)
Mental health risk scores							
		Mean	SD	Mean	SD	Mean (SD)	p-value*
Mental health risk (maximum possible score=9)		1.7	1.1	2.2	1.3	1.8 (1.1)	t-test=-3.1546; df=582; p=0.002

**Independent t-test*



Appendix 1: Participant inclusion flow diagram

Table 3 shows that before fuel subsidy removal, 74.6% of participants in Jigawa state and 51.1% of participants in Oyo state had no signs of depression. However, after fuel subsidy removal, 74.8%of participants in Jigawa and 75.8% in Oyo state had at least mild level of depression. Similarly, Lagos state experienced a rise in depression among participants, All three states experienced an increase in level of anxiety after the removal of fuel subsidy. However, the highest increase was seen in Jigawa state, where the figure rose from 25.6% to 76.0% followed by Oyo state (49.9% to 78.7%), and Lagos state (42.7% to 54.0%).

Table 3: Depression and anxiety severity of respondents from three states before and after the fuel subsidy removal in 2023 (N= 1,506)

Mental Health	**Jigawa State (n= 818)**						
Depression severity	Before fuel subsidy removal (%)	After fuel subsidy removal (%)	Chi-square p value= <0.001	**Anxiety severity**	Before fuel subsidy removal (%)	After fuel subsidy removal (%)	Chi-square p value= <0.001
None	610 (74.6)	190 (23.2)		None	596 (72.9)	179 (21.9)	
Mild	90 (11.0)	292 (35.7)		Mild	96 (11.7)	308 (37.7)	
Moderate	46 (5.6)	194 (23.7)		Moderate	66 (8.1)	210 (25.7)	
Moderately severe	34 (4.2)	78 (9.5)		Severe	47 (5.8)	103 (12.6)	
Severe	19 (2.3)	48 (5.9)					
	Lagos state (n=265)						
Depression severity	Before fuel subsidy removal	After fuel subsidy removal	Chi-square p value= <0.001	**Anxiety severity**	Before fuel subsidy removal (%)	After fuel subsidy removal (%)	Chi-square p value= <0.001
None	137 (51.7)	115 (43.4)		None	147 (55.5)	119 (44.9)	
Mild	58 (21.9)	60 (22.6)		Mild	68 (25.7)	86 (32.5)	
Moderate	47 (17.7)	64 (24.2)		Moderate	44 (16.6)	54 (20.4)	
Moderately severe	10 (3.8)	17 (6.4)		Severe	1 (0.4)	3 (1.1)	
Severe	1 (0.4)	2 (0.8)					
	Oyo state (n=423)						
Depression severity	Before fuel subsidy removal	After fuel subsidy removal	Chi-square p value= <0.001	**Anxiety severity**	Before fuel subsidy removal (%)	After fuel subsidy removal (%)	Chi-square p value= <0.001
None	216 (51.1)	73 (17.3)		None	199 (47.0)	79 (18.7)	
Mild	136 (32.2)	96 (22.7)		Mild	187 (44.2)	133 (31.4)	
Moderate	28 (6.6)	72 (17.0)		Moderate	20 (4.7)	119 (28.1)	
Moderately severe	3 (0.7)	78 (18.4)		Severe	4 (1.0)	81 (19.2)	
Severe	2 (0.5)	75 (17.7)					

Among healthcare workers, fuel subsidy removal significantly worsened mental health across all demographics, as shown in Table 4a. Depression and anxiety prevalence soared following the policy change, impacting younger workers (under 30) the most, with a 200% increase in depression and a 177.8% rise in anxiety. HCWs in Jigawa state faced the steepest rise (292.3% depression, 221.4% anxiety). Notably, HCWs who have no wives or children experienced 333.3% increase in anxiety after fuel subsidy removal.

Among community members, fuel subsidy removal led to a significant surge in both depression and anxiety across diverse demographics, as shown in Table 4b. The rise in depression was particularly striking in the under-30 age group, which experienced the highest increase at 167.4%. Unmarried individuals were the most affected by both conditions, with increases exceeding 120%. Notably, Jigawa state bore the brunt of the impact, with depression rising by 218.1% and anxiety by 195.8%. This increase was significantly lower in Lagos. Interestingly, market women experienced the most significant rise in depression (194%) and anxiety (133.8%) among the occupation group.

Overall, the results indicate younger adults, males, those with no education, those who are single, have no child, residents of Jigawa state, and market women were

Table 4a: Percentage difference in impact of fuel subsidies on healthcare workers (HCWs) experiencing depression and anxiety.

HCW		Depression			Anxiety		
	N	Before Fuel subsidy	After fuel subsidy	Percentage increase	Before fuel subsidy	After fuel subsidy	Percentage increase
Age							
<30	60	9 (15.0)	27 (45.0)	200.0%	9 (15.0)	25 (41.7)	177.8%
30-49	94	18 (19.1)	53 (56.4)	194.4%	22 (23.4)	49 (52.1)	122.7%
50 and above	25	7 (28.0)	12 (48.0)	71.4%	5 (20.0)	9 (36.0)	80.0%
Level of education							
None	.	.	.	.	.	.	.
Primary	.	.	.	.	.	.	.
Secondary	15	4 (26.7)	8 (53.3)	100.0%	4 (26.7)	7 (46.7)	75.0%
Tertiary	161	29 (18.0)	84 (52.2)	189.7%	32 (19.9)	76 (47.2)	137.5%
Religion							
Christianity	74	14 (18.9)	32 (43.2)	128.6%	16 (21.6)	31 (41.9)	93.8%
Islam	105	20 (19.0)	60 (57.1)	200.0%	20 (19.0)	52 (49.5)	160.0%
Gender							
Female	121	26 (21.5)	62 (51.2)	138.5%	28 (23.1)	60 (49.6)	114.3%
Male	56	8 (14.3)	30 (53.6)	275%	8 (14.3)	23 (41.1)	187.5%
Marital status							
Single	56	7 (12.5)	26 (46.4)	271.4%	9 (16.1)	23 (41.1)	155.6%
Ever married	123	27 (22.0)	66 (53.7)	144.4%	27 (22.0)	60 (48.8)	122.2%
No of wives							
None	46	5 (10.9)	16 (34.8)	220.0%	3 (6.5)	13 (28.3)	333.3%
1 wife	61	12 (19.7)	35 (57.4)	191.7%	14 (23.0)	33 (54.1)	135.7%
2 and above	13	2 (15.4)	6 (46.2)	200.0%	2 (15.4)	4 (30.8)	100.0%
no of children							
None	45	4 (8.9)	16 (35.6)	300.0%	3 (6.7)	13 (28.9)	333.3%
1 or 2	43	14 (32.6)	26 (60.5)	85.7%	14 (32.6)	22 (51.2)	57.1%
3 or 4	58	9 (15.5)	30 (51.7)	233.3%	11 (19.0)	29 (50.0)	163.6%
5 and above	18	4 (22.2)	9 (50.0)	125%	2 (11.1)	8 (44.4)	300.0%
State							
Jigawa	88	13 (14.8)	51 (58.0)	292.3%	14 (14.9)	45 (51.1)	221.4%
Lagos	49	7 (14.3)	11 (22.4)	57.1%	6 (12.2)	11 (22.4)	83.3%
Oyo	42	14 (33.3)	30 (71.4)	114.3%	16 (38.1)	27 (64.3)	68.8%

Table 4b: Percentage difference in impact of fuel subsidies on community members experiencing depression and anxiety

	N	Depression Before Fuel subsidy	After fuel subsidy	percentage increase	Anxiety Before fuel subsidy	After fuel subsidy	percentage increase
Age							
<30	502	132 (26.3)	353 (70.3)	167.4%	149 (29.7)	378 (75.3)	153.7%
30-49	695	245 (35.3)	493 (70.9)	101.2%	290 (41.7)	518 (74.5)	78.6%
50 and above	130	50 (38.5)	98 (75.4)	96%	52 (40.0)	99 (76.2)	90.4%
Level of education							
None	309	75 (24.7)	246 (79.6)	228.0%	86 (27.8)	266 (86.1)	209.3%
Primary	176	56 (31.8))	141 (80.1)	151.8%	68 (38.6)	152 (86.4)	123.5%
Secondary	526	189 (35.9)	385 (73.2)	103.7%	228 (43.3)	407 (77.4)	78.5%
Tertiary	316	107 (33.9)	172 (54.4)	60.7%	109 (34.5)	170 (53.8)	56.0%
Religion							
Christianity	410	158 (38.5)	277 (67.6)	73.3%	180 (43.9)	292 (71.2)	62.2%
Islam	910	264 (29.0)	661 (72.6)	150.4%	306 (33.6)	697 (76.6)	127.8%
Gender							
Female	611	223 (36.5)	429 (70.2)	92.4%	241 (39.4)	456 (74.6)	89.2%
Male	714	204 (28.6)	515 (72.1)	152.5%	249 (34.9)	538 (75.4)	116.1%
Marital status							
Single	331	100 (30.2)	223 (67.4)	123.0%	115 (34.7)	235 (71.0)	104.3%
Ever married	996	327 (32.8)	721 (72.4)	120.5%	376 (37.8)	760 (76.3)	102.1%
No of wives							
None	244	53 (21.7)	154 (63.1)	190.6%	56 (23.0)	158 (64.8)	182.1%
1 wife	467	155 (33.2)	333 (71.3)	114.8%	195 (41.8)	351 (75.2)	80.0%
2 and above	241	55 (22.8)	185 (76.8)	236.4%	66 (27.4)	199 (82.6)	201.5%
no of children							
None	206	30 (14.5)	121(58.7)	303.3%	34 (16.5)	124 (60.2)	264.7%
1 or 2	341	116 (34.0)	238 (67.8)	105.2%	133 (39.0)	257 (75.4)	93.2%
3 or 4	309	115 (34.0)	224 (72.5)	94.8%	129 (41.7)	232 (75.1)	79.8%
5 and above	319	95 (29.8)	249 (78.1)	162.1%	108 (33.9)	257 (80.6)	138.0%
State							
Jigawa	730	171 (23.4)	544 (74.5)	218.1%	192 (26.3)	568 (77.8)	195.8%
Lagos	216	108 (50.0)	129 (59.7)	19.4%	106 (49.1)	128 (59.3)	20.8%
Oyo	381	148 (38.8)	271 (71.1)	83.1%	193 (50.7)	299 (78.5)	54.9%
Occupation							
Not working	117	40 (34.2)	85 (72.6)	112.5%	50 (42.7)	101 (86.3)	102.0%
Artisan/farming	261	88 (33.7)	193 (74.0)	119.3%	98 (37.5)	194 (74.3)	98.0%
Transporter	176	52 (29.5)	121 (68.8)	132.7%	61 (34.7)	125 (71.0)	104.9%
Petrol attendant/Pos	313	115 (36.7)	227 (72.5)	97.4%	138 (44.1)	251 (80.2)	81.9%
Market women	184	50 (27.2)	147 (79.9)	194.0%	65 (35.3)	152 (82.6)	133.8%
Professional	55	17 (30.9)	39 (70.9)	129.4%	18 (32.7)	40 (72.7)	122.2%

disproportionately affected.

DISCUSSION

This study examined the early impact of fuel subsidy removal on mental health in Nigeria, focusing on healthcare workers (HCWs) and community members in selected states. We found a notably higher prevalence of depression and anxiety among healthcare workers (HCWs) than among community members, as evidenced by HCWs having a higher overall mental health risk score. Notably, subsidy removal coincided with a worsening of depression in Jigawa and Oyo, with residents shifting from no symptoms to mild/ severe depression. Anxiety levels also rose across all states, with the most significant increase observed in Jigawa state. This rise in mental health issues was consistent across demographics, with the greatest impact on younger adults (under 30), individuals who have never been married, people without children, residents of Jigawa, and market women within the community. These findings showed that the policy had a worse effect on younger healthcare workers, men, individuals without dependents, and those stationed in Jigawa. This underscores the importance of developing interventions with broad reach and applicability.

Our finding aligns with existing research demonstrating a significantly higher prevalence of mental health issues among HCWs compared to the general population.[32,33] HCWs in our study exhibited a greater burden of mental health problems and a higher overall mental health risk score. This could be attributed to various workplace stressors, including exposure to patients' suffering, long working hours, and ethical dilemmas compounded by moral distress resulting from resource constraints and challenges in delivering optimal care within a resource-constrained settings.[34-36] These stressors are likely exacerbated by the resultant effects of fuel subsidy removal such as increased transportation costs, inflation, and diminished purchasing power.[37] Furthermore, while our study focused on the pre-and post-subsidy removal of mental health changes, the lingering effects of the COVID-19 pandemic, including anxiety, depression, and post-traumatic stress disorder (PTSD), might have also contributed to the observed rise in mental health issues among HCWs.[35,38] This heightened vulnerability underscores the need for targeted interventions aimed at preserving the mental well-being of healthcare workers.[39] Such interventions should prioritize fostering supportive work environments with reasonable workloads, adequate staffing, and readily available mental health services within healthcare facilities. Additionally, measures to reduce financial burdens, such as transportation subsidies or salary increases, are crucial. Equipping HCWs with coping mechanisms and promoting help-seeking behaviours through educational programs, workshops, and fostering peer support networks can further strengthen their emotional well-being.[40]

Particularly concerning is the substantial increase in depression and anxiety among HCWs and community members under the age of 30.One potential explanation for our observation on mental health issues among younger people is the erosion of hope for the future which makes them particularly vulnerable due to limited financial resources and career instability mostly faced by younger people in this country.[41] Also the increased mental health problems among single people may also be a function of age than marital status since most younger people are likely to fall into the category of single people. Similarly, the male gender experienced a higher increase in depression and anxiety, anecdotally, the reason for this could be culturally explained, considering that family responsibility falls majorly on the male gender in the Nigerian setting.[42] Research suggests that economic hardship can significantly diminish hope, a crucial psychological construct for mental well-being.[43] Our research also identified a notable rise in anxiety and depression among HCWs who have never been married. Feelings of loneliness and social isolation may trigger the mental health impact of fuel subsidy among single HCWs, especially if they lack a strong support network. This suggests that social and family support structures could be a very important tool to potentially limit the mental health impacts of economic difficulties. This aligns with the findings of Tekin *et al.*, who noted strong family support for healthcare workers who have a sense of pride in their profession.[44,45]

Furthermore, the identification of market women as the occupation experiencing the most significant rise in depression deserves further attention. These findings contrast with previous research by Salako *et al.* in similar settings, which found that subsistence farming was associated with lower well-being.[46] The economic vulnerability of market women in Nigeria aligns with a World Bank report in 2022 indicating only 17% of Nigerian workers have jobs with clear upward mobility.[47] This highlights the broader economic hardship faced by many Nigerians, particularly those in small-scale domestic farms and non-farm businesses. For market women, fuel subsidy removal might have exacerbated these challenges by increasing transportation costs and reducing profit margins, ultimately contributing to depression and anxiety. It also highlights the inequality experienced by workers in the informal sector. For instance, only government workers were the beneficiaries of wage bonuses paid

by the government to cushion the effect of subsidy removal.

There is a substantial rise in depression and anxiety prevalence across all three Nigerian states (Jigawa, Oyo, and Lagos) following the removal of fuel subsidies. This likely stems from the economic stress associated with rising fuel prices, transportation costs, essential goods, and potential wage stagnation.[37,48-50] This financial strain can create a sense of hopelessness and contribute to depression.[51,52] The severity of depression observed in Jigawa state may be attributable to factor like higher poverty index rates prior to the removal of fuel subsidies[47,53], which means the state's overall rise in mental health issues as a result of fuel subsidy removal reflects its pre-existing economic vulnerabilities.[54] Therefore, to alleviate the hardship caused by rising fuel costs, urgent and sustained interventions that will reach the vulnerable and underserved populations should be implemented. However, these require inclusiveness, transparency and strong accountability framework for positive impact on the beneficiaries.

LIMITATION

This study's limitations include potential self-reporting bias and its cross-sectional design, which precludes definitive cause-and-effect conclusions. Moreover, the sample size may restrict generalizability to the entire Nigerian healthcare workforce, though efforts were made to enhance representativeness by adjusting for the infinite population. Further longitudinal research with larger, more diverse samples is needed to explore the enduring mental health trends among HCWs and investigate alternative explanations for the observed relationships.

CONCLUSION

In conclusion, healthcare workers, younger people, people with limited education and the male gender were more affected by the fuel subsidy removal. This suggests that these groups may be particularly vulnerable to economic policies that increase financial burdens, thus highlighting the need for targeted mental health interventions and social support systems that address the unique challenges faced by these groups.

Conflict of Interest Statement

The authors affirm that they have no conflict of interests to declare

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