



## Research article

# Does economic shocks influence household's healthcare expenditure? Evidence from rural Nigeria



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## ABSTRACT

Health is profoundly influenced by several factors outside the traditional realm of healthcare. This paper employed a two-step Heckman selectivity model to examine factors influencing the decision to spend on health and the effects of economic shocks on health expenditure. The results from the first stage shows that the likelihood of spending on health increased with age, education, income, and decreases if the household is living in the northern region of Nigeria and uses mosquito bed-net. The findings from the second stage estimation show that a fall in the price of food items, an increase in the price of inputs for household enterprises and loss of job are the significant shocks that affect household health expenditure. Based on these findings, this study concluded that fall in the prices of major food items consumed within the household increased income available for health care among the farmers. Going forward, the study recommends the provision of holistic health-economic-welfare interventions for the marginalized rural populace in Nigeria.

## 1. Introduction

In recent years, both empirical and theoretical research have been amassed in development economics on the subject of rural and urban household behavior in response to economic shocks especially in developing countries such as Nigeria (Dercon 2005; Kurosaki 2009; Shehu and Sidique, 2015; Jenkins et al., 2019). Economic crisis is structurally recognized to distress household spending on critical goods and services (Yang et al., 2001; Zavras et al., 2013; Eko, 2017) as past economic crisis have been associated with an increase in morbidity and mortality rates (Kim et al., 2003; Falagas et al., 2009; Zavras et al., 2016) as well as food and nutrition insecurity (Ogunniyi et al., 2020). For instance, studies (Cutler et al. 2000; Falagas et al., 2009; Kondilis et al., 2013; Zavras et al., 2016) have shown that financial crisis and poor socio-economic conditions are connected with high level morbidity, reduction in the utilization of health services and high rates of poor health outcomes. Specifically, Cutler et al. (2000) found that the mortality rate was about 5–7 % higher in crisis years compared with the years without crisis. Musgrove (1987)

also found that infant mortality and the incidence of children's disease and death were highly aggravated with the decline in economic conditions in Latin America and the Caribbean.

The economic crisis combined with integral shocks facing Nigeria and some other developing countries continues to deteriorate the structure and function of the health sector. The shocks are felt by individuals, households and nationally especially among the rural poor (Nolan et al., 2014). Such shock may reduce the family's demand for health care, and thus have adverse implications on health care spending. The access to competitive health care system has drastically declined due to the high rate of poverty and deprivation in Nigeria. The weak economic stability in the country has affected various sectors of the economy including the health sector leading to low productivity, poor service delivery and poor health outcomes (Omotayo, 2016a, 2020). The Nigerian health sector is still striving to provide basic health care services with the collaborative efforts of the three tiers of government but efforts to achieve this seem impracticable due to the current state of the economy (Eko, 2017).

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The high levels of deprivations and the unstable economy has translated to the prevalence of economic vices such as terrorism (north), herdsman-farmer conflicts (south), and oil spillage (south-south mainly). A significant proportion of the populace who reside in rural areas where farming is the main source of income are often more susceptible to economic shocks which could affect their welfare due to the volatile nature of the agricultural sector (Shehu and Sidique, 2015; Adebayo et al., 2016). Meanwhile, the cost of required healthcare sometimes takes up a large share of the household budget. To be able to pay for health services, some households sacrifice their current level of consumption and/or incurs a long-term welfare consequence due to borrowing or depleting assets (Asfaw and Braun, 2004; Dhanaraj, 2016; Jenkins et al., 2019). Poor households tend to employ these different but limited informing coping mechanisms because full insurance is often not accessible (Blázquez et al., 2014; Jenkins et al., 2019) especially to the rural households (Asfaw and Braun, 2004; Nguyen et al., 2020).

Several research have probed the relationship between health-related issues and outcomes. For instance, Kenjiro (2005) delve deeper into why ill health leads to more economic damage than crop failure in rural Cambodia; Ogunniyi et al. (2015) assessed how the incidence of malaria influenced the productivity of farming households in Nigeria while McIntyre et al. (2006)'s study focused on the economics of illness and health care expenditure in low- and middle-income countries. These studies though well thought out, failed to establish a relationship between economic shocks and health outcomes. This research gap is rather surprising giving a wide dearth of knowledge on how economic shocks affect health related expenditure, especially in rural Nigeria. Considering this, the present study provides the first attempt to examine factors influencing the decision to spend on healthcare and the effects of economic shocks on health expenditure in rural Nigeria. Using a nationally representative data from the World Bank this study used a two-stage Heckman selectivity (Heckman, 1979; Lemba et al., 2013; Sinyolo et al., 2014). From policy perspective, findings from this study offer evidence-based understanding of the routes of potential impact of economic shocks on health expenditure in Nigeria and thereby provides a policy direction and framework for action to mitigate this threat from becoming a long term reality.

2. Literature review

There is growing evidence of households being pushed into poverty or forced into deeper poverty when faced with substantial medical expenses, particularly when combined with the loss of household income due to ill-health (Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; McIntyre et al., 2006; Heltberg and Lund, 2009; Ogunniyi et al., 2015; Igna and Gustafsson-Wright, 2016; Ogundipe et al. 2016, 2019). Empirical studies have shown that households in developing countries are unable to sustain current levels of consumption during and after severe health crises due to substantial increase in medical expenditure and/or loss of income (Wagstaff and Lindelow, 2010; Sparrow et al., 2014; Alam and Mahal, 2014; Nguyen et al., 2020). Health events are also found to have an adverse impact on nutritional status and educational attainment of household members (Dhanaraj, 2016; Omotayo, 2016a). Health shocks, whether an event of death or disease, can cause significant adverse economic outcomes for households in low- and middle-income countries (LMICs).

In recent time, empirical studies on health shocks in the developing countries has increased (Blázquez et al., 2014; Igna and Gustafsson-Wright, 2016; Jenkins et al., 2019; Nguyen et al., 2020; Omotayo, 2017). A study by Igna and Gustafsson-Wright (2016) on health shocks, coping strategies and foregone healthcare among agricultural households in Kenya concluded that health shocks pose a significant risk to households. In another study, when large expenditures go towards treatment and funerals, care-giving responsibilities increase and income is lost as a result of premature mortality and morbidity among younger adult wage earners, households may be unable to cope with the

financial shocks (Heltberg and Lund, 2009; Alam and Mahal, 2014; Nguyen et al., 2020; Kenjiro, 2005; Asfaw and Braun, 2004; Gertler and Gruber, 2002; Lindelow and Wagstaff, 2005; Pitt and Rosenzweig 1984; Yilma et al., 2014).

3. Data and descriptive statistics

This study utilized the General Household Survey (Living Standard Measurement Survey) panel data for the post-planting and postharvest periods of 2015 and 2016 cropping seasons and monthly rural prices of food commodities corresponding to the survey periods (<https://microdata.worldbank.org/index.php/catalog/2734>). Over 60 % of the farmers were male with an average of 42 years. About 40 % of the farmers had ages between 41 and 60 years and the age distribution revealed that more than half of the farmers were aged above 40 years (see Appendix A1). About 41% of the farmers had primary education while only about 12 % had higher education. This implies that the level of education among the farmers was generally low, in line with findings of Omotoso et al. (2020), Omotayo and Oyekale (2013); Omotayo (2016b); Daud et al. (2017), and Nkonki-Mandleni et al. (2019). Over 70 % of the farmers were married while less than 10 % were either divorced, separated, or widowed. Less than half of the farmers had access to electricity while about 85 % of them had a mobile phone. In terms of health-related characteristics, about 14 % of the farmers lived with disabilities while less than 40 % of them slept under mosquito nets (see Appendix A1). The study shows that 83 % decided to spend on health.

4. Analytical methods

The analytical methods used in this study is based on the two-stage Heckman model following (Heckman, 1979; Goetz, 1992; Heltberg and Tarp, 2001). Also, the analytical method relied on the approach as employed by (Sebatta et al., 2014). Utilized variables used were; Age of household head (Years), Age square of household head (Years), Farmer's gender (1 = male, 0 = female), regional dummies (North = 1, South = 0), use of mosquito net (yes = 1, no = 0), disability (yes = 1, no = 0), income (in naira), access to electricity (yes = 1, no = 0), access to mobile (yes = 1, no = 0), economic shocks such as Death/illness of household member (yes = 1, no = 0), Theft/loss of property (yes = 1, no = 0), Increase in price of inputs (yes = 1, no = 0), Fall in price of outputs (yes = 1, no = 0), Fall in price of major food items (yes = 1, no = 0), Job loss (yes = 1, no = 0).

$$y_{1i} = 0 \text{ if } S_{ni} \leq 0 \tag{1}$$

$$y_{1i} = 1 \text{ if } S_{ni} > 0 \tag{2}$$

where;  
 $y_1$  is the binary response.  
 $S_{ni}$  is the amount of money spent by the household  $i$ .  
 The spending equation can then be written as:

$$y_1^* = \beta_{1i} X_{1i} + \epsilon_{1i} \tag{3}$$

where  $y_1^*$  is a latent variable, which is the utility the household will spend on health. The binary model is then stated as:

$$\begin{cases} 1, & \text{if household spend on health} \\ 0, & \text{otherwise} \end{cases} \tag{4}$$

In specific terms, the probit model in stage one of estimation is stated as;

$$\Pr(y_1) = f(x_1, x_2, \dots, \dots, \dots, x_n) \tag{5}$$

where,  $\Pr(y_1)$  is the probability of a household making a decision to spend on health or not,  $x_1, x_2, \dots, \dots, \dots, x_n$  as shown in Table 5 and  $\epsilon$  the normally distributed error term. In the second stage of the Heckman model, OLS are estimated to test the effect of hypothesized factors on the

**Table 1.** Characteristics of farmers.

Variable	Variable	Mean	Std. Dev.
Sex	Sex of the household head [1 if female, 0 = male]	0.624	0.485
Age	Age of the household head	42.010	17.199
No education	1 if the household head did not have any formal education, 0 otherwise	0.152	0.359
Primary	1 if the household head have primary education, 0 otherwise	0.414	0.493
Secondary	1 if the household head have secondary education, 0 otherwise	0.313	0.464
m_stat	1 if the respondent is married, 0 otherwise	0.727	0.445
ln_income	Log of the household income	7.599	2.327
North	1 if the respondent is from the northern region of Nigeria, 0 otherwise	0.553	0.497
Improved	1 if the household use improved waste disposal, 0 otherwise	0.021	0.145
m_phone	1 if the respondent is owns a mobile phone, 0 otherwise	0.852	0.355
mosquito_net	1 if the household use treated mosquito bed net, 0 otherwise	0.365	0.482
electricity	1 if the household have access electricity, 0 otherwise	0.413	0.493
Food items	1 if the household experienced shock in terms of fall in price of major food items, 0 otherwise	0.149	0.356
loss	1 if the household experienced shock in terms of loss of property/theft, 0 otherwise	0.142	0.349
priceinput	1 if the household experienced shock in terms of increase in price of inputs, 0 otherwise	0.051	0.220
job	1 if the household experienced shock in terms of job loss for the "breadwinner", 0 otherwise	0.007	0.086
priceoutput	1 if the household experienced shock in terms of fall in price of outputs, 0 otherwise	0.012	0.107
ln_health_~p	Log of total household expenditure	1.894	3.052
Health	1 if the household decided to spend on health, 0 otherwise	0.830	0.375

extent of spending measured by how much spent on health. The model is stated as;

$$(S_n) = f(y_1, y_2, \dots, y_n, \epsilon) \tag{6}$$

where,

$S_n$  is the amount of money spent on health.  $y_1, y_2, \dots, y_n$  are the variables that were aPriori hypothesised to affect the amount of money spent by the household on health and  $\epsilon$ , the error term (see Table 1).

## 5. Results and discussion

### 5.1. Health expenditure of farmers in rural Nigeria

More than half of the farmers (54.62 %) in the study had incurred health expenses. In Table 2, the expenditure made on health by the farmers was assessed in three ways. About 16 % of the farmers had been ill and had consulted a health practitioner for treatment and paid for the consultation. The average amount spent on consultation was ₦2,172.06 with a maximum of ₦40,000. The second group involves about 4 % of farmers who had been placed on admission as a result of their illness within the past 12 months and paid hospital fees. The average fee paid was ₦18,284.96 with a maximum amount of ₦150,000.00. The third group involves about 52.44 % of the farmers who had either been ill or not but bought drugs or medical supplies. The costs of drugs bought by ill farmers who had made consultations or had been placed on admission were assessed in the last group. The average cost of drugs and other medical supplies were ₦4679.78 with a maximum cost of ₦170,000.00.

**Table 2.** Health and health expenditure of farmers.

Health	Yes (%)	Mean	Standard deviation
<b>Illness (Consulted health practitioner)</b>	15.86		
Consultation fees	-	2172.06	4718.09
<b>Illness (Hospital Admission)</b>	4.02		
Hospital fees	-	18284.96	26330.09
<b>Bought medicine/medical supplies</b>	52.44		
Amount spent on medicine/medical supplies	-	4679.78	12272.72
<b>Total health expenditure</b>	54.62	5650.02	13830.00

### 5.2. Economic shocks among farmers in rural Nigeria

About 32% of the farmers had experienced at least one of death/illness of household member, theft/loss of property, increase in price of inputs, fall in price of outputs, fall in price of major food items and job loss (Table 3). The most experienced shocks were theft/loss of property (14.99 %) and fall in price of major food items (14.99 %). Across the zones, death/illness of household income earning member was highest in the Southeast (12.75 %) and Northeast (11.86 %). Theft/loss of property was mostly prevalent in the Northeast (30.68 %) and Northwest (18.39 %) while increase in price of inputs was experienced most in the North central (10.02 %). The fall in price of major food items was also mostly experienced by farmers in the North central (20.92 %) and Southsouth (18.51 %). The number of farmers who had experienced each shock varied significantly across the geopolitical zones.

### 5.3. Farmer's characteristics and economic shocks

The experience of economic shocks was assessed across the characteristics of farmers in Table 4. The proportion of males (31.62 %) that had experienced at least one shock was slightly higher than females (30.57%). While more males had experienced other shocks, more females had experienced a fall in major food prices (15.15 %) and job loss (0.97 %). More young farmers with age less than 18 had experienced at least one shock compared to those in other age groups. However, more (16.32 %) of those aged above 61 had experienced the death/illness of an income-earning household member while the incidence of theft and loss of property was higher (17.92 %) among those with the age between 25 and 40 years. Uneducated farmers suffered more from economic shocks compared to those that were educated. The death/illness of household member, increase in price of inputs, and fall in price of major food items was higher among farmers who had only primary education while Theft/loss of property was experienced mostly by farmers who had no formal education.

More farmers who were divorced, separated or widowed had experienced at least one shock compared to those that were either single or married. Death or illness of household member was also highest among them and this could be associated with the fact that those that were widowed had lost their spouses. All the other economic shocks were however higher among single farmers. Economic shocks were more experienced by farmers who had low income and fewer assets. About

**Table 3.** Economic shocks experienced by farmers across zones in Nigeria.

Shock	POOLED	NC	NE	NW	SE	SS	SW	Pearson chi2
Death/illness of hh member								
Yes	9.40	6.05	11.86	6.19	12.75	11.90	3.95	37.23***
No	90.60	93.95	88.14	93.81	87.25	88.10	96.05	
Theft/loss of property								
Yes	14.29	8.88	30.68	18.39	2.98	14.68	3.95	232.34***
No	85.71	91.12	69.32	81.61	97.02	85.32	96.05	
Increase in price of inputs								
Yes	5.12	10.02	1.69	6.19	5.63	4.56	-	54.58***
No	94.88	89.98	98.31	93.81	94.37	95.44	100.00	
Fall in price of outputs								
Yes	1.17	3.97	-	1.50	0.66	0.40	-	49.95***
No	98.83	96.03	100.00	98.50	99.34	99.60	100.00	
Fall in price of major food items								
Yes	14.99	20.92	8.43	16.14	17.14	18.51	0.89	79.34***
No	85.01	79.08	91.57	83.86	82.86	81.49	99.11	
Job loss								
Yes	0.77	-	-	0.38	1.00	2.82	-	39.34***
No	99.23	100.00	100.00	99.62	99.00	97.18	100.00	
Had experienced at least one shock								
Yes	31.22	31.38	39.66	33.02	28.64	32.94	7.89	80.71***
No	68.78	68.62	60.34	66.98	71.36	67.06	92.11	

\*\*\*P < 0.01 \*\*P < 0.05 \*P < 0.1.

North Central (NC), North East (NE), North West (NW), South East (SE), South South (SS), South West (SW).

33.41%, 33.54%, and 31.90% of farmers who had a value of input less than ₦10,000, had no access to electricity and had no mobile phones had experienced at least one shock, respectively. However, theft or loss of property and fall in the price of major food items was experienced by most by farmers that had value of output between 30001 and 40000. Farmers who lived with disabilities also experience more economic shocks compared to those who didn't.

#### 5.4. Effects of economic shocks on health expenditure among farmers

The first stage of the Heckman regression model revealed factors that determine the likelihood of farmers to spend on health. In Table 5, the probability of spending on health increased with female farmers being the household head. This implies that the likelihood of spending on health increases if the household head is a female. The probable reason for this may be associated with the fact that women are the main caregiver in households and are more available in the household to attend to member of the household who fell ill. This conforms with studies such as Cuckler et al. (2011); Cylus et al. (2011); Lassman et al. (2014); Matud (2017) that have shown that women use more health care services and spend more on health when compared to men. In explaining this argument, Bertakis et al. (2000) and Oksuzyan et al. (2008) suggested that the disparities may be connected with reproductive biology and specific gender conditions while Singh-Manoux et al. (2008) associated it with the higher rates of morbidity in women than in men. Additionally, Evangelista et al. (2001) associated it with gender differences in health perceptions and the reporting of symptoms and poor health.

The study shows that having at least secondary education has a positive relationship with the decision to spend on health. This implies that having a household head with at least secondary education will increase the likelihood of spending on health when compared to a household whose head has no form education. The result shows a positive relationship with age implying that age also increases the probability of spending on health. This cannot be disconnected from the fact that immunity decreases with age and older members of the family will decide to spend on health because they have the understanding of the general saying that "health is wealth".

Additionally, income was found to have a positive and significant relationship with the probability of spending on health. This implies that the higher the income the higher the probability of spending on health in the household if the need arises. Usage of mosquito bed-net insecticide had a negative and significant relationship with the likelihood of spending on health. This indicates that the usage of mosquito bed-net insecticide reduces the probability of spending on health. This is evident as malaria remains a "main" source of illness and death among children and adults in Nigeria (Oladepo et al., 2019; Omotayo and Oyekale 2013). Hence, the usage of mosquito bed-net insecticide plays a key role in reducing the probability of coming down with malaria and consequently incurring cost of hospital visits and medication. The result of the role of usage of improved waste disposal was found to be negative and significant. This indicates that the practice of proper hygiene through the use of improved waste disposal reduces the likelihood of spending on health. The study shows that there is a negative and significant relationship between households in the north and the likelihood of spending on health. This implies that households from the northern region of the country has a lesser probability of spending on health. This can be associated with the higher levels of poverty and deprivations in the Northern part of Nigeria compared to the Southern parts of the country.

The second stage of the model revealed the factors that influence the amount farmers spend their health. We found that the education of the head had a positive and significant effect on the amount of money allocated to health. This implies that having at least secondary education will increase the amount of household budgetary allocation for health. Following expectation, income was positive and significant. The higher the income of the household the higher the purchasing power of the household and the higher the amount spent on health in the household. The usage of improved sewage disposal has a negative and significant relationship with the amount of money spend on health. This implies that there is reduction of amount of household budget if the household utilizes hygienic methods of waste disposal. Usage of mosquito net was also found to have a negative and significant relationship with the health expenditure. Therefore, if the household use nets to protect themselves from mosquito bites, it reduces the household expenditure on health. Access to electricity was found to be negative and significant. This

**Table 4.** Distribution of economic shocks across farmers' characteristics.

	Death /illness of hh member	Theft/loss of property	Increase in price of inputs	Fall in price of outputs	Fall in price of major food	Job Loss	Had experienced at least one shock	Pearson chi2
	Yes (%)	Yes (%)	Yes (%)	Yes (%)	Yes (%)	Yes (%)	Yes (%)	
Male	9.17	15.33	4.86	1.13	14.89	0.65	31.62	0.363
Female	9.78	12.60	5.55	1.23	15.15	0.97	30.57	
<b>Age</b>								
>18	9.23	17.26	8.63	2.68	19.05	1.19	34.82	9.27**
18–24	6.93	14.36	6.44	2.97	15.84	0.99	30.20	
25–40	7.08	17.92	4.95	1.18	16.51	1.30	33.96	
41–60	9.00	13.02	4.20	0.86	12.43	0.43	28.45	
>61	16.32	8.28	4.60	0.00	15.40	0.23	31.03	
<b>Education</b>								
None	8.57	25.05	4.84	0.00	13.19	0.44	38.46	19.48***
Primary	11.04	11.76	5.92	1.36	16.24	0.72	31.28	
Secondary	9.30	13.62	4.76	1.62	15.46	1.08	30.27	
Higher	5.03	11.17	3.63	0.84	11.73	0.56	24.30	
<b>Marital status</b>								
Single	10.34	15.51	7.43	2.42	17.45	1.29	34.41	9.52***
Married	8.23	14.37	4.65	0.79	14.23	0.51	29.66	
Other	18.35	10.09	3.21	1.38	15.60	1.83	37.61	
<b>Income and assets</b>								
<b>Val. of output ₦</b>								
<10000	11.44	12.72	7.00	1.81	18.51	1.13	33.41	6.63
10000–20000	8.33	14.09	3.57	0.40	14.29	0.79	30.56	
20001–30000	8.56	12.67	2.74	1.71	9.93	0.00	26.37	
30001–40000	4.35	15.53	5.59	0.00	19.25	0.62	30.43	
>40000	8.18	18.49	3.27	0.49	9.49	0.16	30.11	
<b>Access to electricity</b>								
Yes	9.68	10.01	4.48	0.49	13.02	1.38	27.91	10.68***
No	9.21	17.28	5.57	1.65	16.37	0.34	33.54	
<b>Mobile phone</b>								
Yes	9.59	13.13	5.50	1.18	15.61	0.90	31.13	0.104
No	8.37	21.04	2.94	1.13	11.54	0.00	31.90	
<b>Health related characteristics</b>								
<b>Use of mosquito nets</b>								
Yes	9.28	16.08	4.96	2.02	14.15	0.37	31.80	0.26
No	9.47	13.26	5.21	0.68	15.47	1.00	30.89	
<b>Disability</b>								
Yes	7.97	11.30	7.21	1.21	20.67	0.72	37.50	8.86***
No	18.27	14.77	4.78	0.96	14.07	0.78	30.21	

\*\*\*P < 0.01 \*\*P < 0.05 \*P < 0.1.

suggest that access to electricity will lead to payment for electricity which leads to reductions in household budgetary allocation for health.

On economic shocks, the study shows that reductions in the price of food items had a positive and significant relationship with health expenditure. This suggests that as the food expenditure reduces as a result of price reductions, it allows the household to increase the budget allocation to non-food expenditure such as health services. The increase in the price of input in the family enterprise was found to have a negative and significant effect on health expenditure. This implies that when households have to spend more on inputs due to price fluctuations as a result of inflation, they will be forced to reduce their health expenditure. Additionally, the study shows that job loss by the household head who is often the “breadwinner” of the family had a negative effect on the health expenditure.

## 6. Discussion

In the previous section, the results emerging from this study were presented. First, we showed the factors influencing the decision of

household to spend on health. Secondly, we examined the effect of economic shocks and other control variables on health expenditure. On the drivers of likelihood to spend on health, factors which include gender, age, education, income, household living in the northern region, usage of improved sewage disposal, and use of mosquito bed-net were found to be significant. Being a female plays an important role in utilization of health services and is associated with higher expenditure on health. Studies (Cuckler et al., 2011; Cylus et al., 2011; Lassman et al., 2014; Matud, 2017) have shown that women use more health care services and spend more health than men. Interestingly, several reasonable explanations or reasons have been offered to this argument. Bertakis et al. (2000) and Oksuzyan et al. (2008) suggested that these disparities may not be disconnected with reproductive biology and conditions specific to gender while Singh-Manoux et al. (2008) associated it with the higher rates of morbidity in women than in men. Additionally, differences in health perceptions and the reporting of symptoms and illnesses (Evangelista et al., 2001).

On relationship with age, the probabilities to decide on spending on health increased with age. This was associated with the fact that older



**Table 5.** First and Second stage results of the Heckman regression model.

VARIABLES	Drop in price of food items		Increase in price of inputs		Job loss		Fall in price of outputs		Loss of property	
	(effect)	(selection)	(effect)	(selection)	(effect)	(selection)	(effect)	(selection)	(effect)	(selection)
	Health expenditure	Health decision	Health expenditure	Health decision	Health expenditure	Health decision	Health expenditure	Health decision	Health expenditure	Health decision
Sex (female)	0.531 (0.497)	0.193*** (0.0616)	0.534 (0.504)	0.193*** (0.0616)	0.532 (0.501)	0.193*** (0.0616)	0.534 (0.503)	0.193*** (0.0616)	0.530 (0.503)	0.193*** (0.0616)
Age	-0.0342 (0.0432)	-0.0200*** (0.00204)	-0.0347 (0.0438)	-0.0200*** (0.00204)	-0.0343 (0.0435)	-0.0200*** (0.00204)	-0.0346 (0.0437)	-0.0200*** (0.00204)	-0.0343 (0.0437)	-0.0200*** (0.00204)
No education	-0.215 (0.662)	-0.00442 (0.123)	-0.225 (0.670)	-0.00442 (0.123)	-0.224 (0.666)	-0.00442 (0.123)	-0.227 (0.670)	-0.00442 (0.123)	-0.234 (0.669)	-0.00442 (0.123)
Secondary	0.383*** (0.0031)	0.135*** (0.0036)	0.404*** (0.0039)	0.135*** (0.0006)	0.407*** (0.0035)	0.135*** (0.006)	0.408*** (0.0039)	0.135*** (0.0036)	0.407*** (0.0007)	0.135*** (0.0036)
Married	0.613 (0.672)	0.169** (0.0734)	0.621 (0.681)	0.169** (0.0734)	0.616 (0.677)	0.169** (0.0734)	0.621 (0.680)	0.169** (0.0734)	0.616 (0.679)	0.169** (0.0734)
Income	0.101*** (0.0063)	0.0316*** (0.0121)	0.103*** (0.0075)	0.0316*** (0.0121)	0.104*** (0.0069)	0.0316*** (0.0121)	0.103*** (0.0074)	0.0316*** (0.0121)	0.103*** (0.0072)	0.0316*** (0.0121)
North	0.0899 (0.798)	0.361*** (0.0692)	0.105 (0.809)	0.361*** (0.0692)	0.0886 (0.805)	0.361*** (0.0692)	0.102 (0.808)	0.361*** (0.0692)	0.0922 (0.808)	0.361*** (0.0692)
Improved	-0.730** (0.259)	-0.222** (0.079)	-0.740** (0.275)	-0.222** (0.079)	-0.713** (0.269)	-0.222** (0.079)	-0.733** (0.274)	-0.222** (0.079)	-0.720** (0.272)	-0.222** (0.079)
Mobile phone	0.0398 (0.475)	-0.0132 (0.0889)	0.0187 (0.481)	-0.0132 (0.0889)	0.0167 (0.478)	-0.0132 (0.0889)	0.0138 (0.480)	-0.0132 (0.0889)	0.0170 (0.479)	-0.0132 (0.0889)
Mosquito net	-0.127*** (0.009)	-0.0120*** (0.0008)	-0.121*** (0.002)	-0.0120*** (0.008)	-0.119*** (0.000)	-0.0120*** (0.008)	-0.119*** (0.002)	-0.0120*** (0.008)	-0.117*** (0.001)	-0.0120*** (0.008)
Electricity	-0.212*** (0.0641)	-0.558 (0.457)	-0.212*** (0.0641)	-0.550 (0.461)	-0.212*** (0.0641)	-0.542 (0.459)	-0.212*** (0.0641)	-0.549 (0.461)	-0.212*** (0.0641)	-0.545 (0.460)
Food items	0.380*** (0.098)									
Price input			-0.141** (0.062)							
Job loss					-0.416*** (0.088)					
Price output							-0.0124 (1.404)			
Loss of pro									0.0884 (0.420)	
Constant	0.296 (1.033)	1.781*** (0.184)	0.270 (1.046)	1.781*** (0.184)	0.286 (1.042)	1.781*** (0.184)	0.267 (1.045)	1.781*** (0.184)	0.254 (1.045)	1.781*** (0.184)
Observations	2,948	2,948	2,948	2,948	2,948	2,948	2,948	2,948	2,948	2,948

Standard errors in parentheses.  
 \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

people tend to require more health care due to health challenges associated with old age. Our finding is line with previous studies (Liang et al., 2010; Lucanin and Lucanin, 2012) in this area of research suggesting that health challenges increases with age Education enlightens and it helps in making informed decisions. In line with our study, previous studies (Jenkins et al., 2019; Shahraki, and Ghaderi, 2019) found that well-educated people are likely to spend on health and experience better health than the poorly educated. Income were found to increase the probability of spending on health. It is known fact that the ability to utilize or obtain adequate medical services depends to some extent on the income level of an individual or a household. Our finding reinforces the study of Blázquez et al. (2014) that suggested that the decision to spend on health may be disrupted if income of the household is low.

The second stage showing the effects of economic shocks and other control variables shows that fall in the price of food items, increase in the price of inputs for household enterprise, loss of job, are key economic shocks that affect household health expenditure while education, high income, usage of improved sewage disposal, expenditure on electricity and use of mosquito bed-net were other control variables affecting

household health expenditure. The result shows that there exists a positive effect of reductions in the price of food items on household health expenditure. The argument here is that reduction in the intra-household budget allocation towards food expenditure favors the non-food expenditure in the context of household health expenditure. The left-over from the initial budget to food expenditures can be added to the household health allocation. Our finding is congruence with the study of Xu et al. (2007) that suggested that reduction in the expenditure of the household toward other household basic amenities such as food, shelter and clothing will increase the expenditure allocated to household health.

The study also revealed that there exists a negative relationship between health expenditure and increase in the price of inputs for household's enterprise. In the absence of functioning formal coping mechanisms, market failures or economic shocks such as increase price of inputs forces households to resort to adjustment in health consumption. A similar result was found in previous studies (Asfaw and Braun, 2004; Shehu and Sidique, 2015). Loss of job was also found to have a negative relationship with health expenditure. Job loss can be directly linked to loss of income. Undoubtedly, a reduction in income or loss of income

source will directly affect both food and non-food expenditure such as health. Our finding is consistent with the study of Shehu and Siddique (2015) in Nigeria and Nguyen et al. (2020) in Vietnam that revealed that economic shocks in the form of job loss are critical and adversely affects all form of household expenditure.

## 7. Conclusions and policy recommendations

This study focused on factors influencing household decision to spend on health and also looked at the effect of economic shocks on household health expenditure using nationally representative data from the World Bank. The study showed from the descriptive statistics that the likelihood of experiencing at least one shock significantly varied across age, level of education, marital status and farmers with disability. Farmers who are less than 18 years, were uneducated, had value of output less than 10,000 were more likely to have experienced at least one shock. The likelihood of spending on health however increased with gender (female), age, education, income and decreased with the probability of the households living in the northern region of Nigeria, usage of improved sewage disposal and use of mosquito bed-net. Job loss by the major income earning household member had a negative relationship with farmer's expenditure on health. Essential household needs such as food, health and shelter compete for limited household income. A reduction in the amount spent on any of the household's essential needs gives room for more to be spent on others. A fall in the prices of major food items consumed within the household increased the amount of income available for health care among the farmers.

The findings from this study offer important insights for policy direction. Firstly, most of the farmers that had incurred health expenditure simply bought drugs or medical supplies while very few had actually visited a health care center. The Federal Ministry of Health needs to create more awareness about the dangers of self-medication while more health care facilities should be made available and accessible in rural areas. Secondly, farmers with disabilities were more susceptible to economic shocks while they also spent more on their health. Special interventions should be put in place for farmers with disabilities by the federal government to help them cope with the adverse effects of economic shocks and their health expenses. Thirdly, the increase in price of inputs for farming will undoubtedly affect the productivity of farmers through their value of output and reduce crop revenue and consequently amount spent on health. Hence, effort should be intensified by the Ministry of Agriculture to put in place more incentives and interventions such as credit facilities, improved seeds and so on to act as a succor in the event of increase input prices. Fourthly, the level of education among the farmers was particularly low and this increased their susceptibility to economic shocks and also influenced their attitude towards spending on

their health. The Ministry of education should provide adult schools suitable for farmers and their households in rural areas while more awareness on the need for households to take care of their health should be created. Finally, the Ministry of Agriculture and The Federal Government also needs to put in place favorable policies that would ensure that food prices remain stable and do not increase unguided. This is essential as increases in food prices will likely reduce the amount of income available for farmers to spend on their health.

## Declarations

### Author contribution statement

Adedoyin Mistura Rufai: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Adebayo Isaiah Ogunniyi, Abioye Oyewale and Ahadi Bwihangane Birindwa: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Kehinde Oluseyi Olagunju and Abiodun Olusola Omotayo: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

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### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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## APPENDIX

Table A1

Characteristics		Freq.	%
<b>Sex</b>	Male	1844	62.36
	Female	1113	37.64
<b>Age</b> Mean – 41.65 ± 17.47	>18	336	11.24
	18–24	202	6.76
	25–40	848	28.38
	41–60	1167	39.06
	>61	435	14.56
<b>Education</b>	No formal education	455	15.23
	Primary	1250	41.83
	Secondary	925	30.96
	Higher	358	11.98

(continued on next column)

Table A1 (continued)

Characteristics		Freq.	%
<b>Marital Status</b>	Single	619	20.72
	Married	2151	71.99
	Divorced/separated/widowed	218	7.30
<b>Income and assets</b>			
Val. of output (₦)	<10000	1420	47.52
Mean – 36147.74 ± 96807.03	10000–20000	504	16.86
	20001–30000	292	9.77
	30001–40000	161	5.39
	>40000	611	20.45
<b>Access to electricity</b>	Yes	1229	41.13
	No	1759	58.87
<b>Has mobile phone</b>	Yes	2544	85.14
	No	444	14.86
<b>Health related characteristics</b>			
<b>Use of mosquito nets</b>	Yes	1088	36.41
	No	1900	63.59
<b>Disability</b>	Yes	416	13.92
	No	2572	86.08

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