Received: October 17, 2025
Revised: January 13, 2026
Accepted: April 19, 2026
Published: June 16, 2026

Elicit Journal of Economics and Management Studies
eISSN: 3121-634X
pISSN: 3093-0529

https://elicitpublisher.com

EMPIRICAL PAPER

Educational Attainment, Unemployment, Nutritional Intakes and Health Status in Nigeria

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10.65820/ejems-7vol2-issue1-2026

Abstract

Purpose: The study explored the effects of educational attainment, unemployment, and nutritional intake on health status in Nigeria, utilising data from the 2018/2019 Nigeria Living Standard Survey.

Methodology: Health status was measured by the number of days individuals reported experiencing illness. The analysis employed an instrumental variable estimation technique (2SLS).

Results: The findings revealed that educational attainment has a positive and statistically significant ($p < 0.01$) effect on the incidence of illness days, whereas unemployment is associated with an increase in the number of ill days ($p < 0.01$). Furthermore, adequate nutrition intake is associated with a reduction in illness days or hospitalisation ($p < 0.01$). This indicates that higher education attainment enhances health status, while unemployment worsens it, and sound nutrition contributes positively to health outcomes.

Novelty and contribution: The study provides microeconomic evidence of educational attainment, employment status, and nutritional intake as essential causal factors influencing health status in Nigeria

Social implications: The study informs the government and relevant stakeholders in formulating policies that facilitate greater access to education, expand employment opportunities, and enhance the quality of food intake to elevate the health status of the people in Nigeria. Also, the government should implement targeted strategies to improve both mental and physical health, to promote health status and boost socio-economic growth and development in Nigeria.

Keywords: Education, Unemployment, Nutrition, Health Status, Microeconomics

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How to cite this article:

Nudegbesi, F. O., Olayiwola, S. O., & Yaqub, J. O. (2026). Educational attainment, unemployment, nutritional intakes and health status in Nigeria. *Elicit Journal of Economics and Management Studies, 2*(1), 120-133.

1 Introduction

Socio-economic factors remain the key determinants of health status in Nigeria, including income per capita. A significant percentage of Nigerians live below the poverty line, making it difficult for them to access essential healthcare services (Abdulrahman, 2023). Limited financial resources often cause delays in seeking medical care until health conditions worsen, leading to higher mortality rates. Geographic location, inadequate infrastructure, and a shortage of healthcare providers also constitute significant barriers to accessing healthcare. This affects the less privileged in society, which includes women, children, and rural inhabitants. Lack of good housing, poor nutrition and sanitation, as well as poor access to potable water, bring about outbreaks of diseases (Govender et al., 2011). Furthermore, Nigeria's healthcare system is burdened by inadequate funding, which limits the ability to maintain and expand healthcare infrastructure and services (Olayiwola et al., 2017; Olayiwola & Olusanya, 2021). Comprehensive healthcare reform needs to focus on increasing funding, improving infrastructure, enhancing the healthcare workforce, and combating corruption. By tackling these issues, Nigeria can make a significant step towards improving health outcomes and achieving sustainable development (Saleem, 2023).

The quality of health status of the citizens of every country is the bedrock for human capital development and economic development. Nigerian citizens have poor access to healthcare services when compared with developed countries or some African countries (Omoleke & Taleat, 2018). Factors such as unemployment, unequal distribution of income, poor nutrition, and poor standard of living contribute to inequality in health status in society. Therefore, the connectivity between socio-economic factors and health status remains a deep concern in health economics. Over the years, the government of Nigeria has implemented various policies to improve healthcare. Some of these policies include the National Health Insurance Scheme (NHIS) established in 1999, Primary Healthcare Under One Roof (PHCUOR) in 2010, Midwives Service Scheme (MSS) launched in 2009, National Strategic Health Development Plan (NSHDP), Revitalisation of Primary Healthcare Centres (PHCs) and Disease Control and Eradication Programmes. Despite the implementation of these policies, Nigeria still faces significant challenges in providing quality healthcare services to its citizens. These challenges are largely influenced by socio-economic factors, which create inequality in health status and access to healthcare. Financial constraints often result in delayed medical care, worsening health conditions, and increased mortality rates (Watkins et al., 2017). Low levels of education contribute to poor health literacy, hindering the understanding of the healthcare system. Unemployment also worsens economic hardships, limiting the ability to seek timely medical attention (Willie & Maqbool, 2023). Access to healthcare services is particularly challenging in rural areas due to geographical barriers, limited infrastructure, and a shortage of healthcare providers. Moreover, insufficient housing, malnutrition, and limited access to safe drinking water exacerbate disparities in healthcare access and results (Govender et al., 2011). This study investigates the effects of nutritional intake on health status in Nigeria in order to provide insights into policy interventions that can enhance overall improvement in health status in Nigeria.

2 Literature Review

Nutrition intake encompasses the process through which individuals consume and assimilate nutrients derived from food and beverages. These nutrients furnish the body with the energy and essential building blocks requisite for growth, development, and overall well-being (Ohuruogu et al., 2019). Nutrition intake includes both the types and quantities of food consumed, as well as the mechanisms by which our bodies digest, absorb, and utilise these nutrients. Achieving balanced nutrition intake necessitates the consumption of a diverse array of foods from all food groups to ensure that we meet the nutritional requirements of our bodies. This entails incorporating a plethora of fruits, vegetables, whole grains, proteins, and healthy fats into our diets while judiciously limiting processed foods, added sugars, and unhealthy fats. Furthermore, being careful of portion sizes and practising mindful eating can facilitate the maintenance of a healthy weight and optimise nutrient absorption. Macro-nutrients comprise carbohydrates, proteins, and fats, whereas micro-nutrients include vitamins, minerals, and water. Water plays a pivotal role in sustaining proper hydration and supporting a myriad of physiological functions. It acts as a solvent for essential nutrients, regulates body temperature, lubricates joints, aids in digestion, and assists in the elimination of waste products from the body (Jequier & Constant, 2010). Consequently, nutrition underscores the significance of balanced diets in conjunction with adequate hydration to maximise nutrient intake and bolster physiological functions.

The nutrition intake adopted in this study is the frequency of days per week that households consume various food categories (in days).

Health status is the overall health condition of an individual at a particular point in time. It is the level of health of an individual or a group of individuals as assessed by those individuals or the group (Akintunde et al., 2019). It includes various dimensions of well-being: physical, mental, emotional, and social aspects. Health status deals with how well someone is doing physically, mentally, and emotionally. WHO (1948), in Akintunde et al. (2019), argued that health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. This implies that health status has different dimensions, such as physical, mental, and social, among others. Physical health concerns the condition of the body — whether one is ill or injured, the presence of any chronic conditions such as diabetes or high blood pressure, and the overall functioning of bodily organs. Mental health is as important as physical health. Mental health also includes our ability to cope with stress, manage our emotions, and maintain healthy relationships with others (Sharma & Kumar, 2015). Social well-being relates to our connections with others and our sense of belonging. It is about whether we have a support system in place, whether we feel connected to our communities, and whether we have fulfilling relationships with family and friends. Health status is also influenced by our environment — where we live, work, and play. Environmental factors can include air and water quality, access to green spaces, and exposure to toxins or pollutants (Kirtchuk & Wylie, 2021). Finally, health status is influenced by access to a doctor at the required time, health insurance availability, and the availability of healthcare facilities in the communities. Access to healthcare can have a great impact on our ability to prevent and treat illnesses; thus, it is a key factor in determining the overall health status (Flike et al., 2022). Thus, health status is conceptualised in the study as a comprehensive health condition of an individual or individuals at a particular time, which includes physical, mental, emotional, and social well-being.

Cameron and Williams (2009) examined the relationship between income and child health in developing countries using the Indonesian Family Life Survey (IFLS) on children aged 0-14 years. The data were collected on health status and household resources at different ages, the distribution of child health status by age category, and robustness to issues in the measurement of child health status. A stratified random sample of over 7,000 households was used for the IFLS, a panel survey conducted in 1993 (IFLS1), 1997 (IFLS2), and 2000 (IFLS3). The study revealed that low income adversely affects health status and that better health is associated with higher income. Sede and Ohemeng (2015) examined the socio-economic determinants of life expectancy in Nigeria using time series data for the period 1980-2011 from the World Development Indicator (World Bank, 2011) and the Central Bank of Nigeria (CBN) Statistical Bulletin (2011). The study used the Vector Autoregressive (VAR) model and Vector Error Correction Model (VECM) as estimation techniques. The study found that per capita income, education, and government expenditure on health are high determinants of life expectancy in developing countries, but not significant in Nigeria.

Alhassan and Abdu (2017), in the study of socio-economic determinants of health status in Nigeria using Ilorin as a case study, employed primary data which were collected by administering questionnaires to 630 respondents in Ilorin metropolis, Kwara State. The study employed logit and probit regression techniques using Grossman's health production model. The findings revealed that households' age, access to safe and improved drinking water, and the type of residence of the populace are the determinants of health status. Omoaregha and Antigha (2018) examined the socio-economic determinants of healthcare service utilisation among rural dwellers in Akpabuyo LGA, Cross River State, Nigeria, employing primary data. Questionnaires were used to collect data from 400 respondents (adults) in Akpabuyo LGA of Cross River State. The data were analysed using Analysis of Variance (ANOVA) and Pearson Product-Moment Correlation (PPMC). The findings showed that income levels at low, middle, and high levels had a significant effect on the utilisation of healthcare services. It also revealed that the proximity of healthcare facilities in terms of distance and location significantly impacted healthcare utilisation.

Akintude et al. (2019) examined the socio-economic determinants of health status in Nigeria from 1980 to 2014 using time series data from the World Development Indicators (WDI). Per capita income, primary school enrolment, government expenditure on health, unemployment rate, carbon dioxide emissions, and gross capital formation are used. The study employed Co-integration and Vector Error Correction Model (VECM) for data analysis. The findings revealed that factors such as carbon dioxide emissions, gross capital formation, health expenditure, and unemployment rate have a significant effect on health status, proxies by life expectancy in Nigeria. Teketel (2021) examined the use of non-prescribed medicine in Ethiopia using primary data collected from 600 respondents through questionnaires. The study adopted a community-based research approach to examine the relationship between the

use of non-prescribed medicine and income, employment status, health insurance, and quality of life. The results showed that socio-economic factors such as age, income, occupation, knowledge, and quality of life contribute to the use of non-prescribed medicine in Ethiopia, thereby determining health status. Mobosi et al. (2022) examined the socio-economic factors that determine the demand for healthcare in Nsuka Local Government Area of Enugu State using primary data administered with a structured questionnaire. The study used descriptive statistics and analysis of variance (ANOVA) as an estimation method. The findings showed that income and age significantly influenced demand for health care in the Nsuka Local Government Area of Enugu State.

Salameh (2022) examined the socio-economic determinants of subjective well-being toward Sustainable Development Goals in Pakistan. Data were collected from 1,566 households in Punjab, Pakistan, using questionnaires. The study adopted the ordered logit and tobit regression techniques. The study revealed that income, education, government effectiveness, and perceived institutional quality improve well-being, while lower trust in family and friends, poor health status, living on rent, and dissatisfaction with the services of hospitals lower the level of well-being. But individuals with more social ties, who face barriers in health services, live more happily satisfied with their lives. Crime victimisation and worrisome terrorism also lower the level of well-being. Onyechege et al. (2023) examined the socioeconomic determinants of tuberculosis in Nigeria using annual time series data from 1985 to 2018 sourced from the World Bank, WHO and United Nations. Data on tuberculosis (TB), primary school enrolment, and gross domestic product were used. The study used the Autoregressive Distributed Lag model technique. The study revealed a positive linkage between TB and socioeconomic factors such as income, savings, education, and final consumption expenditure.

Abdulrahman (2023) examined the effects of poverty on health outcomes in Nigeria using time series data from 1991 to 2021. The time series data were sourced from World Development Indicator (WDI), National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) bulletin on carbon dioxide emission, patients per physician, life expectancy rate, and poverty rate. The study adopted the Autoregressive Distributed Lag method for the data analysis. In Nigeria, the study showed that poverty impacts health outcomes in the short term. Itari et al. (2018) investigated the relationship between poverty and health outcomes in Nasarawa State, Nigeria, employing primary data collected from 399 randomly selected rural community members in three rural communities from three sampled local government areas of Nasarawa State. Bivariate correlation and the logit regression techniques were used. It was found that there is a bidirectional link between poverty and health outcomes. The study also found a linkage between poverty and health in rural communities of Nasarawa State and that educational attainment, number of dependents, poor utilisation of health care facilities, state of health, number of times food is taken per day and the number of children who died before attaining the age of five in the communities are essential instruments for the poverty and health analysis in rural Nasarawa State. It was concluded that health outcomes and poverty are closely related in the rural communities in Nasarawa State. This agrees with the WHO (2002) proposition that poor health is a cause of poverty and a result of poverty. The empirical reviews demonstrated the significant effects of socio-economic factors on health outcomes and well-being across different regions. The evidence emphasised that while socio-economic factors universally impact health, the specific determinants and their impacts vary. This highlights the importance of designing health and socio-economic policies that are specific to the needs of each region or country.

3 Methodology

This study adopted the Grossman (1972) model as the under-pinning theory to examine the effect of nutritional intakes on health status in Nigeria. The Grossman (1972) model conceptualises health as a form of human capital. According to this model, individuals make rational decisions about investments in their health, similar to other forms of capital, such as education or skills development. The theory suggests that health capital can be accumulated through health-related activities like medical care, preventive measures, nutrition, exercise, and a healthy lifestyle, which leads to an improvement in the overall health status. The utility function is of the form:

$$U = U(H_i, Z_i) \qquad (1)$$

*(H_t)*is the health capital at time *t*, which depreciates over time and can be increased through investment, could be as nutritional intake. Z is the consumption of other goods and services that provide utility. The health production function is such that:

$$H_{t+1} = (1-\delta)H_t + I_t \qquad (2)$$

Where δ is the depreciation rate of health capital, and *it* is the health investment at time *t*. Investment in health (I*t*) was modelled as a function of medical care (M_t), time spent on health improvement (T_t), and other factors, such as:

$$I_t = I(M_t, T_t) \qquad (3)$$

The individual faces a budget constraint:

$$Y_t = W_t(T - T_t - L_t) + V_t \qquad (4)$$

In equation (4), Y_t is the income at time *t*, W_t is the wage rate, T is the total time available, T_t is the time spent on health improvement, L_t is the time lost due to illness, and V_t is non-labour income.

The individual's objective is to maximise lifetime utility subject to the health production function and budget constraint. This involves choosing optimal levels of H_t, Z_t, M_t, and T_t.

3.1 Model Specification

The Grossman (1972) model of the health production function assumed that health investment required a stock of health at birth, income, time for health improvement, non-labour income, and other factors that improve health. The other factors for health improvement include socio-economic elements such as nutritional intake and other individual characteristics. Thus, the determinants of health status are modelled as:

$$HS_i = f(inc, edu, unm, nut, age, gen, zon, mar, dwe, sdwr, sdwd) \quad (5)$$

According to equation (5), health status is determined by income, educational attainment, unemployment rate, nutritional intake, and control variables such as age, gender, proportion of households that reported shocks, location, marital status, household size, industry of activity for wage, access to electricity, type of dwelling, and sources of drinking water (during rainy and dry seasons). Health status is captured in the study by the incidence of hospitalisation/admission in the last 12 months. The dependent variable here is a continuous variable with the values 1, 2,…, n. Thence, the empirical model using equation (5) is stated as:

$$\mathrm{Ihp_i} = \beta_0 + \beta_1 \mathrm{edu} + \beta_2 \mathrm{unm}_+ \beta_3 nut + \beta_4 age + \beta_5 gen + \beta_6 inc + \beta_5 gen + \beta_6 inc + \beta_7 zon + \beta_8 mar + \beta_9 dwe + \beta_{10} sdwr + \beta_{11} sdwd + \varepsilon \qquad (6)$$

Given that individuals are likely to possess peculiar characteristics that may produce different health statuses, equation (6) is estimated with an instrumental variable estimation (2SLS) technique to account for these individuals' circumstantial factors. Based on the existing literature and theoretical dictates, the *a priori* expectation is that better nutritional intake is expected to decrease the probability of having health problems or suffering from any illness.

3.2 Data Sources and Measurements

The data for the study were sourced from the Nigerian Living Standard Survey (NLSS) 2018/2019. The Nigeria Living Standards Survey (NLSS) 2018/2019 was conducted by the National Bureau of Statistics (NBS). It provides comprehensive data on household welfare and household living conditions. A multi-staged stratified sampling method was used for the data collection to ensure adequate representation. Interviews were also conducted using computer-assisted personal interviewing (CAPI) to enhance data accuracy and efficiency. The survey covered education, health, employment, income, and household expenditure. The variables considered in the study and their measurements are presented in Table 1:

Table 1 Measurement and Description of Variables

Variable	Description	Measurement
Health Status	Number of Days ill in the last 12 months (incidence of hospitalisation/admission), Sick-Injured	Numerical
Educational Attainment	Highest level of education attainment by sex (% of population above 25 years of age)	Percentage
Unemployment Rate	Participation in the labour activities in the last 7 days (% of individuals above 15 years of age)	Percentage
Nutrition Intake	Number of days/week the household consumed food categories	Number of days
Age	Age of the individual	Years
Gender	Gender of the individual	Binary (1 if male, 0 if female)
Income Level	Household income	Naira
Location: Rural/Urban	Classification of area type	Percentage of rural and urban
Marital Status	Classification based on marital status	Percentage of Never married, Married, Widowed/Divorced/Separated
Type of Dwelling (in per cent of total number of households)	Percentage of households by type of dwelling	Percentage of types of dwelling
Source of Drinking Water (Rainy Season) (in per cent of total number of households)	Percentage of households by primary source of drinking water in the rainy season	Percentage
Source of Drinking Water (Dry Season) (in percent to total number of households)	Percentage of households by primary source of drinking water in the dry season	Percentage

3.3 Descriptive Statistics of the Variables Used

Table 2 shows the descriptive statistics of the variables used in the study. The mean of the variable consultati~1 is 0.36, which shows the centre value of the variable and reveals that all other values revolve around this average. The maximum value is 1, and the minimum value is 0. Other variables such as sick_injur~1, hospital, residence1, age, male1, educ2, unemploy1, nutri2, dweling1, rdrwater1, ddrwater1, trtime2, daysill, daoutwork, renonconsul, consulpay, transpay, consultime, costdrug, inpatientpay, addpay, bednet, and income have their mean as 0.09, 5.75, 0.31, 17.64, 0.47, 0.51, 0.06, 0.21, 0.38, 0.50, 0.15, 0.88, 5.60, 4.84, 0.81, 132.68, 150.48, 23.934, 2079.67, 10611.82, 20047.35, 63.64, and 381779.80, respectively.

The maximum and minimum values indicate the highest and lowest observations for each variable. For example, age has a maximum of 120 and a minimum of 0, showing that the oldest individual is 120 years old and the youngest is a newborn. Also, hospitalisation has a maximum of 365 days and a minimum of 1, indicating the range of hospital-related observations. Consulpay has a maximum of 200,000 and a minimum of 0, showing the variation in consultation payments. Income ranges from 150 to 1.7 billion, which indicates a significant disparity in income levels. These values reveal the spread and distribution of the observations for each variable, with the means representing their central tendency and the maximum and minimum highlighting the extremes.

Table 2 Descriptive Statistics of the Variables Used

Variable	Number of Obs	Mean	Std. Dev.	Min	Max
CONSULTATI~1	2,455,009	0.36	0.48	0	1
SICK_INJUR~1	2,455,009	0.09	0.23	0	1
Hospital	2,455,009	5.75	1.94	1	365
Residence1	2,455,009	0.31	0.46	0	1
AGE	2,455,009	17.64	21.55	0	120
MALE1	2,455,009	0.47	0.50	0	1
EDUC2	2,455,009	0.51	0.37	0	1
UNEMPLOY1	2,455,009	0.06	0.19	0	1
NUTRI2	2,455,009	0.21	0.41	0	1
Dweling1	2,454,897	0.38	0.49	0	1
RDrWater1	2,454,897	0.50	0.50	0	1
DDrWater1	2,455,009	0.15	0.36	0	1
TrTime2	2,455,009	0.88	0.32	0	1
DAYSILL	2,455,009	5.60	2.99	1	30
DAOUTWORK	2,455,009	4.84	2.36	1	30
RENONCONSUL	2,455,009	0.81	0.07	0	1
CONSULPAY	2,455,009	132.68	356.34	0	200000
TRANSPAY	2,455,009	150.48	317.15	0	40000
CONSULTIME	2,455,009	23.934	26.14	.05	3500
COSTDRUG	2,455,009	2079.67	4229.84	0	500000
INPATIENTPAY	2,455,009	10611.82	6533.83	0	2500000
ADDPAY	2,455,009	20047.35	6326.21	100	500000
BEDNET	2,455,009	63.64	210.50	0	12000
Income	2,455,009	381779.80	1085211	150	1.70e+09

4 Results

The Instrumental Variables (2SLS) regression estimation technique was used to examine the effect of education attainment, unemployment, and nutrition intake on health status in Nigeria. Table 3 presents the results of the nexus between educational attainment and health status in Nigeria. The Prob>chi2 = 0.0000 indicates that the result is statistically significant. From the results, age increases the number of ill days. It implies that as individuals get older, there is an increase in the likelihood of experiencing illness. The educational attainment has a negative coefficient of -0.12. This means that a unit increase in educational level decreases the number of ill days. This result is significant at 5% level ($p < 0.05$). It suggests that individuals with higher education levels are healthier and experience fewer days of illness. It implies the significant role of education in improving health conditions and reducing illness. Whether an individual is sick or injured (SICK_INJURED1) has a coefficient of 0.89, which indicates that individuals identified as sick or injured are associated with more ill days. The residence result shows that living in certain residential areas reduces the number of ill days. Urban inhabitants experience better health outcomes compared to those in rural areas. The coefficient of days out of work due to illness (DAOUTWORK) is 0.77. The result further shows that males (MALE1) are likely to report fewer days of illness compared to females. Source of drinking water during the raining season (RDrWater1) decreases the number of ill days but increases the number of ill days during the dry season (DDrWater1). Income has a non-significant, high coefficient of -2.05. This indicates that high income

improves health status. The instruments used in the estimation are age, gender, type of dwelling, and income, among others. These instruments are theoretically assumed to have differential effects on individual health status (Grossman, 1972).

Table 3 Instrumental Variables Regression Result of the Effects of Education on Health Status

DAYSILL	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
SICK_INJURED1	0.89	0.01	141.77	0.000	-0.9016 0.8771
Residence1	-0.08	0.003	-24.05	0.000	-0.0834 0.0708
AGE	0.01	0.0001	129.36	0.000	0.0090 0.0092
MALE1	-0.04	0.002	-15.06	0.000	-0.0495 0.0381
EDUC2	-0.12	0.003	-29.51	0.000	-0.1245 -0.1089
Dweling1	-0.04	0.003	-15.11	0.000	-0.0514 0.040
RDrWater1	-0.08	0.002	26.01	0.000	0.0709 0.0825
DDrWater1	0.03	0.004	-5.11	0.000	-0.0287 0.0128
TrTime2	-1.03	0.004	-210.88	0.000	-1.0361 -1.0170
DAOUTWORK	0.77	0.004	1205.07	0.000	0.7715 0.7740
RENONCONSUL	-2.15	0.02	-104.36	0.000	-2.1891 2.1084
CONSULPAY	0.00001	4.15	5.78	0.000	0.0000 0.0000
TRANSPAY	0.002	4.78	29.28	0.000	0.0001 0.0001
CONSULTIME	0.0001	0.0001	37.03	0.000	0.0020 0.0022
COSTDRUG	0.00002	3.58	64.36	0.000	0.0000 0.0000
INPATIENTPAY	-2.44	2.19	-11.14	0.000	-2.87e-1 -2.01e-1
ADDPAY	-1.17	2.26	-5.18	0.000	-1.62e-1 -7.28e-1
BEDNET	0.001	6.77	13.13	0.000	0.0000 0.0001
Income	-2.05	1.31	-0.16	0.876	-2.77e-1 2.36e-1
_cons	4.45	0.02	237.35	0.000	4.4094 4.483
Number of Obs	2,454,897				
Wald chi2 (19)	1973956.29				
Prob > chi2	0.0000				
R-squared	0.4457				
Root MSE	2.2263				

Table 4 presents the results of the impact of unemployment rate on health status in Nigeria. The Prob>chi2 = 0.0000 indicates that the result is statistically significant. The result revealed that unemployment has a statistically significant impact on health status in Nigeria. Specifically, unemployment causes an increase in reported ill days (Unemployed1 = 0.17). A unit increase in consultation (CONSULTATION1 (-0.19)) leads to a decrease in the number of ill days by 0.19 days. The exponential $e^{-0.1993} = 0.820$ shows that increased consultations significantly decrease the possibility of experiencing more ill days. This result is statistically significant at ($p < 0.05$). An ill or injured person is likely to experience more ill days, given the result of SICK_INJURED as 0.91. The exponential $e^{-0.9104} = 0.402$ shows a significant increase in the likelihood of having a prolonged illness. This is statistically significant at 5% level ($p < 0.05$). A unit increase in hospital visits decreases the number of ill days by about 0.0137 days (Hospital = -0.0137). This is significant at 5% level ($p < 0.05$). The urban residents experience fewer ill days by about 0.09 (Residence1 = -0.0857). Ageing also indicates an increase in the number of days ill by about 0.0092 (AGE = 0.0092). This result is

significant at 5% significance level ($p < 0.05$). Males also report fewer ill days compared to females (MALE1=-0.05) and significant at 5% level ($p < 0.05$). The source of drinking water in the rainy season increases the number of ill days by 0.08 days and reduces the number of ill days during the dry season. The cost of consultation and the cost of drugs increase illness days. Other important factors, such as increased consultations, urban residence, and access to hospital services, improve health outcomes, while prolonged absence from work due to illness and access to potentially contaminated drinking water worsen health outcomes. These results show the nexus between unemployment, health services and health outcomes, and suggest the need for targeted health interventions and employment policies to improve health status in Nigeria.

Table 4 Instrumental Variables Regression Result of the Effects of Unemployment on Health Status

DAYSTILL	**Coef.**	**Std. Err**	**Z**	**p>/z/**	**[95% Conf. Interval]**	
CONSULTATION 1	-0.19	0.003	-60.09	0.000	-0.2058	-0.1928
SICK-_INJURED	0.91	0.01	144.92	0.000	-0.9227	0.8981
Hospital	-0.01	0.001	-18.52	0.000	-0.0151	-0.0122
Residence 1	-0.01	0.003	-26.76	0.000	-.0919	-0.0794
AGE	0.01	0.0001	132.92	0.000	0.0090	0.0093
MALE1	-0.05	0.003	-16.32	0.000	-0.0532	-0.0418
Unemployed 1	0.17	0.01	-21.81	0.000	-0.1818	-0.1518
Dwelling1	-0.05	0.003	-17.70	0.000	-0.0592	-0.0474
RDr Water 1	0.08	0.002	25.95	0.000	0.0707	0.0822
DDr Water 1	-0.02	0.005	-4.54	0.000	-0.0264	0-.0105
Tr Time	-1.17	0.01	-216.34	0.000	-1.1805	-1.1593
DAOUTWORK	0.77	0.001	1198.02	0.000	0.7703	0-.7727
RENONCONSULT	-2.17	0.02	-105.47	0.000	-2.2106	-2.1300
CONSULPAY	7.47	4.16	1.80	0.073	-6.85e-1	0.00001
TRANSPAY	0.0001	4.79	25.42	0.000	0.0001	0 .0001
CONSULTIME	0.003	0.0001	44.53	0.000	0.0024	0.0027
COSTDRUG	0.00002	3.57	63.06	0.000	0.00002	0.00002
ADDPAY	-9.38	2.26	-4.15	0.000	-1.38e-1	-495e-1
BEDNET	0.0001	6.77	13.67	0.000	0.0001	0.0011
Income	-1.75	1.31	-0.13	0.894	-2.74e-1	2.39e-09
_Cons	4.67	0.012	242.79	0.000	4.6321	4.7073
No of obs	2,458,497					
Wald chi2(20)	1980192.40					
Prob> chi2	0.0000					
R- Squared	0.4465					
Root MSE	2.2247					

Table 5 shows the results of the effect of nutrition intake on health Status in Nigeria. The Prob>chi2 = 0.0000 indicates that the result is statistically significant. The result revealed that a unit increase in consultations is associated with a reduction in the number of days ill (DAYSILL) by approximately 0.1998 days. The odds ratio $e^{-0.1998}$ = 0.819 suggests that increased consultations significantly reduced the probability of having prolonged illness. This result is statistically significant ($p < 0.0000$). Also, individuals sick or injured report 0.91 fewer days ill. The odds ratio

$e^{-0.9115}$= 0.402 indicates a substantial reduction in the possibility of having prolonged illness. This result is statistically significant (p < 0.0000). The urban residents experience a reduction of 0.0894 days ill compared to rural residents. The odds ratio $e^{-0.0894}$= 0.914 shows that living in an urban area is associated with slightly better health outcomes. This result is statistically significant (p < 0.0000). The result further shows that a unit increase in age is connected to an increase of 0.0090 days ill. The odds ratio $e^{0.0090}$=1.009 reveals a slight increase in illness days as individuals grow old. This result is statistically significant (p < 0.0000). Being a male is associated with 0.054 fewer days ill compared to females. The odds ratio $e^{-0.0542}$= 0.947 shows that males experience slightly better health outcomes than females. This result is significant (p < 0.0000). An increase in nutritional intake by one unit decreases the number of days of illness by 0.012 days. The odds ratio $e^{-0.0117}$= 0.988 indicates a modest improvement in health outcomes with better nutrition. This result is statistically significant (p < 0.0000). Having a good accommodation decreases the number of days ill by 0.0548 days. The odds ratio $e^{-0.0548}$ = 0.947 shows improved health outcomes. This result is statistically significant (p < 0.000). Source of drinking water increases the number of days ill by 0.08 days in the rainy season and reduces the illness days by 0.02 days during the dry season. Travel time to the hospital reduces ill days by 1.17 days. These results are statistically significant (p < 0.0000). An increase in days out of work due to illness increases the number of days ill by 0.77 days. The odds ratio $e^{0.7712}$ = 2.162 suggests a strong association between prolonged illness and absence from work. This result is statistically significant at (p < 0.0000).

The consultation pay shows that a unit increase in the cost of consultation will lead to a high increase in days ill. The odds ratio $e^{7.50e-06}$ = 1.000007 suggests high impact. This result is significant (p = 0.072) 10% significant level. An increase in the cost of the drug increases illness days marginally by 0.0000225. The odds ratio $e^{0.0000225}$ = 1.0000225 indicates a minimal but statistically significant effect (p < 0.0000). Income has a high coefficient, which indicates that income has a great effect on the number of days ill, though this result is not statistically significant (p = 0.838). The constant term shows the number of days ill when all variables are held constant. This value is significant at (p < 0.0000). The findings revealed that nutrition intake has a significant effect on health status in Nigeria. Specifically, improved nutrition intake is associated with a reduction in the number of ill days, showing a positive impact on health status. In addition, factors such as better dwelling place, reduced sick/injured situations, and increased consultations have a positive impact on health conditions.

Table 5 Instrumental Variables Regression Result of the Effects of Nutrition Intake on Health Status

DAYSILL	Coef.	Std. Err	Z	p>/z/	[95% Conf. Interval]	
CONSULTATION 1	-0.19	0.003	-60.20	0.000	-0.2063	-0.1933
SICK-_INJURED	-0.91	0.01	-145.07	0.000	-0.9238	-0.8991
Residence 1	-0.09	0.003	-27.96	0.000	-0.0953	-0.0831
AGE	0.01	0.0001	131.31	0.000	0.0089	0.0091
MALE 1	-0.05	0.003	-18.72	0.000	-0.0599	-0.0486
NUTR2	-0.01	0.003	-3.38	0.001	-0.0186	-0.0049
Dwelling 1	-0.06	0.003	-18.18	0.000	-0.0607	-0.0489
RDr Water 1	0.08	0.003	26.29	0.000	0.0717	0.0833
DDr Water 1	-0.02	0.004	-3.99	0.000	-0.0242	-0.0083
Tr Time 2	-1.17	0.001	-216.70	0.000	-1.1825	-1.1613
DAOUTWORK	0.77	0.001	1202.24	0.000	0.7700	0.7725
RENONCONSULT	-2.17	0.02	-105.48	0.000	-2.2111	2.1304
CONSULPAY	7.50	4.16	1.80	0.072	-6.58e-1	0.00002
TRANSPAY	0.0001	4.79	24.90	0.000	0.0001	0.0001
CONSULTIME	0.003	0.001	44.61	0.000	0.0024	0.0027
COSTDRUG	0.00002	3.58	61.84	0.000	0.0001	0.00002

INPATIENTPAY	-2.46	2.19	-11.25	0.000	-2.89e-1	-2.03e06
ADDPAY	-1.00	2.26	-4.43	0.000	-1.45e-1	-5.60e07
BEDNET	0.0001	6.77	13.30	0.000	0.0001	0.0001
Income	-2.69	1.31	-2.20	0.838	-2.83e-1	2.30e-1
_Cons	4.62	0.012	243.10	0.000	4.5852	4.6598
No of obs	2,454,897					
Wald chi2 (20)	1978951.86					
Prob> chi2	0.0000					
R- Squared	0.4463					
Root MSE	2.225					

5 Discussion of Findings

The key findings from the study indicate that advancing age correlates with an increased number of illness-related days, suggesting a heightened likelihood of experiencing health issues in later life. Conversely, higher educational attainment appears to diminish the probability of encountering illness. This implies that individuals with high levels of education may enjoy better health and consequently experience fewer days of illness. This underscores the critical role of education in enhancing health status and mitigating illness, a notion also supported by Salameh (2022), who posited that education is a significant factor contributing to improved well-being, and Sede and Ohemeng (2015), who identified that per capita income, education, and government expenditure on health are crucial determinants of life expectancy in developing countries. Unemployment was found to exert a diminishing influence on health status in Nigeria. Specifically, unemployment was correlated with an increase in reported days of illness. This outcome was supported by the findings of Omoaregha and Antigha (2018) in their investigation into the socio-economic determinants of healthcare service utilisation among rural inhabitants of Akpabuyo LGA in Cross River State. The authors indicated that income levels—whether low, middle, or high—significantly affected the utilisation of healthcare services. Similarly, Akintude et al. (2019), Itari et al. (2018), Abdulrahman (2023), and the World Health Organisation (2002) have elucidated that factors such as carbon dioxide emissions, gross capital formation, health expenditure, unemployment rates, and poverty exert a short-term impact on health outcomes and that poor health is both a cause and a consequence of poverty. The implication of this is that unemployment created poverty, which led to more illness days and poor health.

An increase in nutritional intake was found to decrease the duration of illness. The findings suggest a modest enhancement in health outcomes attributable to improved nutrition. Govender, Barnes, and Pieper (2011) demonstrated that inadequate housing, substandard nutrition, poor sanitation, and limited access to potable water precipitate disease outbreaks, thereby increasing the number of days individuals experience illness. This is due to the fact that nutrients provide the body with the energy and essential building blocks necessary for growth, development, and overall well-being (Ohuruogu et al., 2019). Moreover, they serve as solvents for vital nutrients, regulate body temperature, lubricate joints, facilitate digestion, and assist in the excretion of waste products from the body (Jequier & Constant, 2010). Consequently, enhanced nutritional intake not only fosters good health but also significantly reduces the incidence of illness. The prospective study may decentralise education across various strata to ascertain the degree to which different levels of educational attainment influence health outcomes. This could serve as a focal point for future research endeavours.

6 Conclusions

This study examined the nexus between educational attainment, unemployment, nutrition intakes and health status in Nigeria using the 2018/2019 Nigeria Living Standard Survey. The study employed the instrumental variables (2SLS) regression technique for the analysis. It was found that higher educational attainment improved health status in Nigeria; unemployment worsened health status and improved nutritional intake reduced the number of days individuals reported being ill or admitted to a hospital. Therefore, educational attainment, employment status, and

nutrition intake are essential determinants of health status in Nigeria. Thus, policymakers need to design policies to increase access to education, increase employment opportunities, and improve the quality of food intake, among others, to reduce the burden of illness across the population. Also, the government should implement programmes that will contribute to better mental and physical health. These will improve the health status of the masses and contribute to socio-economic growth and development in Nigeria.

Funding

The authors declare that no financial support was received for the research, authorship, and publication of this article.

Declaration of Use Of Generative AI

Under the publication ethics policy of Elicit Publishing Limited, the author(s) declare that generative artificial intelligence (AI) tools were used solely for language refinement and formatting. These tools were not used in the conception, design, data collection, analysis, or interpretation of the study. The author(s) hold full responsibility for the accuracy, originality, and integrity of the content presented in this manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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