Do children belonging to the poorest Nigerian households have access to vaccination, quality water sources and access to cleaner energy than others?

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Abstract

Using the 2018 Demographic Health Surveys (DHS) dataset for Nigeria, this study raises questions as to whether the under-five children from poorest backgrounds received vaccination against Diphtheria, Pertussis (whooping cough) and Tetanus, and whether such children have access to quality water and cleaner energy options. The study adopted descriptive statistics to show that 63% of sampled children in poorest households are not vaccinated which is however different in rich families. Also, 5% of children in poorest families have access to piped water - compared to 18% of richest families. Compared to children from the poorest backgrounds, about 48% of richest households use cleaner cooking fuels while 0.04% of poorest household adopt cleaner fuel options

Motivation

Poverty - a socioeconomic issue have led to high levels of morbidity and mortality among children. First, inability to access safe and constant water supply are linked to high level of poverty. This implies that preventable water-born diseases due to poor water quality keep children out of school and a threat to productive health. Second, access to vaccination against three deadly diseases such as diphtheria, tetanus, and pertussis (whooping cough) (DPT) lead to sustained life of children and poverty reduction. Third, indoor air pollution associated with poor cooking fuel choices (wood, charcoal, coal, and animal dung) are attributed to illness and death especially amongst children from poor backgrounds (Nwaka et al 2020; Ezeh et al 2020).

No wonder the aim of reducing poverty through improved access to health facilities, access to qualitiy water and households' use of cleaner energy sources are some of the core Sustainable Development Goals (SDGs) of the United Nations. It therefore implies that efforts towards promoting a descent standard of living especially amongst children cannot be overemphasized. In the light of these, this study investigates the association between poverty, access to vaccins, quality water and clean cooking fuel amongst families with under-five children in Nigeria. This will shed more light on the SDGs drive towarding ending poverty in a typical African country such as Nigeria.

Dataset

1. The dataset used in this analysis was sourced from the 2018 demographic health surveys (DHS) for Nigeria https://www.dhsprogram.com/Data/. The DHS data captures information related to Sustainable Development Goals (SDGs), Nutrition, Malaria, Wealth index, Family planning, Childhood mortality, Gender and so on.
2. Data collection was administered by the National Population Commission with the support of the US Agency for International developments (USAIDS) across the geopolitical zones, states, and federal capital territory.
3. The 2018 round of the survey consisted of two-stage probability cluster sampling methods by urban and rural areas and the households
4. The DHS Survey Indicators - Maternal and Child Health is used for this analysis. So, the data captures the under five children across households, household's and mother's characteristics.
5. DHS is large dataset that covers over 24940 Nigerian households (out of the 40,666 households) with children that are under-five at the time when the survey was carried out.

Dataset – continued

- Given such a large dataset, trimming (slicing out irrelevant variables) this study captures relevant variables of interest. These variables in no order include:
- gender_child = Gender of the child
- DPT1 = Fist Vaccination against Diphtheria, Pertussis (whooping cough), and Tetanus
- water_dum = Several sources of water - borehole, spring, well, and so on
- index_wlth = Poverty status of household - from poorest, poorer, middle, richer, to richest
- ARI_a = Acute Respiratory Infection amongst children versus non
- diarrhea = Diarrhea prevalence versus non-prevalence
- zones= different geopolitical zones in Nigeria (North-Central, North-East, North-West, South-East, South-South, and South-West)
- urb_rur = urban- rural location of households
- HHsize = total family size.
- cooking_dum= Household's access to energy types - cleaner fuel versus polluting fuel types

Data Preparation and Cleaning

As applied to most survey datasets, the first agenda is to clean the dataset by merging the relevant sections into one unified dataset. DHS dataset includes three different sets such as household, women and children, and men issues. However, this study used the women and children’s component to answer the related research question implied in this study.

Due to the very large survey platform, efficient manipulation through python was not an easy task. Thus, this study captured few household related variables due to such challenges.

Research Question

1. What proportion of children are from poor households in Nigeria?
2. Do children from rich and poor background get vaccinated equally?
3. Do children from the rich and poor household have unequal access to quality water?
4. Do the utilization of cleaner cooking fuel versus polluting fuel vary amongst the children from in poorest households compared to others?
5. How do children in the poorest households varies by household headship, total household size, geopolitical zones and urban-rural concentration?

Methods

This study adopted a descriptive statistics (Exploratory Data Analysis Approach) and Chi-Square tests to shed some light on the research idea while answering relevant research questions.

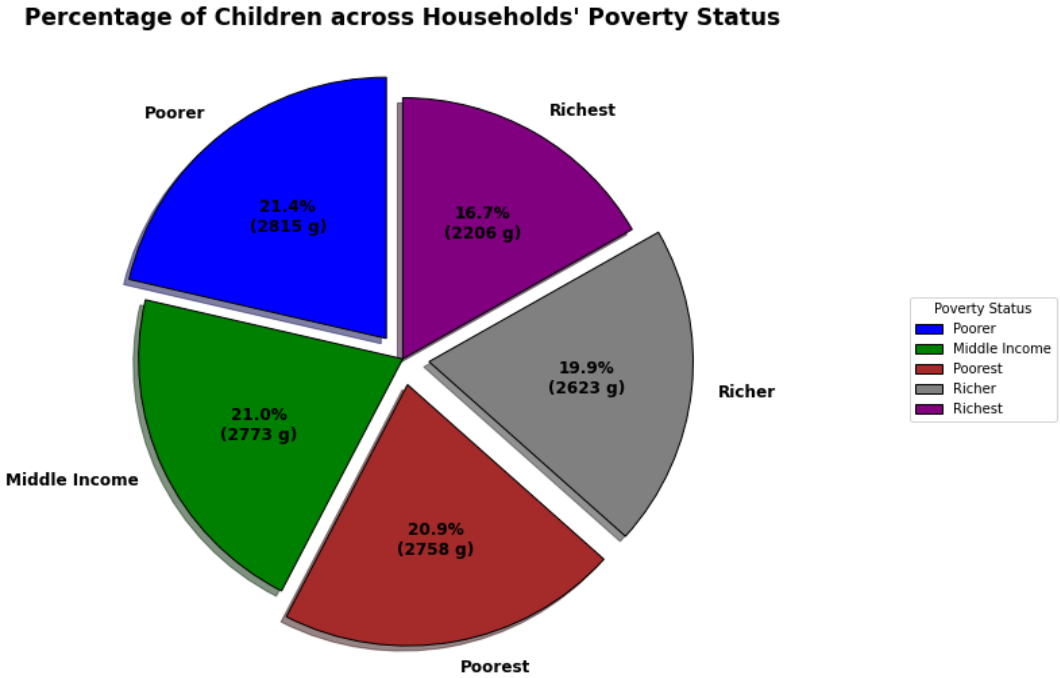
The methods used involved isolating the key variables of interest from other variables using the key python codes. Since the primary question asked relates to the association between poverty, acess to vaccins, quality water and clean cooking fuel, this study adopts a cross-tab relational appraoch and tests whether the distribution of categories are equal or not using the chi-square test statistic. It also uses data visualization (pie charts and histrogram) to further show the degree of disparity across the relevant indicators.

Findings

1. What proportion of children are from poor households in Nigeria?

- Just as observed from the pie chart, about 42% percentage of children are from poor households (poorer +poor)
- Children of the middle-class families represent about 21% of all household types.
- Fewer number of children (17%) belong to rich families.

Overall: Poverty seem to dominate the Nigerian households.



Findings – continued

2. Do children from rich and poor background get vaccinated equally?

1. The Pearson Chi-square test is highly significant confirming that the distributions of children across poverty status and DPT1 vaccination are not the same.

2. About 63% of the sampled children in poorest households are not vaccinated which is however different for in rich families.

3. While 50% of children in the sampled poorer household seem to be vaccinated, the other 50% are not.

4. Over 65% of sampled children in middle income families received the vaccines, while 87% of the richest group also received the vaccines.

Overall: Children from poorest families are less likely to be vaccinated than other children belonging to other household types. This also implies unequal vaccination outcomes.

Findings – continued

3a. Do children from the rich and poor household have unequal access to quality water?

1. 5% of children in poorest families have access to quality piped water - compared to 18% of richest families.

2. Surprisingly, 76% of children from richest backgrounds tend use unprotected well or spring water sources.

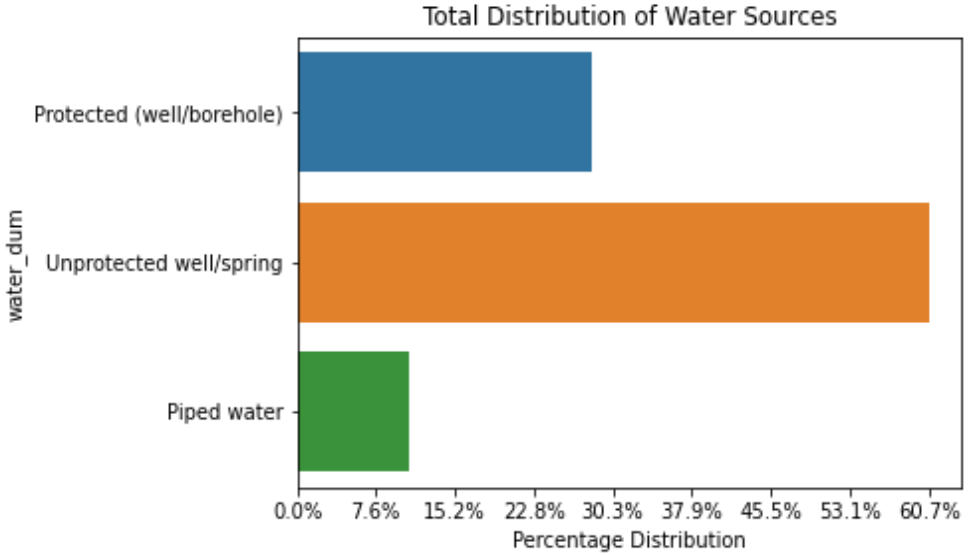
3. The chi-square tests show that the proportion of households across the income categories are not the same - showing a clear difference in water consumption patterns in Nigeria

Findings – continued

3b. Do children from the rich and poor household have unequal access to quality water?

Overall:

The use of unprotected water sources seem to dominate households water usage in Nigeria and there are indeed unequal outcomes in water usage across households such that a greater number of rich households rely on poor water sources.



Findings – continued

4a. Do the utilization of cleaner cooking fuel versus polluting fuel vary amongst the children from in poorest households compared to others?

1.The Pearson Chi-square test is highly significant confirming that the distributions of children across poverty status and household cooking fuel choices are not the same – thus they vary.

2.Poorest households' use of polluting fuel choices is widespread.

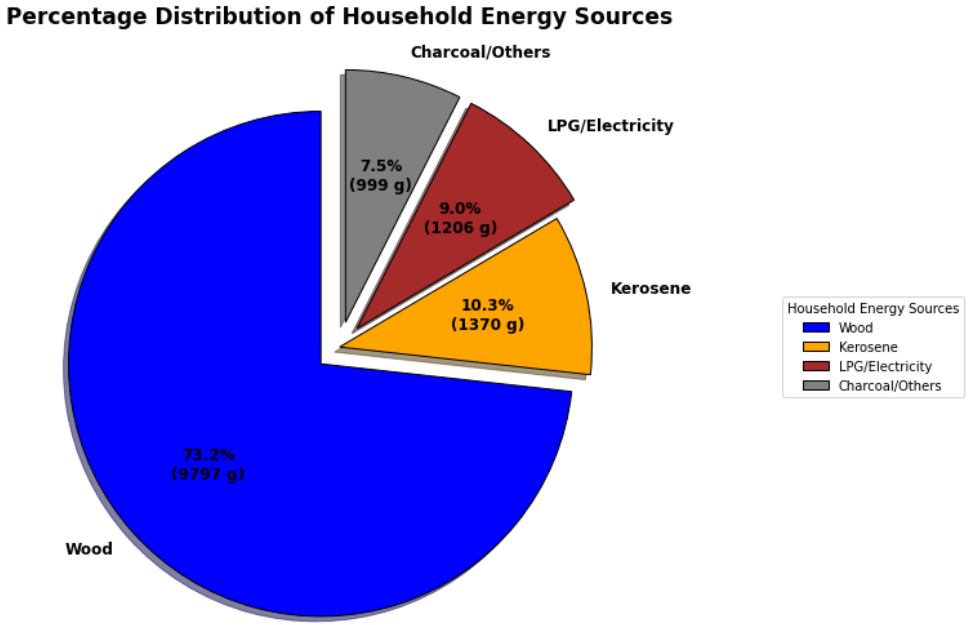
3. About 48% of richest households use cleaner cooking fuels while 0.04% of poorest household adopt cleaner fuel options.

Overall: Polluting fuel choices seem to highly related to poverty as advanced in the theoretical discussions

Findings – continued

4b. How are sources of household energy consumption distributed?

- About 73% of the Nigerian households utilize wood as their energy sources.
- Relatively cleaner energy source represents just 9% of the households.
- Kerosene consumption represents about 10% of all households.



Findings – continued

5a. How do children in the poorest households varies by household headship, total household size and geopolitical zones?

- In the Female-Headed Families:

•Poorest households located in South-South and South-West zones have the smallest family sizes by an average of 5 members.

•Families in the North-East have the largest family members - an average of about 7 members per household.

- In the Male-Headed Families:

•Poorest households' resident in the South (South-South and South-West and South-East) seem to have an average family size of 6 member per household.

•Those in the North-West have an average of 8 members per household.

•***Overall: Female headed households are leaner as compared to male headed ones.***

Findings – continued

5b. How do children in the poorest households vary by household headship, total household size and urban-rural concentration?

- In the Female-Headed Families:

•Poorest households loacted in urban regions have the smallest family sizes by an average of 5 members compared to those in the rural places (6 members).

- In the Male-Headed Families:

•Poorest households' resident in the urban and rural places seem to have an average family size of 8 members per household.

•***Overall: Female headed households are leaner as compared to male headed ones.***

Limitations

The limitations of this study can be drawn as follows: First, the study is limited tgo only household with under-five children in Nigeria. Thus, findings from this research cannot be attributed to all households including those with adult children. Thus, it may be relevant to capture these other segments of Nigerian households in future studies. Secondf, the latest data available is that of 2018 – almost two years different from today. Third, this study relied on descriptive statistics, which someway limits the findings to this approach. Regression annalysis can be applied in a multivariate approach so as to illuminate the findings by including other household demographic factors.

Conclusions

This study raised several questions as: what proportion of children are from poor households in Nigeria?; do children from rich and poor background get vaccinated equally?; do children from the rich and poor household have unequal access to quality water?; do the utilization of cleaner cooking fuel versus polluting fuel vary amongst the children from in poorest households compared to others?; and how do children in the poorest households vary by household headship, total household size, geopolitical zones and urban-rural concentration?

Compared to children from rich backgrounds, the result so far show that poverty is endemic and that children from poor backgrounds have limited access to quality of health services through DPT vaccination, limited access to clean water supply and indeed limited access to cleaner cooking fuel options.

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