



The Determinants of Hospital Length of Stay in Nigeria.

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Abstract

Purpose- Hospital length of stay (LOS) does not only signal the seriousness of illness, it can also lead to catastrophic cost for patients or households. This paper examines the factors that determine LOS in Nigeria; a country where more than 99% of the cost of health care is borne by patients.

Design/methodology/approach- The dataset, consisting of 1,150 people who reported one or more overnight stays in a hospital, comes from the two waves of the Nigerian General Household Survey. Due to the overdispersion and the truncation of LOS at zero, a zero-truncated negative binomial regression model was adopted to establish the causal relationship between LOS and patients' predisposing, enabling and needs-related characteristics.

Findings- LOS tends to increase with the following factors: age, household size, availability of formal medical care facilities, and the severity of illness. However, there is an inverse relationship between LOS and the cost of care, being a female, resource endowment in the area, and utilization of preventive care. People in lower and higher socioeconomic brackets tend to have higher LOS than people in the middle socioeconomic bracket.

Research limitations - Actual description of diseases respondents suffered from, which is important in determining the severity of illness, was not available. I relied on a proxy to measure the severity of illness.

Implications- Policy makers in developing countries continue to explore strategies for reducing poverty and vulnerabilities among the populace. An understanding of the determinants of LOS can help inform policymakers, hospital administrators and patients regarding health care reforms, planning for patients LOS, and planning for the period of hospitalization, respectively.

Originality/value- To the best of my knowledge, this is the first paper to empirically examine the determinants of LOS in Nigeria.

Keywords: Hospital Length of Stay, Zero-truncated Negative Binomial, Healthcare Reforms, GHS-Panel, Nigeria

JEL classification: I12, I28

1. Introduction

According to the Integrated Surveys on Agriculture General Household Survey Panel Report (2014), Nigerians generally spend very little on the direct cost associated with medical care but when they do, it is often on hospital admissions. The concern, however, is the near absence of health insurance to alleviate such unforeseen and potentially burdensome financial need, and the disproportionate distribution of health care facilities. With the gradual decline in major health care indicators for the country, an examination of hospital overnight stays does not only help us understand the coping strategies of households but also offer some insight regarding a health care reform that reduces exclusion, meets the needs of the people and increases participation by all stakeholders.

Previous studies have examined the factors that determine medical care utilization across geographical regions, time, and cultures. One of the most important determinants of health care utilization in the absence of insurance is income, especially for poor households (Kaiser Family Foundation, 2011). Cisse (2011), in an analysis of health care utilization in Cote D'Ivoire for instance, finds that income is positively related to health care utilization. The exact role of income in the consumption of medical care can only be appreciated if consumers correctly report their incomes. Unfortunately, this is not usually the case. Consumers, generally, accurately report their expenditures during surveys, they do not do the same with regards to their incomes (Vyas and Kumaranayake, 2006). In Africa, high levels of illiteracy, cultural practices, the fear of persecution by agents of the state and a large informal sector make income data even more

unreliable.

Apart from income, other studies, specifically on sub-Saharan Africa, have identified other determinants of health care services utilization. The factors determining utilization have been grouped at the level of the provider and the consumer of health care (Mwabu et al., 1993; Ellis et al, 1994; Sahn et al., 2003). At the level of health care provider, the quality of medical care in terms of technical efficiency as proxied by the availability of drugs has been cited as a key determinant of demand for health care (Mwabu et al., 1993; Ellis et al, 1994; Sahn et al., 2003). Due to the difficulty in accessing and the technical nature of measuring provider level data, most studies have focused on the consumer.

Studies that have focused on the role price plays in health care demand at the level of the consumer have been inconclusive. While some studies (Akin et al., 1986; Christian, 2003) find that prices are not important determinants of medical care, other studies find the opposite (Sarah et al., 2006; Mwabu, 1986; Mwabu et al., 1993; Gertler and van der Gaag, 1990; Bolduc et al., 1996; Dow, 1999). The inconclusive nature of the price effect may be due to the particular health service being examined since many of the studies reviewed here examined health services in general. For instance, the influence of price on ambulatory services on the consumer may be different from the role price plays in the utilization of a hospital bed.

Gender differences in health care utilization have also been identified in Kenya (Mwabu et al., 1993), Tanzania (Sahn and Stifel, 2003), and Uganda (Hutchinson, 1999). Mwabu et al. (1993) for instance finds that since men generally control the household finances, they are less constraint by the costs of care

associated with travel and user fees. Hutchison (1999), Sahn and Stifel (2003), on the other hand, find that individuals in households with women with higher levels of education are more likely to use curative care.

Other studies find significant differences in utilization based on place of dwelling (rural or urban) (Cisse, 2011; Oladipo, 2014), level of education of the household head (Cisse, 2011), distance (Feikin et al., 20009; Cisse, 2011; Moisi, 2011), household size (Cisse, 2011; Sahn and Stifel, 2003).

Clearly, while there is ample literature on health care utilization as a whole, the same cannot be said about specific health care services when it comes to sub-Saharan Africa. In the case of hospitalization for instance, while there are studies on length of stay exploring different illnesses in advanced economies, the issue remains mostly unexplored in Africa. This study bridges this gap. This study also enhances the current research in the general field of LOS by utilizing methods that appropriately model the nature of the dependent variable (as demonstrated by Carter and Potts, 2014).

To identify the determinants of health care service utilization, Andersen's (1995) behavioral model or its variant is commonly used throughout the literature. The model categorizes variables into predisposing, enabling and needs-related factors. Predisposing factors include biological factors that may influence the likelihood of an individual's need for health service, the social structure that may influence how an individual can cope with health problems, and health beliefs that may influence an individual's perception of their need for a health service (Andersen, 1995). An individual's preventive health care status can also influence the likelihood of needing further care, including hospitalization. Within this context, preventive care status is a predisposing factor and is also included in the analysis.

Predisposing factors included in this study are demographic characteristics (gender, age, marital status) and socio-structural characteristics such as education level, and family size. Enabling factors are the elements that support access to care. The primary enabling factors used in this study are wealth (based on per capita expenditure and households' assets), travel time to a health care facility, and community characteristics such as availability of resources (resource endowed Southern Belt, the Middle Belt and the resource-deprived Northern Belt) and region of the country (Rural vs Urban).

Needs-related factors include the self-reported perception of the severity of illness. According to the literature, needs are the strongest factors impacting health care service utilization (Andersen, 1995; Boyle et. al, 1996; Dhingra, 2010). Specific diagnoses tend to lead to much higher service utilization. The duration of ill-health, severity of symptoms, psychological distress, and poor physical health and other needs-related factors have been found to lead to higher service utilization. The study relies on the self-reported perception of the severity of illness by including a categorical variable that captures the patient's inability to do vigorous exercise or otherwise.

The next section presents an overview of the methods employed in this study. The section discusses the data and variables used in the study. This is followed by the results section. Section 4 discusses the results and Section 5 concludes the study.

2. Materials and Methods

2.1 Settings

The study setting is Nigeria, where the health care sector is a shared responsibility between the Federal, State, and Local governments. The Federal Government is generally responsible for policy issues. The responsibility for the management of health facilities and programs is shared by the State Ministries of Health, State Hospital Management Boards, and the Local Government

Areas (LGAs). The states operate the secondary health facilities (general hospitals) and in some cases tertiary hospitals, as well as some primary health care facilities. State authorities are also responsible for the training of nurses, midwives, health technicians and the provision of technical assistance to local government health programs and facilities. There are 774 local government units who oversee the operations of primary health care facilities (PHCs) within their respective geographic areas. PHCs provide basic health services, and community hygiene and sanitation. There exists a formal-informal health care system. Formal care refers to services provided by government-owned facilities, private hospitals, and clinics/health centers. Informal care includes self-care, unauthorized religious centers, and other facility/care centers not licensed for the purpose of hospitalization.

2.2 Data

Nigeria is a developing country with high incidence of poverty. With about 60% of the population living in abject poverty, Nigeria is home to the poorest number of people in Africa, despite its rich natural resources. Data from the Nigerian General Household Survey (NGHS) show that the average household spends ₦10,354 a week on food, electricity, meals taken away from home, mobile phone recharge card, education and nonfood expenditure. This translates into \$66.79; using the 2012 exchange rate of \$1 to ₦155.02. The typical household spends ₦2,992 on hospital overnight stay. The NGHS-Panel also reveals that the average household head is 51.43 years with approximately 49.53% and 50.47% of males and females, respectively. About 68.40% of the household members in the sample are not married, and 63.99% have never been married. The average household size in the sample is six, and 73% of the households have members who are 12 years old or younger.

The dataset for this study is from the 2010/2011 and 2012/2013 waves of the panel component of the Nigerian General Household Survey (GHS-Panel). The GHS-Panel is a sub-component of the Nigerian General Household Survey (GHS). The GHS-Panel, which started in 2010, tracks 5,000 households every two years. The GHS-Panel primarily collects additional data on agriculture, other household income, expenditure, and consumption; beyond what the GHS collects. Pooling the two waves of survey yielded 54,936 individuals representing 9,632 households. Using questions related to ill-health and hospital length of stay, the final sample was 1,150.

Length of stay (LOS) here is defined as the self-reported number of nights an individual stayed in a health care facility (whether formal or informal) due to illness. Specifically, the following questions were used to obtain the sample from the two surveys:

During last 12 months, were you admitted to a hospital/health facility?

How many nights did you stay in hospital/health facility?

Other questions used in the study were in relation to households' assets (to determine assets' based wealth), individuals' predisposing characteristics, enabling factors at both the family and community levels, and perceived the severity of illness. All monetary values were converted into 2012 values in order to make the two waves comparable using the consumer price index for 2010 and 2012, respectively.

Next, quantitative variables were converted into ordinal variables. This allowed for a more useful interpretation of the results. For instance, each individual's age was either 1, 2, or 3 if the individual was 0-15years (child), 16-65 years (working age

group) or over 65 years (aged) respectively. Similarly, the time spent in traveling to a health care facility was converted to an ordinal variable: 1, 2, 3 and 4 for travel time of 0-15 minutes, 16-30 minutes and 30-45 minutes and over 45 minutes respectively. Finally, cost per night was calculated as the ratio of total cost to the total number of nights spent in a health care facility. All respondents were grouped under lowest cost, low, and medium costs based on the quintile respondents fall under. The lowest two levels of quintile were put into one category- the low-cost LOS group. Respondents who fell in the highest 2 levels of the quintiles were put together in the high-cost LOS category. The reason for the conversion is to ensure that the results are easily tractable and meaningful for policy reform purposes.

In addition, patients' response to the question "Can you do vigorous activities" was used to measure the severity of ill health. The type of health care facility admitted patients consulted was also included to capture the differences in LOS between the formal and informal caregivers. People consult a variety of professionals in different facilities including hospitals and clinics (formal sector facilities) and informal facilities such as traditional healers, faith-based (religion) facilities, and chemists/patent medicine vendors. Whether a person sought preventive care were also included as variables in the study. One's location can greatly affect health care access and utilization and thus location variables were included.

2.2.1 Socioeconomic Status (SES)

Medical care, in general, can be viewed as any other commodity; individuals in a higher socioeconomic bracket tend to consume more of it. Socioeconomic status (SES) reflects the placement of the individual, family, household, census tract, or some other aggregate with respect to the capacity to create or consume goods and services that are of value in the society. SES can be indicated by educational attainment, occupational standing, social class, income (or poverty), wealth, tangible possessions, houses, cars, boats, or degrees from elite colleges and universities. In ideal settings, SES is reflected by measures of income. Unfortunately, self-reported income data are often inaccurate due to a number of reasons. For instance, income data are missing for a number of individuals in both waves of the GHS-Panel. Some respondents while admitting they received payment for work done, they simply did not state how much they were

paid. A number of respondents also reported receiving in-kind payments while some other households reported that they received no payment (in cash or kind) during last 12 months.

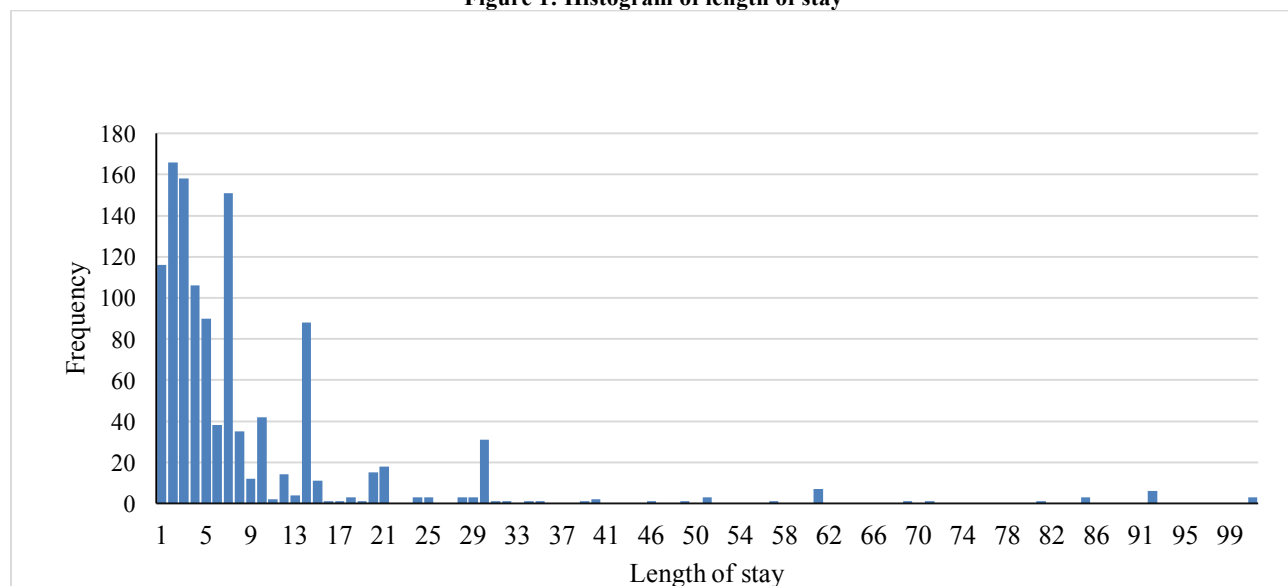
Due to the likely inaccuracy of the income data, I used per capita household expenditure as the measure of socioeconomic status. By way of robust checks, I also constructed a socioeconomic status index based on the assets in the households. To obtain per capita expenditure, households' expenditures were added up across all the different expenditure categories in the survey and divided by the total number of people in the household. The socioeconomic status index was constructed using the principal component analysis command in STATA (version 13). The command generates weights for assets and animal ownership (Gwatkin et al., 2000; Filmer and Pritchett, 2001; McKenzie, 2003) based on their (assets or animals) prevalence; scarce possessions receive a higher weight and common assets receive a lower score. The assets for the construction of the SES index in this paper include ownership of durable household items such as televisions, bicycles, computers, radios, and GSM mobile phones. Ownership of farmland and animal holdings, alongside the type of dwelling, sources of drinking water during dry seasons, sanitation and type of cooking utensils used in the household are also included in the construction of the index (see Appendix A for the full list of components used in the construction of the index). Based on these components, a score is calculated for each household. The household is then categorized into one of the levels of a five-point scale based on its score. The five levels are Poorest, Poor, Medium, Rich and Richest.

3. Results

3.1 Descriptive Analysis

The sample for this study includes 1150 respondents reporting one or more overnight stay in a healthcare facility (LOS) due to ill-health. These patients were admitted into both formal and informal facilities across Nigeria. The number of people reporting LOS was about the same for both waves of the NGHS-Panel. In Figure 1, the maximum LOS reported is 99 nights. The median and mean LOS were 5 and 8 nights respectively. The majority (73%) reported 1-8 nights while 7% spent at least 25 nights (long-term stay). Figure 1 shows the distribution of LOS for all admitted patients.

Figure 1: Histogram of length of stay



In relation to an individual's socioeconomic status, about 32% of all those hospitalized came from poor homes (that is, poorest and poor socioeconomic groups). Based on households' expenditure (assets), 22.59% (25.83%) of the hospitalized were from homes in the richest category. Table 1 shows the distribution

of households' socioeconomic status based on per capita expenditure and assets. The table suggests that the proportion of hospitalized individuals increases with higher socioeconomic classification.

Table 1: Expenditure and Asset Based Socioeconomic Status of inpatients

Wealth quintile	Assets based		Expenditure-based	
		Percent		Percent
Poorest		16.87		14.71
Poor		15.65		18.78
Middle		20.35		22.87
Rich		22.30		21.83
Richest		24.83		22.59
TOTAL		100%		100.00%
N = 1,150				

The length of hospital overnight stay is examined further in Table 2. The distribution of patients who reported at least one night is represented in Table 2 based on different socioeconomic dimensions and demographic characteristics. To keep the analysis tractable, three categories of LOS were created: 1 up to the median number of nights (5 nights); 6 to 24 nights; and over 25 nights to depict long-term stay. Any LOS of 25 or more nights is considered a long-term stay. A number of interesting issues can be observed from Table 2. One observation is that whilst 56% of all those admitted are females, men tend to have a longer LOS.

The table also shows that there exists an urban-rural divide as far as LOS is concerned. About 61% of all those reporting LOS, reside in rural areas. This phenomenon is further supported by the fact that most of the hospitalized came from households in the relatively poorer and rural Northern Belt of the country. This suggests the either absence of formal medical facilities in rural areas hampers healthcare or there is a lack of knowledge on the part of patients or both.

Table 2: Characteristics of patients and number of nights spent in a health facility

	Number (N = 1150)	Percent	Nights, %		
			1 – 5 nights (up to median)	6 – 25 nights	Long-term stay (>25)
Sex					
Female	639	55.57	58.53	36.93	4.54
Male	511	44.43	51.27	40.31	8.41
Age					
≤ 14	321	27.91	63.55	34.89	1.56
15-64	665	57.83	55.49	36.84	7.67
65+	164	14.26	38.41	51.83	9.76
Education					
None	498	43.30	55.02	40.36	4.62
Some	652	57.70	55.52	36.96	7.52
Marital status					
Never Married	454	39.48	62.78	34.36	2.86
Married	572	49.73	51.75	39.34	8.92
Separated/Divorced	18	1.57	50.00	50.00	0
Widowed	106	9.22	43.40	49.06	7.55
Location Type (1)					
Rural	836	72.70	53.11	40.91	5.98
Urban	314	27.30	61.15	31.85	7.01
Location Type (2)					
Southern Belt	238	20.70	51.94	41.17	6.89
Middle Belt	346	30.09	65.13	31.09	3.78
Northern Belt	566	49.21	54.05	39.02	6.94
Household Size					
1-5	400	34.79	52.50	41.00	6.50
6-10	555	48.26	55.14	38.56	6.31
11-15	182	15.84	64.16	31.21	4.62
16+	13	1.11	40.91	45.45	13.64
Wealth quintile (Expenditure)					
Poorest	161	14.00	52.80	40.99	6.21
Poor	216	18.78	56.48	35.65	7.87
Middle	263	22.87	60.84	34.60	4.56
Rich	251	21.83	49.00	43.43	7.57
Richest	259	22.59	56.37	38.22	5.41

Facility type					
Formal	814	70.78	58.72	35.63	5.65
Informal	336	29.22	47.02	45.24	7.74
Travel time					
0 - 15 minutes	363	31.57	55.65	37.47	6.89
16 - 30	655	56.96	55.88	38.02	6.11
31 - 45	125	10.87	51.20	44.00	4.80
46 - 60	7	0.61	57.14	28.57	14.29
Preventive Care					
Yes	108	9.39	54.70	40.84	4.46
No	1,042	90.61	55.30	38.43	6.27

Table 2 also suggests travel time to a health facility positively affects LOS; those living close by are less likely to be hospitalized than those further away. Those further away tend to have a longer LOS. For instance, while about 19% of the 12% of patients who live at least 30 minutes away from a health care facility reportedly stayed more than 25 nights in a health care facility compared, only 12% of the remaining 88.5% who stay less than 30 minutes away from the facility reported long-term stay. Lastly, of the 1150 individuals who were admitted, 9.4% of them utilized preventive care. These preventive care seekers reported shorter LOS on average; they were less likely to report long-term LOS (more than 25 nights).

One of the main concerns of any patient is the cost of admission, especially in a country where insurance is absent when it comes to health care. An examination of the data reveals that patients respond to changes in price when it comes to LOS. For instance, among patients reporting short-term LOS (1-5 nights), 42% reported nightly cost in the low-cost category, 48% in the medium-cost category and 10% in the high-cost category. The percentage of patients reporting medium-term LOS reported nightly cost as follows: 60% in the low-cost category, 35% in the medium-cost category and 5% in the high-cost category. Similarly, for patients in long-term care (more than 25 nights), the following distribution was reported: 65%, 32% and 3% for low-cost, medium-cost and high-cost category respectively.

3.2 Estimation results

This section presents the results of the estimates of the

determinants of LOS in Nigeria. Hospital overnight stay is a count variable which takes discrete, positive values and is not normally distributed (as shown in Figure 1). Straightforward linear models assume constant variance and normal errors. However, with positively skewed LOS here, a linear model might lead to the prediction of negative counts, the variance of the response variable is also likely to increase with the mean, and the errors are unlikely to be normally distributed. Thus, ordinary least squares regression is inappropriate in this situation, and an alternative model that accommodates the properties of this type of data is required.

The Poisson regression model, which is commonly used to model count data, requires that the conditional mean of LOS be approximately equal to its variance. This equidispersion assumption fails to hold in this application since the mean LOS is 8 with variance equal to 150. The overdispersion (variance exceeds the mean) means the usual Poisson model may not be appropriate. An appropriate test for the presence of overdispersion is in order. The likelihood ratio (LR) test compares the validity of the Poisson specification against a Negative Binomial Regression Model. Also, since the data for the study is truncated at 0, I use the Zero-Truncated Negative Binomial (ZTNBin) Regression Model to appropriately account for this constraint.

Table 3 presents results from the ZTNBin regression using STATA 13. The socioeconomic status (SES) measure here is total household expenditure per capita. The results, where the SES measure is based on households' assets are not reported here since they were very similar to the SES based on per capita expenditure.

Table 3: Results from the ZTNBin Regression

Variable	Coefficient	Std. Error	IRR
< 15 years	-0.6254***	0.1099	0.53
> 65 years	0.1018	0.1058	1.11
Female	-0.3222***	0.0707	0.72
Education	0.0944	0.0761	1.10
Married	0.03694	0.0876	1.04
Household: 1-5	-0.7199***	0.2591	0.49
Household: 6-10	-0.7116***	0.2572	0.49
Household: 11-15	-0.8711***	0.2678	0.41
Poor SES	0.2959 ***	0.0962	1.34
Rich SES	0.2493***	0.0898	1.28
Low Cost LOS	0.4108***	0.0944	1.51
High Cost LOS	-0.4450***	0.0957	0.64
Time to facility:	-0.1951	0.4639	0.82
<15 min			
Time to facility:	-0.1132	0.4616	0.89
16-30min			
Time to facility:	-0.20	0.4730	0.81
31-45min			
Rural	0.0030	0.0874	1.00
Southern Belt	0.3343***	0.0976	1.40
Northern Belt	0.3018***	0.1084	1.35
Formal Facility	0.3599***	0.0784	1.43

Can't do vigorous exercise	0.2336***	0.0865	1.26
Preventive care user (Intercept)	-0.2234*	0.1233	0.80
	2.5671***	0.5358	13.02

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Column 1 and Column 3 show the coefficients and the incidence rate ratios (IRRs) respectively. The IRRs are obtained through exponentiation of the coefficients of the independent variables from the ZTNBin regression. The IRR gives the percentage change in LOS given a unit change in the respective independent variable(s). The test for over-dispersion is indicated by the value of α from the ZTNBin regression output in STATA 13. An α greater than zero means that there is a real dispersion in the data. The value of α from the regression is 1.39. This means the estimated based on ZTNBin regression are the preferred results.

Predisposing factors that are statistically significant determinants of LOS are age, gender, household size and preventive care. A child (0-14 years) will stay 53% the time of an individual in the working-age group (15-64 years). Old people (65+ years) on the other hand spend 11% more nights, compared to those in the working-age group. A female only stays 72% the LOS of a male. Meanwhile, patients from households with 16 or more members have longer stays than any household size category. Patients predisposed to preventive have shorter stays than those who have not. An individual predisposed to preventive care records 79% of the LOS of a person who does not utilize such care.

Enabling factors, as mentioned earlier, are those forces that promote or reduce the individual's utilization of care based on their (enabling factors) level of availability. Both the poor and rich have higher LOS than the middle class. Specifically, an individual in the poor category (poorest and poor socioeconomic classes) will stay 34% of the time of the middle class. Those in the upper socioeconomic group (rich and riches groups) also stay 28% longer than patients in the middle SES.

The cost of care to the patient also enables patients' utilization of care. In this study, the price of care is inversely related to the length of stay (LOS). For instance, with low priced nights, patients stay 54% more nights than when prices are in the medium range. Moving from medium priced nights to high priced nights result in 36% fall in LOS.

Other important enabling factors are the location of households and the type of medical facility the individual consults. Individuals from households in the well-to-do Southern Belt, stay 40% more nights than individuals located in the Middle Belt. Those in resource-deprived Northern Belt also spend more nights in the hospital than patients in the Middle Belt; about 35% more. People consulting formal health care facilities stay 43% longer than those consulting providers in the informal sector.

Needs-related factors have been established as important determinants of health care utilization in the literature (Andersen, 1995; Boyle et. al., 1996; Dhingra, 2010). The needs related factor explored in this study is a patient's inability to do vigorous exercise. The regression results in Table 3 include a variable that measures the severity of ill-health. The survey asked respondents who reported to have been hospitalized during the year if they could do vigorous exercise. The response to this question was used as a proxy to measure the severity of ill-health. Patients who cannot do vigorous exercise have 26% more LOS than those who can still do vigorous exercise while ill.

4. Discussion

The study employed a zero-truncated negative binomial model (ZTNBin). Variable selection was mostly based on existing empirical literature on health care utilization in African countries. For ease of interpretation, I converted continuous variables such as age, travel time, the nightly cost of care, and per capita expenditure into relevant and meaningful categories.

Factors which tend to increase LOS were age, the cost of care, resource endowment level of the area, formal medical facilities and the severity of illness. Females, household size, preventive care utilization tend to reduce LOS. The level of wealth is significant but not in a linear form, as one may expect.

Not surprisingly, in the absence of insurance, the enabling factors such as wealth and cost of care are strong determinants of length of stay. The role of insurance in health care utilization cannot be overemphasized. Its enabling role has been established in study after study. The existence of a functional health insurance system is, unfortunately, absent in many African countries and thus the relevance of this study. This study hopes to start bridging this gap. In the absence of insurance, one would naturally expect people in higher socioeconomic groups would use more health care services than those in the lower socioeconomic groups. In this study, this was not the case. After controlling for several variables in the regression, the study found that people in low-income groups spend more nights than the middle- class. Does this mean LOS is an inferior product or certain kinds of diseases requiring lengthy hospitalization only affect the poor? The actual disease type for which a patient was admitted can help shed light on this issue. The expected positive relationship between LOS and socioeconomic status is demonstrated when moving from the middle class to the rich category (high income).

The fact that the utilization of service for which there is no insurance coverage is greater among the poor than the middle class is an interesting result, but it is not surprising. The existence of user fees during hospitalization means that poor individuals are unlikely to seek medical attention if they do not consider their case severe. This behavior is similar to results from the RAND Experiment which showed that people delay or forego health care when payments are required at the point of service (Newhouse and RAND Corporation, 1993). It is also plausible that the poor end up seeking medical help from cheaper alternatives such as traditional healers and other informal sources. Such was the behavior of many Ghanaians during the 1990s when user fees were still in place. Asenso-Okyere et al. (1998) observe that Ghanaians in the 1990s indulged in self-medication and other behaviors aimed at reducing the cost of care. Whatever the reason, such cost-saving measures undertaken by the poor likely lead to the development of comorbidities, which require more nights in a hospital; as a consequence, the seeming initial inverse relationship between LOS and socioeconomic status.

A related enabling factor found in this study was the cost of care. As expected, the higher the cost per night the shorter the LOS. There has not been a consensus in the role price plays in health care utilization. The result here, however, support findings from Uganda (Sarah et al., 2006), Kenya (Mwabu et al., 1993), Egypt (Ellis et al, 1994) and Tanzania (Sahn et al., 2003).

The level of resource in a given area has been found to significantly affect LOS (Carter and Potts, 2014); people in

deprived areas tend to have higher LOS. This is the case in this study but only between the medium-resourced Middle Belt and resource-poor Northern Belt. People in resource-poor Northern Belt have higher LOS than the medium-resourced Middle Belt. However, moving from the medium-resourced Middle Belt to the rich Southern Belt results in an increase in LOS. This phenomenon is similar to the observed nonlinear effect of an individual's socioeconomic status on LOS; both poor and rich SES categories have higher LOS than the middle class.

Many predisposing characteristics were found to be significant determinants of LOS. For instance, gender disparity in LOS was apparent in this study. This result confirms results from past research on health care services utilization in general. This result supports similar findings from Kenya (Mwabu et al., 1993), Uganda (Hutchison, 1999), and Tanzania (Sahn and Tifel, 2003). In the case of Nigeria, the gender difference may be due to the fact that some 23.2% of women relied on their husbands for the payment of hospital bills. Individuals from large households with 16 members or more were also found to have longer LOS. This result is in line with studies on health care service utilization in general. According to (Cisse 2011) for instance, an increase in household size leads to a reduction in the probability of seeking modern medical care. The result suggests households adopt cost-saving tactics as wealth per capita decreases. Since larger households are more likely to be poor, this result again suggests resource-poor individuals have longer LOS than better-resourced individuals; which appears to be the general theme thus far.

On facility type, the study finds that individuals who sought treatment from a formal health facility, spend more nights in such facilities than those who used the informal sector. There is the need for more research to ascertain the reasons for this. What kind of diseases do people take to facilities in the informal sector? What is the difference in the treatment regimes between the two?

Any measure that can increase one's stock of health also reduces LOS. The use of preventive care helps maintain or increase one's stock of health. Thus, individuals predisposed to such care saw a shorter LOS than those who did use preventive services. This is an important revelation as policymakers seek strategies for improving health outcomes in Nigeria. The GHS-Panel survey did not ask respondents about the kind of preventive services they utilized. Such information would have greatly enhanced the analysis here. Nonetheless, the relevance of preventive care in the reduction of LOS should serve as the impetus towards an expansion in primary health care. Such an expansion should focus on identifying and adopting different preventive measures in different localities; a one size won't fit all.

Hospital length of stay does not only signal the seriousness of illness, it can also lead to catastrophic cost for patients and households alike. An understanding of the determinants of LOS in the absence of insurance can help better inform policymakers in Nigeria regarding health care reforms as well as in countries where health insurance is limited. Patients with this knowledge can also make necessary plans regarding the period of hospitalization. Health care administrators can also use the results here as input in planning and as a decision support tool for predicting an individual patient's LOS.

5. Conclusion

The main objective of this paper was to examine the determinants of hospital overnight stay in Nigeria. This is particularly important since those reporting LOS in the panel component of the Nigerian Household Survey had to pay their hospital bills out of pocket or rely on family and friends. The

regression results reveal that overnight hospital stays initially increases in socio-economic status, decreases before increasing again. Compared to the middle class in society, the results show that the poor ends up spending more nights during hospitalization. All other results relating to deprivation either at the individual, household or community level points to a positive relationship between longer LOS and poverty. Thus LOS potentially increases the risks of deepening poverty among the already poor since hospitalization also means absence from work and therefore, loss of income.

Ongoing health care reforms need to address the potential vulnerabilities the poor are exposed to as a result of hospitalization. Fortunately, preventive care and an affordable health insurance program can help ameliorate these vulnerabilities. As discussed earlier, preventive care can reduce LOS by about 20%. This result should provide the basis for the expansion of primary health care programs in Nigeria. Improving the quality of staff in existing primary health centers will be a good start. As emphasized by the World Health Organization, primary care, among other things, ensures that care is continuous and comprehensive and provides the best possible health services in the light of economic considerations. An affordable health insurance program will also increase medical service utilization in general.

References

- Andersen RM. (1995). Revisiting the behavioral model and access to medical care: does it matter? *Journal of Health and Social Behavior*, 1-10.
- Andersen R, Newman JF. (2005). Societal and individual determinants of medical care utilization in the United States. *Milbank Quarterly*, 83(4).
- Asenso-Okyere WK, Anum A, Osei-Akoto I, Adukonu A. (1998). Cost recovery in Ghana: are there any changes in health care seeking behaviour? *Health Policy and Planning*, 13(2), 181-188.
- Bolduc D, Lacroix G, Muller C. (1996). The Choice of medical providers in rural Benin: a comparison of discrete choice models. *Journal of Health Economics*, 15(4), 477-498.
- Boyle MH, Offord DR, Campbell D, Catlin G, Goering P, Lin E, Racine YA. (1996). Mental health supplement to the Ontario Health Survey: Methodology. *Mental Health*, 41(9), 549-58.
- Carter EM, Potts HW. (2014). Predicting length of stay from an electronic patient record system: a primary total knee replacement example. *BMC medical informatics and decision making*, 14(1), 1.
- Cisse, A. (2011). Analysis of health care utilization in Cote d'Ivoire. *Nairobi, Kenya: The African Economic Research Consortium*.
- Cooper R A, Cooper MA, McGinley EL, Fan X, Rosenthal J. T. (2012). Poverty, Wealth, and Health Care Utilization: A Geographic Assessment. *Journal of Urban Health*, 89(5), 828-847.
- Crooks RC, Sverrisson AS. (2001). Decentralization and poverty alleviation in developing countries: a comparative analysis or is West Bengal unique? *IDS Working Paper 130*, Brighton: Institute of Development Studies.
- Dhingra SS, Zack M, Strine T, Pearson WS, Balluz L. (2010). Determining prevalence and correlates of psychiatric treatment with Andersen's behavioral model of health services use. *Psychiatric Services*, 61(5), 524-528.
- Ellis RP, McInnes DK, Stephenson EH. (1994). Inpatient and outpatient health care demand in Cairo, Egypt. *Health Economics*, 3(3), 183-200.

- Feikin, DR, Nguyen LM, Adazu K, Ombok M, Audi A, Slutsker L, Lindblade K.A. (2009). The impact of distance of residence from a peripheral health facility on pediatric health utilisation in rural western Kenya. *Tropical Medicine & International Health*, 14(1), 54-61
- Filmer D, Pritchett LH. (2001). Estimating wealth effect without expenditure data- or tears: an application to educational enrolments in states of India. *Demography*: 38: 115-32
- Hutchinson P. (1999). Health care in Uganda: *Selected Issues* (Vol. 404). World Bank Publications.
- McKenzie DJ. (2005). Measuring inequality with asset indicators. *Journal of Population Economics*, 18(2), 229-260.
- Moisi JC, Nokes DJ, Gatakaa H, Williams TN, Bauni E, Levine OS, Scott JAG. (2011). Sensitivity of hospital-based surveillance for severe disease: a geographic information system analysis of access to care in Kilifi District, Kenya. *Bulletin of the World Health Organization*, 89(2), 102-111.
- Mwabu GM. (1986). Health Care Decisions at the Household Level: Results of a Rural Health Survey in Kenya. *Social Science & Medicine*, 22(3), 315-319.
- Mwabu G, Ainsworth M, Nyamete A. (1993). Quality of medical care and choice of medical treatment in Kenya: An Empirical Analysis. *Journal of Human Resources*, 838-862.
- National Bureau of Statistics Nigeria. (2010). National Manpower Stock and Employment Generation Survey: Household and Micro Enterprise (Informal Sector). *National Bureau of Statistics*
- National Bureau of Statistics Nigeria. (2014). LSMS-Integrated Surveys on Agriculture. General Household Survey Panel Report. *National Bureau of Statistics, Federal Ministry of Agriculture and Rural Development and the World Bank*
- Newhouse JP, Rand Corporation Insurance Experiment Group. (1993). *Free for all?: lessons from the RAND health insurance experiment*. Harvard University Press.
- Oladipo, JA. (2014). Utilization of health care services in rural and urban areas: a determinant factor in planning and managing health care delivery systems. *African Health Sciences*, 14(2), 322-333.
- Sahn DE, Stifel DC. (2003). Urban-rural inequality in living standards in Africa. *Journal of African Economies*, 12(4), 564-597.
- Sarah S, Juliet NO, Ibrahim K. (2004). Demand for health care services in Uganda implications for poverty reduction. *Economic Policy Research Centre*.
- Vyas S, Kumaranayake L. (2006). Constructing socio-economic status indices: how to use principal components analysis. *Health policy and planning*, 21(6), 459-468.

Appendixes

Appendix A: Principal Component Analysis (using STATA 13)

Variable Description	Urban			Rural		
	Mean	Std. dev.	Factor Score	Mean	Std. dev.	Factor Score
Computer	0.088	0.283	0.298	0.188	0.001	0.015
Television Set	0.645	0.478	-0.318	0.255	0.436	0.376
Bicycle	0.097	0.296	0.047	0.262	0.440	0.031
Radio	0.580	0.494	0.078	0.568	0.495	0.120
Refrigerator	0.289	0.454	0.298	0.084	0.278	0.306
Generator	0.329	0.470	-0.338	0.164	0.370	0.317
GSM Phone	0.884	0.320	0.183	0.631	0.483	0.240
Satellite Dish	0.096	0.295	0.310	0.030	0.169	0.228
Vehicle	0.133	0.339	0.339	0.043	0.203	0.217
House- Owned	0.478	0.500	0.046	0.822	0.383	-0.088
House -Rent	0.316	0.465	-0.010	0.043	0.204	0.089
<u>Type of Floor</u>						
Sand	0.024	0.153	-0.114	0.127	0.333	-0.132
Concrete	0.862	0.345	0.070	0.565	0.496	0.330
Wooden	0.010	0.099	0.007	0.010	0.102	-0.015
Tile	0.041	0.197	0.251	0.009	0.095	0.107
Mud	0.061	0.239	-0.145	0.286	0.452	-0.274
<u>Source of Cooking</u>						
wood	0.208	0.406	-0.090	0.704	0.456	-0.192
Coal	0.024	0.152	0.007	0.006	0.078	0.064
Electric cooker	0.007	0.083	-0.001	0.003	0.052	0.034
Gas Cooker	0.030	0.171	0.217	0.006	0.078	0.057
<u>Animal Ownership</u>						
goat	0.582	0.493	-0.049	0.702	0.458	0.095
chick	0.581	0.494	-0.049	0.702	0.457	0.095
sheep	0.500	0.500	-0.049	0.579	0.494	0.095
<u>Source of Water- Dry Season</u>						
Pipe borne	0.166	0.372	-0.031	0.039	0.194	0.024
Borehole	0.415	0.493	0.086	0.340	0.474	0.205
River	0.025	0.155	-0.021	0.200	0.400	-0.148
Drainage	0.011	0.102	-0.044	0.010	0.098	0.016
Sachet Water	0.076	0.264	0.096	0.013	0.115	0.075
<u>Sanitation Facility</u>						
None	0.147	0.354	-0.042	0.282	0.450	-0.144
On Water	0.035	0.184	0.068	0.021	0.144	-0.005
Flush to Sewage	0.101	0.301	0.155	0.021	0.143	0.129
Flush to Septic Tank	0.248	0.432	0.245	0.050	0.218	0.200
Bucket/Pail	0.003	0.051	-0.012	0.008	0.088	-0.017
Uncovered Latrine	0.336	0.472	-0.095	0.341	0.474	0.134