

Employment status, medical support and Income as significant factors in Access to Essential Medicines

Chinwe Christopher Obuaku-Igwe:

Research in Anthropology and Sociology of Health-RASH

Department of Anthropology and Sociology, University of the Western Cape- South Africa

Email: obuaku@gmail.com

Abstract

Poor affordability (as a constraint to access to essential medicine) or lack of capacity to pay for essential medicines has been associated more often with unemployed persons or low-income earners. Even though there is a growing body of work on access to essential medicines in Nigeria, no study has been conducted to determine the extent to which affordability varies across and within social groups. Using six variables, this paper examines factors that have an impact on essential medicine in Nassarawa state, Nigeria. It asks the question: in what ways does the ability to purchase medicines depend on income, perceived unreasonable burden, age, gender, medical aid and employment status? 1000 subjects who utilized primary healthcare facility were randomly selected for the study. A standardized questionnaire was used to determine how the burden of purchasing essential medicines varied across employment and income groups. Out of the 1000 subjects, 640 were females; 360 males with a mean age of 37.4 and a response rate of 90%.

Results: *Two factors: 'employment status and perceived unreasonable burden' were significant predictors of affordability ($F(6,993) = 260.052092$, $P = .05$, $R^2 = .611$, $\text{employment status} = P < 0.03$ and $\text{burden} = P < 0.03$). There was evidence to support that an individual's employment status has an effect on their ability to pay for essential medicine or treatment. There were significant differences in affordability between individuals who had full time paid employment and those who were either self-employed or without a fulltime paid employment, if all factors are constant. Affordability coefficient increased by .35 for each income unit. In addition, there were significant differences that bothered on the type of employment (paid employment vs self-employed, part time vs fulltime), membership of a medical aid and the number of people in the household (Cohen's $d = (333.3 - 660) / 350.4283 = 0.932288$.)*

Conclusion: *"Affordability" or the ability to pay for treatment, varied across and within employment groups (status), an indication that greater access to essential medicine was found to be correlated with fulltime paid employment and medical aid.*

Keywords: *malaria medicine, affordability, income differentials, access, essential medicines, employment status and Nassarawa state*

Résumé

La mauvaise accessibilité financière (comme contrainte d'accès à la médecine essentielle) ou le manque de capacité de payer les médicaments essentiels a été associé plus souvent aux chômeurs ou aux personnes à faible revenu. Bien qu'il existe un nombre croissant de travail sur l'accès aux médicaments essentiels au Nigéria, aucune étude n'a été menée pour déterminer dans quelle mesure l'abordabilité varie d'un groupe à l'autre et au sein des groupes sociaux. En utilisant six variables, cet article examine les facteurs qui ont un impact sur la médecine essentielle dans l'État de Nassarawa, au Nigéria. Il pose la question: de quelle manière la capacité d'acheter des médicaments dépend-elle du revenu, du fardeau déraisonnable perçu, de l'âge, du sexe, de l'aide médicale et de l'emploi? 1000 sujets qui ont utilisé l'établissement de soins de santé primaires ont été sélectionnés au hasard pour l'étude. Un questionnaire standardisé a été utilisé pour déterminer comment le fardeau de l'achat de médicaments essentiels variait selon les groupes d'emploi et de revenu. Sur 1000 sujets, 640 étaient des femmes; 360 hommes avec un âge moyen de 37,4 et un taux de réponse de 90%.

Résultats: Deux facteurs: «état de l'emploi et fardeau déraisonnable perçu» étaient des prédicteurs significatifs de l'abordabilité ($F(6,993) = 260,052092$, $P = 0,05$, $R^2 = 0,611$, statut de l'emploi = $P < 0,03$ et charge = $P < 0,03$). Il y avait des preuves à l'appui que le statut d'un individu a un effet sur sa capacité à payer des médicaments essentiels ou un traitement. Il y avait des différences significatives dans l'abordabilité entre les personnes ayant un emploi à plein temps et celles qui travaillaient à leur compte ou n'avaient pas d'emploi rémunéré à plein temps, si tous les facteurs étaient constants. Le coefficient d'abordabilité a augmenté de 0,35 pour chaque unité de revenu. En outre, il y avait des différences importantes qui gênaient le type d'emploi (emploi rémunéré contre travailleur autonome, temps partiel et temps plein), adhésion à une aide médicale et le nombre de personnes dans le ménage (Cohen's $d = (333,3 - 660) / 350.4283 = 0.932288$.)

Conclusion: «L'abordabilité» ou la capacité de payer pour le traitement, ont varié d'un groupe à l'autre et au sein des groupes d'emploi (statut), ce qui indique qu'un meilleur accès à la médecine essentielle était corrélée avec l'emploi rémunéré à plein temps et l'aide médicale.

Mots-clés: médicaments contre le paludisme, abordabilité, écarts de revenus, accès, médicaments essentiels, statut de l'emploi et état de Nassarawa

Introduction

The price people pay for essential medicines in Nigeria and their economic capacity/ability to mobilize financial resources to settle health related expenses has not been clearly understood. This is partly because, as an emerging economy, Nigeria currently has an unemployment rate of 13.9%¹ coupled with corruption in the public sector, gross mismanagement of public funds, dependence on petroleum exports as well as other governance and leadership related

1 Ojedokun, O. E., & Elugoke, N. O. (2016). Assessment of Human Development Status and Personal Ecological Footprints of Residents of Ile-Ife, Nigeria. *European Journal of Sustainable Development*, 5(3), 513-526.

challenges that may have contributed to a high inflation rate that has resulted in a widening income disparity among its growing population.

Studies have shown that the direct costs of healthcare services², travel time, patients' income, and opportunity costs related to loss of income influence healthcare services utilization pattern and contribute to poor health outcomes³ as well as growing poverty in LMICs⁴. (In addition, the ability to mobilize financial resources, the mode of payment and the type of services available and constrains access.)

However, up till now, only few literatures have examined affordability accessibility of essential medicines in Nigeria and its variation across and within social groups. A 2002 baseline assessment of the pharmaceutical sector by the World Health Organization in collaboration with the federal ministry of health in Nigeria⁵ examined the prices people pay for essential medicines in Nigeria. The study revealed that only 46% of the basic medicines were available in public health facilities in a situation where 23% of the average weekly expenditure of Nigerians went into the treatment of an illness.

Cameron et al (2009) revealed that beyond unavailability of essential medicines, affordability accessibility was a challenge. Results of their secondary analysis indicated that out of pocket payments for medicine was high in Nigeria and patients paid much more than international reference prices for medicines in various facilities in the public and private sectors of the country⁶.

Other studies have suggested that medicines are the largest component of private health expenditure in low and middle income countries⁷ and are unaffordable to 90.2% of Nigerians who live below the income level of US\$ 2 a day as well as the government worker that earns a minimum wage of US\$1.4 per day⁸ (at the time of the study and subject to inflation rate). This study examines differentials in affordability accessibility of essential medicines across and within social groups in Nassarawa state, Nigeria.

- 2 Onwujekwe, O. E., Uzochukwu, B. S., Obikeze, E. N., Okoronkwo, I., Ochonma, O. G., Onoka, C. A., ... & Okoli, C. (2010). Investigating determinants of out-of-pocket spending and strategies for coping with payments for healthcare in southeast Nigeria. *BMC health services research*, 10(1), 67.
- 3 Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2012). Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. *PLoS One*, 7(7), e40811.
- 4 Niëns, L. M., Cameron, A., Van de Poel, E., Ewen, M., Brouwer, W. B., & Laing, R. (2010). Quantifying the impoverishing effects of purchasing medicines: a cross-country comparison of the affordability of medicines in the developing world. *PLoS medicine*, 7(8), 1056
- 5 The Federal Ministry of Health & World Health Organization (2002) Baseline Assessment of the Pharmaceutical Sector. Federal Ministry of Health in collaboration with the World Health Organization
- 6 Cameron, A., Ewen, M., Ross-Degnan, D., Ball, D., & Laing, R. (2009). Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. *The lancet*, 373(9659), 240-249.
- 7 McIntyre, D., Thiede, M., Dahlgren, G., & Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low-and middle-income country contexts?. *Social science & medicine*, 62(4), 858-865.
- 8 Wambebe, C., & Ocheke, N. (2011). *Pharmaceutical sector profile: Nigeria*. Vienna: United Nations Industrial Development Organization

Method:

1000 subjects and mostly out-patients that lived within (5km) walking distance of 250 sampled public primary healthcare facilities were randomly selected for the study. The sampling frame was drawn from a list of 620 public and 150 private primary healthcare facilities, which was obtained from the ministry of health. Most primary healthcare facilities were excluded from the study due to inactivity and poor utilization pattern which was evident from clinical records and mapping.

Recruiting subjects for empirical study in Northern Nigeria has been known to be quite challenging. But that, is to extent that the investigator is not willing to embed themselves in the context of the population they are understudying. This study was conducted over a period of nine months with the support of research assistants and translators who were recruited and sourced locally from Nassarawa state university and the local governments where the survey and interviews was conducted. In addition to the research assistants and translators, the research team solicited the support of traditional rulers, family heads, chiefs, women and religious leaders for ease of access to the population where the sample was drawn from. Furthermore, utilizing religious and group leaders as interpreters in core Muslim and Christian domains helped in gaining the confidence of the population and ultimately, eased the suspicion which built trust and sped up the data collection process. As a Christian female collecting data in Northern Nigeria, the lead investigator ceded the right to speak to male research assistants who oftentimes, were familiar with members of the communities where data was being collected per time, and, depending on the context, were either Muslim or Christians.

A questionnaire was utilized in investigating subjects' economic capacity, income, cost of healthcare, quality of care, time to appropriate healthcare services, type of available services and healthcare service provider behavior. Generally, the focus was on their interaction with care providers and economic capacity which reflected on access to essential medicines in the study location.

The questionnaire was designed in an open-ended and closed ended format and contained three sections with 20 questions which were filled out by the respondents with adequate assistance, since Nassarawa has a largely rural population and only 68% of the respondents had some form of formal education.

The study commenced after due protocol regarding permission from healthcare facility managers and informed consent of participants was obtained. There was heavy reliance on translators/research assistants which resulted in on-site analysis of data. Due to the insurgency in Northern Nigeria and safety/security concerns at the time of the study, data collection was slow, lasted over 9 months and was reduced to 5 local government areas with tangible security measures.

The response rate was 90% (120 out of the 1200 subjects withdrew from the study when they sought incentives but got nothing. By the same token, 80 subjects did not return the questionnaires, bringing the total number to 1000). The population size (n) = 1000, R (squared) = 0.06 with an overall mean of 660, 640 females; 360 males with a mean age of 37.4. In addition, out of 1000, 69.1% had an annual income of ₦600,000 and below while 2% did not know their annual income.

The questionnaire had three sections with 20 questions. The first section provided demographic data of the population such as age, gender, ethnicity, employment, marital and educational status. The second section focused on the economic capacity of subjects: how much they pay for malaria and typhoid treatment, are they able to generate funds without borrowing or selling an asset, their monthly income, how much of their resources are spent in the process of obtaining treatment/medicines. The third section asked questions that bothered on the kind of services and their ability to pay for it, membership of a medical aid, the number of people in their household, the method of payment, perception of healthcare providers' behavior, the quality of care and time to appropriate healthcare service provider. Subjects were asked to tick the answer that corresponded with their perception and understanding of the question.

Using the WHO standard affordability measurement framework, affordability was operationalized as; information on household incomes; (ii) knowledge of the price of the commodity in question, and (iii) a definition of "unreasonable burden"⁹. For this study, 'the price of the commodity in question' was operationalized as the price households pay to purchase essential medicine for the most prevalent health condition among the population- malaria/typhoid.

To determine how the ability to procure essential medicine varied by each demographic group, several questions were asked and clustered under three variables related to affordability: "Annual household income" "unreasonable burden" and "price they pay for medicine". Data was recorded in a multi column excel sheet with short labels for each category and analyzed. Each subjects response was averaged, converted to a score of 1-2 or a weight of 3- 6.

All variables were codified and assigned the following weighting; Annual household income above ₦600,000 was assigned a weighting of 1; annual household income below ₦600,000 was assigned 2. If subjects paid below ₦2000 for malaria/typhoid medicine or treatment, they were assigned a score of '3'; if subjects paid above ₦2000 they were assigned '4'. Males were assigned '1' and females '2'. Subjects with fulltime employment were assigned 5 while those who were self-employed were allotted '6'. Those with medical aid were assigned '1' and those without were assigned '2'. Those who experienced unreasonable burden after purchasing essential medicine or treatment were assigned 2 and those without were assigned '3'. Overall, the social demography of the sample was narrowed down to include the following;

9 Hancock K. E. "Can pay? Won't pay?" or economic principles of affordability. *Urban Studies* 1993; 30: 127-45.

Where do you go for treatment when you are ill? (Subjects were asked to tick one out of four options- Clinics, Chemist, Pharmacy or home remedy. Furthermore, subjects were asked why they preferred or chose a particular service provider (responses ranged from Proximity to residence, to quality of services, and ability to pay without incurring debt. Additionally, subjects were asked how often they used their preferred health services provider, whether they were able to pay for medicines whenever they took ill, If finances were not a problem, would they continue using their present service provider?

Whether they had medical aid coverage and as a follow up, were asked to indicate the commonest health condition they had suffered in the last 6 months, how much they paid to procure medicines or treatment for it and how do they pay for treatments/medicine (How do they mobilize financial resources to pay for healthcare services- here, they were given the options of ticking -Income/saving and borrowing/loans/ Sale of assets.

At a significance level of 0.05, a correlation analysis was conducted between all variables to determine the level of association between dependent and independent and among independent variables. Afterwards, a t-test was used to determine the level of linearity and significance, where two independent variables were found to be positively associated. Questions that had multiple response levels were converted to binomial values and the p values and t-statistic were reported for all variables.

After the test of significance, a multivariate regression statistical analysis was used to determine whether two income groups differed significantly on their ability to purchase essential medicines and whether it placed any burden on them at 95% CI of difference. Using the Z score statistical test, the study tried to determine whether there were variations in affordability cross and within two income groups, to what extent and why? Overall, the statistical tests were utilized to identify and explain variables that were associated with the variations in affordability by income groups.

Results:

Table 1: Essential medicine affordability survey statistics:

Variables indicating survey participants responses	N = 1000 * for all variables	Mean	SD
Medicine price	1000	3.328	0.469719742651547
Annual household income	1000	1.288	0.497295991642104
Age	1000	37.479	10.3980612942355
Gender	1000	3.322	0.467476774326314
Medical aid membership	1000	1.386	0.487074164005073
Employment status	1000	5.763	0.448365957708696
Unreasonable burden of medicine procurement on household	1000	2.616	0.486601254397048

Response scale: responses were codified and assigned weighting between 1- 6 for analysis.

The World Health Organizations' catastrophic approach was adopted and utilized in calculating the variation of affordability of essential medicine across each group. The study utilized a threshold of over 5% total household spending on essential medicines as a measure of catastrophic effects of medicines payment. Then, malaria medicine/treatment cost of ₦2000 or below was used as a benchmark for medicines affordability. Using a 5% affordability threshold, medicines/treatments above ₦2000 was considered unaffordable to subjects whose incomes were below ₦600,000.

R square was examined; however, an adjusted R square was utilized to compare data sets with varied numbers (1, 2, 3, 4, 5 and 6 of predictor variables). The explanatory impact effect of each new variable was further analyzed using Pearson correlation and scatter plot. Each variable was added or excluded based on its perceived ability to significantly explain why variations in affordability exist among and between income groups.

In order to avoid over fitting and multi-collinearity during regression analysis, as well as ensure only a few explanatory variables were used, three steps were followed. First, observations were paired in sample using Pearson correlation to ascertain the association between all independent variables and dependent variables. This was followed by a scatter plot and then, the multiple regression analysis itself. A pairwise correlation among all variables (dependent vs independent, and independent variables vs each other) showed the degrees of association between variables and led to the exclusion of certain variables as indicated in the table below;

Table 2: Correlation matrix showing the relationship between variables

	Med Price	H Income	Gender	Burden	Age	Emp.status	Medical aid
Med Price	1						
H Income	0.709370617	1					
Gender	0.813189115	0.88814311	1				
Burden	-0.73596273	-0.74628055	-0.8596449	1			
Age	0.12335564	0.11770775	0.1317469	-0.09537	1		
Emp.status	0.122321871	0.28846997	0.3310265	-0.137678	-0.014917	1	
Medical aid	0.741128475	0.74317558	0.8559791	-0.995785	0.0911355	0.13055	1

Pairwise correlation between Medicine price and all (six) independent variables

Medical aid	House income	Gender	Age	Burden	Employment status
0.74= strong positive correlation with large effect	0.40 moderate with medium effect	0.81= strong positive correlation with large effect	0.70= strong positive correlation large effect	-0.73 strong negative correlation with large effect	0.08= inverse

The dependent variable (medicine price) was analyzed to determine its relationship with the independent variables at 98% response rate. For those who responded to this survey, higher medicine price scores were significantly correlated with higher household income scores ($r=0.70$), higher gender scores ($r=0.81$), higher medical aid scores ($r=0.74$), which were considered large effects. In addition, higher medicine price scores were negatively correlated with lower burden scores ($r= -0.73$), age ($r= 0.12$) and similar with employment status ($r=0.12$), which could be considered a small effect. Generally, the strength of association between medicine price and all dependent variables was high except for age and employment status.

A pairwise correlation between all independent variables showed that for those who responded to the questions under these variables, employment status scores had a weak correlation with income ($r=0.28$), medical aid ($r=0.13$), gender ($r=0.33$), burden ($r= -0.13$), age ($r= -0.01$), which could be considered small effects. Overall, employment status had a very weak correlation with other independent variables. Furthermore, higher scores of gender were correlated with higher scores of medical aid ($r= 0.85$) and income ($r = 0.88$) with a large effect. On the other hand, higher gender scores were correlated with lower burden ($r= - 0.85$) and age (0.13) with low effects.

As expected, annual household income was significantly correlated with gender, medical aid, medicines price and burden. However, there was no significant relationship between individuals' annual income and their age and employment status (see table 2). In addition, Higher medical aid scores were correlated with lower burden scores, $r= -0.99$, an indication of a strong negative correlation, moderately correlated with income ($r= 0.40$), which can be considered a large effect, positively associated with gender ($r=0.85$), strong negative correlation with burden ($r= -0.85964$), strong positive correlation with age ($r=0.88$), and a weak correlation with employment status. Overall, medical aid had strong positive and negative associations with other independent variables.

In general, 'age' had very weak correlations with medical aid ($r=0.09$), income ($r= 0.11$), gender ($r =0.13$), employment status ($r= 0.01$) and burden (-0.74). Results further showed that unreasonable 'burden' had associations that varied from very strong to moderate and weak negative correlation with other independent variables; medical aid ($r= -0.99579$), gender ($r =-0.85$), age ($r=0.74$), income ($r= -0.40$), and employment status ($r=-0.15$).

Overall, the strength of association between age and other independent variables was very weak, with an indication that age was not correlated with burden, medical aid and employment status. The weak and mostly negative correlation between age and other variables indicated that the more participants aged, the worse their inability to pay for essential medicines $r=.27$, $P=.01$. Whereas, the association between burden and other independent variables denoted that other variables had a tendency to decrease as burden increased.

Surprisingly, employment status had associations that varied from weak to very weak with other variables. And, medical aid on the other hand, had weak associations with burden, age and employment status and a very strong positive relationship with income and gender. The strength of association between annual household income and other independent variables was generally strong except for its weak relationships with burden and age.

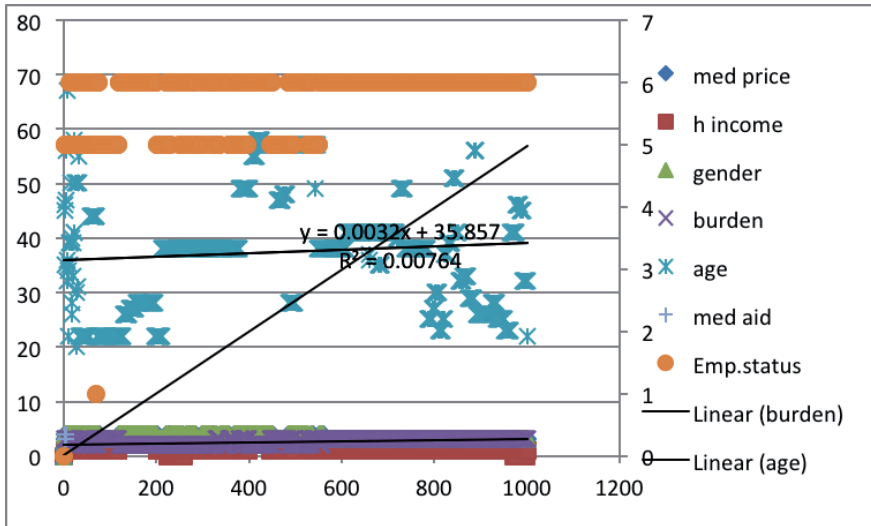
In order to determine the importance as well as linearity of all observed relationships in the population, a test for significance was conducted to ascertain the null hypothesis of no linear correlation present in population against the alternative that there is linear correlation present. In addition, the paired-samples t-test was conducted to compare independent variables that had strong correlations as indicated in table 2. The results from the test for significance indicated that the correlation could be inferred to the population from which the sample was drawn as shown below;

Among the sample who responded (N=1000), there was a statistically significant difference between income (M= 1.288, SD=0.46972) and gender (M=3.322, SD = 0.46748), $t(999) = -137.591$, $p= 0$. With a sample of 999 respondents, there was a significant difference in the scores for income (M=1.2, SD =0.46) and gender (M=3.3, SD = 0.46); $t(999) = -137.591$, $p=0$, 95% CI= 1.96 (reject null hypothesis). On the other hand, the paired sample test between medical aid (M=1.3, SD= 0.48) and income (M=1.2, SD= 0.49), were statistically significant at $t(999) = 6.232$; $p= 1$. In addition, the difference between the means of gender, medical aid and income were statistically significant at $p=0$ & 1 respectively.

These results indicate that gender does have some effect on income and medical aid membership, while income in turn has effects on medical aid. Specifically, the results suggest that the higher variance in gender led to a decrease in income. In addition, an increase in medical aid was associated with a decrease in household income. As indicated in table 2 and the test for significance, most of my estimates were supported.

Having ascertained the relationships between variables and the statistical significance of relationships, there was need for a visual representation of these relationships and possibly, use these as a basis for the interpretation of the regression output. To this end, a scatter plot was used to measure the explanatory impact effect of all variables as indicated below;

Diagram 1: Scatter diagram showing trend lines and impact effect of variables.



The square of the correlation between medicine price and the independent variables as explained by the scatter plot above indicates a consistent, strong and direct positive linear relationship between medicine price and burden. As values of age and burden increased, (the linear line moved progressively and positively towards meds price) so, did values of medicine price.

Multiple regression analysis:

Multiple regression analysis was utilized to establish whether there were variations in affordability of essential medicines, using six variables. Specifically, the analysis was meant to determine which of the six variables had the most impact on medicines affordability in terms of their perceived ability to significantly explain why variations in affordability exist. Additionally, to determine which factors mattered most, which ones to overlook and how each variable interacted with the other. Multi collinearity, over fitting and impact effects of variables were examined using Pearson correlation, T-test for means and scatter plots and these indicated strong degrees of association between dependent and independent variables, except for the exclusion of one variable that was causing multi-collinearity.

The multiple regression analysis was conducted in batches but in no particular sequence. Adjusted R square was used to measure how new input variables enhanced the predictive ability and accuracy of the regression equation as they were added to the

analysis. For the prediction of variations in affordability of essential medicines, results of regression showed that all six variables had a multiple correlation coefficient of .78, an adjusted R square output of .60, ($F(6,993)=260.05092, p=.05.$) with an R square of .611.

Respondents predicted that affordability is equal to $0.469 + 0.358 + 0.496 + 0.001 + 0.045 + 0.938 + 0.015$ where income is coded as 2= below 600,000 naira, 1=above 600,000 naira; burden is coded as 3= household with few people and less burden, 2= large households with burden of paying for essentials; medical aid is coded as 1= those with medical cover, 2= those without medical cover; gender is coded as 1=males , 2= females; employment status is coded as 5= fulltime paid employment, 6= self-employed and age was their real ages.

Affordability increased by 0.358 for each income unit and burden for each large household increased by 49% compared to households with few people and lesser burden. Furthermore, affordability increased 0.001 for each age and those with paid employment increased .045% more than self-employed people. In addition, affordability increased .93% for those with medical aid and .015 for males more than females.

For each increase in median household income, affordability increases by 35%. Each Increase in unreasonable burden of medical expenses also increased affordability of essential medicine by 50%. An Increase in age increased the ability to purchase malaria medicine by .001%. For each increase in employment status, medicines affordability decreased by .04%. Increases in values of medical aid vary together with increases in affordability by 93%. In addition, increases in values of gender vary with decrease in affordability.

When adjusted for the degrees of freedom, adjusted $R^2=60\%$. The R square ($R^2=0.61$) suggests that close to 61% of all variations in medicine price was explained by the independent variables. The regression results showed that two predictors; burden ($p=0.01$) and employment status ($p=0.03$) significantly explained affordability at $\alpha =0.05$.

Table 3: Regression output

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.781724658
R Square	0.6111093441
Adjusted R Square	0.608743552
Standard Error	0.293812026
Observations	1000

ANOVA					
	Df	SS	MS	F	Significance F
Regression	6	134.694772	22.4491286	260.052092	1.0591E-199
Residual	993	85.7212282	0.08632551		
Total	999	220.416			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.469455941	0.85856041	0.5467943	0.5846429	-1.215345092	2.154257	-1.21535	2.154257
H Income	0.358154328	0.02978959	12.022802	3.5056E-31	0.299696554	0.416612	0.299697	0.416612
Burden	0.496918997	0.2103717	2.36210005	0.01836387	0.084094867	0.909743	0.084095	0.909743
Age	0.001763318	0.00090274	1.95329291	0.05106544	-8.18148E-06	0.003535	-8.2E-06	0.003535
Emp.status	-0.045608257	0.02199516	-2.0735583	0.0383777	-0.088770597	-0.00245	-0.08877	-0.00245
Medical aid	0.938784367	0.20909646	4.48971905	7.9674E-06	0.528462704	1.349106	0.528463	1.349106
Gender	-0.015504309	0.01898098	-0.816834	0.4142192	-0.052751743	0.021743	-0.05275	0.021743

Following the results of the regression analysis which indicated that ($p > .05$), there was insufficient evidence to reject the null hypothesis that six factors explained the variations in individuals capacity to pay for essential medicines/treatment at a 5% significance level. The data was consistent with two out of six variables explaining the variations in affordability of essential medicines. Employment status and perceived unreasonable burden' were significant predictors of affordability ($F(6,993) = 260.052092$, $P = .05$, $R^2 = .611$, employment status= $P < 0.03$ and burden= $P < 0.03$). The null hypothesis here was to find out whether there were variations in affordability of essential medicines that could be explained one or more of these six factors (income, burden, age, employment status, gender and medical aid), the extent and why?

$H_0: p \leq 0.5$; $H_1: p > .5$. In this study, (P) $1.05 > 0.05$ (alpha), thus, we fail to reject the null. It was expected that few or more of the six variables could explain the variations in individual's capacity to pay for essential medicines/treatment. However, given this result, it is assumed that repeating the analysis with a different random selection of data could lead to a rejection of the null.

On the other hand, there was need to determine whether the means of the two income and employment groups which formed the basis of the study's hypothesis differed and to what extent? (The two income groups were; those whose annual income was below ₦600,000 and those above ₦600,000; those who had full time paid employment with benefits and those who were self-employed and or on contract without benefits. The null hypothesis here was that there is no variation in affordability across and within these populations. In order to determine whether there were variations within income groups from which sample was drawn from, a simple sample z test was performed: using the population mean (660) and its variance (122800) at a significance level of 0.05, the test was calculated; In order to determine the effect size for the z test of the variance between the two groups, the population mean (660) was subtracted from the sample mean (333) then, divided by the entire populations standard deviation (350.42831)= 0.000009 .

The z test result showed that at 95% CI [$638.28, 681.72$], $P < 0.00001$. An indication that the variations across the two income groups were significant at $p < 0.05$

Discussion

This study examined the extent to affordability of essential medicines differed across demographic groups and whether there were other factors that could explain the differences in affordability between these groups. Findings indicated that economic capacity within the context of a high annual household income could not explain the variations in ability to pay for a particular essential medicine or treatment. Rather, beyond employment status, the type of employment (fulltime paid employment vs self-employment) determined a particular household's ability to pay for essential medicines or treatment without any unreasonable burden of borrowing.

Other studies had shown that affordability in LMICs was a function of income¹⁰. However, there was little explanation for the variations in affordability across income groups in the context of Nigeria. Thus, this study hypothesized that the unreasonable burden placed on an individual or a household as a result of purchasing essential medicine (malaria treatment or medicine) was a function of multiple factors such as annual household income, medical aid, gender, employment status and age. Affordability therefore, was considered ($Y =$ burden) a function of annual household income. This means that the burden placed on a household by the purchase of malaria medicine/treatment can be explained by variations in not just income but employment status and medical aid.

Using multiple regression models, the question thus became: in what ways does the ability to purchase essential medicine (generic malaria meds price = Y) depend on (X) income, perceived burden, age, gender, employment status and medical aid? Therefore, If X causes Y , one could posit that (taking cognizance of the fact that correlation might not be causation), the variations in the ability to purchase medicine across and within income or employment groups could be explained by perceived unreasonable burden and employment status when everything else is constant.

67.2% of the respondents reported paying over ₦2,000 for the treatment of a common health condition (malaria) while 69.1% had annual income below ₦600,000. 61.40% of the respondents reported not having medical aid cover while 38.4% reported that that they experienced no unreasonable burden with regards to malaria treatment/medicines procurement. 61% of the variance in affordability of essential medicine was explained by the unreasonable burden of paying for medicines (borrowing, soft loans and digging into savings) when an individual has a large household, and their employment status. While income had a moderate correlation with affordability, it was not a strong predictor of the variation individual's ability to afford essential medicines. Furthermore, the coefficient for income was .358, meaning that for every additional household income, affordability increased on average by 35%. However, the high p value for income suggests otherwise. It indicates changes in income cannot really be associated with the variations in purchasing in affordability of essential medicine.

Burden

The most predictive variable of affordability was unreasonable burden which covers lacking the capacity to pay but is not limited to economic ability to procure medicines/treatments, the risk of foregoing treatment, going into debt and diverting funds for other basic necessities.¹¹ Unreasonable burden was quite independent of other variables. The

10 Ibid

11 Xu K. Household catastrophic health expenditure: a multicountry analysis. *Lancet* 2003; 362: 1117 doi: 10.1016/S01406736 (03)138615 pmid: 12867110.

small number of respondents (38.4%) who reported not experiencing any unreasonable burden implies that poor affordability, “the capacity to pay” or (its lack thereof) for malaria medicine/treatment cuts across all income groups.

In other words, the burden of forgoing treatment, going into debt, paying over one tenth of annual household income, or three days wages cuts across all social groups. The results from this study show that the difficulty of access and affordability which is a function of the economy affects individuals irrespective of their gender, age and income. It shows that having a fulltime paid employment with the guarantee of a good medical insurance cover is more desirable than being self-employed and having to suffer the unreasonable burden of paying out of pocket for medicines, treatment or forgoing the treatment altogether.

Affordability in this study was defined as the ability to procure malaria medicine or treatment at a price that does not impose unreasonable burden on household income¹². It was further operationalized as taking the following factors into consideration; annual household income, the price of a full dose malaria treatment (physician visits +/- malaria test) and the unreasonable burden of having to use up savings for those who already have, forgoing other essentials needs, borrowing from relative or incurring debt. Thus, at a 5% threshold (for annual household income), malaria treatment was unaffordable to 67.2% of the subjects who reported paying more than 5% of their annual household income on health. In other words, affordability was problematic to 61.4% of respondents who reported not having a medical insurance cover and 69.1% whose employment was not “paid’ fulltime.

Generally, there is high out of pocket payment for essential medicine in Nigeria. However, paying out of pocket sometimes does not necessarily guarantee that one would receive quality services or medicines. For instance, there are people who have the income but do not trust the quality of medicine or services, thus, they travel a long distance to a trusted service provider. When calculated in terms of the financial investment of procuring that particular treatment, it does not immediately reflect as burdensome. On the other hand, if one were to take into account, the emotional and other social burden of procuring that medicine, the difficulty of access becomes obvious.

An annual household income of over ₦600,000, a fulltime paid employment with a guarantee of a medical aid cover was found to be significantly associated with the ability to pay for medicine when everything was constant. Subjects with fulltime paid employment and a medical aid cover ranked health service providers behavior high and did not pay attention to time to use appropriate service. Whereas, those in the low income bracket ranked perceived quality of care and healthcare provider behavior low. Most of the subjects, who paid more than ₦2000 for the treatment of common health condition (malaria treatment) surprisingly, fell under the low income bracket of

12 Hancock KE. “Can pay? Won’t pay?” or economic principles of affordability. *Urban Studies* 1993; 30: 12745.

below ₦600,000. Follow up questions indicated that 60% of these subjects were self-employed, 40% had full time paid employment but without a medical aid membership. Not belonging to any medical aid scheme limited their choice of utilizing an appropriate healthcare service provider and influenced their perception of service availability.

95% of Nigerians pay out of pocket for essential medicines. Considering the high price of medicines, individuals would rather forgo seeking treatment from authorized or appropriate healthcare service provider and instead, opt for alternative care. In other words, out of pocket payment for medicines and debt burdens tend to influence individuals decisions to either self-medicate or patronize chemists/pharmacies. Furthermore, those without medical aid were more likely to treat the same health condition multiple times, experience unreasonable burden as a result of choosing cheaper/easier care options then, consulting an appropriate professional service provider as a last resort.

Often times, the financial burden of essential medicines seem a far cry from the unreasonable burden of physical access. For instance, buying a malaria medication off the shelf might seem a cheaper option compared to obtaining treatment in a clinic. It might seem like a cheap and convenient option which allows individuals to procure medicines without paying for physician visits. However, at the long run, it tends to become very expensive, particularly, when the medicines are purchased in private clinics. For instance, combisunate and ciprofloxacin are the most commonly used medications for the treatment of typhoid fever, cost 400naira each and are easily obtainable. Likewise, Laridox and 'maldox' are anti-malarial medications and cost ₦150.00 at community pharmacies. Yet, the cost of procuring these medicines from authorized sources at the appropriate price (official government price) adds to the unreasonable burden of affordability that is being encountered by 62% of the respondents who reported a higher burden and 67.2% without medical aid cover.

For these groups of people, typically, treating malaria in a clinic would entail obtaining a hospital card, folder (the cost of obtaining folders varies between ₦1000 and above) and running series of blood tests at approximately, ₦2000 to ₦2800. These, combined bring the total cost of malaria and typhoid fever treatment to an average of ₦4000 to ₦4500 in public hospitals which, when considered in the context of this study, amounts to paying 3 days wages to treat just one member of the family. At a threshold of 5% (for household income that should be spent on healthcare), malaria and typhoid treatment is unaffordable to people who earn ₦600,000 and those who do not have fulltime paid employment with the guarantee of a medical cover.

The burden of paying for medicine as experienced by those who earn an annual income of ₦600,000 and below was derived by dividing their annual income by 12 months, then further divided by 30 days (that is, $\text{₦600,000} \div 12 \div 30 = 1,667$) which enables one calculate how many days wages they need to pay for malaria treatment of ₦2500 in a public facility. It should be noted, however that these rates vary and depend on the hospital policy. Running a malaria investigation requires PCV and

malaria parasite and, widal tests to rule out typhoid. However, it was gathered that in a bid to raise funds, hospitals tend to increase the number of compulsory tests that must be run by general outpatients. In orthopedic hospitals for instance, on a first visit, patients are expected to run HIV screening at the rate of ₦500, even though, it is not directly related to malaria investigation. In addition to that, every general outpatient is expected to run full blood rate (FBC, ESR) tests even though these tests are not directly used in malaria investigations.

Thus, even though paying out of pocket and procuring medicines from vendors has been the general practice in Nigeria for those who do not have medical aid cover, the burden of having to run unwarranted tests, pay over and above official government prices cuts across all income and social groups (insured and uninsured). These perceived difficulties of access affects healthcare services utilization pattern particularly, for those who have medical aid and compels individuals without medical cover to boycott treatment altogether or seek alternatives. Providing a medical cover for individuals who earn lower than the minimum wage and enhancing availability and accessibility of medical aid to those who work part-time or self-employed could be a significant way of reducing the unreasonable burden of procuring essential medicines or treatment.

Employment status was the second most explanatory variable. Overall, employment status affects the cost of healthcare given that fulltime paid employment increases the accessibility/availability of medical insurance, the capacity to pay for it and also, influences key determinants of utilization pattern and health behavior of individuals. Previous studies have shown that employed people tend to have better health outcomes than the unemployed. Those studies established that an individual's employment status is associated with their capacity to procure essential medicine and treatment in a timely manner, without them necessarily having to forgo the treatment altogether or delay getting treatment due to the unreasonable strain it places on their finances. However, while paid employment generally provides financial security, on the other hand, the kind of paid employment an individual has to a large extent determines their remuneration and incentives.

In addition, incentives and compensations that accompany fulltime paid employment tend to vary by industry, sector and country. For instance, findings from the study showed that on average, affordability varied by employment status. That is, those who had fulltime paid employment experienced affordability differently depending on the field or sector. Specifically, civil servants, bankers and those in the public sector experienced greater affordability compared to individuals who were self-employed or in the private sector. Even when the economic capital or remunerations from an employment is low, full time paid employment in a reputable organization increases an individual's social capital which goes a long way in reducing their healthcare costs and the impacts of financial hardship.

For some individuals who have fulltime paid employment in the public sector and international organizations, they have unhindered access to a preferred healthcare service provider and credit facility as result of having a verifiable source of income. Their employment status becomes a platform for them to access other incentives apart from their salaries. It becomes a sort of guarantee/indemnification for medical aid cover, loans and credits that those who are self-employed or employed in less reputable organizations do not have access to.

In analyzing the effects of employment status on affordability of essential medicines, there is need to distinguish fulltime paid employment in a professional environment/context where medical cover is included from part time or self-employment where such incentives do not exist. Being employed (fulltime or part-time) tends to be associated with financial security. Unemployment on the other hand exemplifies poverty, poor psychological wellbeing and lack of capacity to pay for goods or services. Yet, there seems to be thin line between poor affordability which results from not having a full time paid employment or the kind that guarantees a medical cover and that, which stems from not having a job/platform where such access is guaranteed. It is important that government and stakeholders provide public welfare/support platforms for not just disabled and unemployed individuals, but those without fulltime employment and others who live below the poverty line. A medicaid program and attitude adjustment by bio medical practitioners employed in the public sector can influence health-related behavior and perceived quality of care which would boost accessibility for those on healthcare support programs.

SES and Access to Essential Medicines

The World health Organization declared free healthcare for all in 1978; therefore one might be inclined to think that primary healthcare in all its ramifications is accessible and available to everyone despite, age, gender, race, ethnicity and income. Yet, the reality is somewhat different. The sad reality is that although several countries ratified the Alma ata declaration, most populations and subgroups seem to suffer the harshest consequences of inequities in health systems, particularly, in developing countries and in relations to obtaining essential medicines.

Access to medicine poses challenges that are widespread and tend to affect each social group distinctly. Although no social group is completely immune to the effects or challenges of insufficient access to essential medicine, it is the working class and low income earners that lack economic, social and institutional capacity to cope or adapt. While affordability and availability might not necessarily be a concern to the high income earners given their purchasing power and vast resources which enables them to obtain medicines in a timely manner, accessibility, availability, quality, the ability to pay

for medicines and the non-financial costs of obtaining medicines remain the biggest challenge for low income earners.

Link & Phelan¹³ and Adler et al¹⁴, argue that those who belong to the lower class experience worse health because, compared to wealthier persons, they are subject to more stress, have less control over that stress, and have less access to health-preserving resources. Equally, the patterning of access to essential medicines in relations to who gets essential medicine, when and how is the result of the effects of the social dimensions of poverty and economic exclusion. Poverty and low income are associated with insufficient access to essential medicines and healthcare; affordability; poor economic capacity; poor access to health education; long distance to nearest primary healthcare facility; physical availability; etc. This constraints/disadvantage are embedded in socio-economic status of individuals as well as the institutional practices that work against them, affecting their ability to access essential medicine.

To provide context, it takes a considerable amount of money and time that most working class people do not have to travel to the nearest clinic. Given that most jobs available to the working class are without paid leave, often times, they tend to miss out on work and risk losing their wages for the day. Clinic visits are usually not a once off effort, which means that the individual needs to book another visit to the physician for a check-up. After the visit to the physician, most working class individuals are often without medical support and have to pay out of pocket for prescriptions and in most cases, such medications usually, are not available at most primary healthcare facilities. In such instances, the patient might choose to either forgo the treatment altogether due to the opportunity cost of obtaining the medicine or incur further costs by travelling to the next facility. On the other hand, if the medicine is physically available and the individual is unable to pay for it, they might choose to delay treatment, seek alternative source of treatments, ways of getting the funds or return to work in order to secure their jobs. In the event that the patient overstayed their sick leave in a bid to obtain treatment, the employer might deem the person a liability as he/she has exacerbated his/her sick days and fire them. The reality is that he/she might lose their job and become unemployed. Unemployment on the other hand, leads to socio-economic challenges that could affect the individual or lead to further health concerns.

One will be justified in claiming that the lower an individual earns, the harder it will be for that person/household to get medical support in terms of affording available healthcare given that most low paying jobs hardly come with a medical insurance coverage. And, in contexts where free healthcare policies are implemented, physical availability and quality of care and essential medicines tend to become compromised

13 Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of health and social behavior*, 80-94.

14 Adler, N. E., & Newman, K. (2002). Socioeconomic disparities in health: pathways and policies. *Health affairs*, 21(2), 60-76.

and challenging due to the high demand. In the event of a cardiovascular disease which is often associated with low income earners and people of low educational status, the individual is expected to be on blood pressure and antidiabetic medications which are not listed on the essential medicines list in Nigeria and on average, cost between \$300 to \$400 (USD). In such cases, nutrition and lifestyle interventions, medical insurance and a good bank account become necessary for initial treatment. These factors are necessities that low income earners and other minorities may not have access to and therefore fare worse off in comparison to high income earners or people whose jobs offer medical support.

The health of a population is influenced by a number of social factors such as poor housing, poor working conditions, low socio-economic status, etc. These factors and more are associated with patterns and processes of poverty and play a role in diminishing the health of a population due to their intersection with institutional practices, geography, ethnicity and gender. Additionally, these dimensions of poverty in Nigeria; within and across social groups intersect with inherent weaknesses in health systems to produce inequality in access to essential medicine. For instance, low income earners are more likely to work longer hours in hazardous jobs, eat processed foods due to time constraints; live in low income neighborhoods with high crime rates, pollutants and no recreational activities to mitigate the impacts of their lifestyle. High and low income earners vary in terms of their experience and responses to stress, illness and diseases. Due to exposure to risk factors, high stress levels and other lifestyle challenges associated with their social status, the working class tends to have poorer health status compared to high income earners; they fall ill easily and are more likely to visit physicians most frequently even when they lack the ability to pay for prescriptions.

Poverty produces health disadvantages by making individuals and households vulnerable to illnesses/diseases. These illnesses/diseases in return diminish their socio-economic standing and bring them a step lower in terms social gradient. This present study indicates that a social gradient in access to essential medicine exists. Therefore, every step up in employment circumstance or socio economic status increases access to essential medicines. In addition, an individual's employment status and socio economic status becomes particularly worrisome when it does not increase availability of treatment, improved physical access to a preferred healthcare service provider or minimal safety from illness related expenses.

Conclusion

In this paper, six demographic factors were expected to explain the variations in affordability of essential medicines. And, even though all variables had explanatory strength in terms of their association with the ability to pay for essential medicine,

only two factors showed evidence of being significant predictors of affordability. While employment status and perceived unreasonable burden are key predictors of affordability, these factors alone do not necessarily guarantee full and timely access to essential medicines. Therefore, the variations in affordability within each demographic group should be explored further and considered for future research.

Reference list

- Ojedokun, O. E., & Elugoke, N. O. (2016). Assessment of Human Development Status and Personal Ecological Footprints of Residents of Ile-Ife, Nigeria. *European Journal of Sustainable Development*, 5(3), 513-526.
- Onwujekwe, O. E., Uzochukwu, B. S., Obikeze, E. N., Okoronkwo, I., Ochonma, O. G., Onoka, C. A., ... & Okoli, C. (2010). Investigating determinants of out-of-pocket spending and strategies for coping with payments for healthcare in southeast Nigeria. *BMC health services research*, 10(1), 67.
- Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2012). Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. *PLoS One*, 7(7), e40811.
- Niëns, L. M., Cameron, A., Van de Poel, E., Ewen, M., Brouwer, W. B., & Laing, R. (2010). Quantifying the impoverishing effects of purchasing medicines: a cross-country comparison of the affordability of medicines in the developing world. *PLoS medicine*, 7(8), 1056
- The Federal Ministry of Health & World Health Organization (2002) Baseline Assessment of the Pharmaceutical Sector. Federal Ministry of Health in collaboration with the World Health Organization
- Cameron, A., Ewen, M., Ross-Degnan, D., Ball, D., & Laing, R. (2009). Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. *The lancet*, 373(9659), 240-249.
- McIntyre, D., Thiede, M., Dahlgren, G., & Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low-and middle-income country contexts?. *Social science & medicine*, 62(4), 858-865.
- Wambebe, C., & Ochekepe, N. (2011). Pharmaceutical sector profile: Nigeria. Vienna: United Nations Industrial Development Organization
- Hancock K. E. "Can pay? Won't pay?" or economic principles of affordability. *Urban Studies* 1993; 30: 127-45
- Xu K. Household catastrophic health expenditure: a multicountry analysis. *Lancet* 2003; 362: 1117 doi: 10.1016/S01406736 (03)138615 pmid: 12867110.