# The impact of the National Health Insurance Scheme on medication adherence of hypertensive patients

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**ABSTRACT**

**Background:** There is paucity of information on the effectiveness of the National Health Insurance Scheme (NHIS) in improving medication access in hypertensive patients, as well as its impact on adherence rates and patient outcomes.

**Objectives:** This study investigated the impact of NHIS enrollment on medication adherence in hypertensive patients by assessing disparities in adherence profiles and patterns of barriers to medication adherence between enrolled and non-enrolled patients of the NHIS, and evaluating the extent to which cost of medication affects adherence.

**Methods:** The study was conducted as a cross-sectional prospective study. Medication adherence score was determined using the eight-item Morisky Medication Adherence Scale, which was self-administered to 250 selected patients on NHIS and non-NHIS respectively. Data was analyzed using SPSS 16 for Windows (Chicago, IL); Mean ± standard deviation was computed for continuous data, Mean values were compared using t-test while comparisons of proportions were carried out using Chi square. All hypotheses tested were two tailed, with significance at $p < 0.05$.

**Results:** The mean adherence score for the NHIS group was 4.40 ± 2.28, while respondents in the non-NHIS group recorded a mean adherence score of 4.92 ± 2.15. The non-NHIS group reported a statistically significant higher adherence score (p= 0.011). From the multiple linear regressions, there was a positive correlation between adherence score and age and duration of disease. There was also statistically significant negative correlation between adherence scores and educational level, monthly income, and improving health status.

**Conclusion:** Enrollment in the NHIS was not associated with better medication adherence level despite associated lower cost of medication. Cost of medication was not found to be a statistically significant barrier to adherence in this study.

**Keywords:** medication adherence, hypertension, NHIS, health outcomes

**L'impact du régime national d'assurance maladie sur l'observance du traitement par les patients hypertensifs**

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**RÉSUMÉ**

**Contexte:** On manque d'informations sur l'efficacité du régime national d'assurance maladie (NHIS) pour améliorer l'accès aux médicaments chez les patients hypertendus, ainsi que sur son impact sur les taux d'observance et les résultats pour les patients.

**Objectifs:** Cette étude a examiné l'impact de l'inscription au NHIS sur l'observance médicamenteuse chez les patients hypertendus en évaluant les disparités dans les profils d'observance et les modèles d'obstacles à l'observance médicamenteuse entre les patients inscrits et ceux qui ne sont pas inscrits au NHIS, et en évaluant dans quelle mesure le coût des médicaments affecte l'observance.

**Méthodes:** L'étude a été menée sous forme d'étude prospective transversale. Le score d'observance des médicaments a été déterminé à l'aide de l'échelle d'observance des médicaments de Morisky à huit questions, qui a été auto-administrée à 250 patients sélectionnés dans le cadre du NHIS et sans NHIS respectivement. Les données ont été analysées à l'aide de SPSS 16 pour Windows (Chicago, IL) ; La moyenne ± l'écart type a été calculée pour les données continues. Les valeurs moyennes ont été comparées à l'aide du test t tandis que les comparaisons des proportions ont été effectuées à l'aide du chi carré. Toutes les hypothèses testées étaient bilatérales, avec une signification à $p < 0,05$.

**Résultats:** Le score d'observance moyen pour le groupe NHIS était de 4,40 ± 2,28, tandis que les répondants du groupe sans NHIS ont enregistré un score d'observance moyen de 4,92 ± 2,15. Le groupe sans NHIS a fait étape d'un score d'observance statistiquement plus élevé (p=0,011). Les régressions linéaires multiples ont révélé une corrélation positive entre le score d'observance, l'âge et la durée de la maladie. Il existait également une corrélation négative statistiquement significative entre les scores d'observance et le niveau d'éducation, le revenu mensuel et l'amélioration de l'état de santé.

**Conclusion:** L'inscription au NHIS n'a pas été associée à un meilleur niveau d'adhésion aux médicaments, même si le coût des médicaments est moins élevé. Le coût des médicaments ne s'est pas révélé être un obstacle statistiquement significatif à l'observance dans cette étude.

**Mots-clés:** observance du traitement, hypertension, NHIS, résultats sur la santé

## INTRODUCTION

Hypertension is a global challenge that affects almost one billion people worldwide, with about 340 million sufferers in economically developing countries.[1] The burden of hypertension is particularly high in sub-Saharan Africa; in Nigeria, prevalence rates of hypertension range from 21% to 47%.[2] Because hypertension is one of the most important modifiable risk factor for cardiovascular disease, prevention and treatment of hypertension reduce the risk of cardiovascular disease. Thus, access to antihypertensives and adherence to medication are key factors in the control of hypertension.

Medication adherence is defined as "the extent to which a person's behavior corresponds with agreed recommendations from a health care provider".[3] Poor adherence is a very common and relevant problem in modern medicine, often unrecognized, which heavily influences treatment success, especially in patients with chronic asymptomatic diseases such as hypertension. It has been calculated that about one-third to a half of patients do not comply with prescribed treatment regimens especially during the first months of therapy, and studies in Nigeria and Ghana have observed medication non-adherence to anti-hypertensives between 32.7% to 66.7%.[2,4,5] Although individuals' socioeconomic status has not conclusively been shown to be an independent factor determining the level of medication adherence, low socio-economic status especially in developing countries may put patients in a position of having to direct limited financial resources to meet other more essential needs, and barriers such as poverty, illiteracy, low social support, and unemployment have been found to impact adherence.[3] In addition, access to health care, particularly the affordability of drugs and travel, can pose a restraint on prospective patients. This has been demonstrated in Nigeria, where it was established that drug costs accounts for more than two-thirds of the costs of treating chronic diseases.[6]

A healthcare financing system encompasses the processes of generating, distributing, and employing funds for healthcare purposes. It has three basic functions of collecting revenues, pooling resources, and purchasing services.[7] The commonly used mechanisms for implementing these functions include tax-based financing, out-of-pocket payments, donor funding, and health insurance.[8] These methods are not mutually exclusive and most health systems adopt a mixture of various methods.[9] Presently, the major payment strategy for healthcare in Nigeria is out-of-pocket spending (OOPS), usually at the point of service. It is estimated that 50% of Sub-Saharan Africa's total health expenditure is financed by out-of-pocket payments, which causes many patients to fall into a poverty trap caused by having to pay for healthcare services [10,11]. User fees were introduced by the Nigerian government in 1988 under the Bamako Initiative which advocated for cost-sharing and community participation to increase the sustainability and quality of health care.[12] It was proposed that implementing user fees would augment access to healthcare resources and enhance both efficiency and fairness in the provision of healthcare services. [13]

The Nigerian government established the National Health Insurance Scheme (NHIS) under Act 35 of 1999 to improve access to health care and reduce the financial burden of out-of-pocket payment for health care services.[11] The NHIS is organized into the following Social Health Insurance Programs (SHIPs); Formal Sector; Urban Self-employed; Rural Community; Children Under-Five; Permanently Disabled Persons; Prison Inmates; Tertiary Institutions and Voluntary Participants; and Armed Forces, Police and other Uniformed Services. So far, it is only the formal sector social health insurance program, which is mandatory for Federal Government Employees, that is fully operational. [14,15] Since its inception, there has been a delay in the expansion of the NHIS to achieve significant coverage. In 2008, a survey conducted by the World Bank indicated that only approximately 0.8 % of the population was under the coverage of the NHIS. [16] However, the NHIS was conceptualized to transforming the scheme into a compulsory arrangement for all Nigerians, with the objective of enlisting the entire population by December 2015. [17] Additional factors such as inadequate medical facilities, scarcity of medical personnel, limited awareness, and insufficient funding have been identified as challenges that affect the efficacy of NHIS in Nigeria,[18,19,20,21] Furthermore, the informal sector, which includes those with lower incomes, is not covered by the scheme. This group is also the least capable group when it comes to independently affording healthcare costs. Community Health Insurance programs have been put forward as a means to improve patient access to healthcare but operational difficulties still hamper the successful development of these programs. [22]

Limited information exists regarding the NHIS scheme's effectiveness in improving medication access in hypertensive patients. Additionally, there is a lack of

documented evidence of any meaningful impact these programs have on medication adherence or patients' health outcomes. There has been no evaluation conducted to compare the impact of NHIS on medication adherence or patients' health outcomes between enrollees and non-enrollees of the scheme in Nigeria. This study aims to investigate the impact of enrollment in the NHIS on medication adherence in hypertensive patients by assessing disparities in adherence profiles and patterns of barriers to medication adherence between enrolled and non-enrolled patients of the NHIS in Federal Medical Center, Umuahia, Nigeria, and evaluating the extent to which cost of medication affects adherence.

## METHODS
The study was designed as a prospective cross-sectional study to evaluate the impact of the National Health Insurance Scheme on medication adherence of patients on anti-hypertensives. Study subjects consisted of patients presently receiving antihypertensive medication from the Pharmacy department of the Federal Medical Center Umuahia, Abia State, Nigeria. Respondents included both patients enrolled with the NHIS, and non-enrolled patients.

### Ethical approval
Ethical approval to conduct the study was obtained from the Health Research Ethics Committee of Federal Medical Center, Umuahia Abia State. (HREC Assigned Number: FMC/QEH/5860/VOL 10/138, dated 11th June, 2015.)

### Sample size
The prevalence of non-adherence in Nigeria was taken to be 30%[23] with a standard deviation of ±50%, (which is ±15%), at 95% confidence interval and a 5% sampling error i.e. 1.5 (a statistics of power 0.99 (99%). Applying the standard formula for sample size calculation [24]

$N = [z\alpha/2 \, \delta/E]^2$
Where: N = desired sample size

$z\alpha/2$ = the 95% confidence interval statistic (1.96) at significance level $\alpha$ = 5%, 2 sided test.
$\delta$ = standard deviation of ±50% of prevalence, i.e. ±15%.
E = acceptable error (i.e. a 5% error) in the sample estimate of the population mean prevalence obtained as one tenth of estimate of national prevalence (5%), i.e. (1.5).

$= [(1.96 \times 15) / 1.5]^2 = 384.16$ approximately 385 patients were required;

Based on this, a target sample size of 500 patients was selected to ensure sufficient statistical power.

### Administration of questionnaire
The study subjects were hypertensive patients who fulfilled the inclusion criteria (confirmed diagnosis of hypertension, subjects on oral anti-hypertensive therapy for over six (6) months) and who had no exclusion criteria present (age less than 18 years, pregnant subjects, subjects who declined to participate in the study). Prospective study subjects were provided with comprehensive written information about the study on a consent form, and willing participants were expected to sign an expression of consent.

Data for the outcome variable, antihypertensive medication adherence score, was ascertained using the self-report eight-item Morisky Medication Adherence Scale (MMAS-8).[25] This measure was designed to facilitate the identification of barriers to and behaviors associated with adherence to chronic medications, especially for hypertension.[25] The questions were phrased to avoid the "yes saying" bias by reversing the wording of the questions about the way patients might experience failure in following their medication regimen. Each item measured a specific medication-taking behavior. Response categories were yes/no for each item with a dichotomous response and a 5-point Likert response for the last item. The modified Morisky scale yielded a total score with a range of 0 to 8, with higher scores indicating higher adherence to medication. In previous validation studies, a score of <6 on the MMAS-8 was associated with uncontrolled blood pressure.[26]

An additional 23-item questionnaire was developed by the authors for the purpose of this study, which consisted of close-ended questions for collection of socio-demographic details and respondents' perceptions on barriers to adherence based on a 3-point Likert scale. The additional questionnaire was pre-tested among twenty-five hypertensive patients, followed by adjustments in the contents and structure of the questionnaire. Working with a proposed sample size of 500 patients, the questionnaire was then self-administered to 250 selected patients of NHIS and non-NHIS each, at the point of filling an antihypertensive prescription in the Hospital Pharmacy. Point of care BP measurement (DBP

and SBP) which had already been carried out on the participating patients by the triage nurses at the clinics was documented.

**Data analysis**
Statistical analysis was performed using SPSS 16 for Windows (Chicago, Illinois). Mean ± standard deviation was computed for all continuous data. Frequencies were calculated for categorical data.

Adherence was represented in percentages and treated as continuous data. Study variables found to be correlated to adherence after adjusting for confounding variables were used in the multiple linear regressions. Stepwise method was used to model the effect of predictor variables on adherence. Comparisons of proportions were carried out using Chi square, Fisher's exact or McNemar's tests. All hypotheses tested were two tailed, with significant values taken at $p < 0.05$.

**RESULTS**
A total of 500 questionnaires were distributed, but 499 were retrieved. Details of the socio-demographic data of the respondents are shown in Table 1 below.

**Table 1: Respondents' socio-demographic data**

| CHARACTER | NHIS FREQUENCY (%) | NON NHIS FREQUENCY (%) |
|---|---|---|
| **GENDER** | | |
| Male | 105 (44.3%) | 132 (55.7%) |
| Female | 144 (58.5%) | 102 (41.5%) |
| **AGE** | | |
| Below 30 years | 7 (77.8%) | 2 (22.2%) |
| 30-39 years | 27 (56.3%) | 21 (43.8%) |
| 40-49 years | 91 (72.2%) | 35 (27.8%) |
| 50-59 years | 86 (74.8%) | 29 (25.2%) |
| 60-69 years | 22 (23.7%) | 71 (76.3%) |
| 70 years + | 15 (16.3%) | 77 (83.7%) |
| **EDUCATION LEVEL** | | |
| None | 6 (20.0%) | 24 (80.0%) |
| Primary | 23 (26.4%) | 64 (73.6%) |
| Secondary | 41 (46.6%) | 47 (53.4%) |
| Tertiary | 180 (63.8%) | 102 (36.2%) |
| **MARITAL STATUS** | | |
| Single | 7 (26.9%) | 19 (73.1%) |
| Married | 222 (56.9%) | 168 (43.1%) |
| Widowed | 18 (29.5%) | 43 (70.5%) |
| Divorced | 3 (50.0%) | 3 (50.0%) |
| **OCCUPATION** | | |
| Civil servant | 196 (83.4%) | 39 (16.6%) |
| Self-employed | 18 (16.1%) | 94 (83.9%) |
| Retired | 34 (25.0) | 102 (75.0%) |
| **MONTHLY INCOME** | | |
| < N30,000 | 46 (40.0%) | 69 (60.0%) |
| N30,000-N70,000 | 68 (41.7%) | 95 (58.3%) |
| > N70,000 | 131 (65.2%) | 70 (34.8%) |
| **DURATION OF HBP** | | |
| < 1 year | 48 (50.5%) | 47 (49.5%) |
| 1-5 years | 105 (55.6%) | 84 (44.4%) |
| 6-10 years | 57 (62.0%) | 35 (38.0%) |
| 10 years + | 37 (34.6%) | 70 (65.4%) |
| **HAVE FAMILY MEMBER WITH HBP** | | |
| No | 92 (47.4%) | 102 (52.6%) |
| Yes | 155 (56.4%) | 125 (44,6%) |
| **GENERAL HEALTH STATUS** | | |
| Poor | 0 (0%) | 20 (100.0%) |
| Fair | 55 (45.1%) | 67 (54.9%) |
| Good | 119 (54.6%) | 99 (45.4%) |
| Very good | 51 (60.7%) | 33 (39.3%) |
| Excellent | 24 (64.9%) | 13 (35.1%) |

(Percentage expressed as count percentage within each category of parameters)

Medication adherence was measured using the 8-point Morisky scale (Table 2) The Morisky scale was graduated as follows: No–1 point, Yes–0 point. The exception was question 5 where the reverse was the case. Patients who scored 8 were classified as adherent while patients who scored below 8 were classified as non-adherent. Following that, the patient adherence outcome variable was dichotomized into 2 groups: adherent versus non-adherent (Table 3).

**Table 2: Determinants of adherence of respondents (Morisky scale)**

| PARAMETERS | NHIS FREQUENCY (%) | NON NHIS FREQUENCY (%) |
|---|---|---|
| SOMETIMES FORGET TO TAKE DRUGS | | |
| No | 143 (56.5%) | 110 (43.5%) |
| Yes | 107 (46.1%) | 125 (53.9%) |
| SKIPPED DOSES OVER THE PAST 2 WEEKS | | |
| No | 142 (54.0%) | 121 (46.0%) |
| Yes | 108 (48.2%) | 116 (51.8%) |
| STOPPED DUE TO SIDE EFFECTS OF DRUGS | | |
| No | 75 (46.9%) | 85 (53.1%) |
| Yes | 175 (53.5%) | 152 (46.7%) |
| FORGET DRUGS WHEN TRAVELLING | | |
| No | 108 (55.7%) | 86 (44.3%) |
| Yes | 141 (48.3%) | 151 (51.7%) |
| TOOK DRUGS YESTERDAY | | |
| No | 95 (59.4%) | 65 (40.6%) |
| Yes | 154 (47.4%) | 171 (52.6%) |
| STOP DRUGS WHEN BP IS UNDER CONTROL | | |
| No | 147 (52.3%) | 134 (47.7%) |
| Yes | 102 (50.0%) | 102 (50.0%) |
| STRESSED DUE TO TREATMENT PLAN | | |
| No | 124 (57.7%) | 91 (42.3%) |
| Yes | 123 (45.9%) | 145 (54.1%) |
| DIFFICULTY REMEMBERING TO TAKE DRUGS | | |
| All the time | 10 (62.5%) | 6 (37.5%) |
| Usually | 5 (38.5%) | 8 (61.5%) |
| Sometimes | 56 (62.2%) | 34 (37.8%) |
| Once in a while | 92 (55.4%) | 74 (44.6%) |

(Percentage expressed as count percentage within each category of parameters)

**TABLE 3: Adherence status of respondents**

| ADHERENCE STATUS | NHIS | NON NHIS |
|---|---|---|
| Non adherent | 213 (50.0%) | 213 (50.0%) |
| Adherent | 23 (48.9%) | 24 (51.1%) |

(Percentage expressed as count percentage within each category of parameters)
Adherent: Morisky score = 8
Non adherent: Morisky score < 8

Results from the study revealed low medication adherence scores for both groups of patients, though the non-NHIS group reported a statistically significant higher adherence score (p = 0.011). However, the NHIS group had statistically significant lower systolic BP readings compared to the non-NHIS group (p = 0.001).

**TABLE 4: t-test on adherence parameters**

| PARAMETERS | NHIS | | NON NHIS | | P-VALUES |
|---|---|---|---|---|---|
| | N | Mean | N | Mean | |
| Adherence score | 248 | 4.40±2.28 | 237 | 4.92±2.15 | 0.011 |
| SBP | 50 | 135.22±25.79 | 75 | 150.13±22.74 | 0.001 |
| DBP | 49 | 91.47±14.34 | 75 | 90.60±13.02 | 0.728 |

p-values $\leq$ 0.05 : significant
p-values $\geq$ 0.05 : not significant

From the multiple linear regressions, a correlative relationship between adherence score and social-demographic characteristics of respondents was derived following adjusting for confounding variables including age of respondents, educational level, monthly income, duration of HBP, as well as systolic and diastolic BP readings. From the results, a positive correlation between adherence score and factors like age and duration of disease was observed, whereas factors such as educational level, monthly income and BP readings showed a negative correlation with adherence score.

**TABLE 5: Correlative relationship between adherence score and social-demographic characteristics of respondents**

| PARAMETERS | N | PEARSON'S CORRELATION. | P-VALUE |
|---|---|---|---|
| Age of respondent | 492 | 0.212** | ≤0.0001 |
| Educational level | 496 | -0.113* | 0.012 |
| Monthly income | 490 | -0.191** | ≤0.0001 |
| Duration of HBP | 493 | 0.129** | 0.004 |
| General health status | 495 | -0.069 | 0.127 |
| SBP | 124 | -0.293** | 0.001 |
| DBP | 123 | -0.221* | 0.014 |

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

A correlative relationship was determined between reported factors of non-adherence and the adherence scores of respondents. It revealed statistically significant negative correlation between adherence scores and factors such as side effects of drugs (p=<0.0001), disrupted family structure (p=0.034), forgetfulness (p=<0.0001), lack of trust in the provider (p=0.021) and negative attitude to treatment (p=<0.0001).

**TABLE 6: Correlative relationship of non-adherence factors and adherence scores**

| FACTORS | N | PEARSONS' CORRELATION | P-VALUES |
|---|---|---|---|
| Low literacy level/rates | 492 | -0.058 | 0.197 |
| Side effects of drugs | 493 | -0.376** | ≤0.0001 |
| Disrupted family structure | 492 | -0.096* | 0.034 |
| Peer pressure/influence | 492 | -0.105 | 0.019 |
| Forgetfulness | 492 | -0.371** | ≤0.0001 |
| Cost of medication | 494 | -0.086 | 0.057 |
| Poor access to care | 493 | -0.054 | 0.229 |
| Poor patient-provider communication | 491 | -0.073 | 0.106 |
| Lack of trust in the Provider | 491 | -0.104* | 0.021 |
| Negative attitudes toward the prescriber | 490 | -0.086 | 0.056 |
| Negative Attitudes to treatment | 490 | -0.263** | ≤0.0001 |
| Depression | 490 | -0.254** | ≤0.0001 |
| Feeling of wellness | 492 | -0.361** | ≤0.0001 |

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

## DISCUSSION

This study revealed that overall, self-reported medication adherence was low among hypertensive subjects; with a medication adherence of about 40-50%. The difference in medication adherence between the two groups was observed to be statistically significant (p= 0.011); however, the difference in adherence score between the two groups did not correspond with the point-of-care BP readings, as the NHIS group had statistically significant lower (p=0.001) systolic BP readings. This indicates that adherence level is not necessarily the only factor that has to do with the level of blood pressure control. Other studies have corroborated this view. For instance, some systematic reviews revealed that there was not enough convincing empirical evidence to support the hypothesis that poor drug adherence accounted for the inadequate control of BP in most patients.[27,28] Other studies have been carried out that reported this inverse relationship among their patients.[29,30]

Forgetfulness and perceived improvement in health were cited by the respondents in the NHIS group as the major factors hindering adherence. These barriers to adherence were by no means limited to the NHIS enrollees, or any single group of patients. Some of these findings were similarly reported in previous studies.[31,32] A study conducted in Nigeria in 2004 reported that only about 30% of patients suffering from hypertension knew that the disease should ideally be treated for life while 58.3% believed that antihypertensive drugs should be used only where there are 'symptoms'.[33] Though it has been suggested that it is sometimes possible to withdraw drug therapy and continue lifestyle-modification after several years, the consensus is that almost all who are

hypertensive before treatment will become hypertensive again if treatment is stopped.[34]

The major barriers to adherence cited by most respondents of the non-NHIS group were poor access to care and cost of medication. This was evidenced by the difference in management or the two classes of patients by the hospital. The NHIS patients have a dedicated clinic in Federal Medical Center, Umuahia which is equipped with an electronic portal that facilitates access to care for the enrollees. Non-enrollees of the NHIS do not have such facilities, and have to make do with the manual processes. In addition, cost of medication was noted as a barrier to adherence for the non-NHIS respondents, albeit a non-significant one. Most of the respondents in the NHIS group did not report cost of medication as a major hindrance to adherence. This agrees with a study which reported increased medication adherence level because 88% of the patients had some form of health insurance, indicating that the cost of medications was not likely an important barrier to adherence.[35] However, it is worthwhile to note that even patients who enjoy the NHIS would still have to pay directly for certain medical services and drugs. Other studies report that medication cost and lack of insurance coverage can affect medication adherence.[36,37]

This current study also revealed that, when the respondents were considered as a single uniform group, higher medication adherence was associated with socio-demographic factors such as age, educational level, and monthly income, and duration of disease. Other studies have reported improving medication adherence with increasing age.[38,39] A statistically significant negative association was established between achievement of BP control and self-reported drug adherence (p=0.001), implying that poor medication adherence was implicated in uncontrolled blood pressure in the respondents. These findings concur with a number of other studies carried out all over the world.[40,41] While it does sound logical to imply that failure to adhere to prescribed medications would be a direct cause of failure to achieve BP control, experts argue that issues involved in BP control are of a highly complex nature and cannot be broken down as simplistically as that.[39] However, an inverse relationship was drawn between adherence score and several factors including side effects of drugs. The identification of side-effects due to drugs taken represents another cause of non-adherence to treatment. This finding lays credence to the submission that a primary reason given for stopping medication relates to adverse effects.[42]

Social support networks are important in the long-term management of chronic conditions, such as hypertension, which requires a radical and life-long change in the lifestyle of the affected person. In the present study, respondents reported a disrupted family structure such as living alone as a significant influence causing lower adherence to treatment. This is an important finding and is consistent with other studies conducted in Nigeria which have reported the influence of social support networks on antihypertensive medication adherence; one such study reported that support from friends is a stronger factor influencing high self-reported compliance than support from family members.[34]

Finally, the absence of a statistically significant association (p=0.057) between the adherence scores and the cost of medication is unexpected as it was indicated as a barrier to adherence by most of the non-NHIS enrollees, and even some of the NHIS enrollees. Other studies have documented issues of socioeconomic status of patients and reported that financial hardship is a significant barrier to complying with treatment and is a contributory factor to non-compliance.[34,43] Furthermore, this study reported a statistically significant lower adherence score (p=0.011) in the NHIS group despite associated lower cost of medication, and this concurs with studies which indicated that access to health insurance surprisingly showed significant association with medication non-adherence.[2] While the findings in this study differ from the observed association among poor adherence and lack of funds for the purchase of drugs reported by other studies,[34,43] they strongly suggest that cost may not be the most important determinant of medication nonadherence, as observed in a study carried out in a setting in which antihypertensives were offered for free, where it was noted that BP control was just marginally higher than in settings where medications were not given for free.[44] Further studies are needed to comprehensively evaluate this relationship between cost of medication, health insurance and adherence.

Several limitations of the study need to be noted. First, the sample was taken from out-patient clinics in a tertiary hospital setting only. Patients' characteristics may differ in other settings such as inpatient care, or community settings, hence limiting its representativeness. Secondly, assessment of medication adherence in this study involved self-reported measures which depend largely on individuals' memory, and so, recall bias may exist. Inclusion of other methods, such as pill-counts or

medication refill records may have helped to more accurately assess medication adherence, but this was not feasible due to frequent non-availability of medication in the hospital during the course of the study. Nonetheless, the study provides valuable information on the burden of medication non-adherence among hypertensive patients, particularly the association between health insurance and non-adherence.

## CONCLUSION

It was discovered from this study that adherence to antihypertensive medication was generally low and was related to advanced age, longer duration of hypertension, lower income and lower educational level. Enrollment in the NHIS was not observed to be associated with a better medication adherence level despite the reduced cost of medication. Significant barriers to adherence elucidated by this study included: side effects of medication, disrupted family structure, forgetfulness, negative attitude toward treatment, and improving state of health. Cost of medication was not found to be a statistically significant barrier to adherence in this study.

## ACKNOWLEDGEMENT

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