


# The Influence of National Health Insurance on Medication Adherence Among Outpatient Type 2 Diabetics in Southwest Nigeria

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Saka S Ajibola, MPharm, FPCPharm<sup>1</sup>  
and Fajemirokun O Timothy, BSc, Pharm D, FPC Pharm<sup>1</sup>

## Abstract

**Purpose:** Medication adherence (MA) is a challenge among patients with chronic diseases worldwide. Little has been reported on the influence of National Health Insurance Scheme (NHIS) on MA among diabetic patients in Nigeria. **Objective:** To assess the influence of NHIS on MA among outpatient type 2 diabetics in 2 public secondary health facilities in Southwest Nigeria. **Method:** A cross-sectional study involving 110 consecutively selected outpatient type 2 diabetics (insured, n = 42; uninsured, n = 68) was carried out. The patients' perceptions of care and the influence of drug cost on MA between the insured and uninsured were compared. The patients' perceptions of care were assessed using a 25-item pretested questionnaire. The MA was measured using the Morisky MA-8 scale. The use of oral antidiabetic drugs (OADs) was evaluated using a medical chart review. Information about patients' sociodemographics, year of diagnosis, comorbidities, and types of OADs prescribed was retrieved from the medical records. Descriptive statistics were used for data presentation. A Pearson  $\chi^2$  was used for test of associations. *P* values < .05 were considered significant. **Results:** Majority of the respondents (68 [61.8%]) were uninsured. The insured and the uninsured patients differed in their perceptions of the adequacy of time used by pharmacists for medication counseling (*P* < .0005). The MA between the groups also differs (*P* = .0002). The monthly drug cost for OADs was significantly associated with MA (*P* = .037). **Conclusion:** The study concluded that the NHIS may positively influence MA among diabetic patients. The drug cost may have contributed significantly to the difference in MA between the groups. More time should be devoted to the counseling of the uninsured patients.

## Keywords

impact, insurance, medication adherence, diabetes

## Introduction

Medication nonadherence is an established therapeutic challenge and a dilemma to both the patients and the health-care providers. It contributes to a reduction in the patients' quality of life and increases both the individual's and nations' health-care expenditures (1,2). The multifactorial nature of medication nonadherence makes proffering an effective solution a challenge. Many factors such as patients' forgetfulness, medication side effects, health system structure, social support, and health-care providers' attitude and skills have been documented to influence patients' medication adherence (3–6). A high cost of drugs and high patients' out-of-pocket drug cost payment have been consistently linked with medication nonadherence in many disease conditions (7). The influence of drug cost on MA is indeed vital

in a country such as Nigeria, where it is established that the drug cost accounts for more than two-thirds of the costs of treating chronic diseases (8). The National Health Insurance Scheme (NHIS) was thus proffered by many stakeholders in health care including the World Health Organization as a solution to improving patients' accessibility to drugs and health-care services (7).

<sup>1</sup> Department of Clinical Pharmacy/Biopharmacy, Olabisi Onabanjo University, Sagamu Campus, Ogun State, Nigeria

## Corresponding Author:

Saka S. Ajibola, Department of Clinical Pharmacy/Biopharmacy, Olabisi Onabanjo University, Sagamu Campus, Ogun State, Nigeria.  
Emails: sulsak01@yahoo.com; ajibola.saka@oouagoiwoye.edu.ng



Evidence has since shown that the NHIS improves health-care accessibility and reduces catastrophic spending on drugs in many health-care settings (9,10). This increase in health-care access can however not be assumed to have improved the health care of the population. For instance, a study in Quebec showed that having a health insurance cover with a small co-payment did not contribute to a reduction in death, heart failure, and angina among patients with chronic diseases (11). Nigeria, a middle-income nation, commenced the implementation of the NHIS more than a decade ago. The scheme presently covers about 8% of the estimated 170 million of the country's population, mainly those in the formal sectors of the economy (12). The premium in the Nigerian NHIS is shared between the employees (deducted from the monthly pay) and the employers. The enrollees are however expected to pay 10% of their total bills on accessing care at the point of service. The NHIS in Nigeria is still in its infancy, and studies of its impacts on the health of the population have been largely restricted to acceptability and sustainability, while its impact on medication therapy problems such as MA and patients' clinical outcomes has remained largely unexplored (13,14). The MA traditionally has been determined using pill counts and self-reported questionnaires. The use of a standardized self-reported questionnaire has however gained a wider acceptance among researchers in comparison to other methods due to its low cost and time expenditure (15). The Morisky MA-8 scale (MMA-8) is a standardized self-reported scale, which has been widely used by many researchers and acknowledged for its high reliability and validity in MA measurement (15–17).

Nigeria is presently witnessing a high morbidity and mortality among type 2 diabetics, with estimated 4 million people living with the disease (18). The clinical outcome in diabetes care is known to be largely dependent on patients' MA (19), and the effect of any health policy on MA should, therefore, be of a great concern to the stakeholders. Presently, less than 20% of the diabetics in Nigeria are covered by the NHIS (20). The MA is a public health issue, and in view of the little reports from the low- and middle-income countries and the conflicting reports from the developed world of the influence of health insurance on MA, there is the need for a further study. This study aims to evaluate the influence of the NHIS on MA among diabetic patients in Southwest Nigeria.

## Method

This study was cross-sectional, involving 110 consecutively selected type 2 insured and uninsured diabetic patients, who attended the outpatient diabetes clinics of the State Hospital Ijebu-Ode and Jericho Nursing Home, Ibadan, between May and September 2015. The 2 secondary health-care facilities are situated in the southwest, Nigeria. The clinics had no diabetologist at the time of the study but were manned by physicians who had been trained in diabetes care. The hospitals had 169 (insured = 61; uninsured = 108) registered

diabetics at the time of the study. A sample size of 118 was considered adequate by the statistician. One hundred forty-six type 2 diabetics who met the study inclusion criteria were approached for participation in the study. The inclusion criteria were (1) being a type 2 diabetic patient, (2) being on oral antidiabetic agents, and (3) had at least 4 diabetes clinic visits prior to the time of the study. Exclusion criteria were (1) nonconsenting type 2 diabetic patients, (2) those transferred to another level of care, (3) those who were unable to answer the questionnaire, based on vision and hearing problems, and (4) inappropriately filled or unreturned questionnaire. A total of 120 copies of a questionnaire which took about 10 minutes to complete was administered to the participants while waiting for the consultation with the physicians. The diabetes clinics held twice in a week in the hospitals. The study was approved by the Olabisi Onabanjo University Teaching Hospital Health Research Ethics Committee (OOUTH/HREC/3/007) and the Ethics Review Committee of Ogun State Ministry of Health. The hospitals' authorities also gave approval for the study. The study was a part of the research evaluating the impacts of Nigerian NHIS on the quality of care and patients' clinical outcomes. Data were analyzed using Statistical Package for Social Sciences (SPSS version 18). *P* values < .05 were considered significant

## Evaluation of Patients' Perceptions of Cost and Pharmaceutical Care Services

A pretested 25-item questionnaire which was sectioned into 3 parts was used. Seven questions assessed the patients' socioeconomic demographics, 6 questions evaluated patients' perceptions of the effects of cost on oral antidiabetic drugs (OADs) accessibility, while 12 questions assessed patients' perceptions of selected pharmaceutical care (PC) services using a 5-point Likert scale "never to very often." Based on the response received, the scale was compressed to 3 with the option "never" removed and "very often" and "often" merged and recoded "always" in the result presentation. The questionnaire was validated by an academic and 2 clinical pharmacists. The participants' responses were tagged and coded to match the identity on their medical records. Descriptive statistics were used to present the sociodemographic parameters. The differences in patients' perceptions of care were analyzed using Pearson  $\chi^2$  test.

## Medication Adherence

The MMA-8 questionnaire was used to assess MA. The MMA-8 categorizes MA based on the summated score of the patient responses to the adherence questions. High and medium adherences were considered adequate in this study. The association between patients' monthly payments for OADs and MA was analyzed using Pearson  $\chi^2$  test.

## Oral Antidiabetes Drug Utilization and Patients' Clinical Outcomes

The medical records of the participants were retrieved immediately after consultation with the physicians and cross matched with the code on the questionnaire. Information such as patients' sociodemography, comorbidities, number and names of OADs on the prescription, fasting blood glucose (FBG) on diagnosis, last FBG, year of diagnosis, duration on the insurance plan, among others, were extracted and evaluated. The blood glucose control was defined as the last FBG below 110 mg/dL (6.1 mmol/L). The mean number of drugs per prescription was determined. The differences in means of drugs per prescription and last FBG for both the insured and the uninsured were analyzed using *t* test. The relationship between the number of drugs prescribed and MA was determined using the  $\chi^2$  test.

## Results

### Selection of Study Participants

Of 146 diabetic patients who met the inclusion criteria, 26 (17.8%) were excluded: 7 due to referral to a higher level of care, 5 due to impairments, and 14 refused to give consent, leaving only 120 patients who were administered the questionnaire. Only 110 (91.7%) of the 120 questionnaires distributed were eventually analyzed. The remaining was either not properly filled (6) or not returned (4). The valid respondents were subsequently used in other stages of the study.

### Socioeconomic Demographics of the Respondents

The majority of the respondents (68 [61.8%]) were uninsured, 75 (68.2%) earned below ₦50 000 monthly, and 39 (35.5%) aged 60 years and above (Table 1).

The majority of the uninsured respondents (51 [75.0%] of 68) were self-financed; (28) (66.7%) of 42 insured respondents were primary beneficiaries in the NHIS; and (29) (69.0%) of 42 of the insured had been on NHIS for greater than 5 years. The medical chart review showed that many of the participants (41 [60.3%] of 68) uninsured and 16 (38.1%) of 42 insured had been on OADs for more than 5 years; 22 (52.4%) of 42 insured and 47 (60.3%) of 68 uninsured had the last FBG above 6.1 mmol/L, with no significant difference between the groups ( $P = .673$ ).

### Respondents' Perceptions of the Effect of Cost of OAD

Only 14 (12.8%) of the 101 respondents who knew their monthly cost of OADS claimed to spend less than ₦1000 (equivalent <\$3). There was a significant difference in the monthly cost of OADS ( $P = .0001$ ) between the insured and the uninsured patients. The monthly cost of OADS is as shown in Table 2

The majority of (27 [64.3%] of 42) the insured respondents have had to miss their drugs due to inability to pay for the OADS. The uninsured respondents (39 [57.4%;  $P = .062$ ]

**Table 1.** Socioeconomic Demographics of the Respondents.<sup>a</sup>

Variables	Insured, n (%)	Uninsured, n (%)	P Value
Gender			
Male	21 (50.0%)	33 (48.5%)	.538
Female	21 (50.0%)	35 (51.5%)	
Age, years			
30-39	2 (4.8%)	8 (11.8%)	.001
40-49	16 (38.1%)	8 (11.8%)	
50-59	19 (45.2%)	18 (26.5%)	
60 and above	5 (11.9%)	34 (50.0%)	
Marital status			
Single	8 (19.0%)	20 (29.4%)	.017
Married	34 (81.0%)	48 (70.6%)	
Education qualification			
No schooling	5 (11.9%)	12 (17.6%)	.006
Primary	2 (4.8%)	21 (30.9%)	
Secondary	11 (26.2%)	15 (22.1%)	
Post-secondary	24 (57.1%)	20 (29.4%)	
Monthly income			
Below ₦20 000	4 (9.5%)	19 (27.9%)	.001
₦20 000-₦29 000	3 (7.1%)	24 (35.3%)	
₦30 000-₦39 000	7 (16.7%)	5 (7.4%)	
₦40 000-₦49 000	7 (16.7%)	6 (8.8%)	
₦50 000	21 (50.0%)	14 (20.6%)	

<sup>a</sup>n indicates the number of participants and % indicates the percentage of frequency.

**Table 2.** The Monthly Cost of Oral Antidiabetic Drugs Among the Participants.<sup>a</sup>

Cost of Medication (\$ Equivalents) <sup>b</sup>	Insured, n (%)	Uninsured, n (%)	P Value
Below ₦1000 (< \$3)	9 (21.4%)	5 (7.4%)	.0001
₦1000-₦1999 (\$6)	18 (42.9%)	15 (22.1%)	
₦2000-₦2999 (\$9)	5 (11.9%)	21 (30.9%)	
₦3000 and above (>\$9)	9 (21.4%)	19 (27.9%)	
I don't know	1 (2.4%)	8 (11.8%)	

<sup>a</sup>n indicates the number of respondents and % indicates the percentage of frequency.

<sup>b</sup>Calculated at ₦350 per dollar.

of 68) perceived drug stock out; the insured respondents (21 [50.0%;  $P = .046$ ] of 42) perceived long waiting time as a major factor contributing to their nonpurchase of OADS in the facilities.

### Patients' Perceptions of PC

Fifty-eight (53.7%) of the 108 respondents who answered questions on the adequacy of counseling time considered the time adequate always; 92 (85.2%) of 108 claimed that the pharmacists emphasized the importance of MA always (Table 3).

### Income and Cost of Medication versus MA

Respondents with monthly income below ₦20 000 had lowest MA ( $P = .580$ ). Only 12 (10.9%) respondents had high adherence on the MMA-8 scale (Table 4).

**Table 3.** Respondents Opinion About Some Pharmaceutical Care Activities Offered by Pharmacists.<sup>a</sup>

Pharmaceutical Care Activities	Patients' Categories	Frequency of Services			$\chi^2$ Value	P Values <sup>b</sup>
		Always, n (%)	Sometimes, n (%)	Rarely, n (%)		
Willingness to answer patients' questions (N = 110)	Uninsured (n = 68); insured (n = 42)	57 (83.8); 38 (90.5)	8 (11.8); 4 (9.5)	3 (4.4); 0 (0%)	2.11	.349
Counseling on medication (N = 102)	Uninsured (n = 65); insured (n = 37)	39 (60.0); 16 (43.2)	21 (32.3); 18 (48.6)	5 (7.7); 3 (8.1)	2.88	.237
Adequacy of counseling time (N = 108)	Uninsured (n = 67); insured (n = 41)	38 (56.7%); 20 (48.8)	12 (17.9); 20 (48.8)	17 (25.4); 1 (2.4)	16.51	<.0005
Enquiry about adherence to nonpharmacological treatment (N = 105)	Uninsured (n = 66); insured (n = 39)	6 (9.1); 11 (28.2)	12 (18.2); 12 (30.8)	48 (72.7); 16 (41.0)	11.27	.004
Enquiry about the last laboratory investigation (N = 100)	Uninsured (n = 62); insured (n = 38)	6 (9.7); 2 (5.3)	7 (11.3); 6 (15.8)	49 (79.0); 30 (78.9)	2.54	.281
Education of family members about diabetes (N = 104)	Uninsured (n = 63); insured (n = 41)	10 (15.9); 6 (14.6)	14 (22.2); 5 (12.2)	39 (61.9); 30 (73.1)	1.87	.393
Explanation of therapeutic goal to the patient (N = 108)	Uninsured (n = 68); Insured (n = 40)	22 (32.4); 14 (35.0)	11 (16.2); 4 (10.0)	36 (52.9); 22 (55.0)	0.71	.700
Emphasis on medication adherence (N = 108)	Uninsured (n = 67); insured (n = 41)	56 (83.6); 36 (87.8)	7 (10.4); 4 (9.8)	4 (6.0); 1 (2.4)	0.75	.687
Encouragement about self-monitoring of blood glucose (N = 108)	Uninsured (n = 67); insured (n = 41)	35 (52.2); 38 (92.7)	8 (11.9); 2 (4.9)	24 (35.8); 1 (2.4)	19.77	<.0005
Enquiry about patients' experience of OADs (N = 105)	Uninsured (n = 64); insured (n = 41)	31 (48.4); 23 (56.1)	16 (25.0); 16 (39.0)	17 (26.6); 2 (4.9)	8.39	.015
Provision of dosage form (N = 106)	Uninsured (n = 65); insured (n = 41)	61 (93.8); 40 (97.6)	4 (6.2); 1 (2.4)	0 (0.0); 0 (0.0)	0.77	.680

Abbreviation: OADs, oral antidiabetic drugs.

<sup>a</sup>n indicates the number of valid respondents and % indicates the percentage frequency calculated based on the number of valid respondents.

<sup>b</sup> $\chi^2$  P value for analysis of difference in opinions between insured and the uninsured. Only valid responses were considered for analysis.

Age and educational qualification were not significantly associated with MA,  $P = .282$  and  $P = .394$ , respectively. The majority (78 [70.9%] of 110) of the respondents had more than 4 drugs per prescriptions (mean  $\pm$  SD;  $5.138 \pm 1.565$ ,  $P = .067$ ). Metformin accounted for 110 (50.2%) of the 219 OADs encounters, glibenclamide 97 (44.3%), and pioglitazone 12 (5.5%). The insured received 10 (83.3%) of the 12 pioglitazone prescriptions. The patients' monthly cost of OADs was significantly associated with MA ( $P = .037$ ). The number of drugs prescribed and the last FBG were not significantly associated with MA ( $P = .092$  and  $P = .594$ , respectively).

## Discussion

Previous studies on the influence of NHIS on MA in the developed countries reported conflicting results (21,22). This study, however, showed that NHIS may influence MA. The insured in this study had significantly higher MA than their uninsured counterparts. The difference in the monthly cost of drugs between the insured and the uninsured patients may have contributed to the difference in the MA between the groups. This study finding indicates the

**Table 4.** Income, Cost of Medication, Insurance Status, and Medication Adherence.<sup>a</sup>

Variables	Medication Adherence			P Value <sup>c</sup>
	High, n (%)	Medium, n (%)	Low, n (%)	
Income <sup>b</sup>				.58
< ₦20 000 (<60)	0 (0.0)	10 (43.5)	13 (56.5)	
₦20 000-₦29 000 (<90)	0 (0.0)	12 (44.4)	15 (55.6)	
₦30 000-₦39 000 (<120)	2 (16.7)	4 (33.3)	6 (50.0)	
₦40 000-₦49 000 (<140)	2 (15.4)	5 (38.5)	6 (46.2)	
₦50 000 and above (>150)	5 (14.3)	13 (37.1)	17 (48.6)	
Cost of medication, monthly				.037
< ₦1000(<3)	7 (50.0)	3 (21.4)	4 (28.6)	
₦1000-₦1999(6)	25 (75.8)	5 (15.2)	3 (9.1)	
₦2000-₦2999(9)	9 (34.6)	14 (53.8)	3 (11.5)	
₦3000 and above (>9)	2 (7.1)	12 (42.9)	14 (50.0)	
I don't know	0 (0.0)	5 (55.6)	4 (44.4)	
Insurance status				.0002
Insured	9 (21.4)	22 (52.4)	11 (26.2)	
Uninsured	3 (4.4)	22 (32.4)	43 (63.2)	

<sup>a</sup>n indicates the number of respondents and % indicates the percentage frequency of valid respondents.

<sup>b</sup>Cost presented in Naira (\$ equivalent). Calculated at ₦350 per dollar.

<sup>c</sup> $\chi^2$  value.

necessity of scaling up NHIS to cover more type 2 diabetic patients in Nigeria. The MA in this study was, however, lower than previously reported in the country (8,23). The different settings could have accounted for the observed differences. The earlier studies were carried out among patients attending tertiary health facilities, who could have had better medication information and treatments to aid their MA.

Although the insured patients pay just 10% of the drug bills, the majority claimed it contributed to their nonaccessibility of OADs. This finding contradicts the conclusion of a review on the impact of drug co-payment on drug utilization by patients (10). This co-payment fees being paid by the insured patients can be a hindrance to achieving adequate MA among the patients. The policymakers will need to consider this observation in the review of the NHIS. A payment plan based on the individual income should be considered. This suggestion is based on the finding of the study that the effect of the cost of medication on MA may be more significant among diabetic patients with low monthly incomes.

The NHIS appears not to have influenced the availability of OADs in the health-care facilities. The majority of the insured patients claimed OADs were not sometimes available in the health-care facilities. Inability to access medications at the health-care facility has a potentially negative effect on MA, considering that some of the patients may be discouraged from honoring their future clinic appointments. The insured patients compared with the uninsured considered waiting time to be long in the facilities and this contributed to their inability to purchase OADs in the facilities. The bureaucratic processes involved in the documentation of NHIS patients' medication could have been responsible for this observation. Waiting time has been shown to have a potentially negative effect on patients' MA (3).

The study observed a negative influence of the NHIS on the pharmacist-patient relationship. Pharmacists appeared to favor the uninsured patients with regard to the counselling time and the quality of medication information provided. This discriminatory practices may potentially erode the insured patients' trust in the pharmacists, which may consequently affect the patients' MA. Inadequate time for medication counseling can result in poor understanding of medication use by the patients, and this has been reported to be a major cause of medication nonadherence in patients (4).

The association between the number of drugs and patients' MA has been inconsistent in the literature (19). This study, however, did not find any significant association between the number of drugs prescribed and the MA, in contradiction of the report of an earlier study in the country (23). There was no difference in the number of drugs prescribed to both the insured and the uninsured patients in this study, which may indicate that the NHIS did not negatively influence the prescribing habits of the physicians. This study, however, took note that the insured patients received a more expensive and more toxic drug, pioglitazone than the

uninsured. This observation is of concern, especially when there was no indication for its use in the patients' medical records. Prescription of expensive drugs may potentially reduce patients' MA through an increase in the expenses on medication. The side effects of pioglitazone may also contribute to medication nonadherence in the patients (3,24).

The blood glucose control in the patients was not significantly associated with both the patients' insurance status and MA. This supports the conclusion of the report of a similar study in Nigeria that MA alone may not account for blood glucose control in type 2 diabetes (25).

The use of only public health facilities is a limitation in the study since there are many NHIS accredited private health-care facilities offering diabetic care in the country. The use of a self-report tool (MMA-8) is subject to recall bias and patients tend to overestimate their adherence. These limitations should, therefore, be considered in the generalization of the results.

## Conclusion

The study concluded that the NHIS may influence patients' MA. There was a difference in MA between the insured and the uninsured diabetic patients. This difference in MA could be due to the difference in the monthly cost of OADs between the groups. A nationwide study is needed for a further evaluation of the influence of the scheme on MA.

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## References

1. Blackburn DF, Swidrovich J, Lemstra M. Nonadherence in type 2 diabetes: practical considerations for interpreting the literature. *Patient Prefer Adherence*. 2013;7:183-9.
2. Iuga AO, McGuire MJ. Adherence and health care costs. *Risk Manag Health Policy*. 2014;7:35-44.
3. Ho PM, Bryson CL, Rumsfeld JS. Medication adherence: its importance in cardiovascular outcomes. *Circulation*. 2009;119:3028-35. doi:10.1161/CIRCULATIONAHA.108.768986.
4. Brunton S, Gough S, Hicks D, Weng J, Moghissi E, Peyrot M, et al. A look into the future: improving diabetes care by 2015. *Curr Med Res Opin*. 2011;27:65-72.
5. Braithwaite S, Shirkhorsidian I, Jones K, Johnsrud M. The role of medication adherence in the US healthcare system. 2013.

- Retrieved November 24, 2015, Available from: <http://sttic.correofarmaceutico.com/docs/2013/06/24>.
6. Khosravizade HT, Madarshahian F, Nikoo MK, Hassanabadi M, Mahmoudirad G. Impact of family support improvement behaviors on anti-diabetic medication adherence and cognition in type 2 diabetic patients. *J Diabetes Metab Disord*. 2014;13:113.
  7. Chernew ME, Shah MR, Wegh A, Rosenberg SN, Juster IA, Rosen AB, et al. Impact of decreasing co-payments on medication adherence within a disease management environment. *Health Affairs (Project Hope)*. 2008;27:104-112.
  8. Fadare J, Olamoyegun M, Gbadegesin BA. Medication adherence and direct treatment cost among diabetes patients attending a tertiary healthcare facility in Ogbomosho, Nigeria. *Malawi Med J*. 2015;27:65-70.
  9. Lee Y, Hung Y, Tsai Y, Huang S, Kuo K, Mckee M, et al. The impact of universal national health insurance on population health: the experience of Taiwan. *BMC Health Serv Res*. 2010;10:225.
  10. Mann BS, Barnieh L, Tang K, Campbell DJT, Clement F, Hemmelgan B, et al. Association between drug insurance cost sharing strategies and outcomes in patients with chronic diseases. A systematic review. *PloS One*. 2014;9: e89168. doi:10.1371/journal.pone.0089168.
  11. Pilote L, Beck C, Richard H, Eisenberg MJ. The effects of cost-sharing on essential drug prescriptions, utilization of medical care and outcomes after acute myocardial infarction in elderly patients. *CMAJ*. 2002;167:246-52.
  12. Onoka CA, Hanson K, Hanefeld J. Towards a universal coverage: a policy analysis of the development of the National Health Insurance Scheme in Nigeria. *Health Policy Plan*. 2014;21:1-13. doi:10.1093/heapol/czu116.
  13. Agba AM, Ushie EM, Osuchukwu NC. National Health Insurance Scheme (NHIS) and employees' access to healthcare services in cross river state, Nigeria. *Glob J Hum Soc Sci*. 2010; 10:9-16.
  14. Soors W, Davadasan N, Durairaj V, Criel B. Community Health Insurance and Universal Coverage: Multiple paths, many rivers to cross (World Health Report 2010 Background Paper 48). Geneva, Switzerland: World Health Organization; 2010.
  15. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)*. 2008;10:348-54.
  16. Al-Qazaz HK, Hassali MA, Shafie AA, Sulaiman SA, Sundram S, Morisky DE. The eight item Morisky Medication Adherence Scale MMAS: translation and validation of the Malaysian version. *Diabetes Res Clin Pract*. 2010;90:216-21.
  17. Ajayi EA, Adeoti AO, Ajayi IA, Ajayi AO, Adeyeye VO. Adherence to antihypertensive medications and some of its clinical implications in patients seen at a tertiary hospital in Nigeria. *IOSR J Dent Med Sci*. 2013;8:36-40.
  18. Ogbera AO, Ekpebegh C. Diabetes mellitus in Nigeria: the past, present and future. *World J Diabetes*. 2014;5:905-11.
  19. Ahmad NS, Ramil A, Islahudin F, Paraidathathu T. Medication adherence in patients with type 2 diabetes mellitus treated at primary health clinics in Malaysia. *Patient Prefer Adherence*. 2013;7:525-30.
  20. Nwankwo CH, Nandy B, Nwankwo BO. Factors influencing diabetes management outcome among patients attending government health facilities in south-east Nigeria. *Int J Trop Med*. 2010;5:28-36.
  21. Schneeweiss S, Patrick AR, Maclure M, Dormuth CR, Glynn RJ. Adherence to beta blocker therapy under drug cost sharing in patients with and without acute myocardial infarction. *Am J Manag Care*. 2007;13:445-52.
  22. Zhang Y, Lave JR, Donohue JM, Fischer MA, Chernew ME, Newhouse JP. The impact of Medicare part D on medication adherence among older adults enrolled in Medicare-Advantage products. *Med Care*. 2010;48:409-17.
  23. Adisa R, Fakeye TO. Effect of number and type of antidiabetes medications on adherence and glycemia of ambulatory type 2 diabetes patients in southwestern Nigeria. *Pharm Pract (Granada)*. 2013;11:156-65.
  24. Sharma S, Tandon VR, Roshimahajan A. Prescribing pattern of oral antihyperglycaemic drugs, rationality and adherence to American Diabetes Association (ADA) treatment guidelines among type 2 diabetes mellitus (T2DM) postmenopausal women. *J Clin Diagn Res*. 2016;10:OC11-OC15. doi:10.7860/JCDR/2016/16044.7063.
  25. Adisa R, Fakeye TO, Fasanmade AO. Medication adherence among ambulatory patients with type 2 diabetes in a tertiary health care setting in south western Nigeria. *Pharm Pract*. 2011;9:72-81.

### Author Biographies

**Saka S Ajibola** is an fellow of the West African Postgraduate College of Pharmacists and a lecturer in Olabisi Onabanjo University, Nigeria. He is currently a PhD candidate in the Discipline of Pharmaceutical Sciences, University of KwaZulu-Natal, South Africa. His research interests include Health system analysis, pharmacoepidemiology and geriatric pharmacy.

**Fajemirokun O Timothy** is a senior lecturer in Olabisi Onabanjo University, Ogun State, Nigeria and a fellow of the West African Postgraduate College of Pharmacists. His research interests include Drug information management and pharmacoepidemiology.