THE IMPACT OF NATIONAL HEALTH INSURANCE SCHEME ON CLINICAL PARAMETERS OF DIABETIC AND HYPERTENSIVE CIVIL SERVANTS AND RETIREES IN SOUTH-EAST NIGERIA

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Abstract:
The National Health Insurance Scheme (NHIS) was founded with the aim of ensuring that every Nigerian has access to good healthcare but majority of persons currently covered by NHIS are civil servants who pay only 10% of the cost of their prescribed drugs on consulting a doctor. Hence, the civil servants are motivated to receive effective health care. On the other hand, majority of the retired civil servants are no longer covered by NHIS and would have to exhaust their pension for relatively high cost of treatment for geriatric ailments. Significantly, the high cost of treatment of terminal and/or geriatric illness is one the major causes of adult mortality and untimely death in Nigeria. It is a strong barrier to assessing effective healthcare. Consequently, the health status of many retirees is often debilitating and impacted negatively while that of the civil servants is virile and reasonably secured. Hence, this study aims at determining the impact of NHIS on the clinical parameters of Civil servants and Retirees who are diabetic and hypertensive. The Study was carried out at the Enugu State University of Science and Technology (ESUT) Teaching Hospital, Enugu, Nigeria. 210 patients who met the inclusion criteria were enrolled into the study but only 200 participated till the end of the study. Clinical parameters were collected at baseline (first day of recruiting a patient) and at exit (3 months into the study). Data collected from each participant include: Demographic factors; Blood pressure readings; Fasting Blood Sugar; Random Blood Sugar; Glycosylated haemoglobin; Electrolyte, Urea, Creatinine; lipid profile (High Density Lipoprotein, Low Density Lipoprotein, Very Low Density Lipoproteins, Total Cholesterol, and Triglycerides). Data were analysed using SPSS Version 22.0 software. Characteristics of groups were compared using student t-test for continuous variables. Results were set to be significant at p<0.05.
Keywords: *Insurance, Diabetes, Hypertension, Civil Servants, Retirees, Clinical Parameters, Nigeria.*

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INTRODUCTION:

The NHIS was established under Act 35 of 1999 by the Federal Government of Nigeria which provides social health security in Nigeria for Nigerians. The Scheme is aimed at a) providing and securing easy access to healthcare for all Nigerians at an affordable cost through various prepayment systems; b) NHIS is totally committed to securing universal coverage and access to adequate and affordable healthcare for Nigerians and c) NHIS is committed to improve the health status of Nigerians, especially for those participating in the various programmes/products of the Scheme. (NHIS, 2019)

The Scheme facilitates its programmes and initiatives through various contributory funds made from a common pool of funds contributed regularly by members of the Scheme. These funds enable the Health Maintenance Organizations (HMOs) to pay for medical services needed by participants of the scheme. This scheme also enables resource mobilization and equity through a risk sharing arrangement (NHIS, 2019). The overriding objective of NHIS is health security for all Nigerians and participants of the programme. This is why the NHIS is made up of different programmes to cater for different health needs and capability of the nation (NHIS, 2019).

Programmes and Deliverables:

The Formal Sector Social Health Insurance Programme is a social health security system in Nigeria which ensures total health care of employees in the Formal Sector through divergent healthcare delivery systems and funded through consolidated salary scheme contributions from both the employer and employee. The Formal Sector consists of:
i) The Public Sector;
ii) The Organized Private Sector; and,
iii) The Armed Forces, Police and other uniformed services.
For Public sector programme, the Federal government pays 3.5 per cent while the employee pays 1.75 per cent of the employee's consolidated salary. For the Private sector programme and other tiers of Government, the employer pays 10 per cent while the employee pays 5 per cent representing 15 per cent of the employee's basic salary. In some instances, especially among big multinational organizations, the employer may decide to pay the entire contribution and may undertake extra commitment for additional packages as provided by NHIS through the HMOs across all accredited Healthcare facility in Nigeria. According to NHIS, the scope of health security covers the following:

1. The contributions paid cover health care benefits for the employee, a spouse and four (4) biological children below the age of 18 years.
2. More dependants or children above the age of 18 are covered on the payment of additional contributions by the principal beneficiary as determined by NHIS.
3. Principals are entitled to register four (4) biological children each, however a spouse or a child cannot be registered twice. (NHIS Formal Sector Group, 2019)

b. The Informal Sector Social Health Insurance Programme consists of:
i. The Community-based Social Health Insurance Programme (CBSHIP) and,
ii. The Voluntary Contributors Social Health Insurance Programme (VCSHIP).
c. The Vulnerable Group Social Health Insurance Programme covers the following:
 i. Physically challenged persons,
ii. Prison inmates,
iii. Children under five years,
iv. Refugees, victims of human trafficking,
v. internally displaced persons,
vi. Immigrants and,
vii. Pregnant women (Eke, 2018).

Challenges:

Despite the existence of all these programmes in Nigeria, NHIS coverage remains grossly inadequate and largely unable to satisfy the increasing health needs of the Nigerian populace. The latest NHIS coverage level as stated by the Speaker of the House of Representatives, Senator Yakubu Dogara, is about 4-5% and is composed mainly of the formal sector (Dogara, 2017). The formal sector consists of the Civil servants who work across the three tiers of government – the Local government, the State government and the Federal government services but only the Federal Civil servants and their dependants largely benefit from the NHIS in Nigeria (Adekola, 2015). Reasons for this low NHIS coverage are: the informal sector in Nigeria forms 90% of the Nigerian employed population, most of whom are poor, vulnerable and are usually employed in organizations that find it cumbersome to collect contributions for inclusion into the NHIS insurance scheme (Wolfe, 2013; Kazungu & Barasa, 2017). Other reasons are: lack of trust in the government, distrust in public policies and minimal confidence in the NHIS (Donfouet et al, 2011; Jutting, 2003; Chuma , Mulupi & McIntyre, 2013).

Regrettably due to insufficient and/or gross lack of enabling policy or legislative framework, the federal civil servants lose their insurance coverage on

retirement or disengagement from public service. Unfortunately, retirement is the period of life that most individuals suffer most from chronic diseases, such as, diabetes and hypertension, and thus require utmost medical care as elder statesmen (Levitt et al, 1993; Malerbi & Franco, 1992; Taylor et al, 2006). In Nigeria, the cost of treating diabetic and hypertensive patients are high (Ilesanmi, 2012; Enwere, 2002). Expectedly, this high cost of treatment will negatively impact on the health of these retirees since this cost is borne wholly by the retirees, who are no longer under the NHIS or engaged in meaningful jobs. It will be of utmost importance to investigate the health implications of and/or health status of the federal civil servants under NHIS and the retirees without any health insurance scheme. Hence, this study aims at determining the impact of NHIS on Clinical parameters of diabetic and hypertensive civil servants and retirees in Enugu, South-East Nigeria. The clinical parameters to be considered include Blood Pressure, Fasting Blood Sugar (FBS), glycosylated haemoglobin (HbA1C), electrolyte level, urea/creatinine level, and lipid profile.

MATERIAL AND METHODS:
Study Design:
This study was a prospective study with a 3-month follow up period.

Study Setting:
The patients were recruited from the Medical Out Patient Department of the ESUT Teaching Hospital, Enugu. The ESUT Teaching hospital is a State owned tertiary healthcare facility located in Enugu North Local Government Area in Enugu State, South East Nigeria. It has ten specialist clinics, namely: Rheumatology, Nephrology, Haematology, Cardiology, Clinical Pharmacology, Psychology, Endocrinology, Pulmonology and Gastroenterology. Hypertensive clinics are held on Tuesdays and Wednesdays while Diabetes clinics are held on Wednesdays and Fridays. Average number of patients seen in the medical Out-patient Department per day is 83.

Sample Size:
A convenience sample of 210 patients was recruited into the study. However, 200 patients participated till the end of the study.

Study Participants:
Participants who were included in the study consisted of:
I. patients with either hypertension or diabetes mellitus (Type I and Type II) or patients who have both hypertension and diabetes mellitus;
II. Patients who were either federal civil servants or retirees.
III. Patients who are ≥ 50 years.
IV. Patients who gave oral informed consent.
V. Patients who have been on follow up at the ESUT Teaching Hospital.
VI. Patients without other morbidities.

Participants that were excluded from the study consisted of:
I. Patients who did not have hypertension, diabetes mellitus or both;
II. Patients who were not federal civil servants or retirees;
III. Patients who were not up to 50 years of age;
IV. Patients who did not give oral informed consent;
V. Patients who were seeing the doctor on a first appointment basis;
VI. Patients who were pregnant.

Baseline and Exit assessments:
The term 'baseline' as used in this study refers to the first day in which a patient is recruited into the study while the term 'exit' refers to the third month from patient recruitment.

Baseline Assessment:
On the day of patient recruitment, patient demographic information was obtained orally from each patient and recorded in each patient file. Afterwards, the blood pressure reading of each patient was taken with the aid of a sphygmomanometer (Omron M2 Eco Upper arm blood pressure monitor), blood glucose measurements, that is, Fasting Blood Sugar was carried out by a Glucose meter (Accu-check blood glucose meter). Patients' blood samples were collected in heparinized test tubes and sent to the medical laboratory where the following tests were carried out: glycosylated haemoglobin, electrolyte (sodium, potassium and chloride) test, urea/creatinine test, and lipid profile.

Exit Assessment:
On exit, that is, 3 months from the day in which the patient was recruited into the study, the blood pressure readings and Fasting Blood Sugar readings were determined with the same instruments that were used for baseline assessment. All test done in baseline assessment – glycosylated haemoglobin, electrolyte (sodium, potassium and chloride) test, urea/creatinine test and lipid profile were also carried out 3 months from recruitment.

Analysis of Data:
Data was analyzed using SPSS Version 22.0 computer software. Data were summarized as percentages, mean ± standard deviation. Characteristics of groups will be compared using student t-test for continuous variables. Results will be set to be significant at $p<0.05$.

Ethical Consideration:
Ethical clearance was given by the Research Ethical Committee of ESUT Teaching Hospital, Enugu following formal application from the researcher.

RESULTS:
**Demographic and clinical characteristics of patient surveyed**
Out of 210 patients recruited into the study, 200 had complete data. This provided a completion rate of 95.2% during the 3 months follow-up period. Table 1 shows that majority of the respondents were in the age bracket of 60 – 69 years. The gender distribution was almost equal between the female and the male respondents while about 40% of the participants were graduates almost 45% of them were under NHIS coverage. This shows reasonable distribution of research inputs across respondents.

Table 1 Demographic Characteristics of the Participants ($N = 200$)

	N	*%*
Gender		
Female	97	48.5
Male	103	51.5
Body Weight in Kg		
54 and above	4	2.2
55 – 69	74	37.0
70 – 84	100	50.0
85 – 99	13	6.5
100 and above	9	4.3
Age in years		
50 – 59	47	23.5
60 – 69	85	42.5
70 and above	68	34.0
Educational status		
Primary	69	34.5
Secondary	52	26.0
Graduate	79	39.5
Source of financing		
NHIS	90	45.2
OUT of Pocket	110	54.8

Prevalence of HTN-DM co-morbidity:
Figure 1 shows that more than half of the participants (59.7%) had co-morbidity of high blood pressure and diabetes mellitus while 24.2% had diabetes only and 16.1% had hypertension only.
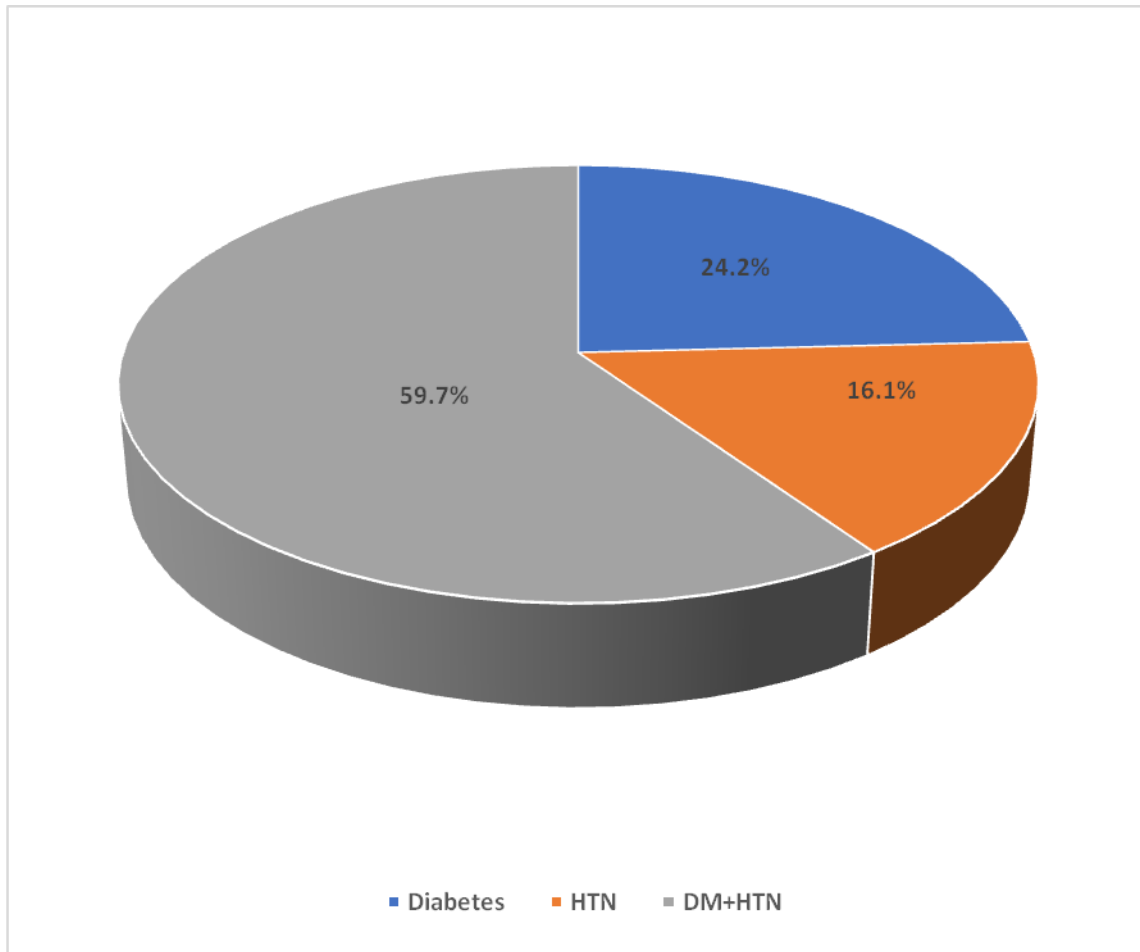
Figure1 Distribution of HTN/DM comorbidity

Mean Clinical laboratory values for Civil Servants and Retirees:
Table 2 showed that the systolic blood pressure for the civil servants changed from 140.93mmHg at baseline to 129.22mmHg on the third month of the study while that of the retirees increased from 139.15mmHg at baseline to 140.27mmHg on exit (the third month of the study). The diastolic blood pressure of the civil servants reduced from 90.07mmHg at baseline to 79.19mmHg on the third month of the study while that of the retirees decreased from 84.48mmHg at baseline to 77.28mmHg on exit.

The Fasting Blood Sugar of the civil servants decreased from 131.37mmHg at baseline to 123.77mmHg on exit whereas the Fasting Blood Sugar of the retirees increased from 156.30 mmHg at baseline to 163.28mmHg on exit. The baseline and exit HbA1c readings for the civil servants were 7.46mg/dl and 7.35mg/dl respectively while the baseline and exit HbA1c readings for the retirees were 7.62mg/dl and 7.45mg/dl respectively.

The baseline and exit sodium levels for the civil servants were 135.54mEq/l and 136.15mEq/l respectively while that of the retirees were 133.59mEq/l and 133.16mEq/l respectively. The baseline and exit potassium levels of the civil servants were 3.98mEq/l and 3.81mEq/l respectively while those of the retirees were 4.06mEq/l and 3.61mEq/l respectively. The chlorine levels of the civil servants were 97.96mEq/l at baseline and 95.00mEq/l on exit. On the other hand, the chlorine levels of the retirees at baseline was 98.78mEq/l while at exit, it was 124.55mEq/l.

The urea levels for civil servants at baseline and exit were 5.36mg/dl and 5.21mg/dl respectively while the urea levels for the retirees were 4.46mg/dl and 4.79mg/dl at baseline and exit respectively. The creatinine levels for the civil servants were 102.34 ml/min and 101.00ml/min at baseline and exit respectively whereas the creatinine levels of the retirees at baseline and exit were 69.69ml/min and 70.95ml/min respectively.

The baseline and exit total cholesterol levels for the civil servants were 5.35mmol/l and 5.34mmol/l respectively while that of the retirees were 6.06mmol/l and 5.98mmol/l respectively. The High density Lipoprotein values at baseline and exit for the civil servants were 1.57mmol/l and 1.99mmol/l respectively. On the other hand, the High density lipoprotein values for the retirees at baseline and at exit were 1.46mmol/l and 1.33mmol/l respectively.

Furthermore, the baseline and exit low density lipoprotein values for the civil servants were 4.01mmol/l and 3.09mmol/l respectively while that of the retirees were 3.87mmol/l and 3.96mmol/l respectively.

Table 2 Respondents' mean Clinical laboratory values for Civil Servants and Retirees

Clinical Parameters	CIVIL SERVANTS		RETIREES	
	Baseline	Exit	Baseline	Exit
1. Blood Pressure				
Systolic Blood Pressure (mmHg)	140.93 ± 19.22	129.22 ±15.43	139.15± 20.97	140.27±29.12
Diastolic Blood Pressure (mmHg)	90.07 ± 10.85	79.19 ± 8.21	84.48 ± 13.01	77.28 ± 15.88
2. Blood Glucose level				
Fasting Blood Sugar (mg/dl)	131.37±42.66	123.77±30.09	156.30±79.03	163.28±79.16
HbA1c (%)	7.46±1.82	7.35±1.93	7.62±1.53	7.45±1.12
3. Electrolyte Test				
Sodium (mEq/l)	135.54±4.26	136.15±3.64	133.59±3.55	133.16±2.81
Potassium (mEq/l)	3.98±0.61	3.81±0.41	4.06±0.68	3.61±0.73
Chlorine (mEq/l)	97.96±6.60	95.00±7.56	98.78±2.94	124.55±2.14
4. Kidney Function				
Urea (mg/dl)	5.36±2.62	5.21±1.92	4.46±1.31	4.79±1.41
Creatinine(ml/min)	102.34±25.08	101.00±21.13	69.69±20.45	70.95±14.91
5. Lipid level				
Total Cholesterol (mmol/l)	5.35±1.78	5.34±1.21	6.06±0.78	5.98±0.63
High Density Lipopoprotein (mmol/l)	1.57±0.53	1.99±2.62	1.46±0.38	1.33±0.30
Low Density Lipoprotein (mmol/l)	4.01±2.50	3.09±0.95	3.87±0.46	3.96±0.39
Total Low Density Lipoprotein (mmol/l)	0.78±0.52	0.76±0.32	0.73±0.21	0.68±0.20
Triglycerides (mmol/l)	1.64±1.06	1.64±0.69	1.57±0.43	1.46±0.41

Normal Values
Systolic Blood Pressure: 140mmHg
Diastolic Blood Pressure: 90mmHg
Fasting Blood Sugar: 126 mg/dl
Glycosylated Haemoglobin, HbA1c : < 7%
Sodium : 135 – 145mEq/l
Potassium : 3.5 – 5.0 mEq/l
Chloride: 96 – 106mEq/l
Urea: 5 – 20 mg/dl
Creatinine: Males; 97 – 13 ml/min
            Females; 88-128ml/min
Total cholesterol: < 5.2mmol/l
High Density Lipoprotein: Males; 1.0 – 1.3mmol/l

Females; 1.3 – 1.5mmol/l

Low Density Lipoprotein: < 2.6mmol/l

Triglycerides: < 1.7mmol/l

HbA1c: <6.5%   (Laposata, 2019; MOH, 2016)

Table 3 displays values that help predict the civil servants' and the retirees' risk of developing heart diseases. On exit, the civil servants had non-HDL cholesterol levels and cholesterol ratio levels of 3.35mmol/l and 2.7:1 respectively whereas the retirees' non-HDL cholesterol levels and cholesterol ratio levels on exit were 4.65mmol/l and 4.5:1 respectively.

TABLE 3 Civil Servants' and retirees' risk of Heart Disease

Clinical Parameters	CIVIL SERVANTS		RETIREES	
	Baseline	**Exit**	**Baseline**	**Exit**
Non-HDL cholesterol level* (mmol/l)	3.78	3.35	4.60	4.65
Cholesterol Ratio**	3.4:1	2.7:1	4.2:1	4.5:1

*Non-HDL cholesterol level=Total Cholesterol –High Density Lipoprotein,
**Cholesterol Ratio= Total Cholesterol/High Density Lipoprotein

Normal Values

Non-HDL cholesterol: ≤ 3.37 mmol/l

Cholesterol Ratio: $\leq 4:1$ (Lopez-Jimenenz, 2019)

Table 4 shows the p-values that were less than the significance level, 0.05, after the student's t-test was carried out.

Table 4 Comparison between baseline and exit clinical characteristics between Civil Servants and Retirees.

Clinical Parameters	T-test (t)	p-value (2 tailed)
Baseline Total Cholesterol	-2.082	0.042
Baseline Creatinine	-5.648	0.000
Exit Sodium	3.521	0.001
Exit Creatinine	6.320	0.000
Exit FBS	-2.374	0.022
Exit Total Cholesterol	-2.552	0.013
Exit Low Density Lipoprotein	-4.692	0.000

DISCUSSION:

This study revealed that the percentage of participants who had both diabetes mellitus and hypertension was higher than the percentage of patients with either diabetes mellitus or hypertension only. Patients with the co-morbidity were greater than a combination of the patients who suffered from diabetes mellitus only and hypertension only. However, the percentage of patients who had diabetes mellitus was greater than the percentage of patients with hypertension.

After assessment of participants' blood pressure at baseline and on the third month of the study, it was discovered that there were improvements in the systolic and diastolic blood pressure of the civil servants on the third month of the study whereas for the retirees there was an increase in their systolic blood pressure while there was a reduction in their diastolic blood pressure. Thus, this indicates that blood pressure control was better among NHIS civil servant participants compared to retirees without the NHIS social health security.

In addition, there was improvement in the fasting blood sugar level for NHIS civil servants when baseline readings were compared with readings taken on the third month of the study. This reading was less than the normal level of 126mg/dl. Conversely, the retirees had significant increase in the fasting blood sugar levels when baseline readings were compared with readings taken on the third month of the study. The readings were remarkably high as they were far above the normal reading of 126mg/dl. This implies that the civil servants had good short term glucose control while the retirees' glucose control in the short term was poor. Although HbA1c readings decreased for both the civil servants and retirees on the third month of the study, the readings were higher than 7%. The implication is that the long-term diabetic control of the participants, both civil servants and retirees was poor.

Furthermore, the sodium levels for the civil servants were within the normal range, while the sodium levels of the retirees were less than the normal range. The exit sodium level of the retirees was statistically significantly different from the exit sodium level of the civil servants. Low sodium levels in the retirees, implies that the retirees may be more prone to brain swelling and intra cranial hypertension which may proceed to seizures, coma, and respiratory arrest. This may eventually lead to permanent brain damage or death if hyponatraemia is not managed (Adrogue and Madias, 2012). The potassium levels for both the civil servants and the retirees at baseline and on the

third month of the study were within the normal range. This implies that both the civil servants and retirees may be less prone to developing life-threatening heart rhythm (Goyal et al, 2012). On the other hand, the chloride levels of the civil servants were within the normal range at baseline and the third month of the study, whereas only the baseline chloride levels of the retirees were within the normal range. Hence, on the third month of the study, the retirees' chloride levels were greater than the normal chloride values. This is an indication that the retirees might have been dehydrated, might have had kidney disease, acidosis or alkalosis (WebMd, 2019; Salyer, 2009).

The kidney function test revealed that the urea and creatinine levels for the civil servants at baseline and on the third month were within the normal range. This indicates that the kidneys of the civil servants were in a good state. On the other hand, the retirees' urea and creatinine levels were below the normal range but only the retiree's exit creatinine level was statistically significantly different from that of the civil servants. Low retirees's urea level is indicative of liver disease or malnutrition (WebMd, 2019). The low creatinine level implies that the liver or the muscles may be dysfunctional in the retirees. This low creatinine level may also be due to decreased muscle mass that occurs with age (Healthline, 2019).

The non-HDL cholesterol level and the cholesterol ratio for the civil servants at baseline and exit were within the normal readings. Hence, the civil servants' risk of developing heart diseases was low. However, the retirees' non-HDL cholesterol level and cholesterol ratio at baseline and exit were above the normal readings. This implies that the retiree's risk of developing heart disease is high (Lopez-Jimenenz, 2019).

However, Baseline clinical characteristics of the civil servants that were significantly different from the retirees group include creatinine and TC while the exit clinical characteristics of the civil servants that were significantly different from the retirees group were sodium, creatinine, fasting blood sugar, Total Cholesterol, and Low Density Lipoprotein values.

CONCLUSION AND RECOMMENDATION
CONCLUSION:

Finally, this study showed that blood pressure control was better in the participants who were civil servants than in the retirees. Short term blood glucose control in the civil servants was good whereas retirees' short term blood glucose control was poor. Long term blood glucose control for both the civil servants and

the retirees was poor. In addition, the sodium, potassium and chloride levels for the civil servants were within the normal both at baseline and on the third month. However, for the retirees, the sodium level at baseline and exit; and the chlorine level on exit were not in line with the normal values. Kidney function test showed that the civil servants did not show any sign of kidney diseases/dysfunction. Similarly, the kidney function test for the retirees revealed that the retirees do not have kidney diseases but the test revealed that the retirees may be having other diseases/dysfunction, like liver diseases or muscle dysfunction. Furthermore, the retirees had higher chances of developing heart diseases when compared with the civil servants.

Therefore, the Civil servants exhibited better clinical parameters than the retirees. The Civil servants who participated in this study were all under NHIS coverage while the retirees were not covered by any form of insurance. The insurance policy provided for sufficient stockpiling of relevant geriatric medications and competent administration at reasonably very low cost. This provides an incredible socioeconomic and psychological relief and wellbeing needed for effective patients' recuperation. Hence, the NHIS programme has overall positive impact on clinical parameters of diabetic and hypertensive patients in Nigeria. The value indices are inestimable despite its obvious challenges noted in the course of the study.

RECOMMENDATION:
The Nigerian Government should introduce ways that will enable civil servants that are under NHIS coverage to remain insured on retirement from the civil service scheme as this will greatly improve the health indices of Nigeria. Alternatively, there should be sufficient medication rebates for these elder statesmen who have sacrificed greater part of their lives in service of the nation. If they cannot be secured in the programme, government should develop subsidy regime exclusive to geriatric healthcare and management especially for ex-service men and women of the nation.

The need for nation-wide studies on the effectiveness of NHIS is urgent. Hence, effectiveness studies on different programmes and capabilities of NHIS should be funded to ensure a wider coverage of Nigeria ailing public- children, pregnant women, elderly, physically challenged etc. There is need to promote interdisciplinary collaboration in the health sector among experts and professionals as this will ensure reliability and validity of research outputs and targeted studies in the Nigerian health sector.

Academics (who are interested in Health Administrative research) should device strategies that will promote the dissemination of NHIS centered researches and/or alternate medical subsidy regime to the policy makers.

Surprisingly, our study showed that the long term blood glucose control results of civil servants were poor. This highlights the fact that the administrators of NHIS should adopt proactive and effective interoperation strategies for managing diseases, such as, health education and promotion, into the NHIS program. This will boost long and healthy lifestyles across the nation.

Further studies aimed at seeking ways/strategies of improving participation of non-federal civil servants and employees of the informal sector in the NHIS should be promoted by the Government and other health organisations. The programme is laudable and should be inclusive than exclusive. All Nigerians should be made to benefit from the programme because the healthier a people the wealthier the nation.

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