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# Prevalence of undiagnosed hypertension among staff of a tertiary institution in Enugu State, Nigeria

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Availability of data and materials: all the generated and analyzed data were used in this study. Study materials are available on request from the Department of Community Medicine, Enugu State University College of Medicine.

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## Abstract

Hypertension is the most important modifiable risk factor for cardiovascular disease, and a high proportion of hypertension in Nigeria remains undiagnosed. The aim of this study was to determine the prevalence of undiagnosed hypertension among the staff of Enugu State University College of Medicine. About 86% (140 of 163) of the staff of the College of Basic and Clinical Medical Sciences, Enugu State University College of Medicine, Enugu, Nigeria, that met the inclusion criteria participated in the study. The blood pressure, weight, and height of consenting staff members were measured. A systolic blood pressure of 140 mmHg and a diastolic blood pressure of 90 mmHg according to the guidelines from the American Heart Association, were classified as hypertension. The weight and height measurements were used to calculate the Body Mass Index (BMI) of the participants. A structured questionnaire was used to collect data on the socio-demographic characteristics. The prevalence of undiagnosed hypertension was 21.4%. Almost half of the participants were pre-hypertensive (48.6%). On bivariate analysis, no socio-demographic characteristic significantly affected the prevalence of hypertension among the participants, but there was an inverse relationship between educational level and prevalence of undiagnosed hypertension. The study showed that there was a high prevalence of undiagnosed hypertension among the staff of Enugu State University College of Medicine. With the above result, there is an urgent need to create awareness and implement measures for early diagnosis of hypertension.

## Introduction

Hypertension, also known as high or raised Blood Pressure (BP) is a global public health challenge.[1,2] Hypertension is a chronic medical condition in which the BP in the arteries is elevated.[1] The higher the pressure in blood vessels, the harder the heart has to work in order to pump blood, thus making the heart work too hard.[1] It is popularly known as the "silent killer" because it has no specific signs and symptoms in the initial stage.[3] Hypertension is the most important modifiable risk factor for cardiovascular disease.[4] It cuts across every social class. Both lower-income groups and higher-income groups may be at increased risk of developing hypertension.[5] The aetiology of hypertension is multifactorial.[1,6] Aside from genetic factors, several behavioral and socioeconomic factors can put an individual at risk.[1]

Worldwide, hypertension is the number one cause of death and is ranked number four in Disability Adjusted Life Years (DALY).[7] It constitutes a public health epidemic with an increasing global prevalence, especially in low and middle-income countries.[1,8] In sub-Saharan Africa, the burden of hypertension has been increasing continuously, with a prevalence varying widely between 15% and 70%.[9,10] The increasing prevalence of hypertension is attribut-

ed to population growth, aging, unhealthy diets, lack of physical exercise, obesity, and increasing life stresses.[1]

As it has a silent nature, early identification of subjects with undiagnosed hypertension may prevent or reduce the progression of many of its serious complications, including stroke, ischemic heart disease, congestive cardiac failure, sudden cardiac death, peripheral vascular disease, and renal insufficiency.[1,11]

Hypertension is the most common non-communicable disease in Nigeria.[12] Hypertension and its complications constitute approximately 25% of emergency medical admissions in urban hospitals in Nigeria.[13] It is the most frequently diagnosed cardiovascular disorder in Nigeria.[14] Hypertension is rarely accompanied by any symptom, and its identification is usually through screening, or when seeking healthcare for an unrelated problem.[1,3] Screening, ideally, not only detects hypertension, but also the basis for education and therapy.[3] The country's statistics on hypertension are unreliable as most of the data are speculations based on mathematical models and surveys that are scanty and unrepresentative.[15] This makes it necessary to conduct surveys that will generate reliable data that will inform decision-making at the appropriate levels of government. A prevalence rate is an important tool for assessing the magnitude and burden of a health event. Determining the prevalence of undiagnosed hypertension will help estimate its magnitude in the community and institute necessary measures to mitigate its accompanying dangers. The aim of this study was to determine the prevalence of undiagnosed hypertension among the staff of Enugu State University College of Medicine (ESUCOM).

## Materials and Methods

### Study area

The study was conducted at ESUCOM, Enugu State Nigeria at the Faculties of Basic and Clinical Medicine. ESUCOM is one of the two Colleges of Medicine in Enugu State.

### Study design

This was an institution-based descriptive cross-sectional study.

### Study population

About 86.0% (140 of 163) of the staff of the Faculties of Basic and Clinical Medicine of ESUCOM participated in the study.

### Inclusion criteria

The staff of the College of Basic and Clinical Medical Sciences of the Enugu State University College of Medicine who were available and willing to participate in the study.

### Exclusion criteria

Staff that were absent or on leave during the data collection.

### Data collection

The World Health Organization (WHO) stepwise approach for non-communicable disease surveillance was used for data collection. Two levels of the approach were used: i) a structured questionnaire to gather socio-demographic characteristics; ii) anthropometric measurements.

Participants were approached during working hours in their respective offices within the college. Two research assistants (final-year medical students) were used to collect the data. They were trained on how to collect the data and guided during data collection by the principal investigator. A brief explanation of the study protocol after verbal introductions were made, after which data was collected from consenting staff.

A structured questionnaire with two sections was used for data collection. The first section contained information on the socio-demographic characteristics of the participants, which was self-administered, while the second section is a pro forma where the anthropometric measurements (Blood Pressure, weight, height, and calculated Body Mass Indexes, BMIs) were entered.

### Blood pressure measurement

The participant's blood pressure was measured with a mercury-in-glass sphygmomanometer, with an appropriate cuff size, while in a sitting position. The average of two consecutive measurements was recorded. The criteria of the Seventh Report of the Joint International Committee on Prevention, Detection, and Treatment of high BP[16] was used to classify the blood pressure levels as:

- Normal BP: systolic BP<120 and diastolic <80 mmHg
- Prehypertension: systolic BP 120-139 mmHg and diastolic BP 80-89 mmHg
- Stage 1 hypertension: systolic BP 140-159 mmHg and diastolic BP 90-99 mmHg
- Stage 2 hypertension: systolic BP 160-179 mmHg and diastolic BP 100-109 mmHg
- Stage 3 hypertension: systolic BP 180 mmHg or more and diastolic BP 110 mmHg or more

### Anthropometric measurements

A calibrated (in kilogram) Hamson weighing scale with an accuracy of 0.1 kg was used to measure the participant's body weight. The weighing scale was checked prior to each measurement to ensure that it was on zero. The participants were asked to stand erect on the scale with their footwear removed, looking straight without bending while the research assistant read off the weight. To doubly ascertain that the scale is functioning well, it was checked after each measurement to ensure that it returned to zero point. A tailor measuring tape was used to measure their height. The BMI was subsequently calculated from the weight and height measurements using the formula BMI = weight (kg)/height in meter square. The BMI was classified according to the National Institute of Health of the US as follows:[17]

- BMI <18.5 is underweight
- BMI 18.5-24.9 is normal
- BMI 25-29.9 is overweight
- BMI 30-34.9 is Class 1 obesity
- BMI 35-39.9 is Class 2 obesity
- BMI of 40 or more is Class 3 or morbid obesity

### Data management

#### *Independent variable*

Socio-demographic characteristics of the staff.

#### *Dependent variable*

Undiagnosed hypertension.

### Statistical analysis

Data were analyzed with the Stastistical Package for Social Sciences (SPSS) (IBM Corp., Chicago, USA) version 25. Categorical variables (age in groups, gender, place of residence,

educational level, marital status, staff designation, cadre, blood pressure categories and BMI) were presented as frequencies and percentages, while quantitative variable (age) was presented as mean and standard deviation. Chi-squared test was used to test for associations between variables with significant levels placed at $p \leq 0.05$.

### *Definition of terms*

Urban dwellers are those that reside within Enugu Metropolis (Enugu North, Enugu South, and Enugu East Local Government Areas). Rural dwellers are those that reside outside the Enugu Metropolis.

## Results

Table 1 shows the socio-demographic characteristics of the study participants. The majority of them were aged 40 years and above 83 (59.3%). More than half were females 76 (54.3%), and the majority were urban dwellers 120 (85.7%). The majority had tertiary education 96 (68.5%), married 116 (82.9%), and non-academic staff 95 (67.9%).

Table 2 shows the blood pressure status of the participants, with the prevalence of undiagnosed hypertension of 21.4% and a prevalence of all hypertension of 37.1%. Almost half of them were pre-hypertensive 68 (48.6%).

Table 3 shows that about half of the participants were overweight 75 (53.6%), 32 (22.9%) had normal weight, while 33 (23.5%) were obese.

Table 4 shows that no socio-demographic characteristics, including the BMI, significantly affected the prevalence of hypertension among the participants.

## Discussion

The prevalence of undiagnosed hypertension in the present study was 21.4%. This is high considering the dangers associated with it. This high level of undiagnosed hypertension could be attributed to a lack of screening services or lack of awareness of these services where they exist or reluctance of the participants to go for regular check-ups. Another Nigerian study reported a similar finding. (25.0%)[18,] but other studies from Nigeria,[19, 20] and Bangladesh[21] reported lower figures. The prevalence of undiagnosed hypertension varies between Low and Middle-Income Countries (LMIC) and High-Income Countries (HIC), with higher prevalence in LMICs. This may be due to more functional health facilities that take care of the needs of their citizens in HICs.[22]

The socio-demographic characteristics and BMI did not significantly affect the prevalence of undiagnosed hypertension in our study. However, we found out that the prevalence of undiagnosed hypertension has an inverse relationship with educational level as it is lower in higher-educated participants and increases as the educational level decreases. The reason could be that the higher-educated people have more health-seeking behaviors, have more knowledge about hypertension, and are financially empowered to access medical services when compared to the lower-educated participants.[22] A similar study corroborated the findings.[21]

Females are less likely to have undiagnosed hypertension when compared to males. A similar study reported similar findings.[21] This may be because females have more health-seeking behaviors than males, and hence their hypertension is diagnosed on time. Obese participants had a higher risk of undiagnosed hypertension when compared to those with normal BMI. This was surprising as obese people are normally present in hospitals for other medical conditions like diabetes, making it easier for early diagnosis of hypertension. Other studies reported a contrasting finding.[20,21]

A higher proportion of rural dwellers also had undiagnosed hypertension when compared to urban dwellers. This can be due to poor performance or the absence of functional health facilities in rural areas. The number of healthcare facilities is also higher in the urban area when compared to the rural area. A lack of qualified

**Table 1.** Socio-demographic characteristics of the participants (N=140).

| Variable | Frequency | Percentage |
|---|---|---|
| Age (years) Mean ± SD | 43.52±10.42 | |
| Age in groups | | |
| 20-29 | 13 | 9.3 |
| 30-39 | 44 | 31.4 |
| 40-49 | 39 | 27.9 |
| 50-59 | 32 | 22.9 |
| ≥60 | 12 | 8.5 |
| Gender | | |
| Male | 64 | 45.7 |
| Female | 76 | 54.3 |
| Place of residence | | |
| Rural | 20 | 14.3 |
| Urban | 120 | 85.7 |
| Educational level | | |
| Tertiary | 96 | 68.5 |
| Secondary completed | 39 | 27.9 |
| Primary completed | 5 | 3.6 |
| Marital status | | |
| Married | 116 | 82.9 |
| Single | 24 | 17.1 |
| Other | 0 | 0.0 |
| Religion | | |
| Christianity | 140 | 100.0 |
| Staff designation | | |
| Academic staff | 45 | 32.1 |
| Non-academic staff | 95 | 67.9 |
| Cadre | | |
| Junior staff | 68 | 48.6 |
| Senior staff | 72 | 51.4 |

**Table 2.** Blood pressure status of the participants (N=140).

| Variable | Frequency | Percentage |
|---|---|---|
| Blood pressure category | | |
| Normal | 20 | 14.3 |
| Pre-hypertension | 68 | 48.6 |
| Known hypertension | 22 | 15.7 |
| Undiagnosed hypertension | 30 | 21.4 |

**Table 3.** Body mass index (BMI) of the participants (N=140).

| Variable | Frequency | Percentage |
|---|---|---|
| Body mass index | | |
| Normal weight | 32 | 22.9 |
| Overweight | 75 | 53.6 |
| Class 1 obesity | 19 | 13.6 |
| Class 2 obesity | 11 | 7.9 |
| Class 3 obesity | 3 | 2.1 |

**Table 4**. Factors that affect the prevalence of undiagnosed hypertension among the staff of a tertiary health institution in Nigeria (N=118). Known hypertensives were excluded from the analysis

| Variable | Normal N(%) | Pre-hypertension N(%) | Undiagnosed hypertension N(%) | $X^2$ | p |
|---|---|---|---|---|---|
| Age | | | | | |
| 20-29 | 3 (23.1) | 6 (46.2) | 4 (30.8) | 13.576 | 0.094 |
| 30-39 | 9 (23.7) | 23 (60.5) | 6 (15.8) | | |
| 40-49 | 6 (16.7) | 23 (63.9) | 7 (19.4) | | |
| 50-59 | 2 (9.1) | 13 (59.1) | 7 (31.8) | | |
| ≥60 | 0 (0.0) | 3 (33.3) | 6 (66.7) | | |
| Gender | | | | | |
| Male | 6 (11.3) | 30 (56.6) | 17 (32.1) | 3.490 | 0.175 |
| Female | 14 (21.5) | 38 (58.5) | 13 (20.0) | | |
| Residence | | | | | |
| Rural | 2 (10.0) | 10 (50.0) | 8 (40.0) | 2.942 | 0.230 |
| Urban | 18 (18.4) | 58 (59.2) | 22 (22.4) | | |
| Educational level | | | | | |
| Tertiary | 12 (15.0) | 49 (61.3) | 19 (23.7) | 5.186 | 0.269 |
| Secondary completed | 8 (24.2) | 17 (51.5) | 8 (24.2) | | |
| Primary completed | 0 (0.0) | 2 (40.0) | 3 (60.0) | | |
| Marital status | | | | | |
| Married | 16 (16.8) | 54 (56.8) | 25 (26.3) | 0.208 | 0.901 |
| Single | 4 (17.4) | 14 (60.9) | 5 (21.7) | | |
| Designation | | | | | |
| Academic | 7 (20.0) | 20 (57.1) | 8 (22.9) | 0.404 | 0.817 |
| Non academic | 13 (15.7) | 48 (57.8) | 22 (26.5) | | |
| Cadre | | | | | |
| Junior | 13 (21.0) | 35 (56.5) | 14 (22.6) | 1.691 | 0.429 |
| Senior | 7 (12.5) | 33 (58.9) | 16 (28.6) | | |
| Body mass index | | | | | |
| Normal | 3 (10.3) | 17 (58.6) | 9 (31.0) | 9.168 | 0.328 |
| Overweight | 15 (23.4) | 37 (57.8) | 12 (18.8) | | |
| Class 1 obesity | 2 (12.5) | 7 (43.8) | 7 (43.8) | | |
| Class 2 obesity | 0 (0.0) | 6 (75.0) | 2 (25.0) | | |
| Class 3 obesity | 0 (0.0) | 1 (100.0) | 0 (0.0) | | |

personnel that can correctly diagnose hypertension have been reported to affect the diagnosis of hypertension. A similar study reported that qualified health care providers diagnosed about 53.5% of hypertension while unqualified providers diagnosed 40.7% of hypertension in the study population.[23]

## Conclusions

The study was able to bring out the high prevalence of undiagnosed hypertension among the staff of a tertiary institution. Although no socio-demographic characteristic significantly affected the prevalence of undiagnosed hypertension however, the study found out that there was an inverse relationship between undiagnosed hypertension and level of education. Hence attention and screening should focus more on the less educated persons.

### Limitations of the study

Waist circumference was not included in defining obesity in the study and hence some cases of obesity would have been missed. As a cross-sectional study, causal relationships cannot be established.

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