

# Prevalence of Undiagnosed Hypertension Among Traders at A Regional Market in Nigeria

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## Abstract

**Background:** Hypertension is an important cause of morbidity and mortality worldwide which often remains undiagnosed and subsequently untreated. Data from diverse populations on the prevalence of undiagnosed hypertension therefore become imperative. This study examined the prevalence and risk factors of undiagnosed hypertension among traders at the in a major regional market in Nigeria. **Methods:** Blood pressure measurement, body mass index (BMI) and socio-demographic data of 411 traders at the Monday market in Northeastern Nigeria were obtained in this longitudinal study. Hypertension was defined as systolic blood pressure of 140 mmHg or higher, or diastolic blood pressure of 90 mmHg or higher in two consecutive measurements. Inferential statistics was used to examine associations between prevalence of undiagnosed hypertension and socio-demographic characteristics and BMI of the traders. **Results:** Mean (SD) age of the traders was 36.3 (10.4) years while male traders were in the majority (83%). Undiagnosed hypertension was detected in 25% (102/411) of the traders. Prevalence of undiagnosed hypertension was significantly associated with the age ( $P<0.001$ ), marital status ( $P<0.001$ ) and body mass index ( $P=0.03$ ) of the traders with higher prevalence among older, married and obese traders. **Conclusion:** One in four market traders had undiagnosed hypertension with a significantly higher prevalence among older, married and obese traders. The need for regular high blood pressure screening and effective preventive and attenuating strategies is emphasized.

**Keywords:** BMI, Market, Nigeria, Prevalence, Traders, Undiagnosed hypertension

## Introduction

Hypertension is a major cause of mortality and morbidity globally.<sup>[1]</sup> It is a risk factor for conditions such as coronary heart disease, stroke,<sup>[2]</sup> and kidney disease.<sup>[3]</sup> The high rate of target organ damage following hypertension is also a pointer to the deadly nature of the disease.<sup>[4,5]</sup> These adverse consequences of hypertension however arise when elevated blood pressure remains untreated and uncontrolled.

Treating and controlling high blood pressure depends in part on awareness of one's blood pressure status.<sup>[6,7]</sup> Known as the silent killer, and often asymptomatic, hypertension may remain undetected and undiagnosed until it results in catastrophic events.<sup>[8]</sup> Information on prevalence of undiagnosed hypertension therefore deserves particular attention in the literature especially as such information will assist in planning strategies for effective prevention, diagnosis, treatment and control of hypertension.

Several studies have assessed the prevalence of undiagnosed hypertension in diverse populations with varying findings.<sup>[9-12]</sup> For instance, the prevalence of undiagnosed hypertension appears to be much higher in developing countries.<sup>[12,13]</sup> In countries in Sub-Saharan Africa, factors such as poor access to health information and services, and low socio-economic status have been reported to contribute substantially to the high prevalence of undiagnosed hypertension.<sup>[12,13]</sup> Regarding socio-economic status, especially in terms of level of education, and occupation, low level of education,<sup>[6]</sup> low income and stressful

life occupations<sup>[14]</sup> have been linked with the prevalence of undiagnosed hypertension. Stressful occupations are characterized by long work hours with workers having little or no time for rest, leisure, and medical check-up and the latter may result in such workers being largely unaware of their health status as it pertains to occult diseases such as hypertension.

Many market traders in Nigeria—a developing country in Sub-Saharan Africa—fit into the socio-economic status described above. Trading in markets is one of the most common sources of informal employment in Nigeria,<sup>[15]</sup> and market traders constitute a substantial portion of the country's working population. With the economic downturn in Nigeria, market traders appear to be at the receiving end especially as their livelihood depends on the purchasing power of shoppers and buyers, in addition to their susceptibility to other adverse factors in the country's socio-economic environment. Thus, market traders often undergo considerable amount of stress to make ends meet and constitute one of groups of individuals with the highest work hours. Additionally, market traders in Nigeria, like many other workers in the country's informal sector, often do not have access to structured workplace preventive and curative health

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programmes and services.<sup>[16]</sup> It is instructive that these scenarios may all be implicated in the risk of developing hypertension.

This study therefore examined the prevalence of undiagnosed hypertension among traders at the principal trading center in North-eastern Nigeria-the Monday Market, Maiduguri.

## Methods

This was a longitudinal community-based survey of male and female traders at the 'Monday Market'. Monday market is an ultramodern market in Maiduguri, Borno state, and the foremost commercial center in North-east Nigeria. Maiduguri, the largest city in North-east Nigeria, has approximately 22 markets. While some markets are dedicated to specific goods and open for business only on specific days, others trade in a variety of goods at albeit at varying levels. 'Monday Market' is however the largest market with the sales of all manner of goods, and opens every day of the week in spite of its name.

Ethical approval of the relevant institutional review committee was obtained prior to the commencement of this study. A convenience sample of 411 traders was recruited at their stalls based on their availability and willingness to participate in the study and informed consent was obtained from each trader. The number exceeds the 384 sample size calculated using Cochran's formula<sup>[17]</sup> thus:

$$n=(Z)^2pq / d^2$$

where n=sample size

Z=Coefficient of standard normal deviate (usually expressed as 1.96 when the confidence interval is 95% i.e.  $\alpha=0.05$ )

p=Sampling proportion (considered as 50%=0.5)

q=1-p (1 - 0.5=0.5)

d=sampling error (considered as 5%=0.05 for this study)

$$n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05}$$

n =384

Being a big market that covers a large expanse of land with stalls arranged based on goods sold. There are about 12 of such arrangements within the market while there are a few scattered non-aligned arrangements as is the case in many markets in Nigeria. The traders were approached based on their wares (with consideration given to the ease of access to the traders particularly those whose are more likely to always be at their stalls such as traders in food items, clothing items, kitchen wares, household items, footwear, and the likes). The researchers ensured that recruitment was extensive by carrying out multiple visits in order to substantially cover as many traders in the market as possible. Exclusion criteria were age <18 years, pregnancy and menstruation among female traders (menstruation has been linked to high blood pressure<sup>[18]</sup> which may not be a true reflection of an individual's hypertensive

status), prior diagnosis of hypertension and/or taking of anti-hypertensive medications. Specially designed data forms were used to obtain information on age, gender, marital status, and educational level, and record blood pressure, height and weight measurement of the participants. All data were obtained by the second author (JA) and two research assistants in the year 2011.

## Measurements

### Blood pressure measurement

Blood pressure was measured using digital sphygmomanometer (ACON laboratories Model, CA92121, USA) after participants sat quietly for not less than 5 minutes without any work activity. Hypertension was classified as a systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure equal to or greater than 90 mmHg<sup>[2]</sup> in all cases. For those who had high blood pressure during the first measurement, blood pressure measurement was again carried after one week<sup>[19]</sup> and the second measurement was utilized for purpose of data analysis. Market stalls or shops of individuals who required second measurement were identified and recorded and the affected individuals were informed about the readings and were told about the implication of the first measurement and the need to seek medical care. They were also informed that a follow-up visit and measurement would be subsequently carried out to ascertain the high blood pressure status of those concerned. All blood pressure measurements were carried out at the respective participants' stalls or shops within the market and involved two readings. The average of the two readings were utilized for the analyses of the data.

### Measurement of weight and height and calculation of body mass index

Body mass index (BMI) was calculated as weight in kilogram divided by the square of the height in meters. Height was measured using locally fabricated wooden height meter with the participants in standing position without foot wear while weight was measured using a weighing scale (Hanson's Model) calibrated in kilograms. World Health Organization classification of BMI<sup>[20]</sup> was used to grade BMI values obtained thus: underweight - <18.5 kg/m<sup>2</sup>; normal weight - 18.5 to 24.9 kg/m<sup>2</sup>; overweight - 25 kg/m<sup>2</sup> to 29.9 kg/m<sup>2</sup>; obesity - >30 kg/m<sup>2</sup>.

## Data analyses

Descriptive statistics of mean, standard deviation, percentage, and frequency were used to summarize the physical (socio-demographic and BMI data) characteristics of the participants and the prevalence of undiagnosed hypertension. Chi-square statistic was used to examine associations between prevalence of undiagnosed hypertension and age, gender, level of education, marital status and body mass index of the participants. SPSS version 15.0<sup>[21]</sup> was used to analyze the data and level of statistical significance was set at P=0.05.

## Results

### Physical characteristics of participants

A total of 411 traders with a mean (SD) age and body mass index

of 36 (10.4) years and 23.8 (2.8) kg/m<sup>2</sup> respectively participated in this study. Majority (83%) of the traders were males. Mean (SD) systolic and diastolic blood pressure of 133 (11.9) mmHg and 86 (7.5) mmHg respectively [Table 1].

### Prevalence of undiagnosed hypertension

Of the total number of traders that participated in this study, undiagnosed hypertension was observed in 102 individuals, giving a prevalence of 25%.

**Table 1: Characteristics of participants (N=411)**

Variable	Value
<b>Age (years)</b>	
Mean ± SD	36.3 ± 10.4
Range	20-62
<b>Gender</b>	<b>n (%)</b>
Male	342 (83.2)
Female	69 (16.8)
<b>Educational Qualification</b>	<b>n (%)</b>
None	195 (47.4)
Primary	57 (13.9)
Secondary	156 (38.0)
Tertiary	3 (0.7)
<b>Marital Status</b>	<b>n (%)</b>
Married	253 (61.6)
Divorced/Widowed	7 (1.7)
Single	151 (36.7)
<b>Body Mass Index</b>	<b>n (%)</b>
Normal weight	269 (65.5)
Overweight	136 (33.1)
Obese	6 (1.5)
Mean ± SD (kg/m <sup>2</sup> )	23.8 ± 2.8

**Table 2: Associations between prevalence of undiagnosed hypertension and characteristics of the participants**

Characteristic	HTN n (%)	N-HTN n (%)	χ <sup>2</sup>	P
<b>Age (years)</b>			<b>105.9</b>	<b>0.00**</b>
20-29	7 (6)	120 (94)		
30-39	19 (14)	116 (86)		
40-49	39 (40)	58 (60)		
>50	37 (71)	15 (29)		
<b>Gender</b>			<b>0.42</b>	<b>0.52</b>
Male	87 (25.4)	255 (74.6)		
Female	15 (21.7)	54 (78.3)		
<b>Marital status</b>			<b>40.98</b>	<b>0.00**</b>
Married	90 (36)	163 (64)		
Divorced/ widowed	1 (14)	6 (86)		
Single	11 (8)	140 (92)		
<b>Educational level</b>			<b>3.24</b>	<b>0.36</b>
None	52 (27)	143 (73)		
Primary	17 (30)	40 (70)		
Secondary	33 (21)	123 (79)		
Tertiary	0 (0)	3 (100)		
<b>BMI</b>			<b>7.25</b>	<b>0.03*</b>
Normal weight	60 (22)	209 (78)		
Overweight	38 (27)	98 (72)		
Obese	4 (67)	2 (33)		

### Association between prevalence of undiagnosed hypertension and physical characteristics of participants

Prevalence of undiagnosed hypertension was significantly associated with age (P<0.001), marital status (P<0.001) and body mass index (P=0.03). Higher prevalence of undiagnosed hypertension was detected among traders aged 50 years and above (71%), those married (36%) and obese (67%) [Table 2].

There were however no significant associations between prevalence of undiagnosed hypertension and gender and educational level [Table 2].

## Discussion

Hypertension is a deadly disease which is even more so when undiagnosed and consequently, untreated. One in four (25%) of the market traders in this study had undiagnosed hypertension. This is higher than the reported 16% prevalence of hypertension in a recent survey of traders in a town in South-west Nigeria<sup>[22]</sup> but lower than rates of either undiagnosed or diagnosed hypertension reported in studies involving traders in other locations in Nigeria<sup>[23-25]</sup>. Although reasons for the diverse prevalence rates are not known, our findings and that of the previous studies imply that hypertension constitute a major health challenge among market traders in Nigeria. There is therefore an urgent need for enlightenment and educational programmes on hypertension as well as routine hypertension screening for traders, and the involvement of traditional market traders association would assist in this regard.

While detection of the blood pressure status of a population is important, hypertension treatment and control with appropriate antihypertensive medications and necessary lifestyle modifications are even more crucial issues. Effective treatment and control of high blood pressure is however fraught with many challenges in developing countries especially as it concerns accessibility of effective health care services. For instance, the cost of antihypertensive medications appears to be way above the means of the populace in many developing countries while cheaper and equally effective anti-hypertensives has been reported to be less favored by some health providers<sup>[26]</sup>. With majority of the people living below the poverty line, and having little or no access to health insurance, many have to depend on their meager earnings to cater for their health care needs through out-of-pocket funds.

In Nigeria, the National Health Insurance Scheme has been expanded to cover market traders and other informal workers in recent times<sup>[27]</sup>. Although there appears to be no data on the extent of coverage yet, the coverage for the entire country has been reported to be around only 5%<sup>[28]</sup>. It is however important to state that even in high-income developed countries, and among persons with full health insurance coverage, undiagnosed, untreated and uncontrolled hypertension still exist<sup>[9,29]</sup>.

Of the established risk factors of hypertension, old age and obesity were observed to be significantly associated with undiagnosed hypertension in this study. The fact that older

traders had a higher prevalence of undiagnosed hypertension is a pointer to the need to devise effective public health strategies that would be suitable for this group especially as morbidity after hypertension worsens with increasing age<sup>[30]</sup>. While obese hypertensives are at similar risk of morbidity compared to hypertensives with other body mass index categories<sup>[31]</sup>, it is important to note that obesity on its own is a known risk factor for several debilitating diseases including cardiovascular diseases<sup>[32]</sup>, type 2 diabetes<sup>[33]</sup>, and certain cancers<sup>[34]</sup>. Although only 2% of the traders in our study were obese, the fact that more obese traders were unaware of their hypertensive status should be a cause for concern.

The fact that a significantly higher proportion of married traders in this study were unaware of their hypertensive status compared to their divorced/widowed or single counterparts could be due to variety of reasons. For instance, the fact that married persons are often more engrossed with caring for their families (compared to other marital categories) could suggest that they would pay a less than optimal attention to issues of their personal health. The finding may also indicate. Despite the conjectures however, this finding on the significance of the traders' marital status should be considered when designing educational strategies for the successful prevention of hypertension for this population.

### Limitations of the study

For The non-probability technique used in recruiting the sample for this study may have resulted in selection bias which limits the generalizability of our findings. Similarly, the small size of the sample of traders that participated in this study may also affect the external validity of findings. While the researchers sought to exclude menstruating women from this study, they relied on the self-report of the female participants to that effect and this was unverifiable. It is also important to note that data on common risk factors of hypertension such as high salt intake, smoking, excessive alcohol intake were not obtained and this lack of information constitutes a shortcoming of our study. The skewed gender distribution in favour of male traders is also worthy of mention although this is a true reflection of the population of market traders in Northern Nigeria due to the cultural environment of the region which largely prevents women from engaging in market trading.

### Conclusion

The outcome of this study showed that many market traders could have hypertension without being aware of it. It therefore becomes expedient for the Nigerian government to formulate policies that will provide market traders, and indeed all other actors in the informal sector access to effective healthcare services that will facilitate prevention, diagnosis, treatment and control of hypertension. There is also the need for health practitioners, non-governmental organizations, and other stakeholders including market traders' associations, to organize educational and enlightenment programmes on risk factors of hypertension, as well routine hypertension screening exercises in markets across the country.

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