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# Influence of Environmental Factors in the Occurrence of Hypertension and Stroke in Ohafia, Abia State Nigeria

Amadi C.O.A.[1]; Iro, O.K[2]; Amadi A.N[1]; Ibe S.N.O[1]; Nwufo R.C [1]; Ede A.O [2] and Obasi K.O[4].

1. Department of Public Health, Federal University of Technology, Owerri
2. Environmental Health Science, College of Medicine and Health Sciences, Abia State University Uturu
3. Department of Environmental Health Science, College of Medicine and Health Sciences, Nnamadi Azikiwe University, Awka

Corresponding Author: Ede.A.O[2]

## ABSTRACT

Environmental risk factors in relation to hypertension and stroke are noise, overcrowding and violence that can influence the prevalence of morbidity and mortality in humans. This study aimed at determining the influence of environmental factors on the occurrence of hypertension and stroke in Ohafia, Abia State Nigeria. The study employed a cross sectional research design to obtain information on the association of the environmental factors with hypertension and stroke using questionnaire after being examined of their blood pressure level. A total of 587 participants were involved in this study that comprise of males 219(37.3%) and females 368(62.7%). The data were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. The results were presented in frequency tables and charts. The chi-square tool was used to determine the statistical influence of the variables. Results obtained from data collected showed that 161 (27.43%) of the participants had hypertension while 426 (72.57%) were normotensive. Also 3(0.51%) cases of stroke were observed while 584 (99.41%) were non-stroke cases. Again, 76(12.95%) and 2(0.34%) of the participants agreed that they had hypertension and stroke respectively due to environmental violence and overcrowding. On the same note, 47(8.01%) and 2(0.34%) of the participants agreed that they had hypertension and stroke respectively due to environmental noise. The findings of the study showed a statistically significant with noise, overcrowding and violence in the occurrence of hypertension at $P<0.05$ and not statistically with stroke at $P>0.05$.

**Keywords:** Hypertension, Stroke, Environmental factors, Overcrowding, Noise

## INTRODUCTION

Hypertension and stroke are major worldwide cardiovascular diseases associated with an increased risk of morbidity and mortality, arising from environmental, socio-economic and genetic factors. Hypertension is the principal risk factor for cardiovascular disease and is defined as systolic and/or diastolic blood pressures ≥140/90 mmHg in tandem with the seventh report of

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the Joint National Committee (JNC VII) on prevention, detection, evaluation and treatment of high blood pressure in adult aged 18 years and older.[1]

Hypertension frequently clusters with other cardiovascular risk factors in affected individuals across populations thereby increasing the absolute cardiovascular risk.[2] It often co-exists with other potent cardiovascular risk factors thus increasing the risk of early death from cardiovascular causes by about three-fold.[3] However, the relationship between blood pressure and the risk of cardiovascular events is continuous, consistent and independent of other risk factors.[4]Hypertension grows slowly, asymptomatic and unnoticed, over a period, while stroke could happen in an unanticipated manner.[5]Stroke on the other hand is a sudden loss of consciousness followed by paralysis due to hemorrhage (bleeding) into the brain or spinal cord or formation of an embolus (detached "blood" clot) or thrombus (a blood clot obstructing a blood vessel). The nerve cells in the affected part of the brain quickly lose their ability to function and the sensation, movement and other body functions controlled by that portion of the brain are affected leading to difficulty in speaking, loss of memory, disturbed vision and partial or complete paralysis.[6]Stroke occurs when the blood supply to a part of the brain is interrupted by a blood clot which blocks an artery or when an artery in the brain bursts, causing bleeding into the brain. According to Akinkugbe, [7] cardiovascular diseases are leading causes of death in Nigeria and the globe.

Studies on hypertension and stroke are needed in developing nations, considering the poor awareness of the dangers of both diseases in most of our communities.[8] Nigerians are particularly susceptible to hypertension and its complications such as disabling and fatal stroke which remains a major cause of morbidity and mortality.[7,9]There is also strong evidence to suggest that hypertension and its associated complications like stroke are major health challenges in the 21st century.[10] As of the year 2000, nearly one billion persons or 20% of adult population, were affected with hypertension worldwide,[10] and it has been predicted that the number could jump to more than 1.5billion in 2025, if drastic measures are not taken to control hypertension and stroke complications.

Hypertension and stroke in adults have high negative impacts on the economy and the quality of life of individuals.[11] Developing countries experiencing epidemiological transition from communicable to non-communicable chronic disease often bear the brunt of hypertension and stroke. In sub-Saharan Africa, hypertension and stroke affects over 20 million people and remain the leading causes of hospitalization and mortality.[12] The increased prevalence of hypertension and stroke in Nigeria is possibly due to socio-economic factors (life style), genetic and environmental factors; all of which play a key role in this cardiovascular disease development. Hypertension and stroke are among the greatest health problems developing nations face and continue to be major contributory factors in the development of many diseases like diabetes, renal failures, etc. Since hypertension could grow on an asymptomatic condition, many people are unaware that they have it, while it progresses to complications like stroke and diabetes.[13]Community based studies[14] on stroke in Lagos, Nigeria revealed a prevalence of 114

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per 100,000 per year and crude incidence rate of 25.1 per 100,000 per year. Over 80% of Nigerian stroke cases in the above study were below 45 years of age.

Environmental factors such as exposure to harmful substances, noise, climatic factors, and overcrowding potentially can cause increased vulnerability to hypertension. Increasing noise from the traffic occurs in parallel with industrialization and urbanization. Exposure to noise can interfere with relaxation and concentration and during the night, noise exposure at normal urban levels has been associated with sleep disturbance. [15,16] This is believed to result in a stress reaction with activation of the sympathetic and endocrine system, resulting in autonomic reactions, including increased blood pressure.[17]Deviant acts like terrorism, kidnapping, militancy and robbery are other environmental factors that also make people vulnerable to hypertension. When subjected to trauma of terror, kidnapping, militancy, or robbery people develop fear and anxiety, thereby releasing epinephrine and norepinephrine which bind to beta receptors. It is the stimulation of the beta-receptor by epinephrine and norepinephrine that gives rise to the flight or flight response. An accelerated heart rate, rapid heartbeat or increase in high blood pressure is experienced when we feel intense fear is owing to the stimulation of beta receptors. Therefore, this study was to ascertain the influence of these environmental factors on the occurrence of hypertension and stroke in Ohafia Local Government Area, Abia State, Nigeria.

## MATERIALS AND METHODS

This research was a cross sectional study carried out in Ohafia Local Government Area, Abia State, Nigeria. The participants were randomly selected from communities in Ohafia. Appointments were placed at community centers and town union centers. Information concerning the blood pressure and stroke assessment as well as other health check was circulated within the sampled communities prior to the date of visit. Information was formally passed through the town union heads, worshiping centers and writing notices which were pasted at strategic locations. The subjects were examined of their blood pressure level and a questionnaire booklet was completed on 587 participants by the research team through face-face interview. The blood pressure was taken three times at few interval gaps of 2 minutes and the average of the last two measurements were compiled for data analysis. Data on stroke was collected through a questionnaire to determine knowledge of the subjects on the occurrence of stroke. The dates, nature of diagnosis as well as the hospital of stroke diagnosis were requested so that stroke information is authentically verified. Diagnosis of hypertension was based on 2003, joint national committee WHO criteria on high blood pressure,[4] which defined hypertension as systolic blood pressure of > 140mmHg and/or diastolic pressure > 90mmHg or a blood pressure below this level for individuals previously diagnosed of hypertension but are placed on hypertensive drugs or on therapy. Information on environmental influence (violence, noise and crowding) on the occurrence of hypertension and stroke such were collected, adequately classified and assessed. The collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. The results were presented in frequency tables and charts. The chi-square tool was used to determine the statistical influence of the variables

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## STATISTICAL ANALYSIS

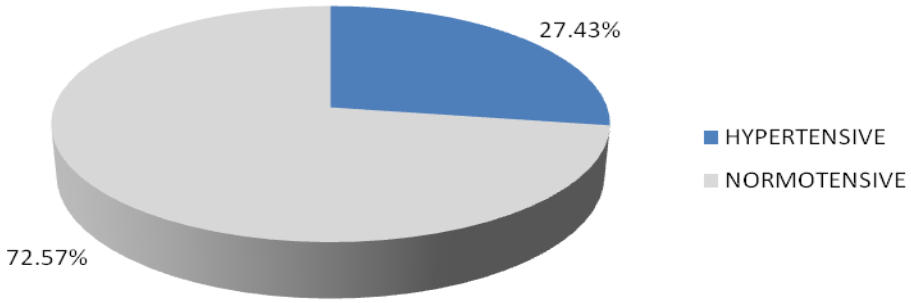


**Figure 1: Distribution of Hypertensive and Normotensive subjects**

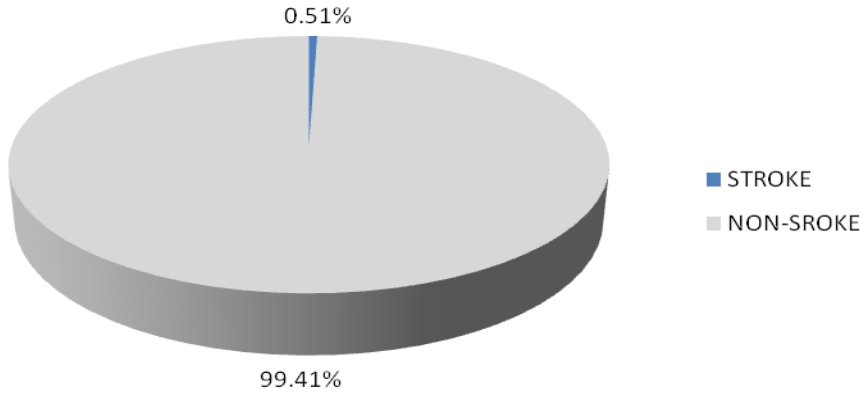


**Figure 2: Distribution of Stroke and Non-Stroke cases**

**Table 1: Age distribution of Hypertension and Stroke**

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| Age Group | Hypertension | | | Stroke | | |
|---|---|---|---|---|---|---|
| | N | Cases | % | N | Cases | % |
| 20-30 | 62 | 4 | 0.68 | 62 | 0 | 0.00 |
| 31-40 | 73 | 11 | 1.87 | 73 | 0 | 0.00 |
| 41-50 | 115 | 27 | 4.60 | 115 | 0 | 0.00 |
| 51-60 | 111 | 28 | 4.77 | 111 | 1 | 0.17 |
| 61 + | 223 | 90 | 15.34 | 223 | 2 | 0.34 |
| Not Stated | 3 | 1 | 0.17 | 3 | 0 | 0.00 |
| Total | 587 | 161 | 27.43 | 587 | 3 | 0.51 |
| P-value | 0.0000 | | | 0.809 | | |

**Table 2: Environmental factors influencing Hypertension and Stroke**

***Environmental Violence Distribution/Impact on Hypertension and Stroke***

| **Factors** | **Hypertension** | | | **Stroke** | | |
|---|---|---|---|---|---|---|
| **Violence** | **N** | **Cases** | **%** | **N** | **Cases** | **%** |
| Yes | 240 | 76 | 12.95 | 240 | 2 | 0.34 |
| No | 343 | 85 | 14.48 | 343 | 1 | 0.17 |
| Not stated | 4 | 0 | 0.00 | 4 | 0 | 0.00 |
| Total | 587 | 161 | 27.43 | 587 | 3 | 0.51 |
| P value | 0.067 | | | 0.658 | | |

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***Noise Exposure/Impact on hypertension and stroke***

| | Hypertension | | | Stroke | | |
|---|---|---|---|---|---|---|
| **Noise** | **N** | **Cases** | **%** | **N** | **Cases** | **%** |
| Yes | 223 | 47 | 8.01 | 223 | 2 | 0.34 |
| No | 364 | 114 | 19.42 | 364 | 1 | 0.17 |
| Total | 587 | 161 | 27.43 | 587 | 3 | 0.51 |
| P value | 0.007 | | | 0.305 | | |

***Influence of overcrowding on hypertension and Stroke***

| **Crowded Area** | **Hypertension** | | | **Stroke** | | |
|---|---|---|---|---|---|---|
| | **N** | **Cases** | **%** | **N** | **Cases** | **%** |
| Yes | 240 | 76 | 12.95 | 240 | 2 | 0.34 |
| No | 344 | 85 | 14.48 | 344 | 1 | 0.17 |
| Not given | 3 | 0 | 0.00 | 3 | 0 | 0.00 |
| Total | 587 | 161 | 27.43 | 587 | 3 | 0.51 |
| P value | 0.064 | | | 0.382 | | |

## RESULTS

A total of 587 subjects were involved in this study. Out of this number, 161 (27.43%) had hypertension while 426 (72.57%) were normotensive (figure 1). Also only 3(0.51%) cases of stroke were observed while 584(99.41%) were non-stroke cases (figure 2). The age distribution of the hypertension and stroke cases was shown in Table 1. Majority 90 (15.43%) of the subjects had hypertension and 2(0.34%) reported stroke.

The table 2 showed that 76(12.95%) and 2(0.34%) of hypertension and stroke cases respectively reported “yes” due to environmental violence while 85(14.48%) of hypertension and 1(0.17%) of stroke said no to environmental violence. Also, 47(8.01%) of hypertension and 2(0.34%) of stroke reported due to exposure to noise while 114 (19.42%) and 1(0.17%) of hypertension and stroke cases respectively said no due to exposure to noise. Out of 587 subjects, 76(12.95%) of

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that had hypertension and 2(0.34%) of stroke cases reported due to crowded area and 85(14.48%) of hypertension and 1 (0.17%) of stroke said no due to overcrowding. The statistical analysis with the Chi-square using the SPSS version 20 Statistical Package for Social Sciences showed that the influence of environmental violence and noise were statistically significant in the occurrence of hypertension ($P<0.05$) but overcrowding was not statistically significant in the occurrence of stroke ($P>0.05$).

## DISCUSSION

Hypertension and stroke is associated with environmental factors which can aggravate the health conditions of the human beings leading to increase in morbidity and mortality.. The findings of this study showed that people who are exposed to environmental violence tend to have an increased blood pressure which can be attributed to the anxiety and physiological effects from the violence. In this condition, it can also cause a blood clot (embolus) to reach the brain and cause stroke. [1, 9] The noise pollution was significantly associated with the occurrence of hypertension at $p = 0.007$ and not with stroke at $p = 0.305$ but the stress from noise exposure continuous causing discomfort on people within the source of the noise. The noise usually comes from transportation services such as road, rail or air transport. These people reside in the neighboring environments either beside a busy road, or a motor park, have constant exposure to traffic noise. The constant use of generators due to power outages is another major cause of noise pollution as reported by the participants. Babisch [18] found a positive association between aircraft noise and hypertension. Other studies [19-21] reported inconsistent association between road traffic noise and hypertension. The findings of the study did not show any significant association with overcrowding in the occurrence of hypertension and stroke at p-value of 0.064 and 0.382 respectively. Though, living in a crowded environment is associated with hypertension and stroke because overcrowding can come from poor housing conditions, poor environmental sanitation, traffic congestion, indoor and outdoor emissions and noise. [18]

## CONCLUSION AND RECOMMENDATIONS

From the findings of this study, environmental factors were observed to have a statistically significant influence on the occurrence of hypertension and not so in the occurrence of stroke. This may be as a result of lack of proper health education, poor awareness, illiteracy and poverty as confounding factors to the occurrence of hypertension and stroke.

Therefore, the following recommendations are made; there is a need to properly educate the public on the dangers they face every day when exposed to environmental factors such as noise, violence and overcrowding. People can be advised to relocate to a quieter neighborhood if there is too much noise where they are living or if it is overcrowded. They can also learn to avoid violence and live a life free from stress. Provision of adequate power supply will go a long way

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in reducing the use of generators and the noise that comes with it. Proper urban and rural planning of housing conditions is necessary to avoid overcrowding. Government and non-governmental organization can also be encouraged to assist in providing adequate health centers and practitioners to the rural centers which would reduce the cost involved in travelling long distances to the cities for medical check-up.

**Conflicts of Interests**

The authors declare no conflict of interest. There is no conflict in the design of the study; data collection, analyses, or interpretation of data; writing of the manuscript, and final decision to publish the results.

## REFERENCES

Iloh, G.U.P., Ofoedu, J.N., Njoku, P.U., Amadi, A.N. and Godswill-Uko, E.U. Medication adherence and blood pressure control amongst adults with primary hypertension attending a tertiary hospital primary care clinic in Eastern Nigeria. African Journal of Primary Health Care & Family Medicine. 2013; 5: 446.

Kannel, W.B. Blood pressure as a cardiovascular risk factor, prevention and treatment. JAMA. 1996; 275: 1571-1576.

Dirks, J. and Robinson, S. Preventing vascular diseases in the emerging world: a multidisciplinary approach. Diabetes Voice, 2006; 51: 45-46.

Chobanian, A.V., Bakris, G.L., Black, H.R., Cushman, W.C. and Green, L.A. The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure: the JNC VII report. JAMA, 2003; 289(19): 2560-2572.

Marshall, I.J., Wolfe, C.D. and McKevitt, C. Lay perspectives on hypertension and adherence: systematic review of qualitative research. BMJ. 2012; 345: e3953.

Onuzulike, N.M. Issues in Health. 3rd edition, McWilliams, 2006; 127-132.

Akinkugbe O.O. Non-communicable diseases in Nigeria. The next epidemics; Abayomi Memorial Lectures. Nigerian Journal of Medical Practice: 2000; 3:9

Ulasi, I.I., Ijeoma, C.K., Onwubere, B.J.C., Arodiwe, E., Onudugo, O. and Okafor, C. High prevalence and low awareness of hypertension in a market population in Enugu, Nigeria. Int J Hypertens. 2011; 869675.

Nwosu, C.M., Nwabueze, A.C. and Ikeh, V.O. Stroke at the prime of life: a study of Nigerian Africans between the ages of 16 and 45 years. E Afr. Med J. 1992; 69: 384-390.

Kearney, P.M., Whelton, M., Reynolds, K., Muntner, P., Whelton, P.K. and He, J. Global burden of Hypertension. J Hypertens. 2004; 21(1): 140.

Cooper, R., Rotimi, C., Ataman, S., McGee, D. and Osotimehin, B.O. The prevalence of hypertension in seven population of West African origin. Am J Public Health, 1997; 87:160-168.

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ISSN: 2581-3366

World Health Organization. Global burden of disease. Available at: www.who.int/healthinfo/global_burden_disease/2004_report_update. 2004. Retrieved 20th January 2014.

Philip, S.B. Epidemiology of Diabetes Mellitus in USA. 6th edition. Saunders Publishers, 2004; 167-168.

Danesi, M.A., Okudebajo, N. and Ojin, F. Prevalence of Stroke in urban mixed income community in Lagos, Nigeria. Neuroepidemiology, 2007; 204: 1– 8.

Ising, H. and Kruppa, B. Health effects caused by noise: evidence in the literature from the past 25 years. Noise Health, 2004; 6: 5-13.

Stansfeld, S.A. and Matheson, M. P. Noise Pollution: non auditory effects on health. Br. Med. Bull. 2003; 68:243-257.

Berglund B. Guidelines for Community Noise. Geneva: World Health Organization. 1999.

Babisch, W. Exposure – response relationship of the association between aircraft noise and the risk of hypertension. Noise Health. 2009; 11 (44): 161 – 168.

Babisch, W. Transportation noise and cardiovascular risk: updated review and synthesis of epidemiological studies indicate that the evidence has increased. Noise Health, 2006; 8:1-29.

Jarup, L. Hypertension and exposure to noise near airports: the HYENA study. Environ. Health Perspect, 2008; 116:329-333.

Van-Kempen. Noise Exposure and children's blood pressure and heart rate: the RANCH project. Occup. Environ. Med. 2006; 63 (9): 632 – 639.