

Blood Pressure Outcome among Elderly Women in Sagbama, Bayelsa State, Nigeria

Solomon M. Uvoh^{1*} and Emmanuel Onokpите²

¹Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Rivers State, Nigeria.

²Department of Anaesthesia, Faculty of Clinical Medicine, College of Health Sciences, Delta State University, Abraka, Nigeria.

*Corresponding Author Email: Solomonu31@gmail.com

Direct Research Journal of Public Health and Environmental Technology



Vol. 11(3), Pp. 1-5, August 2026

Author(s) retains the copyright of this article

This article is published under the terms of the Creative Commons Attribution License 4.0.

<https://journals.directresearchpublisher.org/index.php/drjphet>; <https://www.ajol.info/index.php/drjphet>

Research Article

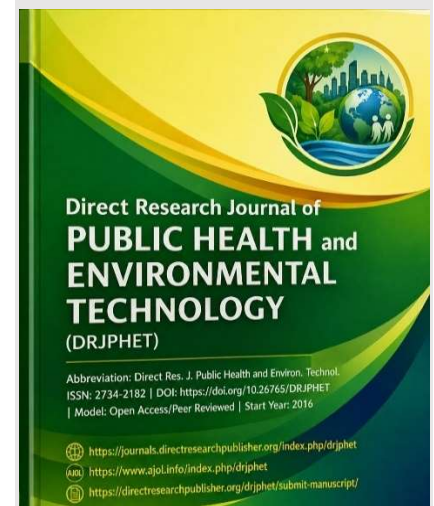
ISSN: 2734-2182

Received 22 May 2026, Accepted 27 July 2026, Published 3 August 2026

ABSTRACT

This study assesses the blood pressure of elderly women in relation to their age and dietary intake in Sagbama LGA. A descriptive study design was adopted to select all 225 participants for this study using a mercurial sphygmomanometer, stethoscope, fingertip, bathroom scale, interviewers and a structured questionnaire for documentation of all indices obtained for the study. Results: The obtained results showed elderly women aged 60-64years (37.78%) and above 80years (24.44%) as the most respondents during the study, while divorced rate (48.89%) was high, including secondary education attainment. The systolic blood pressure was lower (123mmHg) among categories of age 60-64yrs compare with 65-69yrs (127mmHg). However, at age 75- 79 years, the respondents' blood pressure rises significantly from 126 to 138 mmHg among elderly women above 80years. Regarding diastolic blood pressure, it increases steadily from the lower age group of 60- 64 years (67mmHg) to (68mmHg), (70mmHg) among age categories of 65- 74 years, but declined to (64 mmHg) at age 75- 79 years and further increased to 69 mmHg among respondents above 80years. The pulse significantly decreased (82bpm) among the elderly above 80years compared with other ages. Furthermore, the anthropometric indices of the elderly were all within normal range weight according to age. More so, the past lifestyle of the elderly shows their rate of much salt consumption (55.56%) and the addition of vegetables (75.56%) in their diet regularly. An increase in BP is associated with increasing age due to the narrowing of blood vessel lumens. We hereby recommend that the government should set up enlightenment campaign teams through the Ministry of Health to educate elderly women on the importance of consuming good nutrition that will improve their blood pressure health status. Also, hospitals for the elderly should be built to care for their health needs regularly.

Keywords: Age, blood pressure, diets, pulse, women.



Citation: Uvoh S.M. & Onokpите E. (2026). Blood pressure outcome among elderly women in Sagbama, Bayelsa State, Nigeria. *Direct Research Journal of Public Health and Environmental*. Vol. 11(3), Pp. 1-5. <https://dx.doi.org/10.4314/drjphet.v11i3.1>

INTRODUCTION

Blood pressure is the force of blood exerted by circulatory blood on arterial walls (Sembulingan, 2010). In 1733, Reverend Stephen Hales directly measured blood pressure for the first time using a brass pipe inserted into a horse artery (Martin *et al.*, 2025). However, in 1900s, clinical devices (sphygmomanometer) was used to measure blood pressure in humans viewing high blood pressure as a normal way of blood circulation in the body

but in the 1940s-1950s Framingham heart study regards death of U.S president Franklin Roosevelt from stroke shows high blood pressure to be a dangerous disease and not normal regulation (Moser, 2006; Saklayen and Deshpande, 2016). Hypertension is a major predisposing factor for cardiovascular diseases, which include myocardial infarction, stroke and renal diseases (WHO, 2025; Murray *et al.*, 2022). Non-communicable diseases

related to cardiovascular disease are the commonest causes of medical admission among the elderly. It is measured clinically with a mercurial sphygmomanometer calibrated in (mmHg) for both systolic and diastolic blood pressure. Systolic blood pressure is a major predictor of individual cardiovascular outcome (Franklin *et al.*, 2001). Older women experience cardiovascular events at a rate 2 to 3 times greater than younger adults (Virdis *et al.*, 2011). Reasons for gender differences in hypertension remain a matter of debate. Prospective longitudinal studies have suggested that an increased BMI and ageing, rather than postmenopause, are mainly involved (Cifkova *et al.*, 2008). In 2005, the percentage of people aged 60 and above was 8%, corresponding to 5 million individuals, and this number is expected to increase to 16.1% or 1.5 billion individuals by 2050 (WPP, 2004). The prevalence of hypertension in the U.S population is around 29% and increases progressively with age, so that in women aged 75 and above, 79% are hypertensive (Roger *et al.*, 2011). In Nigeria, the prevalence of hypertension is high (44.7%) among elderly women dwelling in rural settings (Egbewale *et al.*, 2019).

Hypertension is known to be an important risk factor for cardiovascular morbidity and death among the elderly. The high prevalence of hypertension in Africa is due to both urbanization and a shift towards western habits such as smoking, unhealthy diets with excess salt and fat intake (Egbewale *et al.*, 2019). Pseudo-hypertension: Note that falsely increased systolic blood pressure resulting from arteries becoming thickened and stiff due to arterial medial sclerosis and calcification is common among elderly women (Wright and Looney, 1997). Another aspect characterizes elderly patients, with prevalence rates between 15 and 25%, is the so-called white coat hypertension. This is a persistently elevated clinic blood pressure together with home blood pressure values within the normal range. Hence, confirmation of white coat hypertension diagnosis among the elderly is crucial to avoid overtreatment (Virdis *et al.*, 2011). It is a well-known fact that ageing is associated with increased blood pressure due to varied components which are not caused by ageing factors but also by lifestyle and environmental factors. Advancing age, microscopic and macroscopic changes to the heart and vascular changes may occur and affect blood pressure (Singh *et al.*, 2023).

Sudden rise or sustained prolonged blood pressure elevation is a significant risk factor for end-organ damage (Schmieder, 2010). The co-morbidity associated with hypertension among the elderly can cause many debilitating, if not fatal, outcomes such as stroke, myocardial infarction, kidney disease and vascular dementia (Lim *et al.*, 2015). Due to insufficient information on this area regarding elderly women in SALGA, this study becomes necessary as it will help clinicians and health workers on the need for early detection, prevention and treatment of hypertension in this study area.

Therefore, the objective of this study is to assess the blood pressure of elderly women in relation to their age and dietary intake in Sagbama Local Government Area of

Bayelsa State.

MATERIALS AND METHODS

Study location

The study was conducted in Sagbama Local Government Area (LGA) of Bayelsa State, Nigeria. Sagbama is a predominantly riverine area situated at approximately latitude 5°9'32" N and longitude 6°11'49" E, with an average elevation of about 13 m above sea level. The LGA covers a total land area of approximately 945 km² and shares a boundary across the river with Agoloma community in Delta State. The area is characterised by an extensive network of rivers, creeks, and wetlands, which strongly influence the socio-economic activities of the inhabitants. The major occupations of the residents include fishing, farming, trading, and civil service, with fishing and agriculture serving as the primary sources of livelihood due to the area's rich aquatic and fertile land resources.

Study design

This study adopted a cross-sectional descriptive survey method with a semi-structured questionnaire to assess hypertension, risk factors, adherence to management, etc. Their blood pressure was measured using an Accuson standardized mercurial sphygmomanometer; pulse, weight and height of the elderly were taken as well. Each respondent was asked to sit quietly for at least 5 minutes and their bare arms supported at heart level on a desk. The stethoscope bell was placed over the brachial artery pulse while the cuff was inflated to 20 mmHg above the palpated systolic blood pressure and deflated at a rate of 2-3 mmHg/second.

Study population

The population was two hundred and twenty-five respondents of elderly women residing in Sagbama, Tumgbabiri and Tumgbo communities in Sagbama LGA.

Sample size determination

A previous study on hypertension among the elderly in Yenagoa has shown a percentage prevalence of 15.81% (Uvoh *et al.*, 2025). Using Tamoghna formulae where p = percentage proportion of hypertension among elderly women, e = margin of sampling error tolerated at 95% confidence intervals at 5% or 0.05, $q = 100 - p$

$$n = pq / (e/1.96)^2$$

$$N = 15.81 \times 84.19 / (5/1.96)^2$$

$$N = 1,331.04 / 6.502$$

$$N = 204.71 \text{ participants.}$$

Therefore, calculating for a non-response rate of 10% assumption

$$N = 10/100 \times 204.71$$

$$N = 20.47$$

N = 225 participants for this study.

Sampling technique

Simple random sampling technique through balloting with replacement was used to select 225 respondents from Sagbama Local Government Area, Bayelsa State

Inclusion criteria

Only elderly women within 60 years and above were allowed to participate in this study. The elderly women who have lived consistently in Sagbama Local Government Area for the past five years and above and those who consented were selected for this study

Exclusion criteria

Elderly women residing outside Sagbama LGA, less than 60 years, and those who have stayed for less than 5 years were excluded from this study.

Instrument for data collection

Structured questionnaire, comprising four sections: Section 'A' to elicit data on the socio-demographic data of the respondents, Section 'B' focuses on the cardiovascular status of the elderly women, Section 'C' focuses on the lifestyle of the elderly, while Section 'D' focuses on the food intake measures to reduce high blood pressure among elderly women in SALGA, Bayelsa State.

Method of data collection

The instrument (235) was administered physically with instructions, while (225) were retrieved after being filled. Trained research assistants on data collection methods for effective and thorough outcomes were also included during data collection.

Validity/reliability of the instrument

Reliability was ensured with a pilot study of 10% using the test-retest method among the elderly in Sagbama LGA, which has the same demographic characteristics.

Data analysis

Data obtained from this study were analysed using SPSS version 25.0 and are presented in frequency distribution tables and + or - standard deviation statistically.

RESULTS

The study included 225 elderly women residing in Sagbama Local Government Area, Bayelsa State. As presented in Table 1, the largest proportion of participants was aged 60–64 years (37.78%), followed by those aged over 80 years (24.44%), while women aged 70–74 years constituted the smallest age group (6.67%). All participants were female (100%). Regarding marital status, divorced women accounted for the highest proportion of the study population (48.89%), followed by widows (31.11%), whereas married women represented 20.00% of the respondents. Educational attainment was predominantly secondary education (35.56%), while primary and tertiary education each accounted for 31.11% of participants; only 2.22% had no formal education. In terms of family size, most respondents had five children (35.56%), followed by three children (31.11%) and two children (20.00%), whereas only 4.44% had one child and 8.89% had no children. The participants were drawn from three communities, with Sagbama and Tumgbabiri each contributing 40.00% of the study population, while Tumgbo accounted for the remaining 20.00% (Table 1).

Table 1. Demographic characteristics of the study population.

Variables	Frequency (n=225)	Percentage (%)
Age (years)		
60-64	85	37.78
65-69	40	17.78
70-74	15	6.67
75-79	30	13.33
>80	55	24.44
Gender		
Females	225	100.0
Male	0	0.0
Marital status		
Married	45	20
Divorce	110	48.89
Widows	70	31.11
Educational status		
Primary	70	31.11
Secondary	80	35.56
Tertiary	70	31.11
Nil	5	2.22
Number of children		
One	10	4.44
Two	45	20
Three	70	31.11
Five	80	35.56
Nil	20	8.89
Community		
Sagbama	90	40
Tumgbabiri	90	40
Tumgbo	45	20

Source: Field survey, 2026.

The blood pressure characteristics of the elderly women by age group are presented in Table 2. Mean systolic blood pressure increased with advancing age, ranging from 123.50 ± 9.44 mmHg among women aged 60–64 years to 138.75 ± 26.96 mmHg among those older than 80 years. This variation was statistically significant ($p = 0.00$). Diastolic blood pressure also differed significantly across age groups ($p = 0.04$), with mean values ranging from

Table 2. Blood pressure of the elderly according to age (years).

B/P(mmHg)	Age (Years)					p-value
	60-64	65-69	70-74	75-79	>80	
Systolic	123.50±9.44	127.00±21.10	126.20±14.97	126.67±12.11	138.75±26.96	0.00
Diastolic	67.50±3.53	68.40±5.27	70.90±7.18	64.60±4.97	69.50±7.61	0.04
Pulse (b/m)	84.67±8.13	85.63±8.49	86.64±4.37	86.14±5.24	82.09±4.59	0.01

Significant at 0.05.

Table 3. Anthropometric status of the elderly according to age (years).

Variables	Age (Years)					p-value
	60-64	65-69	70-74	75-79	>80	
Weight(kg)	66.20±5.12	63.27±6.57	64.11±8.19	65.50±6.44	65.90±9.08	0.23
Height(m)	1.69±0.10	1.67±0.08	1.74±0.08	1.69±0.07	1.67±0.09	0.05
BMI (kg/m ²)	23.18±0.04	22.69±0.32	21.18±0.12	22.93±0.14	22.69±0.13	0.04

Significant at 0.05.

Table 4. Current/previous life style of the population

Variables	Total (n)	Frequency(n)		Percentage (%)	
		Yes	No	Yes	No
Do you consume excess salt regularly in your food?	225	125	100	55.56	44.44
Do you always think about your condition?	225	150	75	66.67	33.33
Do you smoke?	225	22	203	9.78	90.22
Have you smoke regularly in the past?	225	23	202	10.22	89.78

Source: Field survey, 2026.

Table 5. Dietary food intake among the elderly.

Variables	Total (n)	Frequency(n)		Percentage (%)	
		Yes	No	Yes	No
Do you regularly consume red meat?	225	45	180	20	80
Do you regularly consume fatty foods?	225	115	110	51.11	48.89
Do you regularly add vegetables to your diet?	225	170	55	75.56	24.44

Source: Field survey, 2026.

64.60 ± 4.97 mmHg in women aged 75–79 years to 70.90 ± 7.18 mmHg among those aged 70–74 years. Similarly, pulse rate varied significantly with age ($p = 0.01$), with the highest mean pulse rate observed among participants aged 70–74 years (86.64 ± 4.37 beats/min) and the lowest among women older than 80 years (82.09 ± 4.59 beats/min) (Table 2).

The anthropometric measurements of the participants are summarised in Table 3. Mean body weight ranged from 63.27 ± 6.57 kg among women aged 65–69 years to 66.20 ± 5.12 kg among those aged 60–64 years, with no statistically significant difference across age groups ($p = 0.23$). Height showed a borderline significant variation ($p = 0.05$), with the highest mean height recorded among women aged 70–74 years (1.74 ± 0.08 m). Body mass index (BMI) differed significantly across age categories ($p = 0.04$), with the highest mean BMI observed among participants aged 60–64 years (23.18 ± 0.04 kg/m²) and the lowest among those aged 70–74 years (21.18 ± 0.12 kg/m²) (Table 3).

The current and previous lifestyle practices of the respondents are presented in Table 4. More than half of the participants (55.56%) reported regularly consuming excess salt in their meals, while 44.44% did not. Approximately two-thirds (66.67%) indicated that they frequently worried about their health condition, whereas 33.33% did not. Cigarette smoking was uncommon

among the respondents, with only 9.78% reporting current smoking and 10.22% indicating a previous history of regular smoking. The vast majority (90.22% and 89.78%, respectively) reported neither current nor previous regular smoking (Table 4).

The dietary habits of the elderly women are shown in Table 5. Most respondents (80.00%) reported that they did not regularly consume red meat, while only 20.00% consumed red meat on a regular basis. Slightly more than half of the participants (51.11%) reported regular consumption of fatty foods, compared with 48.89% who did not. Furthermore, a substantial majority (75.56%) indicated that they regularly included vegetables in their diet, whereas 24.44% did not (Table 5).

DISCUSSION

The findings of this study indicate that the majority (37.78%) of the elderly women were aged 60–64 years, with a substantial proportion (24.44%) also aged above 80 years. Divorce (48.89%) and widowhood (31.11%) were common marital statuses among the respondents, while most had attained at least secondary education (35.56%). The relatively higher level of educational attainment observed in this study may positively influence awareness, health-seeking behaviour, and adherence to blood pressure management strategies. This finding agrees with

Uvoh *et al.* (2025), who reported that education enhances awareness of hypertension and its management among elderly populations in Bayelsa State.

A lower number of elderly women admitted to smoking (9.78%) presently, while most do not consume red meat (805) regularly. However, fatty food consumption (51.11) was a regular habit develops among most of the elderly women considered in this study. The addition of vegetables (75.56%) to their diet regularly was a welcome development compared to 24.44% who have not been doing so regularly. Malnutrition can be prevented by engaging in a well-balanced diet regularly with a variety of nutritious whole foods. The presence of sufficient nutrient intake needed by the body will reduce micronutrient deficiencies that are common even with a fairly standard diet. Blood tests will serve as a guide to find out if there are to improve micronutrient supplements, in addition with healthcare provider that can help determine the correct dose intake (Degarege *et al.*, 2015).

The blood pressure observed among the elderly women in Sagbama Local Government Area shows a significant gradual systolic and diastolic increase from the lower age group (60-64 years) (123/67mmHg) to above age 80 years (138/68 mmHg) among the study population. Elderly women exposed to a gas flare environment from the onset of their life are also predisposed to hypertension and blood pressure increase coupled with increasing age (Solomon *et al.*, 2021; 2025). However, our findings are not in agreement with the study conducted by Solomon *et al.* (2025) of higher blood pressure observation among elderly women of age 60-64years (140/83 mmHg) in the Yenagoa environment that is polluted by gas flares. The pulse rate was also significantly increased gradually from 84 to 86 bpm among 75-79years but then declined to 82 bpm at age 80 and above. Older persons are an incomparable population, and the management of their blood pressure is distinct from that of the overall population (Muller as cited in Li *et al.*, 2024). National Health Nutrition Examination Survey in the United States showed 70% of persons above 65years with hypertension (Mills *et al.*, 2016). It was estimated that the worldwide prevalence of hypertension in people aged 30- 79 years was at a level of 32% in women and 34% in men (Muntner *et al.*, 2022). The 2017 Global Burden of Disease estimated 1.56 billion hypertensive person that will be affected globally in 2025. In Nigeria, Osun State precisely, the prevalence of hypertension among the elderly was 44.7% (Egbewale *et al.*, 2019), while in Bayelsa State, a cross-sectional study conducted in Ogboloma community revealed a prevalence rate of 50.4% (Egbi *et al.*, 2018; Ali *et al.*, 2023). Hypertension is accountable for about 30.6% of all cardiovascular mortality in Nigeria, with the bulk of this mortality happening among older persons (Stergiou *et al.*, 2020).

The anthropometric assessment showed that the respondents generally maintained normal body weight and body mass index (BMI), although significant age-related differences were observed in BMI. These findings suggest that maintaining a healthy body weight may contribute to

favourable cardiovascular outcomes in older adults. Similar observations were reported by Egbewale *et al.* (2019), who found that normal anthropometric characteristics were associated with better blood pressure control among elderly Nigerians. Furthermore, Li *et al.* (2024) emphasised that maintaining an appropriate nutritional status reduces frailty-related cardiovascular complications in older adults.

Despite the generally favourable anthropometric profile, lifestyle practices identified in this study revealed important modifiable risk factors for hypertension. More than half of the respondents (55.56%) reported regular consumption of excess dietary salt, while about two-thirds (66.67%) frequently worried about their health condition. Excessive dietary sodium intake has long been recognised as a major contributor to hypertension and cardiovascular disease. Similarly, WHO (2025) identified high salt intake as one of the leading modifiable risk factors for elevated blood pressure, while Mills *et al.* (2016) highlighted unhealthy dietary practices as important contributors to the global burden of hypertension. Persistent psychological stress may also contribute to increased blood pressure through sustained activation of the sympathetic nervous system, thereby increasing cardiovascular risk (Murray *et al.*, 2023). In contrast, the low prevalence of current and previous smoking observed among the respondents suggests that tobacco use may have contributed minimally to hypertension risk within this study population.

The dietary assessment further showed that most respondents (80%) did not regularly consume red meat, whereas slightly more than half (51.11%) frequently consumed fatty foods. Encouragingly, the majority (75.56%) regularly incorporated vegetables into their diets. Adequate vegetable intake is known to provide dietary fibre, potassium, antioxidants, and other micronutrients that support healthy blood pressure regulation. Similar findings were reported by Solomon *et al.* (2021), who demonstrated that healthy dietary practices, particularly increased vegetable consumption, were associated with improved cardiovascular parameters among women in Bayelsa State. However, frequent consumption of fatty foods may counteract these benefits by increasing the risk of obesity, dyslipidaemia, and hypertension, as noted by Martin *et al.* (2025).

Conclusion

The blood pressure among elderly women in Sagbama Local Government Area increases with advancing age, accompany with decrease in pulse rate. Lifestyle and body mass index were also observed as contributing factors associated with their blood pressure status. However, vascular pathophysiology is most common in advanced hypertension among the elderly, but clinical impact does vary among individuals.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

REFERENCES

- Ali, Y. A., Thokerunga, E., Mohamed, Z. A., & Wang, X. (2023). High blood pressure increases the risk of cerebral microbleeds in hypertensive individuals. *International Journal of Clinical Medicine*, 14(4), 185-196.
- Degarege, D., Degarege, A., & Animut, A. (2015). Undernutrition and associated risk factors among school age children in Addis Ababa, Ethiopia. *BMC Public Health*, 15(1), 375.
- Cifkova, R., Pitha, J., Lejskova, M., Lanska, V., & Zecova, S. (2008). Blood pressure around the menopause: a population study. *Journal of Hypertension*, 26(10), 1976-1982.
- Egbi, O. G., Ogoina, D., & Oyeyemi, A. (2018). Prevalence of hypertension and associated factors in a rural community in Bayelsa State. *Int J Res Med Sci*, 6(4), 1106-1113.
- Egbewale, B. E., Oyekale, A., Adedokun, S. A., Akindele, A., & Adejimi, A. (2019). Prevalence and pattern of hypertension among elderly in Osun State, Nigeria. *International Journal of Community Medicine and Public Health*, 6(12), 5081-5087.
- Singh, J. N., Nguyen, T., Kerndt, C. C., & Dhamoon, A. S. (2023). Physiology, blood pressure age related changes. In StatPearls [Internet]. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK537297/>
- Franklin, S. S., Larson, M. G., Khan, S. A., Wong, N. D., Leip, E. P., Kannel, W. B., & Levy, D. (2001). Does the relation of blood pressure to coronary heart disease risk change with ageing? The Framingham Heart Study. *Circulation*, 103(9), 1245-1249.
- Lim, K. K., Sivasampu, S., & Khoo, E. M. (2015). Antihypertensive drugs for elderly patients: a cross-sectional study. *Singapore Medical Journal*, 56(5), 291.
- Li, L., Duan, L., Xu, Y., Ruan, H., Zhang, M., Zheng, Y., & He, S. (2024). Hypertension in frail older adults: current perspectives. *PeerJ*, 12, e17760.
- Martin, S. S., Aday, A. W., Allen, N. B., Almarzooq, Z. I., Anderson, C. A., Arora, P., Avery, C. L., Baker-Smith, C. M., Bansal, N., Beaton, A. Z., & American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Committee. (2025). Correction to: 2025 Heart disease and stroke statistics: A report of US and global data from the American Heart Association. *Circulation*, 151(25), e1096-e1096.
- Mills, K. T., Bundy, J. D., Kelly, T. N., Reed, J. E., Kearney, P. M., Reynolds, K., Chen, J., & He, J. (2016). Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. *Circulation*, 134(6), 441-450.
- Moser, M. (2006). Historical perspectives on the management of hypertension. *The Journal of Clinical Hypertension*, 8(8) 15-20.
- Muntner, P., Miles, M. A., Jaeger, B. C., Hannon III, L., Hardy, S. T., Ostchega, Y., Wozniak, G., & Schwartz, J. E. (2022). Blood pressure control among US adults, 2009 to 2012 through 2017 to 2020. *Hypertension*, 79(9), 1971-1980.
- Muntner, P., Jaeger, B. C., Hardy, S. T., Foti, K., Reynolds, K., Whelton, P. K., & Bowling, C. B. (2022). Age-specific prevalence and factors associated with normal blood pressure among US adults. *American journal of hypertension*, 35(4), 319-327.
- Murray, E. C., Delles, C., Orzechowski, P., Renc, P., Sitek, A., Wagenaar, J., & Guzik, T. J. (2023). Vascular phenotypes in early hypertension. *Journal of Human Hypertension*, 37(10), 898-906.
- Stergiou, G. S., Palatini, P., Modesti, P. A., Asayama, K., Asmar, R., Bilo, G., ... & Parati, G. (2020). Seasonal variation in blood pressure: Evidence, consensus and recommendations for clinical practice. Consensus statement by the European Society of Hypertension Working Group on Blood Pressure Monitoring and Cardiovascular Variability. *Journal of Hypertension*, 38(7), 1235-1243.
- Roger, V. L., Go, A. S., Lloyd-Jones, D. M., Adams, R. J., Berry, J. D., Brown, T. M., Aronson, M. R., Dai, S., De Simone, G., Ford, E. S., & Wylie-Rosett, J. (2011). Heart disease and stroke statistics—2011 update: a report from the American Heart Association. *Circulation*, 123(4), e18-e209.
- Saklayen, M. G., & Deshpande, N. V. (2016). Timeline of history of hypertension treatment. *Frontiers in cardiovascular medicine*, 3, Article 3.
- Schmieder, R. E. (2010). End organ damage in hypertension. *Deutsches Ärzteblatt International*, 107(49), 866.
- Virdis, A., M. Bruno, R., Fritsch Neves, M., Bernini, G., Taddei, S., & Ghiadoni, L. (2011). Hypertension in the elderly: an evidence-based review. *Current Pharmaceutical Design*, 17(28), 3020-3031.
- Wright, J. C., & Looney, S. W. (1997). Prevalence of positive Osler's manoeuvre in 3387 persons screened for the Systolic Hypertension in the Elderly Program (SHEP). *Journal of Human Hypertension*, 11(5), 285-289.
- Solomon, M. U., Onokpite, E., Belema, D., Jonas, D. T. (2025). Assessment of Cardio-Anthropometric Status and Hypertension Risk Factors Among Women of Childbearing Age in Ahoada West River State, Nigeria. *Asian Journal of Research in Cardiovascular Diseases*, 7(1), 149-157.
- Solomon, M. U., Kiridi Emily, G. E., Tonkiri, A., Charles, N. N., & Okuroemi, O. H. (2021). Dietary effect on cardiorenal parameters of women residents in gas flares polluted environment in Bayelsa State, Nigeria. *International Journal of Scientific and Research Publication*, 11(12), 157-155.
- Solomon, M. U., Nwafor, A. C. & Azibialua, A. A. (2021). Evaluation of some cardiovascular parameters of apparently healthy pregnant women in gas flaring communities: A baseline study in Bayelsa State, Nigeria. *Journal of research in medicine and medical sciences*, 2(6), 104-108.
- Uvoh, S. M., Emmanuel, O., Kianen, S., Goodhope, B. K., & Ben-Wakama, E. R. (2025). Hypertension and Its Clinical Warning Signs among the Elderly in Yenagoo LGA, Bayelsa State, Nigeria. *Asian Journal of Cardiology Research*, 8(1), 617-623.
- World Health Organisation (WHO) (2025). Hypertension. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/hypertension>.