**ASSESSMENT OF CARDIO-ANTHROPOMETRIC STATUS AMONG CHILDBEARING AGE IN AHOADA WEST RIVER STATE, NIGERIA.**

**Abstract**

**Aim/Objective:** This study aimed to determine the cardio-anthropometric status of child bearing age women with focus on factors responsible to the development of hypertension in Ahoada west LGA River state, Nigeria. **Materials and Methods:** A random sampling method was employ for this study using Youngkang Zhenzhong and calibrated meter rule to determine weight(kg) and height(m) while Omron digital apparatus was used to determine the cardiovascular status of all the subjects (271). All data obtained were documented in a structured questionnaire**. Results:** The age of the respondents ranges from 18->36yrs.Regarding their educational status, 45.93%, 41.48%, and 11.85% possess tertiary, secondary and primary education compared with those without (0.74%) without any qualifications. Married couples were 74.08% and single 16.29% while divorce and separation was 1.48% and 8.15% respectively. Their major occupation was civil service (28.89%) and business (32.59%) while house wives were 19.26% and unemployed 14.82% compared with students of 4.44%. The study also observed (15.19%) hypertensive and (40.37) Prehypertensive subjects compared with 44.44% normal and 0.00% hypotensive women among child bearing age women. Moreso, the SBP of participants above 36% was elevated (132mmHg %) including their MAP (103.33mmhg %) with a significant p-value of 0.00 and a pulse rate of 69.00bpm of 0.04 significant p-value compared with younger respondents of normal values. The anthropometric indices shows 5.93% underweight, 44.44% normal, 23.33% overweight and 26.29% obese while the statistical value shows 22.09kg/m² (18-24yrs),25.98kg/m² (25-30yrs), 23.16kg/m² (31.35yrs) and 26.60kg/m² (>36yrs) with p-value of 0.00 among the study population. Furthermore the attitude of respondents towards the use of contraceptives was 48.89% yes while 51.11% decline to their use. **Conclusion:** The cardiovascular status increases gradually from normal to pre-hypertension stage with increasing age among the respondents statistically. Pre- and hypertensive subjects was quite high in terms of percentage. The percentage of overwt and obese gradually increases among the participants**.** Comprehensive treatment and prevention of CVD should include adherence to a healthy diet, a healthy body composition, and regular physical exercise.

**KEYWORDS:** Age, BMI, Hypertension, Weight, Height.

**INTRODUCTION**

In recent decades, cardiovascular diseases have become more abundant due to lifestyle changes and are the leading cause of death worldwide (Opio *et al.,* 2020). Cardiovascular mortality, which is closely associated with cardiovascular risk factors such as high triglyceride and fasting blood sugar levels with increased body fatness (Shahraki, 2017). Visceral fatty depots have the potential to increase free fatty acids and adipokines with atherogenic, pro-inflammatory, and pro-thrombotic properties, which triggers the development of CVD and diabetes (Stone *et al.,* 2022).

Cardiovascular diseases worldwide with ischemic heart disease and stroke are the leading causes of CVD related death (Aune *et al.,* 2016; Baber *et al.,* 2015; Gao *et al.,* 2022). Commonly anthropometric indices used to screen for cardiovascular disease are BMI kg/m2, waist circumference, and waist-to-hip ratio (Grandhi *et al.,* 2020; Oladosu *et al.,* 2023). BMI is a simple indicator associated with an increased risk of CVD, although it may not reflect variations in body fat distribution (Iacobini *et al.,* 2019). Due to its simplicity, usability, and availability, BMI is the most common method of obesity assessment ([Louise *et al.,*](https://pubmed.ncbi.nlm.nih.gov/?term=Goh+LG&cauthor_id=24503301) 2014; Corsi *et al.,* 2015; Gavriilidou *et al.,* 2015; Masrouri *et al.,* 2024).

Elevated blood pressure is a major risk factor for cardiovascular disease and is often associated with obesity and other anthropometric indicators. Resting heart rate can be an indicator of overall cardiovascular health with higher rates potentially indicating increased risk. Other Factors such as lipid profiles and other biochemical markers can also provide insights into cardiovascular risk (Cesare *et al.,* 2015; Bhandazi *et al.,* 2016). Obesity is prevalent among women of childbearing age and is associated with increased cardiovascular risk. Early identification allows for timely interventions, including lifestyle modifications and medical management to reduce risk. Clinical significance shows that assessment of cardiovascular and anthropometric indices among women of childbearing age is crucial for identifying women at risk of cardiovascular disease and pregnancy complications (Gavriilidou *et al.,* 2015).

Decline in fertility globally is associated with significant social and economic implications on a preexisting ageing . The ongoing rise of overweight and obesity rates, particularly among women of childbearing age worldwide has compounded the problem and more than 80% of the global burden of CVD will occur in low- and middle-income countries ([Ofori-Asenso,](https://openpublichealthjournal.com/VOLUME/10/PAGE/32/#con0) *et al.,* 2017; Whelton *et al.,*2020;Nazir *et al.,* 2023;Corsi *et al.,* 2015).The number of pregnancies and births associated with CVD risk is on the increase with some studies showing a linear relationship between increasing parity and increased carotid artery thickness (Hambidge *et al.,* 2015; Akinbule *et al.,* 2022; Onokpite *e tal.,* 2024).

Adequate [nutrition](https://www.sciencedirect.com/topics/food-science/nutrition) of women of child-bearing age plays a vital role in the prevention of essential nutrient deficiency against undesirable health outcomes and many diet-related chronic diseases, and hence improves maternal and child health (Hambidge *et al.,* 2017; Wang *et al.,* 2023). Findings have revealed that the quality of diet consumed contributes to high prevalence of multiple forms of malnutrition and diet-related non-communicable diseases which are higher among women than men for certain forms of malnutrition (Kozuki *et al.,* 2019**;** Karaye *et al.,* 2024).

Physiological changes during pregnancy exert stress on the heart that could lead to cardiac decompensation, especially in the presence of background diseases such as cardiomyopathy, hypertension, valvular, or congenital heart diseases. Heart disease in pregnancy is an important contributor to maternal and fetal adverse outcomes. Although data on heart disease in pregnancy are generally scarce, a few available studies have shown higher prevalence in northern than southern regions of Nigeria. In addition, clinical outcomes among pregnant women diagnosed with heart disease are worse than among those without and apparently healthy women (Nazir & Musa, 2023; Manzo *et al.,*2025).

Socio-economic status is a predictor of CVD and its risk factors. However, the nature of this relationship variations dependent on the economic development of the countries (Oguoma *et al.,* 2015). According to the Centers for Disease Control and Prevention, anthropometry provides a valuable assessment of nutritional status in children and adults (Akinbule *et al.,* 2022). Body measurements can help assess health and dietary status and future disease risk in adults. These measurements can also determine adult body composition to help determine underlying nutritional status and diagnose obesity (Burke *et al.,* 2016). Lower female fecund ability (i.e., the cycle probability of conception) has been linked with overweight and obesity (Fryar *et al.,* 2016).

**MATERIALS AND METHODS**

**Study design**

A descriptive research design was employed for this study to assess the cardiovascular and anthropometric indices among child bearing age women

**Study Area:** Akenema, Okaki, Mbiama ,Kunisha, Igovia

**Study Population**

The population of this study includes all child bearing aged women in the study area.

**Inclusion Criteria:** Only those who consented to be part of this study were included.

**Exclusion Criteria:** Those who were too sick and do not consent was excluded.

**Sample size: Apply**ing Tamoghna formula (2013), n =pq/(e/1.96)2. Sampling error tolerated at 95% degree, confident interval set at 5% or 0.05, q = 100-p

n= 20 x 100 – p/(5/1.96)2.

n = 20 x 80/6.51

= 246 participants. non-respondent adjustment of 10% will give 10/100 x 246 = 25

Sample size = 246+ 25 = 271.

**Source of data:** Primary.

**Instrument for data collection:** Structured questionnaire, Young Zhezhong scale for weight, calibrated meter rule for height, stethoscope and sphygmomanometer.

**Data analysis: spss version 24.0**

**Ethical Consideration:** Ethical approval was obtained from the Ethics and Research Committee of the institution.

**RESULTS**

**Table 1: Socio- Demographic Characteristics of the study Population**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Age of Respondents and Educational Levels** | | | | | | | | |
| Age(yrs) | Primary.  n (%) | | Secondary. n(%) | | Tertiary n(%) | | None.  n(%) | Total(n) | |
| 18-24 | 6(2.22) | | 36(13.33) | | 2(0.74) | | - | 44 | |
| 25-30 | 12(4.44) | | 38(14.07) | | 56(20.74) | | - | 106 | |
| 31-35 | 6(2.22) | | 24(8.89) | | 34(12.59) | | 2(0.74) | 66 | |
| >36 | 8(2.96) | | 14(5.19) | | 32(11.85) | | - | 54 | |
| Total (%) | 32(11.85) | | 112(41.48) | | 124(45.93) | | 2(0.74) | 270(100) | |
| **Marital Status of Respondents** | | | | | | | | | |
| Variables | **Frequency (n)** | | | **Percentage (%)** | | |  | |  |
| Married | 200 | | | 74.08 | | |  | |  |
| Single | 44 | | | 16.29 | | |  | |  |
| Divorce | 4 | | | 1.48 | | |  | |  |
| Separate | 22 | | | 8.15 | | |  | |  |
| Total | 270 | | | 100 | | |  | |  |
| **Occupation of Respondents** | | | | | | | | | |
| **Variables** | | **Frequency(n)** | | | | **Percentage (%)** | | | |
| Civil Servant | | 78 | | | | 28.89 | | | |
| Unemployed | | 40 | | | | 14.82 | | | |
| House wife | | 52 | | | | 19.26 | | | |
| Students | | 12 | | | | 4.44 | | | |
| Business | | 88 | | | | 32.59 | | | |
| Total | | 270 | | | | 100 | | | |

**Field Survey (2025)**

The table above describes the basic characters of the study population.

**Table2: Family History of Cardiovascular Disease**

|  |  |  |
| --- | --- | --- |
| **Variables** | **Frequency(n)** | **Percentage (%)** |
| Yes | 24 | 8.89 |
| No | 246 | 91.11 |
| Total | 270 | 100 |
| **Do you Smoke?** | | |
| Yes | 14 | 5.19 |
| No | 256 | 94.81 |
| Total | 270 | 100 |
| **Respondents Attitude towards additional salt in Diets** | | |
| **Variables** | **Frequency (n)** | **Percentage (%)** |
| Yes | 62 | 22.96 |
| No | 208 | 77.04 |
| Total | 270 | 100 |
| **Regular Alcoholic Intake** | | |
| **Variables** | **Frequency (n)** | **Percentage (%)** |
| Yes | 30 | 11.11 |
| No | 240 | 88.89 |
| Total | 270 | 100 |

**Field Survey (2025)**

The above table shows the regular habits engaged upon by the respondents in order to trace their etiological cause of high blood pressure.

**Table 3: Relationship between Blood Pressure (mmHg) and Age of the Study Population (WHO 2023)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Age (years)** | **Hypotension**  **≤90/60**  **n(%)** | **Normal**  **90-119/60-79**  **n(%)** | **Pre-hyper**  **120-139**  **n(%)** | **Hypertension**  **>140/90**  **n(%)** | **Total**  **(n)** |
| 18-24 | - | 28(10.37) | 15(5.56) | 1(0.37) | 44 |
| 25-30 | - | 66(24.44) | 34(12.59) | 6(2.22) | 106 |
| 31-35 | - | 22(8.15) | 30(11.11) | 14(5.19) | 66 |
| >36 | - | 4(1.48) | 30(11.11) | 20(7.41) | 54 |
| Total  n(%) | - | 120  (44.44) | 109  (40.37) | 41  (15.19) | 270  (100) |

**(2025)**

The table above shows how the blood pressures of the participants correspond with the age range of the study population.

**Table 4: CARDIOVASCULAR STATUS OF THE RESPONDENTS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Age**  **(yrs)** | **Systolic (mmHg)** | **Diastolic (mmHg)** | **MAP**  **(mmHg)** | **Pulse(bpm)** |
| 18-24 | 113.86±9.58 | 71.62±12.84 | 85.70±5.12 | 68.48±5.66 |
| 25-30 | 112.62±21.73 | 71.77±9.68 | 85.39±11.72 | 73.37±6.45 |
| 31-35 | 121.27±9.85 | 76.67±12.53 | 91.51±6.67 | 71.20±5.66 |
| >36 | 132.00±32.85 | 89.00±16.16 | 103.33±23.93 | 69.00±5.73 |
| P-value | 0.00 | 0.00 | 0.00 | 0.04 |

**(2025)**

P-value ≤ 0.05 is considered significant.

The above table shows the statistical analysis and their mean values of the participant’s cardiovascular indices in different age range.

**TABLE 5: Relationship between Anthropometric Indices with Age of the Study Population**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Age (yrs)** | **Underweight**  **≤18.5kg**  **n(%)** | **Normal**  **18.5-24.9kg**  **n(%)** | **Overweight**  **25.0-29.9kg** | **Obesity**  >30kg | **TOTAL**  **(%)** |
| **18-24** | **3(1.11)** | **23(8.52)** | **10(3.70)** | **8(2.96)** | **16.29** |
| **25-30** | **6(2.22)** | **47(17.41)** | **22(8.15)** | **31(11.48)** | **39.26** |
| **31-35** | **1(0.37)** | **38(14.07)** | **17(6.29)** | **10(3.70)** | **24.45** |
| **>36** | **6(2.22)** | **12(4.44)** | **14(5.19)** | **22(8.15)** | **20.00** |
| **Total**  **n(%)** | **16(5.93** | **120(44.44** | **63(23.33)** | **71(26.29)** | **270(100)** |

**(2025)**

The above table describes the normal ranges of anthropometric indices according to W.H.O in comparison with the study population indices

**TABLE 6: ANTHROPOMETRIC INDICES OF THE STUDY POPULATION**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Age**  **(yrs)** | **Weight**  **(kg)** | **Height**  **(m)** | **BMI(kg/m²** |  |  |  |
| 18-24 | **60.14**±7.42 | **1.65**±0.07 | **22.09**±1.50 |
| 25-30 | **67.35**±12.11 | **1.61**±0.58 | **25.98**±0.24 |
| 31-35 | **64.60**±8.69 | 1.61±0.05 | **23.16**±4.20 |
| >36 | **67.28**±2.13 | **1.59**±0.07 | **26.6**±1.39 |
| P-value | **0.04** | **0.02** | **0.00** |

The above table shows the statistical mean values of the participant’s anthropometric indices.

**Table 7: Attitudes of Respondents toward use of Contraceptive Pills**

|  |  |  |
| --- | --- | --- |
| **Variables** | **Frequency (n)** | **Percentage (%)** |
| Yes | 132 | 48.89 |
| No | 138 | 51.11 |
| **Total** | **270** | **100** |
| **Ethnicity** | | |
| **Variables** | **Frequency (n)** | **Percentage (%)** |
| Engene | 166 | 61.48 |
| Ikwere | 26 | 9.63 |
| Igbo | 32 | 11.85 |
| Others | 46 | 17.04 |
| **Total** | **270** | **100** |

**Field Survey (2025)**

The above table describes the conception of the respondents toward accepting the use of contraceptive methods of preventing pregnancy. The tables also describe the different ethnic groups involved in this study.

**DISCUSSION**

Findings from this study reveal age 25-30yrs as the highest frequency (106) and percentage (39.26%) compared with 18-24yrs of (44) and (16.29%) being the lowest in the study population.

**Education:** Respondents with tertiary level of education rank the highest percentage (45.93%), followed by secondary (41.85%), primary (11.85%) and none (0.74%) being the least among the entire population.

**Marital Status:** The study reveals a good percentage of married (74.08%) respondents followed by single mothers of (16.29%) compared with the least (1.4810) divorced. However, separation rate was 8.15% among women of child bearing age in Ahoada West LGA, Rivers State. Separation and divorce rate increase could be a factor of concern that triggers psychological imbalance and a cause leading to the development of high blood pressure among study the population (Ntoimo *et al.,* 2014, 2019).

**Occupation:** Considerable number of the population were into business (32.39%), civil servants (28.89%) while house wives was (19.26%) and unemployed (14.82%) with students (4.44%) being the least among the respondents.

**Cardiovascular status:** normal blood pressure is assume to be >120 over >80mmHg according to (Solomon *et al.,* 2021; WHO, 2023). This study reveals pre-hypertensive subjects of 40.37% and 15.19% among the respondents studied while 44.44% had normal blood pressure. The SPSS analysis also shows a significant increase in both systolic and diastolic pressures among age 18-24yrs to respondent’s above age 36yrs with the exception of age 18-24yrs. The study also observed a gradual decline in the pulse rate with increase age among the respondents. Heart rate decrease is marked with aging that reduce spontaneous generated electrical system from the SA-node of the heart pace maker (Eric *et al.,* 2013) (Ovuakporaye *et al., 2016, 2019;* Solomon *et al;* 2021). Hence, the prevalence of hypertension in this study was 15.19%.

**Anthropometric indices:** The findings from this study reveal a normal weight of (22.09%m2) and (23.16kg/m2) among 18-24yrs and 31-35yrs respondents while age 25-30yrs and above 36yrs were overweight with regards to their statistical mean values.

However, the underweight with regards to percentage was 5.93% while normal (44.44%), overweight (23.33%) and obese (26.29%) respectively.

The child bearing age women attitude toward contraceptives and smoking was (51.11%; 48.89%) and (94.81%; 5.19) No and Yes while with regards to family history of cardiovascular disease development was 91.11% No and 8.89% Yes affirmatively. However the study also observed 22.96% of respondents adding additional salt to their meal after tasting it before eating while 77.04% abstain from such practice.

Regular consumption of alcohol among women of child bearing age in the study population was 11.11% compared with 88.89% that do not engage regularly.

**CONCLUSION**

The percentage of respondents that are within the category of pre and hypertensive stage are enormous as revealed from this study which could be attributed to the greater percentage of obesity (26.29%) and overweight (23.33%) among the study population. The mean arterial pressure was higher among respondents above age 30yrs compared with younger age groups.

**Conflict of Interest;** None declared

REFERENCES

Akinbule, O.O.,  Okekhian, K L., Omidiran, A.T.,  Adenusi, S.A., Lasabi, O.T., & Oladoyinbo, C.A., (2022). Factors associated with hypertension in women of child-bearing age in Abeokuta journal of [Human Nutrition & Metabolism](https://www.sciencedirect.com/journal/human-nutrition-and-metabolism). 30(1). 129. <https://doi.org/10.1016/j.hnm.2022.200160>

Aune, D., Sen, A., Prasad, M., Norat, T., Janszky, I., Tonstad, S., Romundstad, P., & Vatten, L.J., (2016). BMI and all-cause mortality: systematic review and non‐linear dose‐response meta‐analysis of 230 cohort studies with 3.74 million deaths among 30.3 million participants. Biomedical care journal of pregnancy and child birth.;353:i2156.

Baber, U., Mehran, R., Sartori, S, Schoos MM, Sillesen H, Muntendam P, Garcia MJ, Gregson J, Pocock S, Falk E, (2015). Prevalence, impact, and predictive value of detecting subclinical coronary and carotid atherosclerosis in asymptomatic adults: the BioImage study. Journal of American College of Cardiology. 6(5):1065–1074.

Bhandari, S.,  Sayami, J.T.   Thapa, P., Sayami,  M., Kandel, B.P., & Banjara, M.R., (2016). Dietary intake patterns and nutritional status of women of reproductive age in Nepal: findings from a health survey. *Journal of belgian public health association*, 74 (2) (2016), pp. 2-11

Burke, M., Heft-Neal, S., & Bendavid, E., (2016). Sources of variation in under-5 mortality across Sub-saharan Africa: A spatial analysis. *Lancet global health.* 4(12):e936–45.

Cesare, M.D., Bhatti, Z., Soofi, S.B., Fortunato, L., Ezzati, M., & Bhutta, Z.A., (2015). Geographical and socioeconomic inequalities in women and children’s nutritional status in Pakistan in 2011: an analysis of data from a nationally representative survey. *Lancet global health.* 2015;3(4):e229–39.

Corsi, D.J., Mejia-Guevara, I., & Subramanian, S.V., (2015). Risk factors for chronic undernutrition among children in India: Estimating relative importance, population attributable risk and fractions. *Social science & medical.* 15 (7):165–85.

Eric DL,Joshua R, Chair Whitney AS, Roger AB, Catherine Proeza (2013).Depressed pacemaker activities of sino-aterial node myocytes contribute to age dependent decline in maximum heart rate. Proceedings of the National Academy of Sciences of the United State of America (PNAS).

Fryar CD, Gu Q, Ogden CL, & Flegal KM., (2016). Anthropometric Reference Data for Children and Adults: United States, 2011-2014. *Vital health statistics 3 analysis studies.*  3(9):1-46.

Gao J.W., You, S., Liu, Z.Y., Hao Q.Y., Wang, J.F., Vuitton, D.A., Zhang, S.L., & Liu, P.M., (2022). Different metabolic phenotypes of obesity and risk of coronary artery calcium progression and incident cardiovascular disease events: the CARDIA study. Arterioscler Thromb Vasc Biol. 4(2):677–688.

Gavriilidou, N.N, Pihlsgård, M., & Elmståhl, S., (2015). Anthropometric reference data for elderly Swedes and its disease-related pattern. *European journal clinical nutrition*.  69(9):1066-75.

Grandhi, G.R., Mirbolouk, M., Dardari, Z.A., Al‐Mallah, M.H., Rumberger, J.A., Shaw, L.J., Blankstein, R., Miedema, M.D., Berman, D.S., & Budoff, M.J., (2020). Interplay of coronary artery calcium and risk factors for predicting CVD/CHD mortality: the CAC consortium. Cardiovasc Imaging. 1(3):1175–1186.

Hambidge, K.M., Krebs, N.F., & Garcés, A., (2015). Anthropometric indices for non-pregnant women of childbearing age differ widely among four low-middle income populations. *Biomedical care journal of public health* 1(8),45. doi.org/10.1186/s12889-017-4509-z

Hambidge, K.M., Krebs, N.F., Garcés, A., Westcott, J.E., Figueroa, L., Goudar, S.S, & Dhaded S., (2017). Anthropometric indices for non-pregnant women of childbearing age differ widely among four low-middle income populations. *Biomedical care journal of public health.* 18(1):45. doi: 10.1186/s12889-017-4509-z.

Iacobini C., Pugliese G., Fantauzzi C.B., Federici M., , & Menini S (2019). Metabolically healthy versus metabolically unhealthy obesity. Metabolism. 92:51–60.

Karaye, K.M., Muhammed, I.Y., Sa'idu, H., Ishaq, N.A., Balarabe, S.A., & Tukur, J., (2024). Prevalence of left ventricular dysfunction and relationship with serum selenium in apparently healthy pregnant women: *Global cardiology* 2(1):40–44

Kozuki, N., Katz, J., Lee, A.C., Vogel, J.P., Silveira, M.F., & Sania, A., (2019). Short maternal stature increases risk of small-for-gestational-age and preterm births in low- and middle-income countries: individual participant data meta-analysis and population attributable fraction. *Journal of nutrition*. 145(11):2542–50.

[Louise, G.H.,](https://pubmed.ncbi.nlm.nih.gov/?term=Goh+LG&cauthor_id=24503301)  [Dhaliwal](https://pubmed.ncbi.nlm.nih.gov/?term=Dhaliwal+SS&cauthor_id=24503301), S.S.,  [Welborn](https://pubmed.ncbi.nlm.nih.gov/?term=Welborn+TA&cauthor_id=24503301),  T.A.,  [Lee](https://pubmed.ncbi.nlm.nih.gov/?term=Lee+AH&cauthor_id=24503301),  A.H.,& [Della](https://pubmed.ncbi.nlm.nih.gov/?term=Della+PR&cauthor_id=24503301), P.R., (2014). Anthropometric measurements of general and central obesity and the prediction of cardiovascular disease risk in women: a cross-sectional study. Biomedical care journal of pregnancy and childbirth 6;4(2):e004138.  doi: 10.1136/bmjopen-2013-004138.

Manzo-Silberman, S., Chabbert-Buffet, N.,  Roux, E.,  Parisi, M.,  Regidor, P., & Mounier-Vehier, C., (2025). Prevalence of cumulative cardiovascular risk factors among women of childbearing age in France. [*Journal of gynecology obstetrics and human reproduction*](https://www.sciencedirect.com/journal/journal-of-gynecology-obstetrics-and-human-reproduction)

Masrouri, S.,   Saeed, S., Zadeh, T., Afaghi,  S.,  Hadaegh, F.,  Khalili, D.,  & Shapiro, M.D., (2024). Association of anthropometric indices with midlife cardiovascular risk in young individuals without obesity and traditional risk factors. *Journal of the American heart association. 13(13).901.* <https://doi.org/10.1161/JAHA.123.033355>

Nazir, S.M., & Musa, K.K., (2023).Heart diseases in pregnancy in Northern Nigeria – A brief review. *Nigerian journal of cardiology*[20(2);52-56.](https://journals.lww.com/nijc/pages/currenttoc.aspx) *DOI:*10.4103/njc.njc\_10\_24

Ntoimo LFC and Monica EA (2014).Prevalence and patterns of marital dissolution in Nigeria. The Nigerian Journal of Sociology an……….

Ntoimo LFC, Okonofua FE, & Igboin B (2019).Why rural women do not use primary health centres for pregnancy care: evidence from a qualitative study in Nigeria. *Biomedical care journal of pregnancy childbirth* 1(9); 277. <https://doi.org/10.1186/s12884-019-2433-1>

[Ofori-Asenso,](https://openpublichealthjournal.com/VOLUME/10/PAGE/32/#con0) R., [Agyeman](https://openpublichealthjournal.com/VOLUME/10/PAGE/32/#con1) A.A., & [G., Ashiagbor (2017).](https://openpublichealthjournal.com/VOLUME/10/PAGE/32/#con2) Anthropometric Profiles of Child-bearing Women in Ghana — Past Measurements and Future Trends. *The open public health journal.*

Oguoma, V.M., Nwose, E.U., & Skinner, T.C. (2015)*.* Prevalence of cardiovascular disease risk factors among a Nigerian adult population: relationship with income level and accessibility to CVD risks screening. *Biomedical care journal of public health* 15, 397. <https://doi.org/10.1186/s12889-015-1709-2>

Oladosu W.O., Alayo, A.M., Ahmed, A.O., Jimoh O.S., Olarinoye-Raji, S.T., Egbeyemi, B.A., & Ajadi, T.A., (2023). Assessment of Relationship between Anthropometric Measurements and Reproductive Hormonal Profiles, Among Females of Childbearing Age at a Tertiary Health Facility in Nigeria. *International journal of medicine and health development* 28(1):p 12-18, DOI: 10.4103/ijmh.IJMH\_47\_22

Onokpite E,Solomon MU,Tonkiri A,Kemmer B, Blessing LD (2024).Assessment of maternal mortality and contributing factors in some rural communities of Bayelsa state ,Nigeria. International Journal of Research and Report in Gynecology 7(1) :136-142.

Opio J, Croker E, Odongo, GS., Attia, Wynne, K, & McEvoy, M (2020). Metabolically healthy overweight/obesity are associated with increased risk of cardiovascular disease in adults, even in the absence of metabolic risk factors: a systematic review and meta‐analysis of prospective cohort studies. Obes Rev. 2020;21:e13127.

Ovuakporaye Sol, Igweh C.J., Aloamaka C.P. (2016). Imp-act of gas flaring on cardiopulmonary parameters of residents in gas flowing communities in Niger Delta Nigeria. British Journal of Medicine and Medical research 15 (6):1-13, (BJMMR).

Ovuakporaye S.I, Enaohwo M.T, Odigie O.M, Igwe J.C (2019).A comparative study on cardiopulmonary markers in gas flaring communities, south-south Nigeria. Journal of pulmonary and respiratory medicine 9;486.doi;10.4172/2161-105x,1000486.

Shahraki M, *et al*. The Leading Anthropometric Indicator of Cardiovascular Health Risks among Female Nurses: A Cross-Sectional Study. Ann Med Health Sci Res. 2017; 7: 52-59

Solomon MU,Charles NN,Emily Kiridi GE,Okuroemi OH (2021).Dietary effect on cradio-renal parameters of women residents in in gas flares polluted environment in Bayelsa state, Nigeria. International Journal of Scientific and Research Publication 11(12):157-166.

Solomon MU,Nwafor AC, Azibalua AA(2021).Avaluation of some cardiovascular parameters of apparently healthy pregnang women in gas flaring communities: a baseline study in Bayelsa state,Nigeria. Journal of Research in Medicine and Medical Science 2(6):104-108.

Stone NJ, Smith SC Jr, Orringer CE, Rigotti NA, Navar AM, Khan SS, Jones DW, Goldberg R, Mora S, Blaha M, (2022). Managing atherosclerotic cardiovascular risk in young adults: JACC state‐of‐the‐art review. J Am Coll Cardiol. 79:819–836.

Wang P, Liu M, Zhuang X, Guo Y, Xiong Z, He L, Cai X, Chen Z, Peng L, & Liao X. (2023). Association of metabolically healthy obesity in young adulthood with myocardial structure and function. International Journal m of Obesity.;47:399–405.

Whelton, S.P., McEvoy, J.W., Shaw, L., Psaty, B.M., Lima, J.A.C., Budoff, M., Nasir, K., Szklo, M., Blumenthal, R.S., & Blaha, M.J., (2020). Association of normal systolic blood pressure level with cardiovascular disease in the absence of risk factors. JAMA Cardiol. 5:1011–1018.

WHO (2014,2023), 89:127-136. Doi: 10, 2471/BLT, 10.077982