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Analysis of the Physiological Risk Factors of Cardiovascular Diseases among Adult Members in Enugu State Sport Club.

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ABSTRACT

The study analyzed the physiological risk factors of cardiovascular diseases among adult members of Enugu State Sports Club and the implications of emerging technologies for achieving sustainable development goals. Three specific purposes and three research questions guided the study. Quasi-experimental research design was adopted for this study. The population for the study consisted of all members of the Enugu State Sports Club however only 76 (28 females and 48 males) willing to participate in the experiment were recruited. The equipment used for the experiment includes a scale, tape, a calculator for measuring body mass index, a sphygmomanometer for measuring blood pressure level, el and a glucometer for measuring blood sugar level. Construct validity was performed to ensure that the instruments were accurately measuring what they were supposed to measure. The experiment was carried out on days agreed on between the researcher, the research assistants, and the participants. Data collected were analyzed using percentages while the hypotheses were done using Chi-Square-Test. The results showed that except for body mass index which appeared normal (51.3%), blood pressure level (67.1%) and Blood sugar level (60.5%) were found to be a physiological risk factor for cardiovascular disease and there was no significant difference among male and female participants in all cases. The study concluded that high blood pressure levels and high blood sugar are the major risk of cardiovascular diseases among members of Enugu State sport club and this is a major concern because the causes of these physiological conditions are not definite. Therefore, the only hope for in-depth understanding and prevention of this condition is emerging technologies. The study recommends that; participation in physical activities and consumption of a healthy diet may reduce the risk of developing high blood pressure and high blood sugar, regular cardiovascular medical check-ups should be encouraged and the Government should ensure the provision of equipment for measuring high blood pressure and blood sugar among individuals as well as organize awareness campaign on ways to prevent cardiovascular diseases.

Keywords: Cardiovascular Diseases (CVD), Risk Factors, and Enugu State Sports Club.

INTRODUCTION

One of the numerous global health issues is cardiovascular disease. Kohi (2021), defines a cardiovascular system as a constituent of the heart, the blood vessels, and blood, and its primary function is to transport nutrients and oxygen-rich blood to all parts of the body and to carry deoxygenated blood back to the lungs. The cardiovascular system is an important body system that helps in the production of energy from inhaled oxygen and the nourishment of the cells and all the other systems in the body. Therefore cardiovascular system especially the heart is the powerhouse of the systems of the human body. However, World Health Organization (2015) reports that some negative conditions such as coronary artery diseases, heart attack, high blood pressure, and stroke may negatively affect the cardiovascular system

The negative health conditions or diseases that negatively affect the functions of the

cardiovascular system are known as cardiovascular diseases. Celermajer, Chow, Marijon, Anstey, and Woo (2012), define cardiovascular diseases as negative health conditions that may affect the heart or blood vessels. Cardiovascular disease may be associated with a build-up of fatty deposits inside the arteries which can lead to an increased risk of blood clots and damage to arteries in organs such as the brain, heart, kidneys, and eyes. Celermajer, Chow, Marijon, Anstey, and Woo (2012), adds that some diseases such as coronary heart disease (CHD), stroke, rheumatic heart disease (RHD), and cardiomyopathy are among the leading cause of death worldwide. World Health Organization (2022), estimated that 17.9 million adults may have died from cardiovascular diseases, and this figure represents 32% of all global deaths. The report further revealed that among these deaths, 85% were due to heart attack and stroke. Olufunke, Oloruntosin, Temilola, and Damilola (2020), report that 63% of deaths in Africa were due to non-communicable diseases, out of which 48% were due to cardiovascular-related diseases alone. In addition, cardiovascular disease contributed to 88% of the deaths among adults recorded in sub-Saharan Africa and the global mortality burden from cardiovascular disease among adults has been projected to increase by 30% by the year 2030 and the majority of the cases may be in Sub-Saharan African including Nigeria (Olufunke, Oloruntosin, Temilola & Damilola, 2020).

Furthermore, World Health Organization (2015), estimates that cardiovascular diseases may have caused 361,000 deaths in Africa, and current projections suggest that this number will nearly double by 2030. In other words, by 2030, cardiovascular diseases may become the leading cause of death among adults in low-income countries such as Nigeria, contributing to 13.4% of total deaths in such countries. Cardiovascular diseases may become the fifth among the 10 leading causes of disability-adjusted life years (DALYs) in low-income countries by 2030 (WHO, 2015). These reports highlight that there is a high percentage of death (especially, among adults) caused by cardiovascular disease in developing countries such as Nigeria. Therefore, it is important to determine the risk factors that may lead to cardiovascular diseases among adults.

Risk is a situation involving exposure to dangers. Cardiovascular risk factors can be seen as situations or circumstances that can predispose an individual to acquiring cardiovascular disease. Kohi (2021), identified the risk factors for cardiovascular diseases to include gender, hypertension (HTN), obesity, hypercholesterolemia, diabetes, waist-to-hip circumference ratio, tobacco use, family history of CVD, and sedentary lifestyle. This report highlights that gender may be a risk factor for cardiovascular disease. Graham (2011) defines gender as a role assigned to males and females in society that affects the way they behave toward some events, objects, or activities. In this context, gender is a biological difference in the physical and physiological capacity of an individual and hence is an important variable that determines the risk of cardiovascular disease. Adeloye, Basquill, Aderemi, Thompson, and Obi (2020), illustrates that there was a statistically significant association between genders as it regards the occurrence of cardiovascular diseases as the prevalence of these condition varies among male and female in a given population in Nigeria. Anoshirike, Asinobi, and Ibeanu (2019), indicates that the prevalence of cardiovascular diseases varies among male and female while men as significantly predicted with chances of cardiovascular disease than women ($p<0.001$). Other physiological factor that may constitute a risk for cardiovascular

diseases includes; body mass index, high blood pressure, and high blood sugar.

Body mass index refers to the total body mass an individual possesses. According to the Centers for Disease Control and Prevention (CDC, 2022), body mass index (BMI) is defined as a measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters (kg/m2). Body mass index is a simple, inexpensive, and noninvasive surrogate measure of body fat that relies solely on height and weight, and with access to the proper equipment, individuals can have their body mass index routinely measured and calculated with reasonable accuracy. According to the Women of Color Health Information Collection (2020), High body mass index levels may lead to health risks, especially cardiovascular health problems. Ekwomagu (2019), found that high body mass index increases the likelihood of various diseases and conditions, particularly cardiovascular diseases, type 2 diabetes, obstructive sleep apnea, certain types of cancer, osteoarthritis, and depression. Another physiological factor that is closely aligned with body mass index is the blood pressure level.

High blood pressure (hypertension) is a common condition in which the long-term force of the blood against your artery walls is high enough that it may eventually cause health problems, such as cardiovascular diseases. According to the Women of Color Health Information Collection (2020), high blood pressure is defined as an average systolic blood pressure greater than or equal to 140 mmHg or an average diastolic blood pressure greater than or equal to 90 mmHg. A blood pressure reading is given in millimeters of mercury (mm Hg). It has two numbers (systolic pressure). The first, or upper, number measures the pressure in your arteries when your heart beats (diastolic pressure). The second, or lower, number measures the pressure in your arteries between beats (Medicinenet, 2022). According to Mackay & Mensah (2014), high blood pressure is a major risk factor for cardiovascular disease for all age groups, especially among individuals aged 50 years and above. A recent review of the global burden of high blood pressure found that approximately 54 percent of strokes, 47 percent of IHD, and 25 percent of other CVDs were attributable to High blood pressure (Women of Color Health Information Collection, 2020). Therefore WHO (2022) and MayoClinic (2022), affirms that high blood pressure may lead to numerous cardiovascular health defects such as high blood sugar level.

High blood sugar (hyperglycaemia) is a situation where the level of sugar in the blood is too high. High blood sugar leads to diabetes which is one of the major health problems that may lead to cardiovascular disease. According to Asia Pacific Cohort Studies Collaboration (2013), high blood sugar is increasingly becoming a significant contributor to CVD risk. In other words, individuals with high blood sugar have more than two-fold greater risk of CVD compared to those with low blood sugar. In addition, Peterson Jamison, and Trijo-Gutierrez (2015), stated that high blood sugar magnifies the effect of other risk factors including raised cholesterol levels, raised blood pressure, smoking, and obesity. The author further reported that male teachers with high blood sugar have a 2-4 fold greater annual risk of coronary heart disease while women have an annual 3-5 fold greater annual risk of coronary heart disease. High blood sugar can damage the vessels that supply blood to vital organs and hence increase the risk of cardiovascular disease and stroke, kidney disease, vision problems, and nerve problems among others. Subsequently, there is a need to determine the risk factors of cardiovascular disease, especially among physically active

adults because it may assist in providing viable insight on how to prevent sudden death during exercise in Enugu State Sports Club.

Enugu State sport Club is a nonprofit-making, elite, and family membership club for young or old, male or female with various sports sections and physical activities such as golf section, lawn tennis, swimming, badminton, gymnastics, baseball, and squash among others. The majority of the adult participants are not necessarily athletes but they participate in intensive physical activities which require appropriate cardiovascular fitness to avoid sudden death during physical activities. Hence, it is important to determine the physiological constituents of the adult members of Enugu State Sports Club to determine if they are at risk of cardiovascular diseases. This study is considered relevant because Ogah, Madukwe, Onyeonoro, Chukwuonye, Ukegbu, Akhimien, and Okpechi, (2013); Dokunmu, Yakubu, Adebayo, Olasehinde, and Chinedu, (2018), reported that in south-eastern and southwestern Nigeria there was a high prevalence of cardiovascular diseases. In addition, Ulasi, Ijoma, Onwubere, Arodiwe, Onodugo, and Okafor (2011) found that in Enugu the prevalence of hypertension amongst workers was at 42% which is incredibly high. The report emphasized a high percentage of workers in Enugu state are at risk of falling prey to cardiovascular diseases, however, the report did not specifically focus on adult members of Enugu State Sports Club nor did it attempt to find out the physiological risk factors of cardiovascular disease. Nevertheless, Eze and Kalu (2019), reported that stroke and heart failure constituted 24.4% and 14.7% of causes of mortality in medical emergency rooms respectively while Nnadi (2019), submits that High blood pressure comes with age and is prevalent among the population which constitutes the majority of members in Enugu State Sports Club. These submissions bring to the forefront the need to assess the physiological risk factors of cardiovascular diseases in other to take appropriate precautions during exercise training as well as improve the health of individuals. The study analyzes the physiological risk factors of cardiovascular disease among adult members of Enugu State Sports Club.

Statement of the Problem

Sudden cardiac death due to cardiovascular diseases can occur during sports and physical activity and includes unexpected deaths in people with symptoms onset within one hour of their death. The research has read that cases of sport participants suffering heart problems, collapsing, or even dying suddenly, is causing increasing concern and is a major source of tragedy among individuals. For instance, the sudden deaths of individuals during participation in sports such as Marc-Vivien Foe, Daniel Jarque, and Antonio Puerta have all attracted attention in recent years. More recently, the high-profile cardiac arrest and successful resuscitation of Danish footballer Christian Eriksen during the Euro 2020 championships have again attracted global attention to this issue. More than half of all sudden deaths in athletes are due to cardiovascular causes, the most common of which are hypertrophic cardiomyopathy and congenital coronary.

The researcher was concerned that adult members of the Enugu State sports club may develop cardiovascular conditions unknowingly leading to numerous adverse situations that may be life-threatening. In addition, the majority of adult seldom assess their physiological condition such as blood pressure, blood sugar, and cholesterol level. This may predispose them to cardiovascular diseases and subsequent negative implications. Furthermore, it remains a difficult medical challenge to prevent

sudden cardiac death among individuals hence the need for emerging technology to focus on finding solutions to this health condition. Subsequently, finding out the cause of this cardiovascular disease may help to prevent its occurrence as the protection of individuals' health should be a paramount concern. This study aims to analyze the physiological risk factors of cardiovascular diseases among adult members of the Enugu State Sports Club.

Purpose of the Study

The general purpose of this study is to analyze the physiological risk factors of cardiovascular diseases among adult members of the Enugu State Sports Club. Specifically, the study sought to;

1. find out if body mass index level is a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sport Club
2. determine if blood pressure level is a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sport Club
3. ascertain if blood sugar level is a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sports Club.

Research Questions

The following research questions guided the study;

1. Is the body mass index level a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sports Club?
2. Is the blood pressure level a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sports Club?
3. Is blood sugar level a physiological risk factor for cardiovascular diseases among adult members of Enugu State Sports Club?

Research Hypotheses

The following null hypotheses tested at 0.05 degree of significance guided the study;

1. There will be no significant difference in the body mass index level of male and female members of Enugu State Sport Club
2. There will be no significant difference in the blood pressure levels of male and female members of Enugu State Sport Club
3. There will be no significant difference in the blood sugar level of male and female members of Enugu State Sports Club.

Methods

The study used quasi quasi-experimental research method. The population for the study consisted of all members of Enugu State sport club however only 76 (28 females and 48 males) who were willing to participate in the experiment were recruited for the study. The materials used in the measurement of parameters include a scale, a tape measure to determine height a calculator for measuring body mass index, a sphygmomanometer for measuring blood pressure level, and a glucometer for measuring blood sugar level. Construct validity was performed to ensure that the instruments were accurately measuring what they were supposed to measure.

Three experts who are familiar with the use of the chosen instruments and techniques for the study validated the instrument. Instruments used for the procedure are standard universally and technologically acceptable for medical practice. The experiment was done with the help of three research assistants who are Health Education students. The experiment was carried out on days agreed on between the researcher, the research assistants, and the participants. To determine the body mass index, the participants were asked to stand on a scale to determine their weight, likewise, their height was measured and the

values were calculated and recorded accordingly. Likewise, blood pressure level was analyzed by asking the participants to sit comfortably on a chair while their blood pressure level was measured using a sphygmomanometer. A glucometer was used to measure the blood sugar level by collecting a small sample of blood from the index finger of the participant in the morning before the daily physical activities began. All values that were obtained from the experiments were appropriately recorded for the study. The data collected were analyzed using percentages while the hypotheses were done using Chi-Square-Test. The decision rule was that if the calculated X^2-value is equal to or greater than the critical value, the null hypotheses were rejected otherwise they were not rejected.

Analysis and Results

Research Question 1: Is the body mass index level a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club?

Table 3: Body mass index and cardiovascular risk factor

Body Mass Index	**Female Freq %**	**Males Freq %**	**Total Freq %**
Below 18.5 Under weight	1(3.6)	5(10.4)	6(7.9)
18.5 – 24.9 Normal	16(57.1)	23(47.9)	39(51.3)
25.0 – 29.9 Over weight	9(32.2)	16(33.4)	25(32.9)
30.0 and above (Obsessed)	2 (7.1)	4 (8.3)	6 (7.9)
Total	**28(100)**	**48(100)**	**76(100)**

Table 3 showed the body mass index level of adult members in Enugu State Sport Club. The result of the table was separated among females and male participants. The result showed that 1(3.6%) of the female participants were under weight, 16 (57.1%) had normal body mass index, 9 (32.2%) were overweight and 2 (7.1%) are obsessed. On the other hand 5(10.4%) of the male participants were under weight, 23 (47.9%) had normal body mass index, 16 (33.4%) were overweight and 4 (8.3%) are obsessed. The average percentage shows that majority of the participants 39 (51.3%) had normal body mass index. The analysis concluded that body mass index level is not a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club.

Research Question 2: Is the blood pressure level a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club?

Table 4: Blood pressure and cardiovascular risk factor

Blood Pressure	Female Freq %	Males Freq %	Total Freq %
Normal	6(21.4)	19(39.6)	25(32.9)
Prehypertension (Mild)	13(46.4)	18(37.5)	31(40.8)
Stage1 (Moderate)	9(32.2)	11(22.9)	20(26.3)
Total	**28(100)**	**48(100)**	**76(100)**

Table 4 showed the blood pressure level of adult members in Enugu State Sport Club. The result of the table was separated among females and male participants. The result show that 6(21.4%) of the female participants had normal blood pressure, 13 (46.4%) had Prehypertension (Mild) blood pressure level and 9 (32.2%) had stage 1 hypertension. On the other hand 19 (39.6%) of the males had normal blood pressure, 18 (37.5%) had Prehypertension (Mild) blood pressure level and 11 (22.9%) had stage 1 hypertension. The average percentage shows that majority of the participants 51 (67.1%) were either Prehypertension or stage 1 hypertension. Hence it was concluded that blood pressure level is a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club.

Research Question 3: Is the blood sugar level a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club?

Table 5: Blood sugar level and cardiovascular risk factor

Blood Sugar Level	Female Freq %	Male Freq %	Total Freq %
<5.0	9(32.1)	21(43.8)	30(39.5)
5.6-6.9 (Prediabetes)	12(42.9)	10(20.8)	22(28.9)
7.0> (Diabetes)	7(25)	17(35.4)	24(31.6)
Total	**28(100)**	**48(100)**	**76(100)**

Table 5 showed the blood sugar level of adult members in Enugu State Sport Club. The result showed that 9 (32.1%) of the female participants had glucose level <5.0, 12 (42.9%) had glucose level 5.6-6.9 (Prediabetes) and 7 (25%) had 7.0> (Diabetes) glucose level. On the other hand 21 (43.8%) of the males had glucose level <5.0, 22 (28.9%) had glucose level 5.6-6.9 (Prediabetes) and 24 (31.6%) had 7.0> (Diabetes) glucose level. The average percentage shows that majority of the participants 46 (60.5%) were within 6-6.9 (Prediabetes) and 7.0> (Diabetes) glucose level. Hence it can be concluded that glucose or blood sugar level is a physiological risk factor of cardiovascular diseases among adult members in Enugu State Sport Club.

Hypotheses

The hypotheses were tested at 0.05 level of significance and are shown below

HO $_1$: There will be no significant difference on the body mass index level of male and female members of Enugu State Sport Club

Table 6: Chi-Square result on the significant difference between the mean score of body mass index level among male and female participants

Variables	Male	Female	Total	X^2	df	Crit-V	Decision
Below 18.5	5(3.79)	1(2.21)	6	1.39	3	7.82	Accept Ho
18.5 – 24.9	23(24.6)	16(14.4)	39				
25.0 – 29.9	16(15.8)	9(9.21)	25				
30.0 and above	4 (3.79)	2 (2.21)	6				
Total	**48**	**28**	**76**				

Key: df- Degree of Freedom, Crit-V = Critical T-value.

The table shows that the calculated X^2-value is 1.39 while the critical-value is 7.82 both measured at .05 level of significance and 3 degree of freedom. Since the calculated X^2-value (1.39) is less than the critical value (7.82) the null hypothesis was not rejected. It then shows that there was no significant difference on the body mass index level of male and female members of Enugu State Sport Club.

HO $_2$: There will be no significant difference on the blood pressure level of male and female members of Enugu State Sport Club

Table 7: Chi-Square Test of difference between the blood pressure level among male and female participants

Variables	Male	Female	Total	X^2	df	Crit-V	Decision
Normal	19(15.8)	6(9.21)	25	2.68	2	5.99	Accept Ho
Prehypertension	18(19.6)	13(11.4)	31				
Stage 1	11(12.6)	9(7.37)	20				
Total	**48**	**28**	**76**				

The table shows that the calculated X^2-value is 2.68 while the critical value is 5.99 both measured at .05 level of significance and 2 degree of freedom. The result shows that the calculated X^2-value (2.68) is less than the critical value (5.99) the null hypothesis was not rejected. It then shows that there was no significant difference on the blood pressure of male and female members of Enugu State Sport Club.

HO $_3$: There will be no significant difference on the blood sugar level of male and female members of Enugu State Sport Club

Table 8: Chi-Square Test of difference between the mean score of blood sugar level among male and female participants

Variables	Male	Female	Total	X^2	df	Crit-V	Decision
<5.0	21(18.9)	9(11.1)	30	3.98	2	5.99	Accept Ho
5.6-6.9	10(13.9)	12(8.11)	22				
7.0> (Diabetes)	17(15.2)	7(8.84)	24				
Total	**48**	**28**	**76**				

The table shows that the calculated X^2-value is 3.98 while the critical t-value is 5.99 both measured at .05 level of significance and 2 degree of freedom. The result shows that the calculated X^2-value (3.98) is less than the critical value (5.99) the null hypothesis was not rejected. It then shows that there was no significant difference on the blood sugar level of male and female members of Enugu State Sport Club.

Summary of Findings

Based on the analysis of the data, the following findings emerged;

1. Body mass index is not a physiological risk factor of cardiovascular disease in Enugu state sports club and the male and female showed no significant difference in their body mass (51.3%)
2. The male and females showed no significant difference in their blood pressure level with majority showing Prehypertension or stage 1 hypertension (67.1%).
3. Blood sugar level is a physiological risk factor of cardiovascular disease in Enugu state sports club (60.5%). The male and female showed no significant difference in their blood sugar level

Discussion

The finding reveals that body mass index is not a physiological risk factor for cardiovascular disease in the Enugu State sports club and male females showed no significant difference in their body mass (51.3%). The result of this study is in tandem with Qiu, Wang, Sa, and Liu (2021) which illustrated that overweight was significantly associated with the occurrence of cardiovascular diseases. This finding is in line with findings by the World Health Organization (2015) which reveals that the prevalence of obesity is greater in developed countries than in underdeveloped countries such as Nigeria. This may be because of the social and economic strain individuals undertake during their daily activities and coupled with nutritional intake. Ekwomagu (2019), agrees with this finding by stating that obesity is a disease of the affluent, and hence since the majority of the Nigerian populace is of low socio-economic status, it is clear that there are likely fewer individuals who are obsessed with the community. In addition, it may imply that the majority of the members of the Enugu State Sports Club are sports lovers who participate in sports for self-actualization and not necessarily to lose weight.

Another finding showed no significant difference in the blood pressure levels of males and females, with the majority being at Prehypertension or stage 1 hypertension (67.1%). The result of this study was expected because there is a variation in the level of blood pressure of individuals be it male or female which when it is significantly high is more likely to constitute a risk factor for the occurrence of cardiovascular diseases. The result of this study aligns with the findings of Amoah, Said, Rampal, Manaf, Ibrahim, and Amoah

(2019) report that existing cases of cardiovascular diseases differ among male and female adults as gender constitutes a significant risk at $p<0.05$. Adeloye, Basquill, Aderemi, Thompson, and Obi (2020), supports this finding by stating that there may be a statistically significant association between male and females regarding the occurrence of cardiovascular diseases as the prevalence of these condition varies among male and female in a given population in Nigeria.

The findings also revealed that blood sugar level is a physiological risk factor for cardiovascular disease in Enugu State sports club (60.5%). The finding further shows that there was no significant difference in the blood sugar level among male and female participants. The result of this study is expected because excessive accumulation of calories is likely to increase body weight or cause overweight which in turn increases the chances of cardiovascular diseases (CVD). The result of this study is in line with studies of Qiu, et al. (2021) which indicated the prevalence of cardiovascular diseases was over 11 times more likely to occur among participants with diagnosed cases of high sugar in the blood and significantly associated with it at $p<0.005$. Al-Zahrani, Shubair, and Al-Ghamdi (2021) and Amoah, et al. (2019), whose studies indicated that diagnosed high sugar in the blood and unhealthy diet directly constitute a significant risk of cases of cardiovascular diseases among participants. Ike and Onyema (2020), report that the occurrence of cardiovascular diseases is due to an increase in blood glucose levels from the accumulation of calories in the body. Anoshirike, Asinobi, and Ibeanu (2019), conducted in Nigeria buttressed that overweight and obese with high with high sugar in the blood were 45 times more likely to report any case of cardiovascular diseases. There were no contrary findings found between prior studies and the current one but the variation in the result was due to the design of the study, and duration of the study. Hence, high glucose level is a significant predictor of cardiovascular diseases.

Conclusion

The study concluded that high blood pressure levels and high blood sugar are the major risk of cardiovascular diseases among members of Enugu State sport club and this is a major concern because the causes of these physiological conditions are not definite. Therefore, the only hope for in-depth understanding and prevention of this condition is emerging technologies.

Implications to Emerging Technology and Sustainable Development Goals

The sustainable development goals are targets that are aimed at promoting the standard of living of all inhabitants globally while emerging technologies are technologies that are not yet realized but are perceived to possess the capacity to change the status quo. The relationship between these two variables is that development is accompanied by technological revolution. In order words technologies are required for achieving the targets of the sustainable development goals. In this study, emerging technologies are considered as the solution to the problem of cardiovascular diseases globally. This is because although there are wealth of knowledge on the causes and prevention of cardiovascular disease which may include adequate dietary, exercise, and so on. However, even among athletes who are involved in physical activities, there are still numerous cases of sudden death caused by cardiovascular diseases. This highlights that there are still gaps in knowledge of the causes, prevention, and solutions of cardiovascular diseases. Most worrying is the prevalence of death related to cardiovascular diseases globally this made various authorities recognize it as one of the top five global burdens of diseases and

death among individuals. Hence to achieve the sustainable development of reducing death rate and improving health outcomes, there is a need for emerging technologies to focus on finding lasting solutions to the problem of cardiovascular diseases. Some reports have highlighted that some emerging technologies such as personalized heart models, skin patches to counterstroke, implantable heart rhythm monitors, nonmaterial for fighting cholesterol and the use of Artificial Intelligence (AI) and machine learning (ML) to interpret heart conditions have been created or are in use, especially in developed countries. Although it is currently unknown the level of effectiveness of these emerging technologies however just as cardiovascular diseases know no boundaries, socio socio-economic status, it will be impossible to achieve the sustainable development goals if these emerging technologies are not completed and made available for use globally.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Individuals should be advised to participate in physical activities and consume healthy diet a to reduce the risk of developing high blood pressure and high blood sugar
2. Enugu State Sports Club should encourage participants to undergo cardiovascular medical check-ups in the health facilities to make them aware of their health status. This will enable early treatment and management of cardiovascular diseases as well as prevent accidents and death within their facilities.
3. The Government should ensure the provision of equipment for measuring high blood pressure and blood sugar among individuals as well as organize awareness campaigns on ways to prevent cardiovascular diseases.

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