

# Sudden Cardiac Death in Nigeria: A National Health Concern

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## Abstract

Sudden Cardiac death is a health challenge that is on the rise globally especially in developing countries like Nigeria. It is an unforeseen and sudden death from cardiac causes. Sudden Cardiac death is of public concern because of its increasing rate. It places a heavy burden on the economic system in low and middle income countries like Nigeria which in turn causes a developmental issue. There is a likelihood of worst figures in developing nations like Nigeria as there is an increase in cardiovascular disease incidence rates and scarce information regarding its prevention. The aim of this study is to assess the prevalence of sudden cardiac death. It will also infuse preventive practices to ameliorate the health challenge. There is need for early recognition of the risk factors for Sudden cardiac death as it is important for all age groups because Sudden cardiac death may occur in apparently healthy individuals or among individuals considered to be at low risk. There should be an adequate public health education and policy generation on performing cardiopulmonary resuscitation as it is an integral part of preventing the increase in cardiac death. More research studies should be carried out on Sudden cardiac death in Nigeria as there is sparse information on the prevalence and records of sudden deaths.

**Keywords:** Sudden Death, Sudden Cardiac Death, National Health Concern,

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## Introduction

Sudden Cardiac death (SCD) has become a leading global health challenge and it is on the rise especially in developing countries like Nigeria which result in increased mortality and morbidity. About half of all cardiac deaths are linked to sudden cardiac death (Mohammed et al., 2015). Annually, over seven million people are estimated to die suddenly which represents 40% of the annual global deaths (Obafunwa et al., 2019). In developed countries, there have been records of declined incidence of sudden death due to adequate intervention programme as a result of availability of detailed research data (Obafunwa et al., 2019). Sudden cardiac death is defined as a natural death from cardiac causes following the sudden loss of consciousness within an hour of onset of acute change in cardiovascular status in a heart disease and the time and mode of death are unexpected (Oluwadare 2011). It can also occur in a person with or without a preexisting heart disease (Mohammed et al., 2015). Over three quarters of Cardiovascular diseases (CVD) deaths occur in low and middle income countries as a result of poor primary health care programmes for early detection and treatment of people with risk factors for CVDs. Detection of cardiovascular diseases is often late in people living in low and middle income countries because of inadequate access to effective and equitable health care services for prompt intervention. (WHO 2021).

The four temporal elements considered in Sudden cardiac death (SCA) include prodromes, acute cardiovascular collapse, cardiac arrest and biological death. Although the elements often occur in the order as listed, It could as well occur rapidly and dramatic that the elements may not even be distinguishable (Oluwadare 2011). The prodromes which are warning symptoms that signal the beginning of a disease or disorder before the full range of diagnostic symptoms emerge (such as dyspnea, palpitation and chest pain are non-specific to SCD and may even be absent. Acute cardiovascular collapse is a terminal event that follows cardiac arrest (reversible in the presence of appropriate interventions) and subsequent biological death (irreversible no matter the intervention or technology) and sometimes irreversible despite intervention with appropriate technology (Oluwadare 2011).

The period between the terminal events onset and cardiac arrest may be no time at all taking into consideration that the time and mode of death are unexpected.

Although there have been reports of SCD in Africans, its epidemiology remain unknown in sub sahara Africa due to lack of cohort studies (Aime et al., 2014). In spite of the significant advances towards the management of cardiovascular diseases and cardiac arrest yet there is a scarcity of research on sudden cardiac death in sub sahara Africa (Mohammed et al., 2015).

## Epidemiology of Sudden Cardiac Death

According to WHO (2021) Cardiovascular diseases (CVDs) are the leading causes of deaths globally as it accounts for 17.9 million deaths from CVD representing 32% of all global deaths of which 85% were due to heart attack and stroke. Out of the 17 million premature deaths (under 70 years) due to non communicable diseases in 2019, CVDs accounts for 38% of deaths. (WHO 2021).

Sudden cardiac death accounts for over 7 million lives per year worldwide (Mehra 2007). Over 300,000 deaths happens per year in the United States with 0.1%- 0.2% as the overall estimated annual incidence. In 20%-25% of the SCD victims, of previously silent or unrecognized heart disease, Cardiac arrest is the first clinical manifestation (Oluwadare, 2011).

As reported by Abdulmajeed et al., (2018), Sudden cardiac death (SCD) accounts for 15%-20% of all deaths worldwide in which out-of-hospital sudden cardiac death is responsible for

more than 60% of all deaths among cardiovascular disease and is a major cause of mortality worldwide. Most of out-of-hospital cardiac arrests (OHCAs) occur in patients as first clinical presentation of the underlying disease or who is already identified but categorized as low risk which results to sudden cardiac death.

Sudden Cardiac deaths (SCD) accounts for 15% - 20% of all deaths worldwide. Out of hospital cardiac arrest accounts for over 60% of all deaths among cardiovascular disease and it is a major cause of mortality worldwide (Abdulmajeed et al., 2018). Most of out-of-hospital cardiac arrests (OHCAs) occur in patients as first clinical presentation of the underlying disease or who is already identified but categorized as low risk which results to sudden cardiac death. OHCA affects about 250,000 to 300,000 patients worldwide yearly (Abdulmajeed et al., 2018). However, there is an increase rate of survival among OHCA victims are those who receive bystander cardiopulmonary resuscitation (CPR) than those who do not receive CPR. (Abdulmajeed et al., 2018)

Miyaki and Musa (2004) observed that cardiovascular diseases with hypertension as a precursor is the most common cause of sudden unexpected death. In an autopsy report of 279 medico legal cases over a period of 8 years in north central Nigeria, hypertension was revealed to be the most common cause of sudden death (Williams et al., 2014).

Although, In athletes Sudden cardiac death is rare, media coverage often makes it seem like it is more prevalent. In the younger athletes SCD occurs mostly while playing sports in about 1 in 100,000 to 1 in 300,000 and about 1 in 15,000 joggers and 1 in 50,000 marathon runners in the older athletes (35 years and older) most often during sporting activities such as running or jogging (Cleaveland 2021).

Sudden cardiac death is the most common and often the first manifestation of coronary heart disease and is responsible for about 50% of the mortality from cardiovascular disease in the United States and other developed countries. In less-developed countries, sudden cardiac death rates parallel the rates of ischemic heart disease as a whole and therefore are lower (Douglas et al., 1998). Several population-based studies have documented a 15% to 19% decline in the incidence of sudden cardiac deaths caused by coronary heart disease since the early 1980s (Douglas et al., 1998). However, the increasing incidence of congestive heart failure may halt this decline in the future. (AHA 2021).

SCD affects all age groups as none is exempted from SCD experience. Among the population of United States, the two peaks of occurrence of the disease are birth to 6 months (because of the sudden infant death syndrome) and 45-75years (because of coronary artery disease) (Oluwadare 2011). SCD account for 19% of sudden deaths in children between 1 and 13years of age and 30% between 14 and 21 years of age in same population. Blacks are more inclined to sudden cardiac arrest than whites. The incidence rate among men is higher than that of women. Also among athletes vigorous exercise is a known risk factor (Oluwadare 2011).

### Risk Factors

It varies with age, race and geographical locations. Coronary artery disease is most common among the middle age and elderly in the western Nations (Oluwadare 2011). About 80% of individuals who suffer sudden cardiac death have coronary artery disease. Congenital heart disease and genetic syndromes are the leading causes of SCD among young adults in same population. (Oluwadare 2011).

### Behavioural Risk Factors

The most important behavioural risk factors are unhealthy diet, physical inactivity, tobacco use and harmful substance abuse (WHO 2021). The effects of these behavioural risk factors in individuals brings about Hypertension, High lipid level in blood, High blood glucose and obesity.

According to Alageel et al., 2016, low physical activity, poor diet, overweight and obesity, excessive alcohol consumption and smoking are behavioural risk factors associated with Cardiovascular diseases. Behaviours risk factors are not independent but rather interrelated within individuals. (Cairney et al., 2014).

According to Cleaveland (2021), 75% of SCA cases are linked to a previous heart attack as the risk is higher during the first six months after heart attack. Other risk factors includes;

1. Prior episode of sudden cardiac arrest
2. Family history of sudden cardiac arrest or SCD
3. Personal or family history of certain abnormal heart rhythms, including long QT syndrome, Wolff-Parkinson-White syndrome, extremely low heart rates or heart block
4. Ventricular tachycardia or ventricular fibrillation after a heart attack
5. History of congenital heart defects or blood vessel abnormalities
6. History of syncope (fainting episodes of unknown cause)
7. Heart failure: a condition in which the heart's pumping power is weaker than normal. Patients with heart failure are 6 to 9 times more likely than the general population to experience ventricular arrhythmias that can lead to sudden cardiac arrest.
8. Dilated cardiomyopathy (cause of SCD in about 10 percent of the cases): a decrease in the heart's ability to pump blood due to an enlarged (dilated) and weakened left ventricle
9. Hypertrophic cardiomyopathy: a thickened heart muscle that especially affects the ventricles
10. Significant changes in blood levels of potassium and magnesium (from using diuretics, for example), even if there is not organic heart disease
11. Obesity
12. Diabetes
13. Recreational drug abuse
14. Taking drugs that are "pro-arrhythmic" may increase the risk for life threatening arrhythmias.

### Preventive Measures

SCD is an irreversible event once occurred. There is no treatment because death is an irreversible cessation of life. Thus, the key to SCD occurrence is prevention. SCD is a major public health challenge. Preventive approach to the problem becomes complicated due to the fact that different electrophysiological mechanisms in the presence of different types of cardiac disease can cause sudden cardiac death and because many of the victims(Oluwadare 2011).

There is presently no organized national measures in place to drastically reduce the burden of SCD in Nigerian society. However, in Western Nations, various measures are in place to lessen the burden of SCD in the society. No single strategy for preventing SCD is sufficiently powerful to have a major positive impact on the magnitude of the public health problem.(Oluwadare 2011).



These intermediate behavioural risk factors such as unhealthy diet, physical inactivity, tobacco use and harmful substance abuse can be detected and indicated as an increased risk factor in primary care facilities. Also, Cessation of tobacco use, Dietary modification, Regular physical activities and substance abuse avoidance reduces the risk of cardiac death. (WHO 2021).

Screening of the general population, risk profiling and interventions, implantable cardioverter defibrillators, automated external defibrillators, and CPR among patients with identified disease are strategies in SCD prevention.

### **Screening Of General Population And Risk Profiling**

Screening of the general population will greatly help discover people with underlying heart diseases in the society especially those that are largely asymptomatic for heart diseases. It will create an awareness in the community about the existence of asymptomatic but deadly heart diseases at the same time providing adequate information for appropriate health planning and management. Conducting a screening test for the population is important considering that the first manifestation of such heart disease may be SCD. When there are a yearly records on SCD in a defined population, those hidden among the general population who are considered as low risk yet they make the greater proportion of the risk of SCD will be identified. It is pertinent that the commonly cited high risk subgroups do not account for the majority of fatal events cases. (Oluwadare 2011)

The absolute risk of having a cardiac arrest is low among young adults, but the benefits of identifying pre-existing conditions are disproportionately high (Robert & Victoria 2007). Although competitive sports are known to increase the risk of SCD among young adults, most of those who die suddenly due to this condition have undiagnosed heart conditions (Oluwadare 2011). Before competing, athletes should undergo a medical evaluation to identify potential lethal cardiovascular abnormalities. This could prevent sudden death. Screening entails medical history, family history, physical examination and Electrocardiogram (Farzam et al 2022).

Aside from high blood pressure, other conditions such as heart disease and congenital heart defects cardiomyopathies, pericarditis and primary electrophysiological abnormalities such as atrioventricular block, bundle branch blocks, preexcitation syndrome, Brugada syndrome, long QT syndromes and short QT syndromes. can also be detected through a medical evaluation (Oluwadare 2011).

### **Pharmacological Therapy**

Various medication classes have been studied in order to prevent unexpected deaths in people with pre-existing heart disease. Beta blockers, amiodarone, calcium channel blockers, and antiarrhythmic medicines in classes I and III are among them (Oluwadare 2011). Amiodarone and beta blockers have been shown to reduce the risk of sudden cardiac death in myocardial infarction survivors (Douglas and Hein 1988). Because hypertension is the leading cause of SCD in adults in Nigeria adequate blood pressure control with antihypertensive medications and lifestyle changes will be necessary.

### **Implantable Cardioverter Defibrillator**

A permanent implantable cardioverter-defibrillator (ICD), sometimes referred to simply as a defibrillator can be implanted so that a shock can be quickly delivered if it is ever needed for patients who are at an increased risk of having a cardiac arrest (Bradley 2021). In the treatment of deadly ventricular arrhythmias, an ICD outperforms antiarrhythmic medications. In persons with stage D heart disease, such as end-stage congestive heart failure

awaiting cardiac transplantation, an ICD could be utilized for secondary preventive of SCD (Oluwadare 2011).

Having an ICD does not prevent the abnormal rhythm from occurring, but it rapidly detects and treats the abnormality, restoring a normal heart rhythm (Bradley 2021). It plays significant role in the primary prevention of SCD in people with arrhythmogenic right ventricular dysplasia and primary electrophysiological abnormalities such as Brugada syndrome, catecholaminergic polymorphic ventricular tachycardia, short QT syndromes and some forms of long QT Syndromes (Oluwadare 2011).

### **Automated External Defibrillator**

The invention and deployment of automated external defibrillators (AEDs) has made a significant contribution to the prevention of SCD. AED is used to resuscitate victims of cardiac arrest, which always follows sudden cardiac death (Oluwadare 2011). The stages of defibrillation are automated with an AED. The operator, who is usually a layperson, merely needs to recognize cardiac arrest and attach the device's two electrodes to the victim's chest. The AED detects the heart rhythm and, if necessary, administers a shock. The operator of an AED is prompted to take appropriate action to save the victim. Prompting is usually done by a combination of voice output and visual display on the screen. This allows the victim of an out-of-hospital cardiac arrest to be resuscitated before an ambulance arrives or the sufferer is brought to the hospital (Oluwadare 2011). Defibrillation is only effective for certain heart rhythms such as pulseless ventricular tachycardia and ventricular fibrillation that is usually needed to restore a viable or "perfusing" heart rhythm through the use of AED (Kanthi 2010). AEDs are held by qualified persons who will attend public gatherings or installed in offices, workshops, sport centres, schools, hotels, restaurants, airports, retail malls, and any other strategic location in the community for quick intervention in cardiac arrest situations. The public access defibrillation, which allows non-medical personnel to utilize a publicly available AED to defibrillate victims of cardiac arrest, has improved the care of cardiac arrest victims and reduced the incidence of sudden cardiac death in areas where the technology is available (Oluwadare 2011).

### **Cardiopulmonary Resuscitation (CPR)**

Cardiopulmonary Resuscitation is a collection of interventions done to provide oxygenation and circulation to the body during cardiac arrest. (Goyal et al 2021). CPR can consist of many different things, but the initial, vital part is Basic Life Support (BLS). Cardiopulmonary resuscitation (CPR) can sometimes save a person who has stopped breathing and whose heart has stopped pumping (CDC 2021). CPR alone is not enough to save lives in most cardiac arrest. It is a vital link in the chain of survival that supports the victim until more advanced help is available (Anbu, 2015).

Following a cardiac arrest the victim must receive immediate CPR to enhance blood flow to the heart and brain, along with an electrical shock from a defibrillator to stop the abnormal heart rhythm. Chances of survival decreases by 7% - 10% for every minute without the victim receiving a quality life saving CPR and defibrillation. (AHA 2014)

Cardiac death occurs most likely after 10 minutes of loss of oxygen to the brain, Brain damage is expected to occur from 6-10 minutes after cardiac arrest, brain damage is very possible from 0-4 minutes and brain damage is virtually non-existent from 0-4 minutes of cardiac arrest if prompt CPR intervention is done. (CPR facts and stats 2020).

### Barriers To Optimal Bystander CPR

According to Heinri (2020), Lack of confidence, Fear of legal implications and lack of knowledge on CPR performance by bystanders leads to delay in CPR initiation on cardiac arrest victims. The recent American Heart Association (AHA) guidelines on the simplified compression only CPR has reportedly have an increasing willingness of bystander to perform CPR as to the decrease in performance due to the airways management on rescue breathings (mouth to mouth resuscitation). According to the AHA (2021) guideline upon noticing a cardiac arrest in a person, the bystander should initiate CPR, call for help and call the emergency contact number for ambulance services. Several challenges to achieving an effective early CPR may arise from one or more steps carried out by the bystander and challenges vary in nature ranging from knowledge deficit, complication recognition, familiarity, comfort and willingness, while some comes from various anxieties and fears (Sasson et al., 2013).

Tanigawa et al., (2011) posited that bystanders are more willing to perform CPR on a witnessed cardiac arrest victims if they had prior training. Also, the need for widespread CPR training to community members is emphasised as bystanders with CPR training had better AED knowledge and a better knowledge of where to find an AED in their community (Tanigawa et al., 2011). Rosalind et al., (2018) identified three barrier of providing CPR which are procedural barriers (time lost due to language barriers and communication issues; telephone problems), CPR knowledge deficit (skill deficits; perceived benefit) and personal factors (physical frailty or disability; patient position; emotional factors). According to Lindsay (2011), the bystander willingness to perform CPR is influenced by the relationship between the patient and bystander. Kuramoto et al., (2008) in Japan found out that 13% of the survey sample of the general public would be willing to attempt CPR on a family member or a friend. When asked about willingness to initiated CPR on a collapsed stranger Kuramoto et al. (2008) reported that the number decreased to 7% When asked about willingness to initiated CPR on a collapsed strange. It was observed in another sudy that the willingness to perform both traditional and chest compression-only CPR on victims who were children or relatives increased and a decreased willingness was noted for trauma victims and strangers (Taniguchi et al., 2012). Similarly, Parnell et al. (2006) reported that 84% of high school students reported that they would perform CPR on a family member compared to only 63% who would perform CPR on a complete stranger.

As reported by Sasson et al., (2011) fear of disease transmission and infection during mouth to mouth ventilation is a barrier in performing bystander CPR. The risk of liability and fear of being sued is also a limiting factor for provision of bystander CPR in out of hospital cardiac arrest (Lindsay 2011).The absence or presence of laws as well as the public awareness and knowledge of these laws influences the barrier prevalence of CPR in a particular jurisdiction (Sasson et al., 2011).

### Conclusion

There is scarce resources regarding the symptomatology and underlying medical conditions and proportions of Nigerians that die suddenly. There is scarce evidence of out of hospital sudden death epidemiology despite the fact that few reports links it to cardiovascular diseases and underlying heart defects as the contributing factors. In the context of targeted interventions and integration of health services as a standard of care, the usefulness of genetic markers to identify disease severity in Nigerians at risk of sudden death has not been exploited in Nigeria. (Obafunwa et al., 2019). Early recognition of the risk factors for SCD is



very important for all age groups because SCD may occur in apparently healthy individuals or among individuals considered to be at low risk. The key to reduction in cardiovascular diseases is the inclusion of cardiovascular diseases management interventions in universal health coverage packages, although it requires significant investment and reorientation in several countries' health system in order to manage CVDs. (WHO 2021).

### Recommendation

From the reviewed information on SCD, the following recommendations are made:

1. There should also be mass education on SCD so that the public will be aware of it.
2. There should be mass education on Cardiopulmonary Resuscitation, training on the use of AED and basic life support techniques.
3. There should be more studies on Sudden cardiac death causes.
4. There should be mass training on the use of AED and basic life support techniques.
5. AED should be placed in every community with the knowledge on where it is kept in emergency situations.

Health policies that create a conducive environment for making health choices is important to motivate people to adopt and sustain healthy behaviours.

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