

# Prevalence and Aetiology of Heart Failure in Patients Seen at a Teaching Hospital in Ghana

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## Abstract

Heart failure is a major clinical problem worldwide. It has been recognized as a contributor to cardiovascular disease burden in Africa for many years. There are no data on the prevalence of heart failure in Ghana; and the prevalence of heart failure among patients attending out-patient clinics in Ghana is unknown. This study was designed to determine the prevalence and aetiology of heart failure among patients attending a cardiac clinic in the Department of Medicine, Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Medical records of 524 patients were selected from the cardiac clinic, using simple random sampling. The demographic, clinical, chest X-ray, electrocardiographic and echocardiographic characteristics of the patients was examined. Among the 524 patients, 398 of the patients had heart failure according to the modified Framingham criteria for the diagnosis of heart failure; giving rise to a prevalence of 76%. The heart failure patients were aged between 13-97 years with the mean age ( $\pm$  standard deviation) of 56.5 ( $\pm$  19) years. There were more females (53.6%; n=213) than males (46.4%; n=185). Majority (45%) of the patients had New York Heart Association (NYHA) Functional class 2. The main aetiologies of heart failure were: hypertension (45%; n=179), rheumatic heart disease (23%; n=90), cardiomyopathy (15%; n=58). Other emerging aetiologies of heart failure in Africa seen in these patients were degenerative valvular disease (7.6%; n=31) and ischemic heart disease (2.3%; n=10).

**Keywords:** Heart failure; Hypertension; Prevalence; Rheumatic heart disease; Cardiomyopathy

## Introduction

Heart failure is a chronic condition characterized by the inability of the heart to pump adequate blood to meet the demands of the body and/or doing so at increased filling pressures. It is a serious clinical condition which represents the end-stage of a myriad of other cardiac diseases.

Heart failure is a major clinical problem worldwide. It has been recognized as a contributor to cardiovascular disease burden in Africa for many years [1-4]. In internal medicine services in Africa, heart failure has been described as the fifth to sixth cause of hospital admission [5,6].

Available data suggest that the aetiologies of heart failure in Africa differ from those seen in the Western world [7]. The most common underlying cause of heart failure in high-income countries is coronary artery disease [8]. In sub-Saharan Africa, the predominant causes are rheumatic heart disease, hypertensive heart disease and cardiomyopathy [9-11].

Heart failure has become a public health problem reaching epidemic levels especially for the elderly population. Data show that more than 20 million people have heart failure worldwide, and the prevalence of heart failure in developed countries is estimated as 2% [12]. The prevalence of heart failure has been shown to follow an exponential pattern, which rises with age and affects 6-10% of people over age 65 in developed countries [13-15].

Few epidemiologic data on the prevalence of heart failure are available in sub-Saharan Africa [16,17]. There are no data on the prevalence of heart failure in Ghana; and the prevalence of heart failure among patients attending out-patient clinics in Ghana is unknown. This study was therefore designed to determine the prevalence and aetiology of heart failure among patients attending a cardiac clinic in the Department of Medicine, Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana.

## Materials and Methods

This was a descriptive study carried out at the cardiac clinic of Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Ethical approval was obtained from the appropriate ethical committee.

Medical records of 524 patients were selected from the cardiac clinic, using simple random sampling. The demographic, clinical, chest X-ray, electrocardiographic and echocardiographic characteristics of the patients was examined. Heart failure was diagnosed, using the modified Framingham criteria for the diagnosis of heart failure [10,18,19].

## Major criteria included

Paroxysmal nocturnal dyspnoea, raised jugular venous pressure, clinical cardiomegaly, basal crepitations, S3 gallop, clinical acute pulmonary oedema, pulmonary upper lobe blood diversion on chest X-ray or pulmonary oedema on chest X-ray.

## Minor criteria included

Tachycardia, orthopnoea, exertional dyspnoea, nocturnal cough, hepatomegaly, pleural effusion, diuretic use.

Heart failure was diagnosed if the patient had two major and one minor or one major and two minor criteria.

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Hypertension was defined as the presence of a persistent elevated systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg in patients aged 15 years and above and/or presence of hypertensive retinopathy and/or the use of antihypertensive drugs and/or past medical history of hypertension [20,21].

All the heart failure patients had standard transthoracic echocardiographic procedures performed by the author. The echocardiographic data of the patients which were obtained included; m-mode, 2- dimensional, doppler, colour flow imaging, and valvular apparatus characteristics.

Left ventricular systolic dysfunction was defined as left ventricular ejection fraction (EF)  $<50\%$ .

Left ventricular diastolic dysfunction was defined as E/A ratio  $<1$  or E/A ratio  $>2$ , DT $>220$  ms or DT $<160$  ms, IVRT $>100$  ms or IVRT  $<70$  ms. Tissue Doppler imaging could not be done. Pulmonary hypertension was defined as right ventricular systolic pressure  $\geq 35$  mmHg in the absence of pulmonary stenosis.

### Statistical analysis

Data from the patients' medical records were entered into a Microsoft Excel (2010) sheet. Data were cleaned and abnormal variable and wrong entry removed or changed. Data were then exported into SPSS 12.0 software for analysis. Descriptive analysis of baseline parameters was provided. Measure of central tendency using mean was calculated, and measure of spread using standard deviation and range were also calculated.

### Results

Among the 524 patients, 398 of the patients had heart failure according to the modified Framingham criteria for the diagnosis of heart failure; giving rise to a prevalence of 76%. The heart failure patients were aged between 13-97 years with the mean age ( $\pm$  standard deviation) of 56.5 ( $\pm 19$ ) years. There were more females (53.6%; n=213) than males (46.4%, n=185). Figure 1 shows age distribution of the heart failure patients.

Figure 2 shows the New York Heart Association (NYHA) Functional classification. The majority of the patients had NYHA functional class 2, and 2.8% of the patients had asymptomatic heart failure.

Table 1 shows the echocardiographic characteristics of the heart failure patients. The mean left ventricular ejection fraction was 41.6%. Left ventricular diastolic dysfunction with normal systolic function was seen in 24% (n=95) of the patients whilst left ventricular systolic dysfunction with or without a diastolic dysfunction occurred in 76% (n=303) of the patients.

IVS-interventricular septum, LVPW-left ventricular posterior wall, LVIDd-left ventricular internal diameter in diastole, LVIDs-left ventricular internal diameter in systole, EF-left ventricular ejection fraction, FS-left ventricular fractional shortening, RVSP-right ventricular systolic pressure.

Table 2 shows the aetiology of heart failure. The main aetiologies of heart failure were: hypertension (45%; n=179), rheumatic heart disease (23%; n=90) and cardiomyopathy (15%; n=58). Other aetiologies of

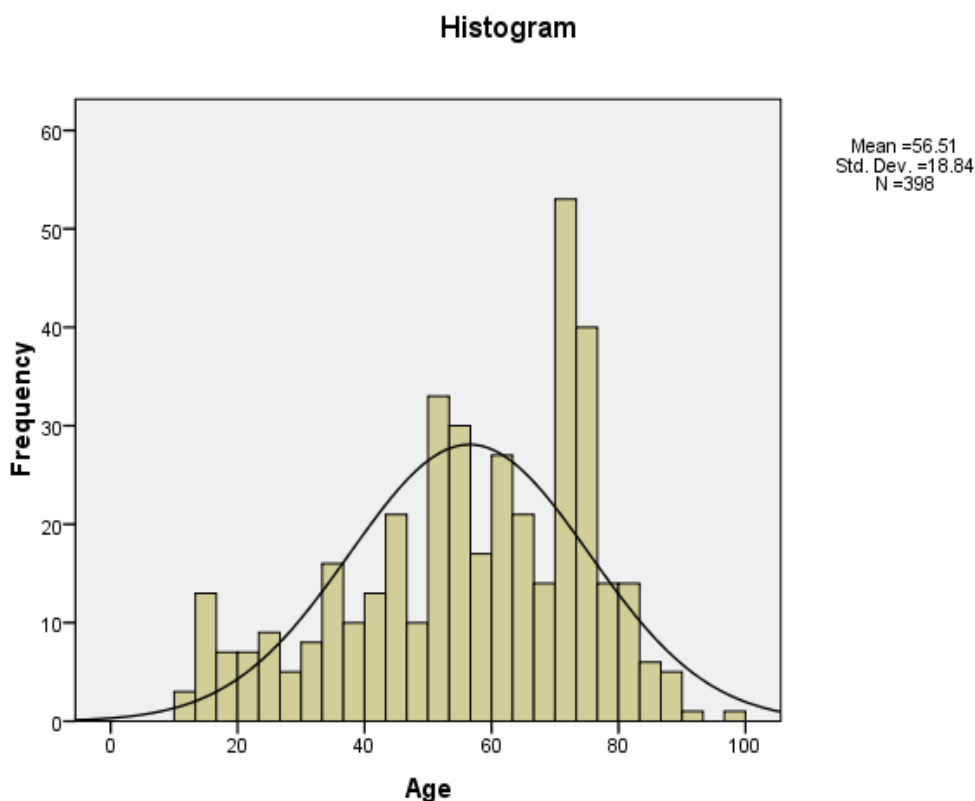


Figure 1: Histogram showing age distribution of heart failure patients.

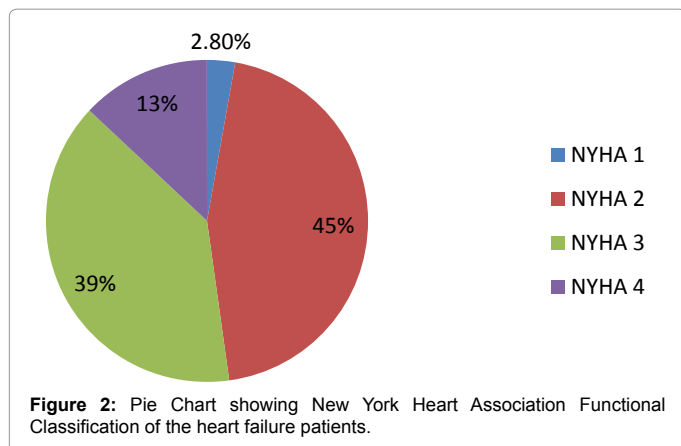


Figure 2: Pie Chart showing New York Heart Association Functional Classification of the heart failure patients.

Echocardiographic characteristics	Mean	Standard Deviation	Range
Aortic Root (cm)	3.27	0.5	2-5
Left Atrium (cm)	3.94	0.9	2.1-7.6
IVS (cm)	1.2	0.3	0.6-2.8
LVPW (cm)	1.23	0.3	0.6-2.4
LVIDd (cm)	5.00	8.9	2.4-8.8
LVIDs (cm)	3.44	18	1.9-7.8
FS (%)	21	12.7	2.6-41
EF (%)	41.6	25	5-77
RVSP (mmHg)	55.7	17	30-120
	<b>N</b>		<b>%</b>
Pulmonary Hypertension	120		30
LV Diastolic Dysfunction	95		24
LV Systolic Dysfunction with or without Diastolic Dysfunction	303		76

Table 1: Echocardiographic characteristics of the heart failure patients.

Aetiology of heart Failure	Number	Percentage
Hypertension	179	45%
Rheumatic heart disease	90	23%
Cardiomyopathy	58	15%
Degenerative Valvular disease	31	7.6%
Ischaemic heart disease	10	2.3%
Pericardial disease	9	2.2%
Congenital heart disease	7	1.7%
Cor-pulmonale	5	1.2%
Others	9	2.2%
Total	398	100%

Table 2 shows the aetiology of heart failure. The main aetiologies of heart failure were: hypertension (45%; n=179), rheumatic heart disease (23%; n=90) and cardiomyopathy (15%; n=58). Other aetiologies of heart failure seen in these patients were degenerative valvular disease (7.6%; n=31) and ischaemic heart disease (2.3%; n=10).

Table 2: Aetiology of heart failure.

heart failure seen in these patients were degenerative valvular disease (7.6%; n=31) and ischaemic heart disease (2.3%; n=10).

## Discussion

The high prevalence of heart failure of 76% seen in this study supports the fact that heart failure is a major contributor to cardiovascular disease burden in sub-Saharan Africa. Similar findings have been reported from Cameroun where heart failure is found to be the fifth to

sixth cause of hospital admissions [5,6]. In other parts of sub-Saharan Africa, heart failure has been found to account to 5% to 10% of hospital admissions [16,17,22,23]. Some authors have also shown that heart failure is a major cause of cardiovascular disorder in Africa [24,25]. Heart failure is a major clinical problem worldwide. In the United States of America, prevalence of heart failure among African Americans between the ages of 45 to 65 was found to be about 70% [26]. Another aspect of concern is the prevalence of asymptomatic heart failure. In Nigeria, Ogah et al. found the prevalence of asymptomatic heart failure among hypertensive patients at 18.1% [27]. Other studies have also found similar prevalence of asymptomatic heart failure [28, 29]. This is worrying and efforts should be made to reduce the high prevalence of heart failure through early detection of patients with cardiovascular risk factors and early introduction of neuro-hormonal blockers such as angiotensin converting enzyme inhibitors or angiotensin receptor blockers which may retard or prevent the development of heart failure.

The mean age of the heart failure patients was 56.5 ( $\pm$  19) years. This is in line with what was found in previous study in Kumasi, Ghana and other parts of sub-Saharan Africa [3-6,10]. Compared to the western world, heart failure in sub-Saharan African tends to occur at a much younger age. This finding could be due to the major contribution of rheumatic heart disease as a cause of heart failure in sub-Saharan Africa.

This study supports available data which show that rheumatic heart disease, hypertensive heart disease and cardiomyopathy are the main contributors to the aetiology of heart failure in Africa, accounting for over 80% of cases [9-11,24,30]. Rheumatic heart disease and hypertensive heart disease are largely preventable causes of heart failure. Hypertension has now become a public health problem in Africa. Studies have estimated prevalence of hypertension in various parts of Africa at 30% to 60% [31-34]. A study in Kenya showed that newly diagnosed rheumatic heart disease was found in 41% of heart failure patients referred for echocardiography [35]. Lack of access to surgery in Africa makes the prognosis of rheumatic heart disease worse; and majority of patients die at a younger age without surgical valve repair or replacement [36].

Our data have also shown that degenerative valvular disease and ischaemic heart disease are emerging as causes of heart failure in Africa. The prevalence of cardiovascular risk factors in Africa has been shown to be high by recent data [37-39]. Therefore, it is more likely that ischaemic heart disease is under-diagnosed in Africa, due to largely unavailability of coronary angiography and other imaging procedures.

## Conclusion

Our data show high prevalence of heart failure among patients attending cardiac clinic in Kumasi, Ghana. Hypertension, rheumatic heart disease and cardiomyopathy were the main aetiologies of heart failure in these patients. Degenerative heart disease and ischemic heart disease are now emerging as causes of heart failure in Ghana.

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