

## Hospital Cost of Heart Failure at the Cardiology Department of the National Reference Teaching Hospital, N'Djamena (Chad)

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### Abstract

**Introduction:** Heart failure is a major public health problem. The aim of this study was to evaluate the cost of hospitalization for heart failure patients.

**Patients and method:** This was a prospective descriptive and analytical study carried out in the cardiology department of the National Reference Teaching Hospital of N'Djamena from May 1st, 2022, to April 30, 2023. Patients hospitalized for heart failure were included. The financial cost was expressed in FCFA.

**Results:** 306 patients hospitalized during the study period for heart failure, 106 (34.6%) of whom met the inclusion criteria. The average age was  $51 \pm 18$  years old (with extremes of 17 to 86 years old) with a sex ratio of 0.79. The average direct cost of hospitalization was  $227.812 \pm 63.008$  FCFA for an average duration of 10 days.

**Conclusion:** Heart failure is a frequent condition in cardiology practice in Chad and diagnosis must be made early in order to implement effective therapies, at reasonable cost and accessible on a case-by-case basis.

**Keywords:** Heart failure; Cost; Hospitalization; Cardiology.

### Introduction

Heart failure is a frequent pathology within the population. It is a major public health problem worldwide because of its high frequency, its consequences in terms of

morbidity and mortality and its impact on the care system. Its prevalence has increased estimated at 26 million people in the world [1,2]. In developed countries, it takes 1 to 2% of the population and affects the older people

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(average age: 70-80 years) with male predominance [2]. In Chad, heart failure occupies a significant part of hospitalization in cardiology (27.6%). Patients are relatively young (average age 50 years old), low school level (82%), low socio-economic and no health coverage for most. In addition, clinical tables reflect a change in an advanced stage of the disease. It greatly impairs the quality of life of patients. The natural history of heart failure patients is marked by many hospitalizations, consecutive to heart counts (20%) and high mortality (33%) [3]. This is why the monitoring of chronic heart failure patients must be regular, putting the cardiologist physician at the center of the care system to detect possible attacks of heart failure. The management of heart failure and the presence of comorbidities represent a financial weight for patients and the family, in developing countries, weighing heavily on family and national economies. However, few studies have been interested in the issue of the cost generated by the hospitalization of heart disease insurance. Which motivated the achievement of this work whose purpose was to evaluate the direct cost of the management of heart failure in cardiological hospitalization.

## **Patients and method**

### **Type and study period**

It has been a descriptive and analytical cross-sectional study, with prospective data collection. The cardiology department of the National Reference Teaching Hospital of NDjamena had served as a framework for the study. The study spanned a period of one (01) year, ranging from May 1<sup>st</sup>, 2022, to April 30, 2023.

## **Study population**

This study focused on a consecutive series of patients completing the inclusion criteria. Thus, all patients of two sexes, hospitalized in the cardiology department of the National Reference Teaching Hospital for a decompensated heart failure during the study period and consenting to participate, were included in the study. The diagnosis of heart failure was retained in accordance with learned societies [4,5]. Patients out against medical notice or patients died during the hospitalization and social cases had not been retained for this study.

## **Study variables and data collection technique**

The variables studied were sociodemographic characteristics, cardiovascular risk factors, clinical data and comorbidities. Were also considered the average duration of the stay and the various costs generated by hospitalization (expenses of complementary examinations, hospital stays, drug costs, food costs, communication and displacement expenses). This data relating to each patient had been recorded on a previously established data collection sheet. These sheets were filled by the doctors. The data collection technique used was the direct interrogation of the patient and/or its entourage on daily expenditure and the daily collection of drug orders payments invoices, complementary exploration and accommodation.

## **Data analysis**

The data was entered on Microsoft Word and Excel 2016 software and analyzed from SPSS.21 and Sphinx.7 statistical software.

Quantitative parameters were presented as an average  $\pm$  standard deviation and qualitative parameters by percentages. The Pearson Chi2 test was used for comparison of proportions. When the application conditions were not observed, the exact test of Fisher was used. Student T test was used for comparing two averages. The threshold of statistical significance was  $p < 0.05$ .

### Ethical considerations

The consent of the patients had been obtained. However, the refusal of a patient to

participate in the study did not affect its subsequent management. The confidentiality of the data collected had been guaranteed.

### Results

During this study 306 patients were hospitalized for cardiovascular diseases, including 106 patients for heart failure (HF), a prevalence of 34.6% of the HF. The age of patients ranged from 17 and 86 years old with an average of  $51.2 \pm 18$  years old and a female predominance was found in 55.7% of cases, a sex-ratio H/F of 0.79.

Parameters	Effective (n)	Percentages (%)
Means age (years)	51.2 $\pm$ 18 [17,86]	
Age range (years)		
<20	4	3.8
21-30	14	13.1
31-40	9	8.5
41-50	10	9.4
51-60	27	25.5
61-70	22	20.8
>71	20	18.9
Female	59	55.7
Marital status		
Married	91	85.9
Widower	10	9.4
Single	3	2.8
Divorce	2	1.9
Socio-professional categories		
Housewife	51	48.1
Official	25	23.6
Trader	15	14.2
Farmer	7	6.8
Worker	4	3.6
Student	3	2.8
Pastor	1	0.9

**Table 1:** Patients' sociodemographic characteristics.

The age group of 51-60 years old represented 25.5%. Housewife were the most represented non-professionals category (48.1%), and the majority of patients (85.9%) were married.

The socio-demographic characteristics are described in Table 1. High blood pressure (HBP) was the leading cardiovascular risk

factor, with a frequency of 50% (Tables 2). The clinical presentation was a congestive heart failure in 90.6% (n=96). In heart ultrasound, the left ventricle ejection fraction (LVEF) was altered in 88 patients (83%). Hypertensive heart disease was the most common etiology, accounting for 33% (n=35) of cases.

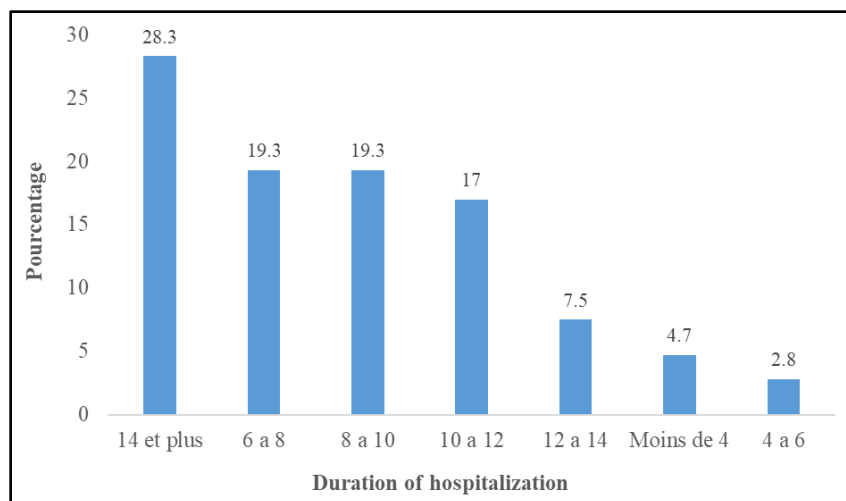
Cardiovascular risk factors	Effectives (n)	Percentages (%)
HBP	53	50
No	35	33
Diabetes	12	11.4
Smoking	2	1.9
Dyslipidemia	2	1.9
Obesity	1	0.9
Alcohol	1	0.9

**Table 2:** Patient distribution by cardiovascular risk factors.

Table 3 summarizes the main etiologies of the HF observed in the patients. None of the patients had benefited from health coverage or a third-party payment system. The average hospitalization of patients was 10 days with an extreme two day (02) and 24 days (Fig 1).

Etiology	Effectives (n)	Percentages (%)
Hypertensive heart disease	35	33
Ischemic heart disease	26	24.5
Peripartum cardiomyopathy	19	18
Dilated cardiomyopathy	17	16
Valvular heart disease	9	8.5
<b>Total</b>	<b>106</b>	<b>100</b>

**Table 3:** Patient distribution by etiology of heart insufficiency.



**Figure 1:** Patient distribution by length of hospitalization.

The main expenditure positions were complementary examinations (35.6%), recovery (31.4%), drugs (24%) and hospitalization (9%). The average cost of the care of the heart failure was  $227.812 \pm 63.008$  FCFA (about  $347 \pm 96$  euros) with a minimum of 79.700 FCFA and maximum of 428.500 FCFA.

Table 4 and 5 describe the cost per consumption. Analysis of variance showed that there was a significant difference in cost between the different clinical presentations of CHF ( $p=0.0001$ ): cost was proportional to the severity of the condition. However, there was no statistically significant relationship between cost and heart failure etiology.

Consumption item	Middle east and economics cost (FCFA)	Percentages (%)
Complémentary examinations	$81301.89 \pm 17858.13$	35.6
Recovery	$71306.73 \pm 30364.73$	31.4
Drugs	$55053.30 \pm 27580.05$	24
Hospitalization	$20858.49 \pm 8668.98$	9
Total	$227812.74 \pm 63008.80$	100

**Table 4:** Average cost of hospitalization by consumption.

Heart failure type	Cost total				p valeur
	<100.000	100.000-200.000	200.000-300.000	$\geq 300.000$	
Right	1	0	0	0	0.0001
Left	0	3	5	1	
Global	0	33	53	10	

**Table 5:** Cost of hospitalization according to the type of heart failure.

## Discussion

This study, the first of its kind, clarified the significant burden of CHF on cardiology hospitalization activity. More than one adult in three was hospitalized in the cardiology department for a heart attack (hospital prevalence of 34.6%). It also enabled us to describe the high medico-economic burden borne by patients and the families during hospitalization for cardiac decompensation. This high prevalence found in the study was also reported in the results of many African series [3,6-10].

In addition, the socio-demographic characteristics of the patients are little different from those of heart disease patients in sub-Saharan African countries [6,9,11,12]. The patients were relatively young age average 51 years old, mainly female, low socio-economic and no health coverage and the clinical pictures at the admission corresponded to an advanced stage of the disease. The young age of the patients contrasts with that of heart failure patients in developed countries, where HF is much more a pathology of the elderly (average age: 65-70) [13].

As a result, a significant proportion of the economically active population is losing out. Rapid urbanization and changes in eating habits (too much salt, too much sugar and too much fat) are contributing to an explosion of cardiovascular risk factors, which are not only frequent, but also early onset and responsible for cardiovascular, cerebral and renal complications. If in the West, Heart failure is the consequence of the ageing population and a better organization of the healthcare systems, in sub-Saharan Africa it is the result

of a relentless epidemiological transition, in an environment where scarce healthcare resources are unfortunately still focused on the fight against infectious diseases. Cardiovascular risk factors were dominated by hypertension, with a frequency of 50%. The same observation was made by Naibé DT, et al., [3] in 2016 in Chad, who found a prevalence of 50%. These results are in line with those of authors in the African literature, who reported a high frequency of hypertension in HF. Pio M, et al., [7] in Togo in 2014 and Kheyi J, et al., [8] in Morocco in 2016 had reported AH frequencies of 52.5% and 46% respectively. The main etiologies were hypertensive heart disease (33%), ischemic heart disease (24.5%), peripartum cardiomyopathy (18%), dilated cardiomyopathy (16%) and valvular heart disease (8.5%). These results corroborate the data in the literature, where these conditions are found in HF at varying frequencies [3,6,7,12,13].

All authors agree that hypertension is not only early and severe in Black Africa, but that diagnosis is often delayed until the complications stage. Even when hypertension is diagnosed, management is suboptimal, and compliance with treatment is poor [14]. Effective prevention of HF in Chad should involve integrated efforts to fight against hypertension and other cardiovascular risk factors, as part of a national program similar to that to combat HIV/AIDS [15]. The average hospital stay in these series was 10 days, with extremes of two and 24 days. This result is similar to those of Naibe DT, et al., [3], Doumbia CT, et al., [6] and Bassakouahou M, et al., [9], who found 12, 11 and 10 days respectively. These long in-hospital stays are related to the severity of the clinical picture

on admission (90.6% of patients were in global chronic HF, and LVEF was impaired in 88% of patients), and above all to the patients' low socio-economic level, which does not allow for optimal management. Patients and/or the families were responsible for the cost of medication and hospitalization, paying 100% in cash. The same observation was made by Bassakouahou M, et al., [9] in Congo Brazzaville in 2016. On the other hand, in the series by Doumbia CT, et al., [6] in Mali in 2021, cost recovery was obtained in 30% of cases by a certificate of assumption of responsibility and in 70% of cases by cash payment. In Chad, countries where poverty and vulnerability are ubiquitous with 42.3% of people living below the national poverty line, there is no universal health coverage. This does not allow early detection of affections and to ensure optimal support for them. The average cost of hospitalization for heart failure patients was 227,812 ± 63,008 FCFA, with a minimum of 79,700 and a maximum of 428,500 FCFA. This represents 3.8 times the minimum wage in Chad, which is set at 60.000 FCFA (97.6 Euros). This high cost found in the study is close to those reported by Doumbia CT, et al., [6] and Baragou S, et al., [16] who noted average costs of 203,289 FCFA and 223,559 FCFA respectively. In the study, the main items of expenditure were complementary examinations (35.6%), recovery (31.4%), drugs (24%) and

hospitalization (9%). Doumbia CT, et al., [6] found 32.2% for complementary examinations; 24.8% for recovery; 30.7% for drugs, and 12.3% for hospitalization.

Clearly, the length of hospitalization, which is closely linked to the severity of the disease, increases the cost of hospitalization. Gombet T, et al., [17] demonstrated this assertion when he reported in his series that the average cost of acute HF management in the emergency setting was 81.900 FCFA, for an average duration of 45.5 hours [17].

This high cost is also due to the large number of imaging and biological examinations required for heart failure and the multitude of drugs recommended for its management. It would therefore seem necessary to consider new management mechanisms or alternatives to prolonged hospitalization, in order to reduce the burden on the patient's health care system.

## Conclusion

Heart failure remains a major public health problem by its high morbidity and mortality. This care is very expensive in Chad for a young population and mostly as unfavorable socio-economic level.

It is essential to put a particular emphasis on the prevention of heart failure and put in place universal health insurance.

## References

1. Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M, et al. The Global Health and Economic Burden of Hospitalizations for Heart Failure: Lessons Learned from Hospitalized Heart Failure Registries. *J Am Coll Cardiol.* 2014;63(12):1123-33. [PubMed](#) | [CrossRef](#)
2. Bui AL, Horwich TB, Fonarow GC. Epidemiology and Risk Profile of Heart Failure. *Nat Rev Cardiol.* 2011;8(1):30-41. [PubMed](#) | [CrossRef](#)
3. Naïbé DT, Langtar MH, Mandi DG, Neldé L, Bamouni J, Yaméogo RA, et al. Characteristics of Effusive Pericarditis in N'Djamena (Chad). *Mali Med.* 2022;37(2):22-27. [PubMed](#)

4. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, et al. 2021 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure: Developed by the Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure of the European Society of Cardiology (ESC) with the Special Contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 2021;42(36):3599-726. [PubMed](#) | [CrossRef](#)
5. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2022;79(17):e263-421. [PubMed](#) | [CrossRef](#)
6. Doumbia CT, Maiga AK, Fofana D, Sonfo B, Diallo S, Daffe S, et al. Aspects Epidémiologiques et Thérapeutiques de l'insuffisance Cardiaque au Service de Cardiologie du CHU de Kati. *PAMJ-Clinic Med*. 2021;6(1). [CrossRef](#)
7. Pio M, Afassinou Y, Pessinaba S, Baragou S, N'djao J, Atta B, et al. Epidemiology and Etiology of Heart Failure in Lome. *Pan Afr Med J*. 2014;18:183. [PubMed](#) | [CrossRef](#)
8. Kheyi J, Benelmakki A, Bouzelmat H, Chaib A. Epidemiology and Management of Heart Failure in a Moroccan Center. *Pan Afr Med J*. 2016;24(1). [PubMed](#) | [CrossRef](#)
9. Bassakouahou M, Ikama MS, Kafata O, Gombet TR, Kimbally Kaky SG. Prise en Charge de l'insuffisance Cardiaque au Centre Hospitalier Universitaire de Brazzaville: Aspects SOCIO-économiques. *Med Afr noire (En ligne)*. 2016;547-52.
10. Abdoulaye MM, Harouna B, Harouna H, Tahirou I, Oma EA, Touré AI. Insuffisance Cardiaque de l'adulte: Une étude sur 130 cas à l'hôpital au Service de Cardiologie de l'hôpital National de Niamey au Niger. *J Afr Cas Clin Rev*. 2018.
11. Ikama MS, Kimbally-Kaky G, Gombet T, Ellenga-Mbolla BF, Dilou-Bassemouka L, Mongo-Ngamani S, et al. Heart Failure in Elderly Patients in Brazzaville, Congo: Clinical and Etiologic Aspects and Outcome. *Med Trop (Mars)*. 2008;68(3):257-60. [PubMed](#)
12. Damasceno A, Mayosi BM, Sani M, Ogah OS, Mondo C, Ojji D, et al. The Causes, Treatment, and Outcome of Acute Heart Failure in 1006 Africans from 9 Countries: Results of the Sub-saharan Africa Survey of Heart Failure. *Arch Intern Med*. 2012;172(18):1386-94. [PubMed](#) | [CrossRef](#)
13. Ziaeeian B, Fonarow GC. Epidemiology and Aetiology of Heart Failure. *Nat Rev Cardiol*. 2016;13(6):368-78. [PubMed](#) | [CrossRef](#)
14. Guwatudde D, Nankya-Mutyoba J, Kalyesubula R, Laurence C, Adebamowo C, Ajayi I, et al. The Burden of Hypertension in Sub-Saharan Africa: A Four-country Cross Sectional Study. *BMC Public Health*. 2015;15:1-8. [PubMed](#) | [CrossRef](#)
15. Touze JE. Cardiovascular Diseases and the Epidemiological Transition in Tropical Regions. *Med Trop (Mars)*. 2007;67(6):541-2. [PubMed](#)
16. Baragou S, Pio M, Afassinou M, Oloude EN, Pessinaba S, Atta B, et al. Cout de l'hospitalisation des Insuffisances Cardiaques en Afrique Sub-saharienne: Cas du Togo. *J Rech Sci Univ Lomé*. 2012;14(1):157-61.
17. Gombet TH, Ellenga-Mbola BF, Ikama MS, Okiemy G, Etitiele F. Urgences cardiovasculaires au Centre Hospitalier et Universitaire de Brazzaville. *Med Afr Noire*. 2007;54(10):505-11.