



Medico-Economic Evaluation of the Management of Mental Disorders in Public Psychiatric Hospitals in Cote d'Ivoire

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Abstract: Economic evaluation is becoming an increasingly important part of public health decision-making. It is useful for rationalising the allocation of available resources in order to maintain a quality health care system that is accessible to all. The economic costs of mental illness are a barrier to access to quality psychiatric care. This study aims to determine the average annual cost of mental disorders in public psychiatric hospitals in Côte d'Ivoire. This descriptive cross-sectional study focused on 100 patients over 15 years of age with psychiatric pathologies who had at least one psychiatric hospitalisation in the two psychiatric hospitals of the country, namely Bouaké and Bingerville. The study showed that the caretakers were parents (77%) with an average monthly income of 185,000 CFA francs and were working in the informal sector (43%). The most frequent diagnosis was acute psychotic disorders and related disorders (51%) and antipsychotics were the most commonly used, including the combination of Haloperidol and Chlorpromazine. The average annual cost per patient was estimated at 303,132.77 FCFA and 523,059.88 FCFA respectively in Bouaké and Bingerville. It is essential that policies look at subsidising mental health care in order to alleviate the economic burden of people living with mental illness.

Keywords: Medico-Economic Evaluation, Mental Illness, Affordability, Cost of Illness

1. Introduction

The World Health Organisation (WHO) defines health as: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". With regard to mental health, WHO defines it as a state of well-being that enables people to fulfil their potential, cope with the normal challenges of life, work successfully and productively and be able to contribute to the community [25]. According to the WHO, mental disorders affect 450 million people worldwide [26]. They are the third most prevalent disease and account for a quarter of all disabilities. The WHO lists five mental illnesses among the ten most worrying diseases for the 21st century (schizophrenia, bipolar disorders, addiction,

depression, and obsessive-compulsive disorders) [9]. In low-income countries, 76-85% of patients are untreated and in developed countries, 35-50% [24]. The economic consequences of mental disorders are profound, multiple and long-lasting. These disorders entail a whole range of costs for the individual, his or her family and the community as a whole. It is therefore a real public health problem. Some of these costs are obvious and quantifiable, others are almost impossible to calculate [20]. In European countries, several studies on the costs of psychiatric disorders in the general population have been conducted. In Canada, psychiatric disorders cost \$14.4 billion and 109.2 billion Euros in France [4, 22]. In Côte d'Ivoire, as elsewhere in West Africa, there are several studies on the epidemiological aspects of mental illness [8] but none

on their costs. This is problematic for the organisation of public health in our country. According to the email from Mrs Moetsi Duchatellier [18], the Bingerville Hospital is a public institution, but if a patient does not have sufficient financial means to cover the costs of hospitalisation, he or she will find it very difficult to receive treatment. The general objective of our study was to determine the average annual cost per patient with mental disorders in public psychiatric hospitals in Côte d'Ivoire.

2. Materials and Method

Our study took place in two public psychiatric hospitals in Côte d'Ivoire. The psychiatric hospital in Bingerville is a referral centre that provides care for nearly a thousand people a year. It houses various services including two hospital wards for men and women, an outpatient department, an internal pharmacy, an analysis laboratory and an electroencephalogram. This centre has a capacity of 150 functional beds. As for the Bouaké psychiatric hospital, it is the reference centre for mental health care in central Côte d'Ivoire. This centre receives patients of all ages for general and psychiatric consultations. It comprises two buildings housing the different services, offices and hospitalization pavilions. It is a structure with a capacity of 20 functional beds. The activities of these psychiatric centres can be summarised in several groups: consultations, hospitalisations, hospital-university activities related to the supervision of medical students and specialists and finally social activities. The study included patients with psychiatric pathologies who had been hospitalised at least once. Patients under 15 years of age who did not agree to participate in the study were not included in our study. We conducted a descriptive retrospective cross-sectional study that took place over a three (3) month period from November 2018 to January 2019. We conducted an exhaustive type of sampling. Thus, all patients who met the inclusion criteria were involved. The data were

collected through an interview with patients and relatives of patients and in the various hospital records. The variables studied were the socio-demographic data of the patients and family carers, the diagnosis, the economic aspect through direct medical and non-medical costs as well as indirect costs. The estimated annual cost of the disease was calculated over 12 months according to the cost of consultations, hospitalisation, complementary examinations, medication, travel and food expenses and lost days. The evaluation of the prices of the different services was carried out using the pricing of the acts and services rendered by the hospitals. Concerning the drugs received by the patients, we listed all the molecules consumed by the patient and calculated the cost of the drugs taken during the last 12 months after the hospital stay in order to facilitate the study and to have an annual cost per patient regardless of the duration of the disease. The prices of the paraclinical examinations were calculated from the tariffs set up by the laboratories of each hospital. The computer processing of the data collected was carried out using the following software: Microsoft Office Word 2016, EPI INFO™ 7, EXCEL.

3. Results

3.1. Socio-Demographic Characteristics

Among the respondents, the male gender was in the majority in Bouaké at 56% with a sex ratio of 1.27, while in Bingerville the female gender represented 64% with a sex ratio of 0.56. The 25-34 age group was the most represented at 35% followed by the 35-44 age group at 25%. The average age was 38.42 years with extremes of 15 and 75 years. The respondents lived in urban areas (64% and 86% respectively in Bouaké and Bingerville) and used taxis as a means of transport (60% in Bouaké and 48% in Bingerville). The level of education was mainly secondary with a rate of 34% and 46% respectively in Bouaké and Bingerville as shown in Table 1.

Table 1. Distribution of socio-demographic characteristics of patients at the psychiatric Hospital in Bingerville and Bouaké.

	Bingerville		Bouaké	
gender	Male	36%	Male	56%
	woman	64%	woman	44%
age	under 25 years	12%	under 25 years	14%
	25 to 34 years old	34%	25 to 34 years old	38%
	35 to 44 years old	26%	35 to 44 years old	24%
	Over 45 years old	28%	Over 45 years old	24%
living environment	urban	86%	urban	64%
	rural	14%	rural	36%
level of education	primary	16%	primary	26%
	secondary	46%	secondary	34%
	superior	66%	superior	12%
	no	4%	no	28%

Our population consisted of 44% unemployed, followed by informal sector workers (26%) and pupils and/or students (19%). Among our respondents, 63% had no monthly income and 10% had health insurance. In 77% of cases, parents were responsible for paying for the patient's health care. In Bouaké, 60% of the parents who paid for the patient's care worked in

the informal sector, whereas in Bingerville, 38% of the parents were civil servants. The average monthly income of the parent providing care in the city of Bouaké was 185,000 FCFA, with extremes of 25,000 FCFA and 500,000 FCFA. In Bingerville, their income was between 50,000 FCFA and 500,000 FCFA with an average of 220,000 FCFA.

3.2. Clinical and Therapeutic Features

Acute psychotic and related disorders dominated the

clinical picture with 51% of cases followed by schizophrenic and related disorders (32%) and mood disorders (16%) as shown in Figure 1.

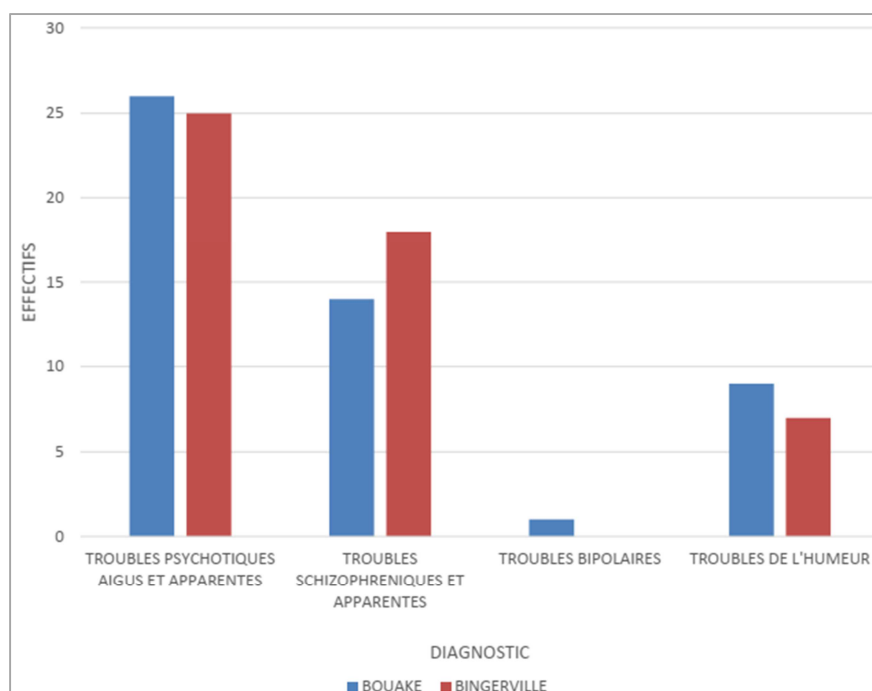


Figure 1. Distribution of respondents by diagnosis.

The average number of consultations per year per person was 7.50 in Bingerville, with extremes of 3 and 12. In Bouaké, the average was 8 with extremes of 4 and 12. The combination of haloperidol and chlorpromazine was the most widely used protocol, with 46% in Bingerville and 52% in Bouaké. To correct the side effects, in Bouaké 94% had used antiparkinsonian drugs and in Bingerville anxiolytics were used by 70%.

3.3. Estimated Average Annual Cost of Mental Illness

For direct costs, the annual cost of consultation varied from 4,000 FCFA to 12,000 FCFA with an average of 8,000 FCFA in Bouaké. In Bingerville, the average cost was 22,500 CFA francs, with a variation of between 9,000 and 36,000 CFA francs. Our respondents were able to spend an average of 30 days in hospital in Bingerville, with extremes of 5 and 90 days, and 16 days in Bouaké, with extremes of 3 and 80 days. The price of hospitalisation is a flat rate, regardless of the length of hospitalisation, and is 7,000 FCFA in Bouaké. In Bingerville, we have several categories. But for the study we took the flat rate of 30,000 FCFA. The annual cost of medicines ranged

from CFAF 44,280 to CFAF 287,250 in Bouaké, with an average of CFAF 79,086.20. In Bingerville, the annual cost varied from 40,100 FCFA to 230,700 FCFA with an average of 82,443 FCFA. 97% of patients had undergone at least one blood test while 88% of patients had not undergone imaging. Paraclinical check-ups were estimated at an average of 13,390 FCFA with extremes of 0 FCFA and 28,500 FCFA in Bouaké. In Bingerville, these costs varied from 10,000 FCFA to 110,000 FCFA with an average of 39,072.35 FCFA. The cost of transport to the psychiatric hospital varied from CFAF 2,400 to CFAF 57,000 with an average of CFAF 14,165 in Bouaké. This cost ranged from 5000 FCFA to 96,000 FCFA with an average of 21,196.15 FCFA in Bingerville. During hospitalisation, expenses ranged from 3,000 FCFA to 80,000 FCFA with an average of 23,307.69 FCFA in Bouaké. Expenditure in Bingerville ranged from 7,500 FCFA to 120,000 FCFA with an average of 108,738.10 FCFA.

For indirect costs, the number of days lost varied from 16 to 168 days in Bouaké with an average of 60.76 days. And in Bingerville the average was 83.86 days with extremes of 20 and 190 days.

Table 2. Breakdown by overall annual cost of mental illness.

	PSYCHIATRIC HOSPITAL OF BOUAKE			PSYCHIATRIC HOSPITAL OF BINGERVILLE		
	Average cost	Cost min	Maximum cost	Average cost	Cost min	Maximum cost
Consultation	8000	4000	12000	22500	9000	36000
Hospitalization	7000	7000	7000	31800	30000	60000
Medicines	79086,2	22280	287850	82443	40100	230700
Paraclinical assessment	13390	0	28500	39072,35	10000	110000
Transport	14633	2400	57000	21616,15	5000	96000

	PSYCHIATRIC HOSPITAL OF BOUAKE			PSYCHIATRIC HOSPITAL OF BINGERVILLE		
	Average cost	Cost min	Maximum cost	Average cost	Cost min	Maximum cost
Food costs	23597,69	3000	80000	108738,1	7500	120000
Total direct cost	145986,89	60680	479350	306169,6	101600	652700
Indirect cost	157145,88	41381,4	434504,73	216890,28	51726,75	491404,16
Overall cost	303132,77	102061,4	913854,73	523059,88	153326,75	1144104,16

In total, the average annual cost of mental illness was estimated at 303,132.77 FCFA with extremes of 102,061.4 FCFA and 913,854.73 FCFA in Bouaké. In Bingerville, this cost was 523,059.88 FCFA with extremes of 153,326.75 FCFA and 1,144,104.16 FCFA.

4. Discussion

Among the respondents, males were in the majority in Bouaké with 56%. This result is consistent with that of Tchinda [21] who found 59% male. However, it contradicts those of Djo Bi Djo [8] who found a proportion of female subjects at 51%. For the population of Bingerville, the female sex represented 64% with a sex ratio of 0.56. This result corroborates that of Yéo-Ténéna [27] and Souleymane [20] who found a female predominance of 70% and 64.2% respectively. This difference in distribution could be explained by the type and population of the study. The 25-44 age group represented 60% with an average of 38.42 years. Our results are in line with Koudou Joël [16] who found 55.1%. As for Diakité [5] in Mali, we noted a predominance of young adults with 72.5% respectively. This could be explained on the one hand by the youth of the Ivorian population, reflecting the demographic structure. Also, the latter are more exposed to stress (school problems, unemployment, consumption of psychoactive substances), hence the frequent occurrence of mental illness in this age group. The majority of our respondents lived in urban areas (75%). This result corroborates the study by Yéo-Ténéna [27] which found 76.82% and by Diakité Mariam [5] in Mali who found 66.1%. The population had a secondary level with a rate of 34% and 46% respectively in Bouaké and Bingerville. Our result is in agreement with that of Djo Bi Djo [7] in Côte d'Ivoire who found in his study a rate of 49.6% for secondary education. The level of education is a guarantee of social and economic success. Moreover, education contributes to increased job and income security [11]. Our population consisted of 44% unemployed followed by workers in the informal sector with 26% and pupils and/or students with 19%. This result corroborates the study by Koudou Joël [16] who indicated that 42.8% of patients were not engaged in any activity. Mental illnesses make schooling difficult and these patients are stigmatised, making it difficult for them to enter the world of work. The mental illness would explain the fact that these patients are without professions. Among our respondents, 63% had no monthly income. This result could be explained by the fact that we have the category of unemployed and pupils and/or students. In our sample, only 10% had health insurance. This corroborates Kouassi's study which indicates that the majority of the population, i.e. 85% to 90%, do not have any social security coverage [15]. Our

result showed that the majority of patients' health costs were covered by their parents (77%). This is consistent with our results as the majority of our respondents were unemployed and only 10% had health insurance. Also, the WHO [23] indicates that family members are often the primary caregivers for people with mental disorders. Concerning the profession of the relative who provided care, we noted that 60% worked in the informal sector in Bouaké, unlike those in Bingerville who were government employees (38%). These results can be explained by the fact that the economic potential of the city of Bouaké is dominated by trade and agriculture [10]. And their average monthly income was respectively 185,000 FCFA in Bouaké, i.e. 3.08 times higher than the Guaranteed Interprofessional Minimum Wage (SMIG), unlike in Bingerville where the salary was 220,000 FCFA, i.e. 3.7 times higher than the SMIG.

In our study, acute psychotic disorders and related disorders dominated the picture with 51% of cases followed by schizophrenic disorders and related disorders (18%). This result is superimposed on that of Saliou [19] who in his study found a predominance of patients with acute psychotic disorders, i.e. 30.73%. However, it is in contradiction with those of Djo Bi Djo [7] who found a predominance of chronic psychosis at 55.8%. This difference in results could be explained by the fact that our study was only interested in patients who had been hospitalised. Acute pathologies have more noisy manifestations requiring more often a request for care that can lead to hospitalisation.

In terms of direct medical costs, the average annual cost of consultations in Bouaké is 8,000 FCFA, which represents 2.64% of the total cost of mental illness, with an average of 8 consultations per year. In Bingerville, this cost is 22,500 FCFA and represents 4.30% of the total cost with an average of 7.5 consultations per year. The average annual cost of hospitalisation in Bouaké is 7,000 CFA francs, representing 7.48% of direct costs and 2.64% of total costs. This cost is lower than that found in Bingerville where the cost is 31,000 FCFA and represents 10.39% of the average direct cost and 6.07% of the average total cost. Our study also found an average duration of hospitalisation of 15.63 days in Bouaké compared to 30.33 days in Bingerville. In Canada [12], the average length of stay in hospital was 45 days. The second most important medical cost in our study in Bouaké is that of drugs. The average annual cost of medicines, which was estimated at 79,086.2 CFA francs, constitutes 54.17% of the direct cost and 26.09% of the total cost. It should be noted that most of the patients on antipsychotics were taking haloperidol and chlorpromazine, while the other molecules were represented by antiparkinsonians (correctors). This cost was estimated at 82,443 FCFA in Bingerville. It represented 26.93% of direct costs and 15.76% of total costs. Our

respondents were also on haloperidol and chlorpromazine (46%). After neuroleptics, the most commonly used psychotropic drugs are anxiolytics and were prescribed to 35 patients. This cost is likely to increase with the number and type of drugs administered to patients. In Bouaké, paraclinical examinations cost 13,390 CFA francs per year per patient, but it should not be forgotten that none of our patients had an imaging test before treatment was started. This cost represented 9.17% of direct costs and 4.42% of total costs. In contrast, in Bingerville, this average annual cost was equal to 39,072.35 FCFA and represented 12.76% of the direct cost. This difference in results for the average direct medical cost could be explained by the fact that the price of consultation and hospitalisation is higher in Bingerville than in Bouaké on the one hand, and that on the other hand, no imaging was carried out in Bouaké, whereas in Bingerville, in addition to imaging, we had blood tests such as gamma GT, alkaline phosphatase, which are not feasible in Bouaké.

The cost of transport was estimated at 14,633 CFA francs in Bouaké and represented 10.02% of the direct cost, compared to 21,616.15 CFA francs in Bingerville, or 7.06% of the direct cost. As regards food costs, we obtained 23,597.69 FCFA in Bouaké (16.16%) of the direct cost. In Bingerville, these costs were estimated at 108,738.10 FCFA, or 35.52% of the direct cost. These costs represented 7.78% and 20.79% of the total average cost of mental illness in Bouaké and Bingerville respectively.

In Bouaké, the indirect costs of reduced productivity due to mental illness were estimated to constitute 51.84% of the average total cost, in contrast to Bingerville where this cost represented 41.47% of the average total cost of mental illness. Mental illness can compromise productivity when the patient applies himself less at work, has to take time off work because of crises or even becomes unemployed. The indirect cost was high in Bouaké, but the cost of medication was also an important part of the average cost of mental illness and efforts must be made to reduce this cost to allow as many patients as possible to have access to care. In Canada [22], although direct cost values are in the thousands of Canadian dollars, they are still higher than indirect costs. The direct cost is estimated at 6.3 billion compared to 3 billion for the indirect cost. According to an investigative survey in Tunisia, psychiatric illnesses cost the state 4.6 million dinars per year [17]. Studies in the United States showed an estimated global cost of \$201 billion in 2013 [1], in the United Kingdom in 2011 [13], the economic and social costs of mental health problems were estimated at £105 billion per year and €109.2 billion in France in 2007 [2]. Referring to the income of the carer, we found that in Bouaké the average annual cost per patient was 13.66% of income with a direct cost of 6.58% and an indirect cost of 7.08%. In Bingerville the cost was 19.82% and the direct and indirect costs were 11.60% and 8.22% of income respectively. The cost of psychiatric health care occupied a large part of the parents' income, not to mention other family expenses, the number of persons per household being 5 according to the 2014 RGPH. In addition

to this, 90% of our respondents did not have health insurance, which poses a real problem of care. Given the health and socio-economic burden of this disease, it will become increasingly heavy if effective measures are not urgently proposed to reduce this burden. Compared to the cost of other chronic diseases such as arterial hypertension whose care expenses were estimated at 130,000 FCFA [6]. Diabetes and its complications had a global cost estimated at 5.6 billion Canadian dollars in 2005 and between 170 million and 250 million Swiss francs in 2009 [3]. Subsidised diseases in Côte d'Ivoire such as malaria had an average direct cost estimated at 17.45 dollars or 10052.17 CFA francs and represented 12% to 14% of the income of poor households and the indirect cost for 4-7 days lost of 22.72 dollars or 13,087.98 CFA francs [14]. We can conclude that psychiatric pathologies are expensive for the parents taking care of them.

5. Conclusion

Economic evaluation is becoming an increasingly important part of public health decision-making. It is useful for rationalising the allocation of available resources in order to maintain a high-quality health care system accessible to all. This study allowed us to determine the overall average annual cost of mental illness and then the specific cost of each condition. Our respondents were young, unemployed and had no health insurance. The parents covered the health costs. Acute psychotic disorders and related disorders dominated the picture. The average annual cost of care was 303,132.77 FCFA in Bouaké, i.e., 13.66% of income, and 523,059.88 FCFA in Bingerville, i.e., 19.82% of parents' income. This shows that health care costs at the psychiatric hospital in Bingerville are higher than those in Bouaké. Mental illnesses in general, occupy a large part of the income of the parents taking care of them. It is therefore urgent for politicians to act in order to reduce the cost of care.

Conflicts of Interest

The authors declare no conflicts of interest.

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